

GUIDING QUEENSLAND AGRICULTURE

1887-1987

P. J. SKERMAN • A. E. FISHER • P. L. LLOYD



DEPARTMENT OF PRIMARY INDUSTRIES

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Foreword

As an arm of the Queensland Government the Department of Primary Industries, under various names, has served the State's primary producers for a century. It was founded amid some controversy, with a staff of three men; today almost three thousand men and women work in the fields of research, extension, marketing, regulation and administration.

Guiding Queensland Agriculture outlines the growth that has taken place over one hundred years — a growth that has paralleled that of the State — and chronicles its achievements.

As it enters its second century this Department of food and fibre resources stands beside the primary producers of Queensland ready to meet even greater challenges in the future: the complexities of modern agriculture, increasingly recurrent issues such as that posed by pesticide residue, soil erosion, the threat of introduced animal and plant diseases, environmental issues, and the national and international economic climate, not to mention the ever-present challenge of seasonal conditions.

As we embark on our second century of service we pledge the Queensland Government's continuing support to that sector of the community which produces our food and fibre and the income which is the cornerstone of the Australian economy.



A handwritten signature in dark ink, reading "N. J. Harper." The signature is written in a cursive style with a long horizontal line underneath.

Hon. N. J. Harper, M.L.A.
Minister for Primary Industries

About the authors

P. J. Skerman, M.B.E., D.Agr.Sc., B.A., F.A.I.A.S., F.A.S.A.P., Q.D.D.

After completing a Queensland Diploma in Dairying at Gatton in 1928, Percy Skerman worked as research officer for the Fairymead Sugar Company. He lectured in agriculture at the Queensland Agricultural College, Gatton, from 1933 to 1943 and at Hawkesbury Agricultural College, New South Wales, from 1943 to 1945. Percy then worked as Agricultural Resources Officer in the Bureau of Investigation of Land and Water Resources and for his work he was awarded a Doctorate in Agricultural Science in 1953 and an M.B.E. in 1957. In 1953 Percy was appointed Senior Lecturer in Agriculture at the University of Queensland. He served as Dean of the Faculty of Agriculture in 1962-63, and in 1965 was appointed Reader in Agriculture. He retired in 1975.

A. E. Fisher, B.A.

Andy Fisher served his cadetship as a journalist on the Rockhampton *Morning Bulletin* and joined the Queensland Department of Primary Industries as an agricultural journalist in 1954. He became editor of the *Queensland Agricultural Journal* in 1966 and Senior Information Officer in 1975. He was then responsible for the Department's media and publicity material as well as having editorial control of most Departmental publications. He played a leading part in establishing the Department's book publishing service.

P. L. Lloyd, B.A., B.Econ., F.R.G.S.A.

Peter Lloyd joined the Queensland Department of Primary Industries in 1975 after nine years with the Commonwealth Government as a research officer in resource mapping and agricultural statistics. He currently holds the position of Extension Agronomist (Information Systems) in Agriculture Branch, Brisbane. In 1979, with Andy Fisher, he drew the Department's attention to its impending centenary and since then has served as secretary of the Centenary Project Committee and Centenary Working Group. His personal interest in agricultural history led to his involvement in the research and collection of material relating to the Department's history.

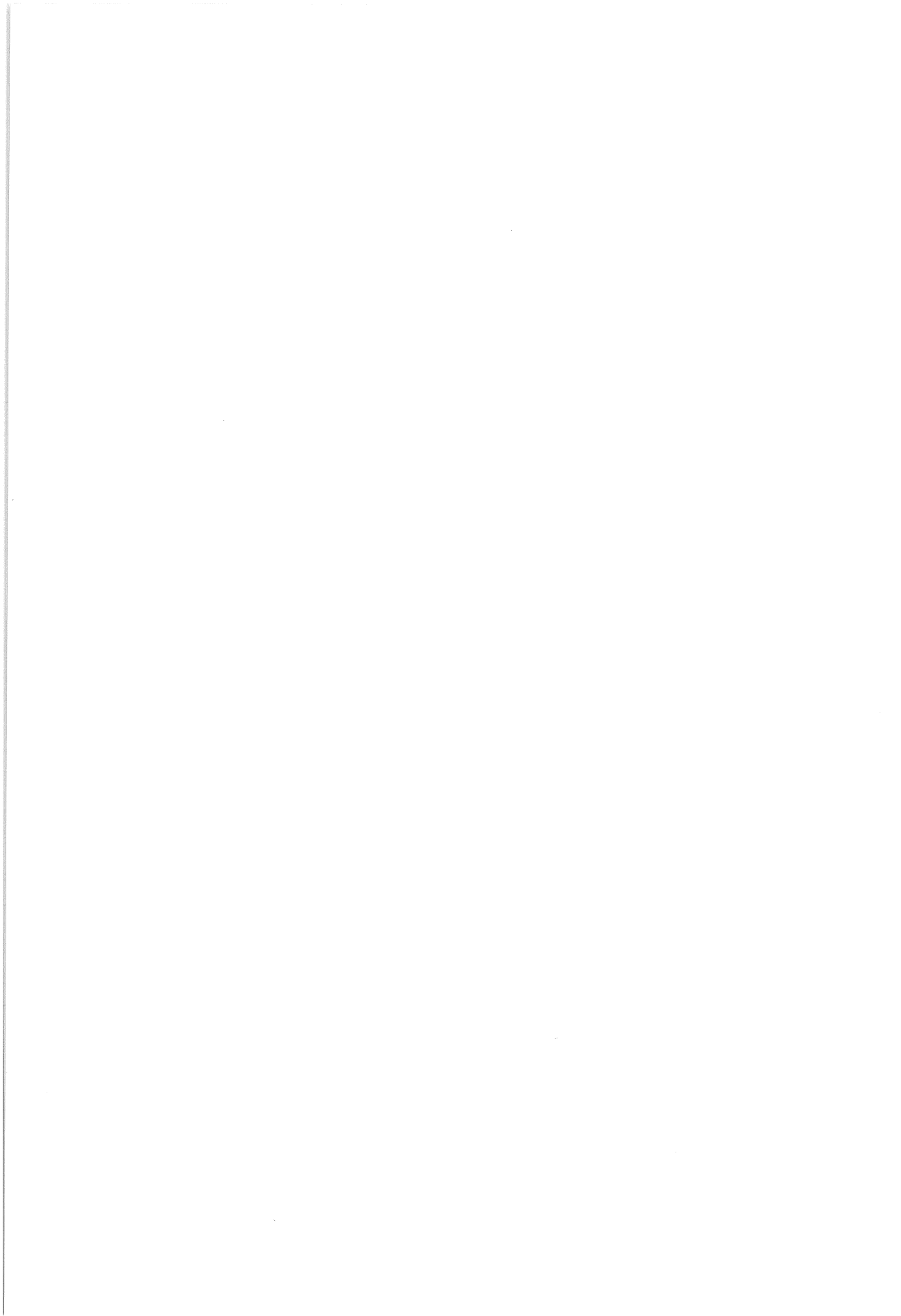
Preface

Guiding Queensland Agriculture is a short history of the Queensland Department of Primary Industries, written for the general reader. It is based on research done by Dr Percy Skerman, who in 1979 was asked to undertake a detailed history of the Department to mark its forthcoming centenary. His work, compiled and published as a reference document, will be available at selected libraries, and readers who wish to study this Department more closely are urged to consult it.

This book's four parts coincide with phases in the Department's development, and the ordering of chapters within each part relates to the Department's structure and its services to specific industries; as many aspects of its work are inextricably linked, some repetition occurs. Annual reports, based on financial years, were the source of much of the information this book contains, so we have been unable to give exact dates in many instances. For consistency, we have used the term 'the Department' throughout the book; however, we have avoided capitalising branch names and titles in the later parts, because of the Department's increased size and complexity, especially in the postwar era.

We wish to acknowledge the help given by several people and organisations in the preparation of this book. Lionel Coxen, of the Soil Conservation Branch, Toowoomba, helped to reconstruct the Department's photographic records, which had been lost in a fire in the late 1940s. Terry Hurst, of Brisbane, lent C. J. Pound's photograph albums to the Department. The John Oxley Library, Brisbane, and the Premier's Department Photographic Section also supplied photographs. We are grateful to past officers of the Department who provided their recollections of past events, and to the many present officers who have given their time and expertise to this manuscript. We wish particularly to recognise the special contributions of our editor, Julie Freeman.

P. J. Skerman
A. E. Fisher
P. L. Lloyd



PART 1

FOUNDATION

In the 1880s Queensland was the stage for the final scene in a long struggle between entrenched pastoralists, who held much of the land, and townspeople, who supported closer settlement.

The struggle was resolved by a series of Land Acts that enabled those with lesser means to take up land for agriculture.

The ensuing wave of new settlers needed supplies of seed, planting material and, above all, guidance, so in 1887 the Department of Agriculture was founded, under the Minister for Public Lands. Over the next decade, it introduced plants, set up State nurseries, initiated agricultural conferences and travelling dairies, and promoted cooperative settlement.

In 1896 the Department of Agriculture became a separate entity, with its own Minister. In the following year it absorbed the Stock Branch from the Colonial Secretary's Department, set up the Queensland Agricultural College and a network of State farms, and started the Queensland Agricultural Journal.

In making possible closer settlement and educating the new settlers, the Department had, by the 1920s, placed Queensland well on the way to achieving self-sufficiency in food production.

1

The origins of the Department

Queensland's first pastoralists, John Campbell and Patrick Leslie, settled on the Darling Downs in 1840, and within thirteen years most of the Downs had been taken up by a group later dubbed by historians the 'Pure Merinos'. These squatters benefited from Orders-in-Council in 1847, which granted them a pre-emptive right to all land resumed by the Crown. As the runs were generally under-assessed, the squatters could afford to acquire freehold title to more than 120 000 hectares of the finest land on the Downs before the pre-emptive right expired in 1865.

The pastoralists were Australia's aristocrats. Related to the British aristocracy, they transferred British political, judicial and social institutions to Australia, adapting them to suit their needs. When Queensland separated from New South Wales in 1859, the constitution of the new colony based political franchise on property and income qualifications. This further entrenched the squatters' position and for the next twenty-five years pastoral interests were supreme, economically, politically and socially.

The squatters believed that land should be used for the purpose to which it seemed best suited — that is, grazing — and felt that government policy should reflect their view. Opposed to them were the townspeople, who held that closer settlement, the subdivision of large pastoral holdings into farming blocks, was ultimately in the colony's best interests. Although the townspeople seemed to have greater moral justification in their view than the squatters, they were in conflict with the economic realities of the times: in 1861, pastoral production accounted for 93.5 per cent of Queensland's total exports.

Pressure for closer settlement persisted. Merchants and professional men wanted to share the squatters' prestige and privileges; artisans and labourers hoped to improve their economic lot by farming; and the prospect of abundant, cheap land brought an increasing flow of landless immigrants from Europe, especially from the British Isles and Germany.

In Queensland, agitation for legislation to break the tremendous political, economic and social power of the Downs squatters was not led by intending farmers and 'honest working men'. The real muscle was supplied by a formidable combination: Brisbane merchants, artisans and professional men; western squatters, who envied the Downs squatters' prestige and success; and a powerful faction on the Downs, led by storekeepers and newspaper proprietors, who sought

wider political and social opportunities and advancement of their own economic interests. This group tried to break the squatters' hold with a series of Selection Acts designed to remove land from their control and make it available for farming. As the historian Waterson wrote in his book *Squatter, Selector and Storekeeper*, 'the Selection Acts did not have one father but many progenitors, each of whom had something to gain from a legislative defeat of the Pure Merinos'.

The first of the Selection Acts, *The Crown Land Alienation Act of 1860*, set aside more than 280 000 hectares for agricultural occupation within agricultural reserves in the settled districts. Applicants could buy up to 130 hectares. The land was sold relatively cheaply, and inducements to occupy the land were offered to prevent the squatters buying it back. For example, settlers who had occupied and begun to develop their blocks within six months were given a deed of grant to the land; immigrants who paid their own way from Europe were also given land grants; and land orders were given as bonuses on cotton production, enabling growers to take up more land. However, the Act did not contribute significantly to closer settlement and the land was generally retained for grazing. The reasons for its failure were lack of finance among selectors competing with graziers; excessive dummyming (use of fictitious names in land deals); evasion of conditions of occupancy; the incorrect classification of poor land as suitable for agriculture; and lack of markets for agricultural produce.

Despite the continued dominance of the pastoral industries, which returned high profits, an agricultural industry was developing. But agriculture had many disadvantages. Added to the high capital investment needed to establish a farming enterprise were high wages and the uncertainty of labour being available when required. Further, it was difficult to transport farm produce to markets over roads that were always bad and often impassable. Consequently, it was cheaper to import agricultural produce than to grow it.

Still, cropping was slowly expanding. In 1861, only 1316 hectares of land were cultivated in Queensland — 3.28 per cent of the colony's freehold agricultural land. By 1863, this area had increased to 4550 hectares, with maize, cotton, wheat and potatoes the main crops. No export crop had yet been found, apart from cotton, but a lucrative export market existed for non-perishable livestock products such as wool, tallow, hides, horns, hair and bones.

In 1867, new selection regulations brought in by the squatters — who dominated Parliament — paralysed the advance of agriculture on the eastern Darling Downs. These regulations allowed free selection of land on agricultural reserves on condition that one-sixth of the land be cultivated within one year of selection. Pastoralists snapped up this land without competition as the cultivation clause placed it beyond the means of small farmers, and the dummyming that occurred was on an unprecedented scale.

The second Selection Act, *The Land Act of 1868*, divided the large pastoral runs in half, with the regional land commissioner selecting the half to be resumed for closer settlement. This Act also favoured the squatters. The selections were too small for stock-raising and there was little demand for farm produce. Thus much of the land ultimately returned to the squatters when farming had failed.

The discovery of gold in 1867 led to the growth of town populations and pro-

vided a new source of capital for investment in agriculture. Although the growing merchant and artisan populations in the cities and towns began to have a political impact in Queensland, franchise was still based on property or wealth. But electoral reform in England and in other Australian colonies led to the Electoral Acts of 1872 and 1874, which introduced full male suffrage and ended the squatters' domination of Parliament. Urban interests finally gained power and quickly revised the Land Acts to break the squatters' economic domination of the colony.

The Crown Lands Alienation Act of 1876 was designed to increase the scale of agricultural settlement. Compulsory personal residence for the first five years of a lease, with forfeiture the penalty for non-residence, brought dummyping to an end. But the holdings offered were even smaller than those offered under previous Acts, and many settlers soon found that their holdings were not economically viable. Some promptly sold out to the nearest squatter; others took off-farm work, breaking the residence conditions. Thus, as the 1868 Act had done, the 1876 Act returned much land to the squatters. This delayed agricultural development, as the squatters strongly opposed cultivation, deriving sufficient wealth from the boom in wool and cattle prices.

The 1884 Land Act

Direct sales of land by auction provided about one-quarter of Queensland's revenue in the 1870s. However, in 1884 the Premier, Sir Samuel Griffith, moved to retain the colony's principal asset by offering crown land for rental rather than sale. To implement this policy, Lands Minister Charles Dutton brought down *The Crown Lands Act of 1884*, which proved the final blow to squatter supremacy when it came into force in 1885.

The Act was designed to encourage smaller pastoral holdings on the western Downs and in other districts that had not yet been settled. The chance to rent or lease crown land instead of purchasing it reduced the capital cost of setting up a farming enterprise, enabling those with little capital, especially immigrants, to take up small selections. The Act also gave station managers and the sons of successful farmers and squatters an opportunity to acquire their own runs. Although the government's land revenue decreased, the immediate result of the 1884 Land Act was an increase in the area of cultivated land — from 9900 hectares in 1866 to 83 300 hectares in 1887.

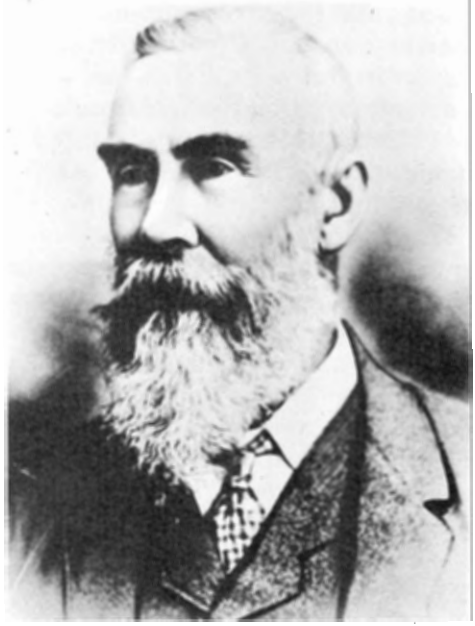
The birth of the Department

By 1887, so many settlers, including immigrants, were applying for selections that the Lands Department was hard-pressed to fulfil its original functions, land administration, survey and mapping. As a result, Acting Premier Sir James Dickson and Lands Minister Dutton decided to create a department of agriculture to control land settlement. Executive Council approval and notification of the establishment of that department appeared in the *Queensland Government Gazette* of 18 June 1887:

'It is hereby notified for general information that His Excellency the Governor, by and with the advice of the Executive Council, has been pleased to establish a Department



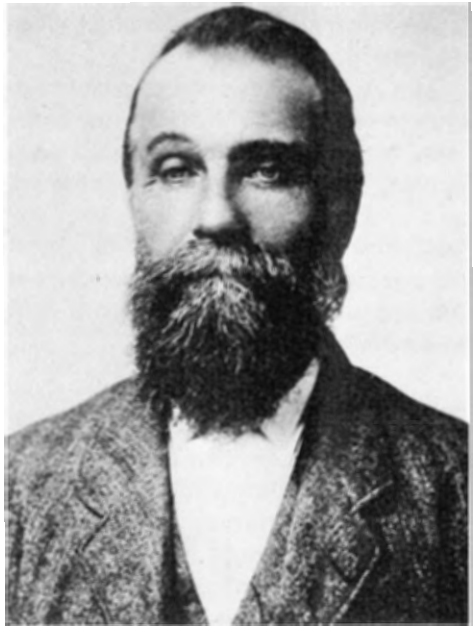
Sir James Dickson, Acting Premier of Queensland, June 1887 (Courtesy John Oxley Library, Brisbane)



C. B. Dutton, Minister for Public Lands, November 1883-August 1887 (Courtesy John Oxley Library, Brisbane)



H. Jordan, Minister for Public Lands, August 1887-June 1888 (Courtesy John Oxley Library, Brisbane)



Peter McLean, Under-Secretary, Department of Agriculture, July 1887-May 1900

of Agriculture, to be managed by an Under Secretary, with the necessary staff, and under the direct control of the Secretary for Public Lands.'

The notice was signed 'C. B. Dutton, Minister for Public Lands' and dated 17 June 1887. Immediately following this notice was another, issued the same day, appointing Peter McLean under-secretary for agriculture, Department of Public Lands, effective from 1 July 1887.

The Legislative Council, Queensland's upper house, heard of the establishment of the Department of Agriculture from the Governor, Sir Anthony Musgrave, when he opened Parliament on 19 July 1887. The Governor said the objective of the new department was to encourage agricultural settlement by making it easier for intending settlers to obtain detailed information about available land. This department would also collect and disseminate practical knowledge on agriculture.

The Legislative Council's reaction was favourable, despite some misgivings about the financial commitment, but the Members did not wholeheartedly support McLean's appointment. McLean had been an inspecting land commissioner in the Department of Public Lands and had had to judge whether settlers were observing or breaking the tenancy conditions of the Land Acts. He was charged with 'obstructive officialism' and blamed for the forfeiture of many holdings. Andrew Thynne summed up the Members' feelings by saying McLean had the unfortunate knack of falling out with everyone he dealt with. 'To create a Department of Agriculture for the purpose of getting rid, out of another branch of the service, of an unworkable official seems to be very bad policy', he said. Thynne's criticism was mild compared with the reaction of Members of the Legislative Assembly (the lower house), where bitter resentment of McLean's appointment put the whole question of a department of agriculture in jeopardy.

In November 1887, Henry Jordan, Minister for Public Lands from August of that year, asked for a supply vote of £1800 (\$3600) for the Department of Agriculture for the year 1888: £500 for the salary of the under-secretary, £300 for the salary of the colonial botanist and £1000 for contingencies, which included clerical help. In support of his motion for supply, Jordan gave his views on the need for a department of agriculture and the direction it should take in the future. The first priority was settling people on the land, especially in view of the pressures caused by increasing immigration. Good agricultural land abounded in Queensland, but occurred in patches, Jordan said; McLean, as under-secretary, would select from the resumed lands those portions suitable for agriculture, as the failure to do this had caused earlier land-settlement schemes to fail. McLean would also implement the settlement scheme already devised by the Department of Agriculture, which had been preparing maps of the land available, divided into grazing and agricultural areas. Jordan argued that cultivation made the most profitable use of land, but said intending farmers needed guidance. He placated the pastoral industry by declaring it was the colony's greatest industry (which it undoubtedly was), but claimed that grazing and every other industry in Queensland would benefit from a vigorous agriculture.

Like the Legislative Council, the Legislative Assembly generally approved the establishment of the Department, although Maurice Black, MLA for Mackay, was

prompted by his objection to McLean's appointment to attack its formation as a waste of public money. He asked the question that has been heard frequently through the years: what could a department of agriculture teach farmers that they did not already know?

In response, Jordan told Parliament of his visionary plans for the new department. He believed that instruction in crop and animal husbandry would ensure successful settlement of the land by small farmers, and that, to place agriculture on a proper foundation, science must be applied to the industry. Thus the government intended to employ an 'instructor in agriculture' to give lectures and form classes, laying the foundations of agricultural education in the colony. That officer would instruct young men in chemistry, botany, geology, soil analysis and comparative anatomy. He would report directly to the Minister, not to Under-Secretary McLean, and his role and duties should not be confused with McLean's. The instructor in agriculture would be nominated by the United States Government, and therefore could be expected to be thoroughly competent.

Either Jordan's explanation of the wider role of the department or his clarification of McLean's duties impressed the Members and the supply vote was passed. Thus Parliament finally endorsed the Executive Council's action, and the Department of Agriculture, controlled by the Minister for Public Lands, became part of the Queensland administration.

Between gazettal of the establishment of the Department in June 1887 and parliamentary approval six months later, Jordan had significantly enlarged the Department's charter. As well as fulfilling its original purely administrative role of putting settlers on the land, the Department would be responsible for teaching and research.

Conclusion

After many years of conflict over land settlement, the Department of Agriculture was set up to help selectors and guide the progress of farming industries. As the real pressure for its establishment had arisen from closer settlement, Charles Dutton, Minister for Public Lands, could be considered the Department's actual founder. His successor, Henry Jordan, enlarged its responsibilities in the fields of agricultural science and crop and animal husbandry. Jordan's foresight led to the appointment of an instructor in agriculture, setting the Department on the complementary paths of science and instruction. It is a credit to Jordan's vision that the twin commitments of research and extension are retained by the Department a hundred years after he won parliamentary approval of its formation.

2

The first decade

No separate portfolio for agriculture or for the pastoral industries existed within the Queensland Government before 1897. The Colonial Secretary administered pastoral activities, while agricultural and dairying matters were the responsibility of the Minister for Public Lands. Six different ministers headed the Department of Agriculture in its first ten years, under various portfolios.

Charles Dutton, Minister for Public Lands, established the Department of Agriculture in June 1887. He appointed an under-secretary and immediately sent him on a fact-finding tour of the southern colonies and New Zealand.

Henry Jordan, Minister for Public Lands from August 1887, foresaw the role the Department would play in Queensland's development and expanded its horizons; its first instructor in agriculture was appointed in 1890, after Jordan's term but as a direct result of his recommendations.

Maurice Black, an opponent of the formation of the Department, was Minister for Public Lands from 1888 until 1890. Despite Black's earlier criticisms, his was a very fruitful ministry: he initiated the travelling dairies, the agricultural conferences and the State nurseries, appointed bacon-curing and tobacco experts, and organised coconut planting on the islands off north Queensland.

Alfred Cowley's major achievement was the implementation of *The Sugar Works Guarantee Act of 1893*, which provided funds for the building of central sugar mills. Assessment of sites for the proposed Queensland Agricultural College began during Cowley's term as Minister for Public Lands and Agriculture.

Andrew Barlow held the Public Lands and Agriculture portfolio in the years 1893-96. The Department expanded because of its increased responsibilities, even though this was a period of stringency and reduction in the public service following the severe economic depression of 1892-94 and the disastrous floods of February 1893. Barlow supported the appointment of Henry Tryon as entomologist, arranging for him to make two visits to New Guinea to collect new varieties of sugarcane, and arranged the export of surplus sugar to Canada. He also piloted through Parliament *The Diseases in Plants Act of 1896*, which Tryon had drafted.

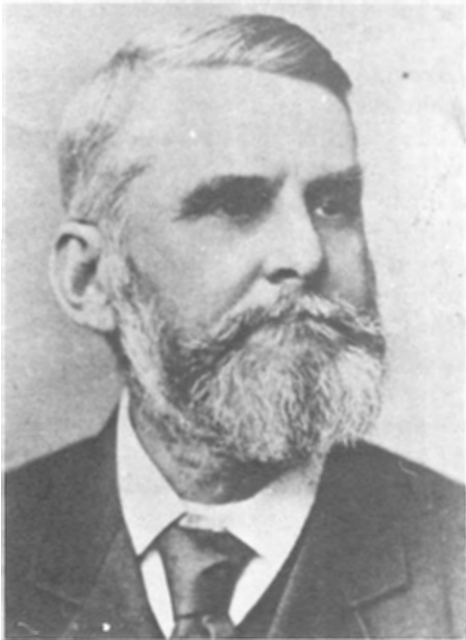
Andrew Thynne became Postmaster-General and Secretary for Agriculture in May 1896. He shed the Postmaster-General's portfolio on 31 March 1897 to become the first full-time Minister for Agriculture. A major event during Thynne's ministry was the foundation of the Queensland Agricultural College,



*M. H. Black, Minister for Public Lands, June
1888–August 1890*



*A. S. Cowley, Minister for Public Lands and
Agriculture, August 1890–March 1893*



*A. H. Barlow, Minister for Public Lands and
Agriculture, March 1893–May 1896*



*A. J. Thynne, Postmaster-General and Minister for
Agriculture, May 1896–March 1897; Minister for
Agriculture, March 1897–March 1898*

which opened in 1897. But the most far-reaching administrative change was the transfer, in 1897, of the Stock Branch from the Colonial Secretary's Department to the Minister for Agriculture. In 1904 the two arms were amalgamated in the Department of Agriculture and Stock. The Department retained that name until 1963, when it was named the Department of Primary Industries.

First appointments

The first appointee to the Department of Agriculture was Peter McLean, who was under-secretary from 1 July 1887 to 1 May 1900. McLean had been elected Member of the Legislative Assembly (MLA) for Logan, where he owned a small mixed farm, in 1878. He had acted as Minister for Public Lands and Mines for just over six weeks, from December 1878 to January 1879. After McLean's defeat in the 1883 election, Dutton, Minister for Public Lands, had appointed him inspecting land commissioner and commissioner (land sales), Department of Public Lands, for Beenleigh, Brisbane and Ipswich. For the next four years, McLean had administered the Land Acts. His appointment had been unpopular, having been made over the heads of existing public servants.

The next appointee was Frederick Manson Bailey, a Fellow of the Linnean Society, who was trained in horticulture and had worked as a farmer, storekeeper and private botanical collector. His botanical work was concerned mainly with identifying and describing native and naturalised plants. In 1873 Bailey was asked to assemble a herbarium of the flora of Queensland and was appointed botanical collector and keeper of the herbarium in the following year. He was appointed colonial botanist in 1881, and was transferred to the Department of Agriculture in that position in 1887.

Ernest Scriven, who had been a clerk in the Department of Public Lands since 1886, was appointed the Department's first clerk in January 1888. His appointment completed the original staffing of the Department, whose three foundation members were housed in two small rooms in the offices of the Department of Public Lands in George Street, Brisbane. In about 1890, the Department of Agriculture took over the old Immigration Depot in William Street.

The Department's early work

In the Department's first two years, Queensland farmers saw little of its officers. Peter McLean was absent for six months after his appointment, studying the work of agriculture departments in New South Wales, Victoria and South Australia and visiting village settlements in New Zealand. His most significant finding was that departments of agriculture in the other colonies and in New Zealand were establishing agricultural colleges and experiment farms, a development that Queensland would soon emulate. The Colonial Botanist, Bailey, remained house-bound because no money had been allocated for plant-collecting trips, but he asked that plant specimens be sent to him.

In his first annual report to Parliament in May 1888, McLean wrote that the Department's work had so far been confined to inspecting resumed land and assessing its suitability for agriculture; procuring and distributing seeds of new

plants of commercial promise to genuine planters and farmers, and requesting reports on their performance; obtaining information on the location of good land, means of access to it and its distance from markets, and supplying that information to intending selectors; and corresponding with agriculture departments in other parts of the world to draw on their experiences.

A formidable task faced Queensland's Department of Agriculture: it must assess the agricultural potential of the colony, settle people on the land and provide them with information on agricultural practices. Its aim was to promote Queensland's agricultural development and make the colony self-sufficient in basic foods. In its first ten years, the Department acquired a dedicated and competent staff who travelled all over the colony, imparting their knowledge. The Department's officers collected, identified and catalogued native vegetation, and collected produce that was sent overseas to test possible markets. They also searched for, and introduced, new varieties of sugarcane. The Department imported seeds and plants of species with commercial potential and distributed them to selected farmers for trial, requesting reports on their suitability and prospects. Tropical plants were introduced and multiplied at State nurseries established in 1889 at Kamerunga (near Cairns) and Mackay. At the same time, the Department took the lead in establishing the dairy, wheat, tobacco and horticulture industries, initiated plant quarantine measures, and promoted the cool storage and export of farm produce.

In its first year, the Department produced 'Papers for the People by Practical Men', twenty pamphlets treating different agricultural topics. These publications were followed by *A Queensland Guide*, a book that contained the twenty papers as well as general information about agricultural opportunities in Queensland.

In 1889 the administration of aid to agricultural and horticultural societies was transferred from the Colonial Secretary's Department to the Department of Agriculture. Parliament had first granted subsidies to agricultural societies to advance and encourage agriculture and stock-raising in 1867. To qualify, a society had to have at least fifty members and total subscriptions not less than £50. In 1889-90, thirty-four societies were subsidised, with the highest subsidy being paid to the National Agricultural and Industrial Association in Brisbane.

Advisory work

The first and most important advisory undertaking by the Department in its first decade was the travelling dairy, established in 1889 to encourage the dairy industry in Queensland (see Chapter 10). The appointment of an instructor in agriculture, advocated by Jordan in November 1887, was made in January 1890, during Black's ministry. The appointee was Edward Shelton, Professor of Agriculture and first principal of the Kansas State Agricultural College in Manhattan, Kansas, USA. In accordance with Jordan's intention to stress the importance of the position, Shelton received a higher starting salary than McLean and was directly responsible to the Minister for Lands.

Shelton's appointment had an immediate impact in the field of rural research. He attended the inaugural Rust in Wheat Conference, called by the Victorian



The Department's first 'home' — the old Immigration Depot in William Street, Brisbane, built in 1866 and occupied by the Department of Agriculture in 1890



Some of the Department's staff in its early years (left to right): Robert Wilson, Clerk; Sydney Hooper, Accountant; Ernest Scriven, Chief Clerk; Peter McLean, Under-Secretary; Henry Tryon, Entomologist; Daniel Jones, Plant Disease Inspector; T. Voltman; and John Liverseed, Storeman



Travelling Dairy No. 2 at the Brisbane Exhibition, Bowen Park, 1897. Manager John Mabon is on the right.



Delegates at the residential farmers' conference held at the Queensland Agricultural College in June 1897. Professor Edward Shelton is seated to the left of centre; on his left are John Mabon, J. V. Chataway and A. J. Thynne.

Agriculture Minister, in Melbourne in March 1890 and was elected to a committee to investigate the problem. In the same month, he toured north Queensland to study agricultural problems in the tropics. He recognised Queensland's resources but saw that little use was being made of them, and stated that the colony's greatest need was for working farmers and small capitalists to develop its riches. Shelton was the driving force in organising Queensland's third agricultural conference, which was held at Beenleigh in August 1890 and at which he presented two papers.

In Shelton's seven years as instructor in agriculture he made many contributions to the Department's stock of advisory literature, publishing bulletins on topics ranging from pig-raising to wheat-growing and stock foods. These bulletins were the Department's major publications before the inauguration of the *Queensland Agricultural Journal* in July 1897. Shelton's *Wheat Growing in Queensland* (Bulletin No. 19, published in September 1892) included a remarkably prophetic map of potential wheat lands; although he had been in Queensland only two and a half years, Shelton was perceptive enough to recognise the potential of what were then vast areas of scrub and forest land.

Agricultural conferences

The Department organised a small agricultural conference at Beenleigh in mid 1889 to disseminate information on agricultural resources, the dairy industry and general agricultural production in the Logan district. McLean suggested organising a more representative conference at some time in the future, a suggestion taken up by the chief inspector of sheep, Patrick Gordon from the Colonial Secretary's Department; he proposed a conference in Brisbane during the National Agricultural and Industrial Association's show week. Gordon, McLean and the secretary of the Association organised the three-day conference, held in August 1889. Two speakers, James Henderson and Henry Tardent, were later to join the Department. Papers covered a wide range of subjects, from fodder plants to stock diseases, but the farmer audience later claimed that the papers had been too theoretical; they wanted practical advice. This point was not lost on McLean and subsequent conferences had much greater farmer involvement.

Agricultural conferences were held at Beenleigh, Maryborough, Rockhampton and Bundaberg in 1890-91. Speakers included representatives of government departments, farmers and Professor Shelton's wife, who gave a paper on canning fruit. The Beenleigh conference covered such topics as fodder plants, dairying, cotton, wheat, fruit, sugar and drainage; its proceedings were published as a pamphlet and distributed throughout Queensland.

Conferences were held in 1892 at Beenleigh, Bundaberg, Rockhampton and Mackay. They then lapsed until revived by Thynne, Minister for Agriculture, in 1897, when delegates elected by farmers' organisations throughout the colony attended a residential conference at Queensland Agricultural College at Gatton. The consensus after the Gatton residential conference was that the benefit of these meetings lay in the interaction between delegates. Participants from all parts of Queensland found a unity of interests and realised that their problems

were almost identical. Other residential conferences followed in the years 1898–1905, at Rockhampton, Mackay, Warwick, Bundaberg, Maryborough and Cairns, with the last dealing almost solely with the sugar industry.

Land settlement

New Zealand's village-settlement scheme placed unemployed people on the land in groups, operating on a cooperative principle. McLean's inspection of those settlements in 1887, when Australia was experiencing a severe economic depression, inspired a similar scheme in Queensland. During another depression in 1893 'co-operative communities', or cooperative land-settlement groups, came into being. McLean saw these as only a temporary measure to help the unemployed in large towns, because the area of land allocated to each group was too small to allow self-sufficiency and the prospect of additional work outside the group was uncertain in a period of depression. He said, however, that if land of first-class quality were allotted within reasonable distance of and with access to markets this type of settlement would benefit the colony.

McLean's idea was adopted and groups were allotted land under *The Co-operative Communities Land Settlement Act of 1893*. Unfortunately, they were formed at the wrong time of year, and arrived at their settlements too late in the season to plant crops immediately. In June 1896 McLean reported that the groups had been dissolved. They had cost the government nearly £15 000 and there was little to show for the outlay. Thus the cooperative land-settlement scheme failed, ending government involvement in establishing farm settlements. But the immigrants who continued to arrive from overseas and from the southern colonies included many experienced farmers, who contributed to the eventual establishment of farming industries.

Drought, frost and flood

Hopes for a new era of productivity, fostered by the establishment of the Department, were dimmed by the stark reality of drought. In his annual report for 1888–89, McLean wrote that the agricultural, pastoral and commercial industries had all suffered but added that the drought had provided a lesson on the need for fodder conservation. After it broke, many farmers began making silage.

In the same year, severe frosts ruined much of the Darling Downs wheat crop and farmers made hay from the damaged wheat. When they had difficulty in selling their hay they made it clear that they wanted the government to buy it. McLean opposed such a policy, believing that the tendency to lean on the government weakened the spirit of enterprise of farmers. However, an agreement was reached with the Railways Department to reduce by one-third the freight on hay sent to the drought-stricken northern and western areas. Thus the principle of allowing freight rebates on fodder for starving stock became a part of Queensland's drought strategy.

In May 1895, Professor Shelton noted that dairy farmers, whose numbers were increasing, were constantly asking for specialised information on growing and conserving fodder. The drought and cold of the 1893–94 season had stimulated

the demand for fodder. Shelton made two brief tours of the Downs to talk to farmers about fodder and fodder conservation. He regretted that he had no central station where he could demonstrate the techniques rather than only talk about them — perhaps he was anticipating the establishment of the Queensland Agricultural College or of State farms as such a venue.

Drought and frost were not the only problems facing the colony's farmers. Some of the worst floods ever recorded in southern Queensland occurred in the Department's first decade. In 1890, a flood devastated some agricultural areas, and large quantities of seed potatoes and seed of maize, oats and lucerne were sent to farmers to replant immediately. More devastation followed in 1893: immediately after the great floods of February, McLean telegraphed the Departments of Agriculture in Sydney and Melbourne asking for seed. The Central Flood Relief Committee had barely distributed that seed when disaster struck again and the process had to be repeated in the wake of another flood in June.

Conclusion

Queensland's early farmers faced all the problems that we face today — and many more. To respond to their needs, the tiny handful of men that comprised the forerunner of today's Department of Primary Industries had to be masters of all facets of agriculture. They had to adapt European technology as best they could, and pass on their advice to farmers with none of the aids to communication or travel that we enjoy today. McLean, the farmer, politician and administrator, and Shelton, the scientist, emerge as the driving forces in the early years of the Department of Agriculture.

3

Administrative and legislative activity, 1897-1919

The Department expanded from a staff of two at its establishment in 1887 to 112 in 1898. This growth came in response to demands from selectors for research and advisory services, and was accelerated by the transfer of the Stock Branch from the Colonial Secretary's Department. With this transfer, pastoralists' demands were added to those of the selectors, requiring further expansion of the Department's services.

The Stock Branch

On 1 July 1897 the Stock Branch in the Colonial Secretary's Department was transferred to the Department of Agriculture, where it remained the Stock Branch under the control of Patrick Robertson Gordon, who reported directly to the Minister. Gordon had been appointed chief inspector of sheep in 1868, mainly to tackle the problems of sheep scab and sheep catarrh under *The Diseases in Sheep Act of 1867*. His responsibilities were gradually increased, and he was designated chief inspector of stock. At the time of the merger, Gordon also administered *The Brands Act of 1872*, *The Native Birds Protection Acts, 1877 to 1884*, *The Marsupials Destruction Acts, 1887 to 1895*, *The Stock Returns Act of 1893*, *The Livestock and Meat Export Act of 1895* and *The Diseases in Stock Act of 1896*.

Gordon brought with him to the Department of Agriculture nineteen inspectors, of whom four were veterinary surgeons. Although these officers were within the Department of Agriculture, they operated as a separate entity and were not fully absorbed into the Department until 1904, after Gordon's retirement. The officers of the Stock Branch were the Department's first country-based staff members, apart from those on State farms and nurseries. They had the first regular contact with primary producers and laid the foundations for the Department's later advisory work.

Ministers for Agriculture, 1897-1919

Eleven ministers headed the Department in the years 1897 to 1919. Of these, two had little impact: William Stephens held office for only three months, and Herbert Hardacre's term was even shorter — the Labor government of which he was a minister held office for only seven days. However, the other nine ministers made substantial contributions in both legislation and the appointment of staff.

A. J. Thynne

Born in Ireland in 1847, Andrew Joseph Thynne came to Queensland in 1864 and worked as a clerk in the civil service. He studied law, to become a solicitor in 1874. Thynne was appointed to the Legislative Council, Queensland's upper house, in 1882. After terms as Minister for Justice, Minister without Portfolio and Postmaster-General, he was given the dual portfolio of Postmaster-General and Minister for Agriculture in 1896. Thynne relinquished the Postmaster-General's portfolio in 1897 to become the first full-time Minister for Agriculture, responsible for a fully fledged department that was no longer merely a dependency of the Lands Department.

Men who were to have a lasting impact on Queensland agriculture joined the Department during Thynne's term. They included Albert Benson, the first fruit expert, Frederick Wills, the first artist and photographer, and Alexander Boyd, the first editor of the *Queensland Agricultural Journal*. The establishment of State farms and of the Queensland Agricultural College were other important initiatives taken during Thynne's administration.

J. V. Chataway

James Vincent Chataway was born in England in 1852 and came to Australia in 1873. He engaged in mining, pastoralism, agriculture and publishing before entering Parliament in 1893, to become Minister for Agriculture in 1898. Chataway had a rewarding three years in that portfolio, before his death in 1901. He had been so impressed by the first residential agricultural conference, held in 1897 at the Queensland Agricultural College under the chairmanship of his predecessor, that he supervised further conferences at Rockhampton, Mackay and Warwick. Delegates from farmers' associations and show societies throughout Queensland attended the Warwick conference, which was considered so important that its proceedings were published in a special issue of the *Queensland Agricultural Journal*.

Chataway was instrumental in setting up the Sugar Experiment Station at Mackay and asked Dr Walter Maxwell, Director of the Sugar Experiment Station of the Hawaiian Sugar Planters' Association, to report on the scientific needs of the sugar industry. On Maxwell's recommendation, he secured the passage through Parliament of *The Sugar Experiment Stations Act of 1900* and appointed Maxwell the first director of the Bureau of Sugar Experiment Stations. Chataway's term also saw the establishment of Biggenden State Farm and Texas Tobacco Experiment Station.

Chataway had the unenviable task of conducting the inquiry into Professor Shelton's administration of the Queensland Agricultural College and subsequently accepting his resignation. He then installed John Mahon as the new principal (see Chapter 6).

He piloted through Parliament *The Slaughtering Act of 1898*, which set out sanitary regulations to be observed by all slaughterhouses in the colony and ensured better-quality meat for home consumption. When McLean reached retiring age in 1899, Chataway asked him to stay on as agricultural adviser and brought in Peter McDermott from the Patents Office as under-secretary.

D. H. Dalrymple

David Hay Dalrymple was born in England in 1840. He came to Australia at the age of twenty-two, and went into business in Mackay, becoming mayor of that city. He was a pastoralist at the time of his election to Parliament in 1888. Dalrymple was appointed to the Ministry in 1895, holding the Public Instruction and Public Lands portfolios before becoming Minister for Agriculture on Chataway's death in 1901. He held office until 1903.

Under *The Meat and Dairy Produce Encouragement Act of 1893*, administered by the Department, a board had been appointed to administer a fund financed by a levy on meat and dairy producers, which was used to assist in setting up processing plants. The fund had not provided the necessary capital, so in 1901 Dalrymple secured the Vote for Loans for Co-operative Agricultural Production, which provided for loans to aid in setting up cooperatives. He also secured the passage of *The Agricultural Bank Act of 1901*. The Agricultural Bank was established in 1902 to promote the occupation, cultivation and improvement of agricultural lands in Queensland.

Dalrymple held the Agriculture portfolio during the most severe drought in Queensland's history, that of 1901–02. The Department's normal work almost came to a standstill as drought strategies called for its undivided attention. Many meatworks were closed and most of the fourteen sugar mills south of Mackay did not crush. Wheat crops were so poor that seed wheat had to be brought in from South Australia for the new season's plantings.

D. F. Denham

Digby Frank Denham was born in England in 1859 and came to Australia in 1881. He established a grain and produce company and, with J. C. Hutton, built many dairy factories in south Queensland. Denham became MLA for Oxley in 1902 and served as Minister for Agriculture (holding other portfolios as well) from 1903 to 1907. He was later Premier of Queensland, from 1911 to 1915.

One of the first of many progressive moves Denham made as Minister was to amalgamate the Agriculture and Stock Branches to form the Department of Agriculture and Stock on 1 January 1904. (His title changed with the amalgamation, to 'Minister for Agriculture and Stock'.) He then introduced an important piece of legislation, *The Dairy Produce Acts, 1904 to 1905*, which regulated to improve dairy hygiene and made Queensland the first State to enforce butter grading.

Denham brought the Bacteriological Institute back to the control of the Department of Agriculture and Stock. Formerly the Stock Institute, it had been transferred to the Home Secretary's Department and renamed during Chataway's term in office. He also established the Roma and Warren State farms.

T. O'Sullivan

Thomas O'Sullivan was born in Ipswich in 1856. A barrister, he was elected to Parliament and twice held the Agriculture and Stock portfolio, for short periods in 1907 and 1908. During O'Sullivan's ministry, arrangements were made at a Premiers' Conference to send John Froggatt, the New South Wales government



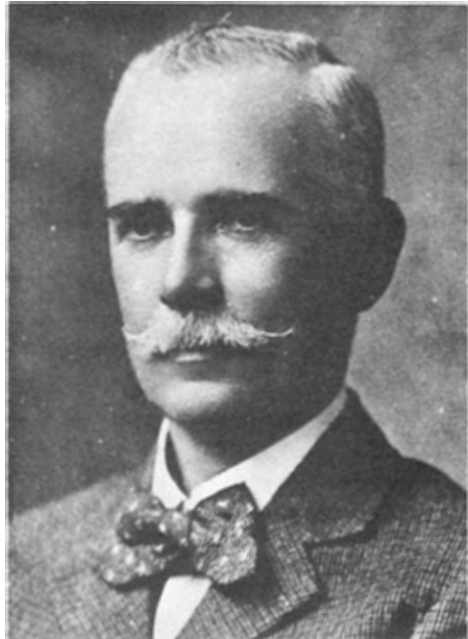
J. V. Chataway, Minister for Agriculture, March 1898-1 December 1899 and 7 December 1899-April 1901



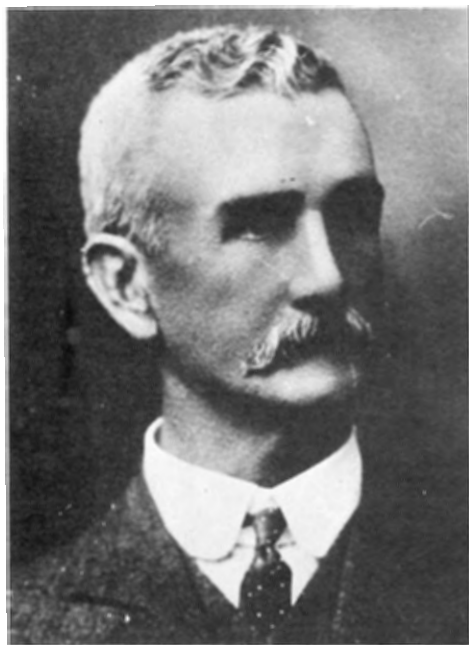
D. H. Dalrymple, Minister for Agriculture, May 1901-September 1903



D. F. Denbam, Minister for Agriculture and Stock, September 1903-February 1907



T. O'Sullivan, Minister for Agriculture and Stock, February-March 1907 and February-October 1908



*W. T. Paget, Minister for Agriculture and Stock,
October 1908–February 1911*



*J. Tolmie, Minister for Agriculture and Stock,
February 1911–December 1912*



*J. White, Minister for Agriculture and Stock,
December 1912–June 1915*



*W. Lennon, Minister for Agriculture and Stock,
June 1915–September 1919*

entomologist, overseas to study the fruit fly. Froggatt's expenses were met by the State Governments of New South Wales, Victoria, South Australia and Queensland.

W. T. Paget

Walter Truman Paget was born in England in 1854 and came to Queensland in 1872. He farmed at Mackay, then ran a sugar mill, and finally operated a dairy farm and butter factory before being elected MLA for Mackay in 1901. Paget held the portfolio of Agriculture and Stock for a little more than two years between 1908 and 1911. His greatest achievement was the establishment of the Yeerongpilly Stock Experiment Station, which opened in 1910. An interesting piece of legislation brought down by Paget was *The Margarine Act of 1910*, which was designed to protect the butter industry by placing restrictions on margarine manufacture.

J. Tolmie

James Tolmie, born near Brisbane in 1862, was a grocer's assistant, a State school teacher and newspaper proprietor before his election to Parliament as MLA for Drayton in 1901. He was Minister for Agriculture and Stock from 1911 to 1912. Though Tolmie held office for less than two years, the legislation he introduced and the appointments he made were significant. After the establishment of the University of Queensland in 1911, Tolmie appointed two State school inspectors and two university staff members to report on the educational value of the Queensland Agricultural College. Their report resulted in a change of policy for the college (see Chapter 6).

J. White

Scottish-born, John White emigrated to Queensland in 1883 at the age of thirty. He formed the Bundaberg Foundry Company and Carricks Limited, and was a director of several companies before his election to Parliament as the Member for Musgrave in 1903. White was Minister for Agriculture and Stock from 1912 to 1915, a period of major legislative activity for the Department. The most important legislation he introduced was *The Pure Seeds Act of 1913*, which ensured the sale of pure seed for planting.

W. Lennon

William Lennon, born in Ireland in 1849, emigrated to Australia with his family in 1854. He was educated in Melbourne, and rose to become manager of Burns Philp, Townsville. Lennon later formed his own mercantile firm in Townsville and was a director of several companies. He was MLA for Herbert from 1907 to 1920 and, as a member of T. J. Ryan's Labor government, was Minister for Agriculture and Stock from 1915 to 1919. Hardacre, the only Labor incumbent of the position before that time, had held office for only seven days; thus Lennon was the first Labor minister to influence the Department. He was very active in legislative matters, a reflection of the change of policies introduced by his government, and was noted for his streamlining of agricultural legislation.

Lennon introduced *The Diseases in Stock Act of 1915*, which consolidated nine of the Acts dealing with stock diseases. *The Brands Act of 1915* followed, consolidating the seven previous Brands Acts and portions of the Diseases in Sheep Acts. *The Regulation of Sugar Cane Prices Act of 1915* set up the Central Sugar Cane Prices Board to oversee prices set by local boards. *The Sugar Acquisition Act of 1915* confirmed sugar acquisition by proclamation and allowed the government to continue to acquire the sugar crop. *The Diseases in Plants Act of 1916* replaced the 1896 Act, which had regulated the importation of plant material and introduced registration of orchards and nurseries. *The Farm Produce Agents Act of 1917* provided for the licensing of farm produce agents and made it compulsory for them to keep registers.

Under-secretaries

Peter McLean, the Department's first under-secretary, had been appointed agricultural adviser (at a higher salary) in July 1899. He retired from the public service in December 1903.

In May 1900 McLean was succeeded as under-secretary by Peter McDermott, who had been registrar of patents. McDermott did not stay long but moved to head the Chief Secretary's Department in 1904. Ernest Scriven, clerk at the foundation of the Department of Agriculture in 1887, then became under-secretary. Scriven quickly moved to establish his authority over all sections of the Department.

On Gordon's retirement in 1904 the Stock Branch was absorbed into the renamed Department of Agriculture and Stock and the Under-Secretary, Scriven, took full control of stock matters for the first time, assuming the title 'chief inspector of stock'. When Dr Maxwell, Director of the Bureau of Sugar Experiment Stations, resigned in 1909, Scriven assumed the directorship of the Bureau as well. However, Scriven later divested himself of these extra duties, giving the position of chief inspector of stock to Arthur Cory in 1915 and the directorship of the Bureau to Harry Easterby in 1921.

Conclusion

The Department of Agriculture, in its first ten years, was a virtual subdepartment within the ministerial portfolios of Public Lands and Public Lands and Agriculture. Its role was to serve the settlers who, in their thousands, were taking up small farming blocks. In 1897 the Department became a separate entity, with the Minister for Agriculture serving the pastoral industries, previously the responsibility of the Colonial Secretary. This was also a year of expansion for the Department into agricultural education, research and publication. In 1904 the pastoral responsibilities were fully integrated, and by 1920 the Department of Agriculture and Stock was an important body, charged with guiding Queensland's rural industries towards greater development and productivity.



P. J. McDermott, Under-Secretary, Department of Agriculture, May 1900–December 1903



E. G. E. Scriven, Under-Secretary, Department of Agriculture and Stock, January 1904–December 1924



The Department's head office in William Street, Brisbane, after extensions were made to the original building in 1898–99 (Courtesy John Oxley Library, Brisbane)

4

Plant introduction and distribution

Before the Department of Agriculture was formed, the Brisbane Botanic Gardens and the Queensland Acclimatisation Society had assembled large collections of plants of agricultural interest to Queensland. Both organisations introduced plants and distributed seed and planting material. After the Department's establishment, McLean directed the distribution of planting material more specifically to farmers. Since he lacked a farm or experiment station, he sent seed to selected farmers who were asked to note the rainfall, soil type, details of the growth of the crop, date of maturity and yield. McLean introduced a register to record this information, which was used to assess the value of each plant species new to the colony and the suitability of different districts for different crops.

Plants collected and introduced by the Department in 1887-88 included coffee, annatto (a colouring agent for butter), Japanese flour maize, rice, hedge plants, broom millet, wheats (including rust-resistant varieties), olives, wattles (for tan bark), giant Honduras sorghum, rye and ramie. Seeds were widely distributed, especially those of the rust-resistant wheats, olives, sorghum, annatto, coffee and wattles. In 1889, a range of forage crop and pasture seeds was sent from Paris. Another notable introduction was the Bahia navel orange.

After 1889, the State nurseries at Mackay and Kamerunga were responsible for the introduction and distribution of seeds and plants of tropical crops. The Botanic Gardens continued to distribute plants, mainly to schools and for city beautification. Seeds of grain crops came mainly from private seedsmen and from State farms after 1897, while the Queensland Acclimatisation Society also continued to supply a variety of plants.

The Botanic Gardens

The Brisbane Botanic Gardens, located opposite Parliament House and today named the City Botanic Gardens, can claim to be the oldest public institution in Queensland, and probably the one that has given the most enjoyment to many people. The Gardens were laid out by Charles Fraser in 1828. His instructions were to establish a public garden, then to collect the vegetable products of the country, make observations on their uses and importance, especially the forest trees, and report on the nature of the soil.

The British Imperial Government appointed Walter Hill superintendent of the Brisbane Botanic Gardens in 1855. Originally the Gardens had an area of only 2.5 hectares with no access to the river but the area was soon increased to 11 hectares, with river access. After Queensland separated from New South Wales in 1859, Hill was appointed colonial botanist and curator of the Botanic Gardens and held these positions until he retired in 1881. In 1861-62, he used £100 granted in the colony's first budget to form the nucleus of a public botanical library and museum. He sent the money to Sir William Hooker, Director of the Royal Botanical Gardens at Kew, who forwarded some valuable books. Hill's contribution to Queensland's agriculture was his introduction and cultivation of crop plants and distribution of planting material. Most of Queensland's major tropical crops, and many others that are not yet grown commercially, were brought in during his term.

In 1881 a board of trustees was appointed to manage the Gardens but control passed to the Department of Agriculture in 1887. The government provided grants for the establishment of parks and gardens in Brisbane and the provincial cities, with McLean appointed curator and *ex officio* trustee in 1889. Gardens, parks and reserves in provincial cities and towns were supervised by trustees, who reported to McLean. Philip MacMahon was appointed curator of the Gardens in Brisbane in April 1889.

The grounds of the Government Domain, where the Queensland Institute of Technology now stands, were placed under the management of the curator of the Botanic Gardens on 1 July 1890. On the same day, a meteorological station was set up in the Gardens to send daily reports to the Weather Bureau.

A serious flood had occurred in March 1890 and water, three metres deep in places, had covered most of the Gardens. The damage was eventually repaired and plans were made to establish a collection of plants arranged in their natural orders. A pharmaceutical garden was also planted for the use of chemists and doctors, who were required by law to pass an examination in botany.

Plant introduction and distribution continued to be an important activity of the Brisbane Botanic Gardens. Planting material was sent to individuals, schools and organisations throughout Queensland. The introduction of Arbor Day in 1890 resulted in State schools placing heavy demands on the Department for trees. A scheme to instruct schoolchildren in horticulture was introduced in April 1891 and continued for several years.

The great floods of 1893 did immense damage. On 5 February, floodwaters covered most of the Gardens, which were inundated again two weeks later. MacMahon's residence was toppled by the flood and his books, furniture and office records were destroyed. The disaster brought one benefit, however: MacMahon published a list of some of the best-known plants killed in the Gardens as a guide for people wishing to grow crops in areas that were susceptible to flooding.

In 1895-96, MacMahon produced *A Queensland Garden Illustrated* and gave a series of lectures on gardening. During an official visit to the Sydney, Melbourne and Adelaide Gardens in 1896-97, he collected a thousand plants for the Gardens in Brisbane.



The curator's residence in the Brisbane Botanic Gardens under water during the Brisbane flood in February 1893 (Courtesy John Osley Library, Brisbane)



Sunday afternoon concert in the Brisbane Botanic Gardens in 1912 — the forerunner of today's FREEPS concerts (Courtesy John Oxley Library, Brisbane)

Development of the Brisbane Botanic Gardens continued in the early years of the twentieth century. Concerts were held every Saturday afternoon in 1900-01, attracting attendances of up to three thousand people. These were the forerunners of today's 'FREEPS', concerts organised by the Brisbane City Council and held in the same area.

In 1905 MacMahon transferred to the Lands Department as director of forestry, and John Frederick Bailey (Frederick Manson Bailey's son) became director of the Botanic Gardens and Government Domain. He also gave weekly lectures at the Queensland Agricultural College. In Bailey's time new economic plants were added to the Gardens, including cocoa, Brazil nuts, cassava, kola nuts, hybrid cotton and rubber. Ernest Bick, head gardener at Government House, was appointed botanical collector in 1913. He became director of the Botanic Gardens in 1917 when John Bailey was appointed director of the Adelaide Gardens.

The Botanic Gardens continued to distribute plants in the early 1920s. The 1920-21 distribution gives some indication of the volume of this service: 2302 plants to 415 State schools; 877 to other government departments; 318 to local authorities; 268 to churches, convents and cemeteries; 156 to progress associations; 183 to hospitals; 187 to other botanic gardens; and 956 in general exchanges. In 1925 the Department handed over control of the Botanic Gardens to the newly formed Greater Brisbane Council.

F. M. Bailey

On the recommendation of the Queensland Acclimatisation Society, the Queensland Government began to assemble a herbarium of the flora of Queensland in 1873. Frederick Manson Bailey, a botanical collector, was assigned to this job. In 1874, Bailey was appointed keeper of the Herbarium, which was then housed in temporary accommodation in Queen Street. A new building (now the State Library in William Street) was erected for the Queensland Museum in 1878, and the Herbarium was transferred there in 1880. Bailey added his own collection to the Herbarium specimens.

Early in his career, Bailey recognised the potential danger of noxious weeds and drew attention to their presence. In 1875, the Queensland Government appointed a board to inquire into the causes of diseases in livestock and to examine the plants of Queensland. Bailey, appointed to the board to handle the botanical work, served on it for five years. *The Divisional Boards Act Amendment Act of 1882* authorised divisional boards (later shire councils) to destroy noxious weeds. The Department of Agriculture later cooperated with local authorities to eradicate noxious weeds from crown lands and reserves, a major task. In May 1894, Bailey reported that it would have cost only a few pounds to eradicate the pest Noogoora burr when it was first discovered in 1880, but left unchecked it had quickly covered large areas of good country and was still spreading.

On the resignation of the curator of the Queensland Museum (William Haswell) in 1880, Bailey was appointed temporary curator. He was appointed colonial botanist on Walter Hill's retirement in 1881, but also retained the Museum position until 1882. He then continued as colonial botanist until his death in 1915 at the age of eighty-eight years.



Frederick Manson Bailey, Colonial (Government) Botanist, 1881-1915

Bailey was one of eight commissioners appointed to assemble exhibits for Queensland's contribution to the Centennial International Exhibition in Melbourne in 1888. He prepared collections of Queensland timbers, Queensland grasses and crop plants grown in Queensland for the display.

When the Department of Agriculture moved into offices in William Street in 1889-90, Bailey set up the Museum of Economic Botany in the building. This contained the Melbourne exhibits and material from a similar museum started by the Acclimatisation Society in 1886 as well as fibres, gums, fruits and botanical specimens from other parts of the world.

In 1889, Bailey joined a scientific expedition to the Bellenden Ker Range in north Queensland. He returned to Brisbane some three months later with a large collection of botanical specimens, many entirely new to science, and others discovered in Australia for the first time. This expedition was the first of its kind sent out in Australia by a colonial government.

At Federation in 1901, Queensland became a State, and Bailey's designation was changed from 'colonial botanist' to 'government botanist'. However, he refused to accept the change and continued to refer to himself by his former title. In December 1902, the sixth and final volume of his *Queensland Flora* was published. A general index of the flora was published in 1905, completing one of Australia's great botanical works. Bailey continued to publish the follow-up series 'Contributions to the Flora of Queensland' in the *Queensland Agricultural Journal* until his death in 1915. In 1895 he was made a Companion of the Order of Saint Michael and Saint George (C.M.G.) for his services to botanical science in Queensland.

John Bailey succeeded his father as government botanist, while remaining director of the Botanic Gardens. He soon resigned to become director of the Adelaide Botanic Gardens, and the positions of director of the Botanic Gardens and government botanist were separated. Cyril Tenison White (John Bailey's nephew) became acting government botanist and Bick was appointed director of the Botanic Gardens in 1917.

State nurseries

Moves to set up experiment farms were initiated by Maurice Black, Minister for Public Lands, in June 1888, and in July Under-Secretary McLean examined the possibilities of establishing farms at Mackay, Cairns and Port Douglas. Some years earlier, after a private trip to the north, Lewis Bernays of the Acclimatisation Society had suggested that the government set up a nursery to propagate and distribute economic tropical plants. After assessing the situation at Mackay, McLean came out against an experiment farm, but recommended a State nursery. His inquiries took him as far north as Mossman, and he advocated another State nursery at Kamerunga, near Cairns. McLean's objective in setting up State nurseries rather than experimental farms was to make the introduction, propagation and distribution of economic plants in Queensland a more organised process.

The Mackay State Nursery was established in May 1889 by David Buchanan, who had been appointed overseer two months earlier. Under pressure from local

growers, the nursery operations at Mackay were soon dominated by sugar. In 1893, the emphasis changed from fodder crops to sugarcane. In 1896, a large consignment of New Guinea canes selected by Henry Tryon was planted, and a year later the Mackay nursery was converted into a sugar experiment station.

At Kamerunga, scrub was cleared and a small nursery was established in 1889, with Ebenezer Cowley as manager. On arrival, Cowley found that most farmers other than canegrowers in the Cairns area were Chinese who cultivated one variety of rice, Cavendish bananas and maize. He lost no time in introducing a wider range of economic plants. Coffee seemed promising, as several growers had had some success in producing economic crops.

Sugarcane also became increasingly important at Kamerunga. Cowley and Henry Tryon (who later became government entomologist) collected cane varieties in New Guinea in 1893 and multiplied them in the nursery. Two years later Cowley had seventy-nine varieties of sugarcane at Kamerunga, including his own and Tryon's New Guinea selections. Batse, a variety introduced in 1893, was popular with growers — and also with children — because of its high sugar content.

When the Mackay State Nursery became a sugar experiment station in 1900, Kamerunga remained the sole source of planting material for other tropical crops and pastures in Queensland. The nursery continued to introduce and test tropical plants and to distribute planting material in Queensland and overseas. It was also called upon to prepare non-competitive exhibits for agricultural shows and to provide Queensland produce for the Agent-General to display in London.

However, by 1914, the Under-Secretary was reporting adversely on the value of Kamerunga. He pointed out that it was situated in a sugar-growing district, where the farmers had little interest in other tropical crops. Yet, he argued, closure would require serious consideration, because the nursery contained so many valuable trees and other material that would be difficult and expensive to replace. Because of the uncertainty of the nursery's future, demonstration plots of vanilla, coconuts and bananas were established on outside farms.

Benson, Director of Fruit Culture, inspected Kamerunga with George Williams, Northern Instructor in Fruit Culture, in 1916. They declared its site unsuitable and the property, with its mangos, coconuts and ornamental palms, was put in the hands of a caretaker.

Conclusion

Before 1887 plant introduction and distribution were carried out in a haphazard way. The Department saw the task of introducing plants and seeds for distribution as one of its major responsibilities, and placed it on a more organised footing. Plants with economic potential were closely monitored and the varieties best suited to Queensland were sought. To this end, the Department was given control of the Brisbane Botanic Gardens and the Queensland Herbarium, and later established State nurseries.

5

State farms

In the Department's first year McLean had tried to assess the productivity of different districts by asking farmers who received seed from the Department to report on their success, or failure, with various crops. But although the farmers readily accepted the seed, they generally failed to respond to McLean's request. This lack of information on crop performance in Queensland's wide range of soil types and climatic environments was a barrier to the continued encouragement of agriculture.

McLean next established 'experimental fields' throughout the colony to assess the productivity of different soils. Selected farmers were asked to set aside small areas of land for the Department's experiments and plots were cultivated at Allora, Roma, Herberton, Springsure, Hughenden, Clermont and Barcaldine between 1892 and 1894. Shelton, Instructor in Agriculture, arranged for thirty varieties of wheat to be planted on each plot. But these trial plots also failed to provide precise information, and both McLean and Shelton expressed continued frustration at the lack of suitable facilities for undertaking controlled experiments. The problem was solved with the establishment of State farms in Queensland's main cropping districts. Towards the end of the Department's first decade, State farms were established at Westbrook, near Toowoomba, and Hermitage, near Warwick, and another five followed between 1897 and 1919.

Westbrook

Westbrook State Farm was established on 174 hectares of land acquired under *The Agricultural Lands Purchase Act of 1894*. The site was chosen by Thynne, Postmaster-General and Minister for Agriculture, and Albert Benson, Director of State Farms and Instructor in Fruit Culture. Development began in February 1897 and Henry Tardent, a viticulturist at Roma, was appointed manager in April. Tardent had previously written articles on grape-growing and lectured at agricultural conferences for the Department.

Westbrook had five managers during its fifteen years under the Department's control. Tardent was transferred to become foundation manager of Biggenden State Farm in 1898. Harold Quodling replaced him, then in 1901 Charles Ross took over. He, in turn, was replaced by James Mitchell in 1910.

Some fifty-seven hectares of forest land were cleared and ploughed. An orchard

Henry Tardent, first manager of Westbrook State Farm (Courtesy Tardent family)



Stacking hay at Hermitage State Farm at the turn of the century (Courtesy John Oxley Library, Brisbane)

was planted with deciduous fruit trees to test the value for drying and canning of plums, prunes, peaches, apricots and pears. A vineyard of wine, table and raisin grapes was planted to test the suitability of the area for grape and wine production. Richard Soutter, the Department's first wheat breeder, planted more than three hundred varieties of wheat obtained from the New South Wales Department of Agriculture. Cowpeas, sorghum, millet, maize, pumpkins, vegetables and fodder crops were also assessed. The original objective had been to make Westbrook a profitable concern by selling general farm produce and fruit, but when the produce was marketed the farming community objected so strongly that the scheme was abandoned.

Cereal experiments were transferred to Hermitage and work at Westbrook was confined to fruit, vegetables, fodder plants, grasses and pedigreed maize. Part of the farm was taken over for a reformatory for boys in 1904, and eight years later the remainder was also taken over.

Westbrook made a significant contribution to Queensland agriculture. The vineyard had received the best grape varieties imported from around the world and planting material had been distributed throughout Queensland. Edward Rainford, the viticulturist appointed in 1898, introduced 'record boxes' in the vineyard to provide information for visitors; these boxes contained leaflets illustrating pruning systems and photographs of vines showing their progress from year to year. The orchard was planted with well over two hundred varieties of stone and pome fruit. Dwarfing experiments were conducted on fruit trees so that they could be covered with netting against fruit fly attack, a serious problem. Fodder and grain crops, vegetables and pasture plants were also tested. Fertiliser trials on wheat and maize were laid out, but the weather had a greater effect than fertiliser on growth, making measurement of fertiliser response very difficult.

Westbrook's experimental work included trials in the eradication of prickly pear. One method that proved successful was burying the pear, a more economical procedure than burning. Another successful method was splitting the stems of the pear and poisoning it. Equally effective was singeing the pear, chaffing it and feeding it to cattle, a practice widely used in the 1902 and later droughts.

Hermitage

An area of 97 hectares, chosen by Benson, was bought from 'Canning Downs', a property east of Warwick, for Hermitage State Farm. Clearing and ploughing began immediately and Charles Ross took up duties as manager in the last week of June 1897. Benson said this station would specialise in wheat breeding, concentrating on improving both the rust resistance and milling qualities of wheat, his top priority for State farms on the Darling Downs and in central Queensland.

Harold Quodling took over as manager in 1901, leaving in 1905 to become agricultural adviser on Peter McLean's retirement. He was succeeded by Alex Martin, who was followed by John Liverseed in 1907.

Researchers at Hermitage experimented with a range of crops at first, but soon concentrated on wheat testing and fodder-crop production, with livestock added in 1905. The vineyard failed and was grubbed out in 1903. The orchard, too,

appeared to fade out; the last report of it, in 1903, mentioned that fruit fly was again bad.

The farm's research responsibilities were clarified at a conference of State farm managers in 1903-04, which fixed the main activity for each farm and eliminated overlapping. Hermitage was allotted experimental work on crops for home use and wheat. Varietal testing was extensive in the early years. Seed wheat of selected varieties was sent to farmers chosen by agricultural or farmers' societies. From their crops, the farmers were required to return to Hermitage double the quantity of pure seed of each variety they received. However, by 1912 growers were beginning to buy seed from seedsmen rather than from Hermitage.

Quodling initiated a departure from the usual farm programme in 1904 by sowing small plots of native grasses on Hermitage. He reasoned that the gradual disappearance of valuable native grasses caused by continuous stocking in enclosed areas was a matter of national concern. A further departure came in 1904-05 when Berkshire pigs were imported from Lord Carnarvon's stud in Scotland and Middle Yorkshires from the famous Holywell Manor stud in England. The boars were made available for service at a nominal fee and their progeny were in great demand.

A scheme to train farm apprentices was introduced at Hermitage in 1905-06. Boys aged sixteen to eighteen who were unable to attend the Queensland Agricultural College (QAC) were apprenticed for three years. The scheme began with four apprentices, building up to ten by the third and subsequent years. The project lapsed in 1912-13, when only one apprentice remained.

Hermitage became the main centre for livestock experiments on the Darling Downs after most of Westbrook was taken over for a boys' reformatory. W. B. Slade of 'Glengallan' stud presented fifty purebred Merino ewes to the State Government in 1905. The ewes were to be kept at Hermitage and rams would be supplied by Slade, whose aim was to ensure that this strain of Merino remained pure. Fat-lamb experiments also began in 1905, with a nucleus flock from Gindie State Farm and rams from the QAC. Cattle and horses were brought to the farm in 1907-08, Milking Shorthorns to supply milk and butter for the apprentices, and Clydesdale mares for breeding.

Biggenden

Biggenden State Farm was set up in 1898 to test crops that might be suitable for the newly settled surrounding district. It was a small farm initially, 34 hectares of dark basaltic soil with some heavy clay. Henry Tardent was transferred from Westbrook in 1898 to become Biggenden's foundation manager and remained until 1901, when George Brooks from Kamerunga took over. In 1904, Brooks was appointed farm foreman at QAC and handed over to Drummond Macpherson. Provision was made for apprentices to be trained on the farm and, when another 49 hectares were added in 1907-08, a small dairy was started.

The farm was closed in 1912 as it was considered too small for large-scale experimental work and had soil problems. But in its fourteen years it had fulfilled some of its aims as a leader in a new agricultural area.



Farm workers chopping and stacking silage at Biggenden State Farm, 1909

Gindie

Gindie State Farm was established in 1898 between Emerald and Springsure. Mainly black soil downs, the 3500 hectare property was watered by the Nogoa River, Mosquito and Gindie Creeks, and other creeks and lagoons, most of which were not permanent. Wells provided small but permanent water supplies. Gindie was set up to investigate the prospects for wheat-growing and other branches of general farming in the central highlands. The Department hoped it would demonstrate that agriculture could succeed in an area subject to periodic and prolonged dry spells.

Alexander Watt, a farmer and sugar planter from the Logan district, was Gindie's foundation manager. After six months he handed over to Robert Jarrott from Laidley. Jarrott retired in 1914 and was succeeded by H. P. Burnage.

Jarrott's first annual report foreshadowed the problems he thought likely in this marginal cropping area, and by 1901 the problems had arisen. Grain crops of wheat, oats, barley, rye and field peas failed, though some were cut for hay and others were grazed. The 1901-02 year was worse, and all crops failed. The vineyard, planted after the promising 1899-1900 season, was abandoned and the surviving vines were sent to Westbrook. As well as severe drought, Gindie suffered from heatwaves, grasshopper and mice plagues, bollworm attack on cotton and weed trouble in its first seven years.

The farm carried livestock from the outset. Sheep, horses, beef cattle and pigs were kept, and a small herd of Ayrshires and Milking Shorthorns supplied cream to the Capella Butter Factory. Although keeping cattle, horse and sheep studs proved the best course at Gindie, the farm had its share of livestock problems: in 1909-10 cattle ticks appeared in large numbers, and in the following year tick fever (redwater) killed many beasts. A dipping programme was initiated and inoculation against tick fever was introduced.

Sheep blowflies became so troublesome in 1911 that the sheep had to be treated. The fly wave led to the appointment of William Brown as the Department's first sheep and wool instructor, stationed at Emerald to service central Queensland. Brown began experiments on blowfly control at Gindie in 1913. He kept Gindie's sheep free from fly, although animals on other properties in the district were still infested as graziers showed little interest in blowfly control.

Roma

Roma State Farm began modestly. Quodling, manager at Hermitage, obtained promising results in growing cereals in the Maranoa in 1904. The following year, the Scottish Australian Investment Company made land available at Bungeworgori, near Roma, for Quodling to carry out cereal-growing experiments. In January 1906, the Department took control of this area and set up Roma State Farm. The Department hoped that the district would become one of the granaries of Queensland, but experimental work was needed to confirm this.

Roma State Farm will always be associated with wheat breeding and with Richard Ernest Soutter, who became one of Queensland's greatest plant breeders. The son of William Soutter, who had been manager of the Queensland Acclimat-

isation Gardens and then inspector of State farms, Richard had been a foundation student at QAC when it opened in 1897. He had begun his public service career at Westbrook State Farm. Richard Soutter was appointed foundation manager at Roma, where he concentrated on hybridising wheats. The varieties then grown matured too late for the Roma area and the hard 'Durum' wheats did not yield well. Soutter bred a selection of varieties and distributed seed to widely separated areas. By 1910, three of the five best varieties for the Roma district had been bred at the State farm. In the early 1920s, tests by Johannes Brännich, the Department's agricultural chemist, revealed the excellent milling qualities of Soutter's wheats, and Roma-bred wheats predominated in Queensland until the 1950s.

As well as concentrating on wheat breeding, Roma State Farm began selection work on Sudan grass and cowpeas, both hardy crops. Fruit- and grape-growing proved promising, but alternative enterprises such as maize- and cotton-growing, dairying and pig-raising were unsuccessful. However, one area of research at Roma proved invaluable to Queensland's grain industries: experiments with tillage systems designed to conserve summer rain in the subsoil, so that winter-growing crops such as wheat could be grown.

Warren

Warren State Farm began operations in November 1907 when Thomas Jones, the newly appointed manager, pitched a tent on the site for himself and his wife. In poplar box country near Neerkol Creek, west of Rockhampton, the farm was intended to service dairy farmers on scrub and forest country in central coastal Queensland.

The productivity of the cleared scrubland was increased by the sowing of introduced pasture species. Trials at Warren showed that Rhodes grass was an excellent pasture grass in scrub areas, and that para grass did well in the swampy country around Rockhampton.

Warren State Farm was set up mainly as a dairying and pig-raising venture and, with mechanised agriculture still years away, as a horse-breeding establishment. Clydesdale horse and Ayrshire cattle studs were established there by the end of 1908. Warren's livestock enterprises provided winners at local agricultural shows, creating a demand for purebred stock and for the services of its Clydesdale stallion. By 1915, however, Jones had decided that the area was not suitable for dairying and recommended switching to dual-purpose Shorthorns.

Jones was transferred in 1916-17 and Quodling, Director of Agriculture, took over supervision of the farm, with H. C. Colledge working it locally. In April 1920, Wilhelm Bechtel was appointed manager of Warren.

Kairi

The extension of the Cairns railway to Atherton in 1907 brought increased farming settlement on the Atherton Tableland and demands for agricultural research related to the area. Local advisory services, pure seed and stud animals to set up farming enterprises were also required. In response to these demands, a State farm

was set up at Kairi, near Atherton, in 1911. Drummond Macpherson, who had been manager at Biggenden since 1904, was appointed foundation manager at Kairi State Farm.

As at earlier State farms, at Kairi a range of crops was grown at first, then attention was given to the activities that proved best suited to the district. Dairying and pig-raising were the main activities. Rhodes grass was sown and stud dairy herds of Jerseys, Ayrshires, Guernseys and Holsteins were established; pigs were obtained from QAC; and a Suffolk Punch stallion was kept at the farm for stud services. Maize was grown and a small nursery of sugarcane provided pure planting material for the sugar research stations.

Conclusion

A network of State farms was established to identify the crops and farming systems suited to various districts in Queensland. The farms were designed to undertake controlled experiments, to demonstrate better farming methods and to supply selected planting material, seeds and animals to farmers to improve their crops and livestock. By 1920, five State farms were fully operational, contributing to the broad range of knowledge required to successfully establish cropping and intensive livestock industries in Queensland.

6

Queensland Agricultural College

The establishment of an agricultural college in Queensland was first proposed in Parliament in May 1874 by E. W. Pechey, timber merchant and Member for the Darling Downs. Pechey left Parliament after one term and the idea lapsed. A later Member for the Darling Downs, Francis B. Kates, introduced a successful motion in Parliament in 1886 asking that land be set aside for agricultural colleges and universities. McLean visited the southern colonies and New Zealand in 1887 and reported favourably on their agricultural colleges, but because of the 'financial condition of the Colony' the government took no action.

Henry Jordan, Minister for Public Lands, announced in Parliament in November 1887 that the government would appoint an instructor in agriculture from the United States. This appointment, he claimed, would lay the foundation for agricultural education in the colony. Edward Shelton, Professor of Agriculture at the Kansas State Agricultural College, was appointed instructor in agriculture in September 1889 and took up duty six months later. After Shelton's appointment, McLean again raised the question of agricultural schools, this time with M. H. Black, Minister for Public Lands.

Shelton visited Dookie Agricultural College in Victoria and proposed that a similar institution be established in Queensland. He was supported by McLean, who felt that the college should be situated in south Queensland, where the concentration of farmers was greatest. Parliament voted the Department of Agriculture £5000 in October 1891 to establish a college, but the finances of the colony were so poor that the money was not made available.

The subject of the college was raised so insistently in the 1894 supply debate that the Agriculture Minister, Barlow, promised to introduce a Schools of Agriculture Bill. However, when the Bill was debated in November some Members who had supported the measure now opposed the clauses relating to finance and the Government let it lapse. In 1895, twelve Members who supported the Government formed the Farmers' Representative Union to press for the establishment of experimental farms, where boys could be taught practical farming. In response to continued pressure from this group, £5000 was placed on the estimates for this purpose.

In April 1896, McLean requested that sections of 'Rosewood' be set aside for a school of agriculture and experiment station. 'Rosewood' was between Gatton,

Tarampa and Forest Hill, with frontages to Lockyer and Laidley Creeks. McLean and Shelton had selected the site because it was accessible by rail to most of the Department's experts stationed in Brisbane and its soil types were suitable for demonstrating different agricultural practices.

Andrew Thynne, who became Minister for Agriculture in 1896, needed no convincing of the need for a college, having already sent his son to the Hawkesbury Agricultural College in New South Wales. A few days after his appointment, Thynne sanctioned the purchase from 'Rosewood' of 2500 hectares of land for the college and experimental farm. In the supply debate soon after, £4000 was granted for the agricultural college and £2000 for the experimental and training farm.

Construction of the college buildings and the development of the farm began in late 1896. One aspect of the farm's work was silage-making, an operation that was new to Queensland. More than two hundred farmers from as far away as Warwick, Nanango and the North Coast were present when the College's first maize crop was ensiled in April 1897.

Thynne invited delegates from farming centres in north, central and south Queensland to a residential conference at the College in June 1897, before the opening. This was a master stroke, bringing together influential men from all over the State to inspect the new agricultural college.

After the conference, a call was made for students for the first half-year course, to start on 1 July 1897. Queensland Agricultural College was officially opened by the Governor, Lord Lamington, on 9 July 1897, before a large party of official visitors drawn from both Houses of Parliament and the farming and business community. Twenty-three young men were admitted as foundation students, and eleven more students had enrolled by December.

The Shelton period

The College's first principal was Professor Edward Shelton. His foundation staff included Johannes Brännich, who held the position of chemist to the Department of Agriculture and lecturer in chemistry at the College. He was based at the College laboratory until the William Street laboratory was built in 1899. Philip McKenzie Pitt was English, surveying and mathematics master, and became College secretary from 1899 as well. Joachim Schmidt was appointed natural science master and College secretary from June 1897, but resigned in 1899. He later became a meat inspector with the Department of Agriculture.

Harold Quodling was appointed farm foreman in January 1897 to prepare the farm for the first student intake. In 1898, he left to become manager of Westbrook State Farm and went from there to manage Hermitage State Farm. Hugh Gorrie took up duties as horticulturist in March 1897. He had been in charge of the propagating and forwarding department of the Queensland Acclimatisation Society. Robert Quinn was appointed superintendent of the mechanical department in July 1898 to oversee buildings and machinery.

The course included classroom theory and practical work in equal proportions, with students working on alternate days in field and classroom. Much of the early

development of the College farm was done with student labour, under Quinn's guidance. Quodling also found plenty for the students to do: developing the farm, feeding stock and handling a range of crops and pastures. On Shelton's recommendation, cowpeas, not previously grown in Queensland, were introduced as both a soil-renovating and a fodder crop.

Although enrolments were increasing, the students complained about the College's lack of facilities, the absence of holidays and lack of transport for church attendance. Their discontent reached a climax in May 1898, when they demonstrated by throwing stones and clods of soil on several buildings. The demonstration continued for a week.

After the expulsion of one student and the suspension of another, the remaining thirty-seven signed a petition to the Minister expressing dissatisfaction with the principal. As a result, in June 1898, Agriculture Minister James Chataway chaired an inquiry at the College at which staff members and students gave evidence. The consensus was that Shelton was too autocratic, would not delegate authority, imposed overly severe study requirements, and restricted recreation. In fairness to Shelton, it must be stated that he was not unsympathetic to the students' demands, but that he was conscious of the amount of work needed to develop the College as well as to raise the educational level. Differences in background were another cause of friction: for example, Shelton did not wish to allow a holiday on Good Friday, which was not then a public holiday in the United States (it still is not). He finally conceded, but this and other differences no doubt added to his reputation as a stern taskmaster.

The outcome was that Shelton resigned as principal in June 1898. Much more use could have been made of his knowledge, but he chose to return to America, a sad end to his eight years of dedicated service to the Department and to Queensland's rural industries.

John Mahon

John Mahon was appointed in July 1898 to succeed Shelton. He was well qualified for this position, having had extensive dairying experience in Victoria and with Travelling Dairy No. 2 in Queensland.

In the reorganisation that followed Shelton's resignation, Alexander Boyd, the editor of the *Queensland Agricultural Journal*, became secretary of the College, to be followed by McKenzie Pitt in 1899. Charles McGrath, an assistant instructor in dairying in the Department, became the College's dairy instructor in July 1898 and in August Alexander Watt replaced Quodling as farm foreman. Schmidt resigned in April 1899 and was replaced by Peter Sutherland, who had taught at Ballarat College and at Longerenong Agricultural College in Victoria. Visiting technical officers from the Department also gave educational help.

Mahon initiated more practical instruction at the College. For example, he introduced milk testing, production recording and feeding tests with different rations for cattle and pigs. He recommended the appointment of a full-time experimentalist to take care of farm records. Mahon's policy was to give students experience with all the crops and improved pastures that could be grown in the



Foundation staff and students at the Queensland Agricultural College, 1897. Professor Edward Shelton, principal, is seated centre.



Administration building at the Queensland Agricultural College, a few years after its establishment (Courtesy John Oxley Library, Brisbane)

area, and he also ensured that students learnt to use farm machinery, encouraging them to enter ploughing competitions. Mahon soon found that some students did not wish to undertake the full three-year course, either because they were needed to help on the home farm or because they wished to specialise in a particular aspect of agriculture. To cater for such students, he introduced special courses, a system that worked well.

During his time with the travelling dairy, Mahon had noted the poor quality of Queensland's native pastures in the winter. After coming to the College, he introduced a range of temperate grasses and legumes to provide winter forage. His most successful introduction was the summer-growing paspalum, which soon became the main dairy pasture in south Queensland.

Mahon added to the College's dairy herd with purchases and importations of Ayrshire, Shorthorn, Jersey, Holstein (Friesian) and Guernsey stock. College-bred animals were always in great demand from commercial dairymen. In 1900 the College bought a New South Wales-bred Clydesdale stallion and two Victorian mares, and by 1909 had twenty-four brood mares, whose progeny were turning out well. Two hundred Merinos were bought in 1900 for crossbreeding with Romney and Shropshire rams. The sheep proved useful in keeping down weeds on fallow land, but crossbreeding was abandoned after the flock was severely mauled by dogs in 1904-05. A few purebred Lincoln sheep were acquired in 1908-09, and in 1911 a wool-classing course was inaugurated. This course was taken by the horticulturist James Carew, who was also a qualified wool classer.

In July 1898, the College had about a hundred pigs under the care of A. Cullac. Mahon made the piggery unit an effective teaching and livestock sales centre, and the College's pig section acted as the Department's pig husbandry advisory service until 1923. During this period, the demand for College-bred pigs usually exceeded the supply.

Poultry yards built in 1900 were stocked with fowls of the thirteen best breeds and William Hinde was appointed poultry instructor. He dealt with breeding, use of the incubator and caponising, and kept egg-laying records. A small apiary was also established in 1900, supervised by Robert Quinn. When he left, Hinde took over the apiary.

In 1900, the College began exhibiting at the National Show in Brisbane. The first exhibit included butter, cheese, condensed milk, evaporated milk, bacon, hams and lard. The College's produce was of high quality. By order of the Duke of York, who was in Australia for the 1901 Federation celebrations, consignments of cheese, bacon and ham were sent to HMS *Ophir* for use by the royal visitors.

Hugh Gorrie had developed an excellent orchard and vegetable garden and beautified the College grounds before his untimely death in February 1900. The new horticulturist, C. Cole, took over in the following month but left in 1901. A former student took over the vegetable section in 1902-03 and Samuel Voller, the Department's assistant instructor in fruit culture, supervised the orchard. James Carew was appointed horticulturist in 1903, responsible for the orchard, the vegetable garden and the vineyard that Edward Rainford had established.

Five farm foremen supervised operations in the years to 1911: Harold Quodling, Alexander Watt, Drummond Macpherson, George Brooks and Alfred

Gibson. Brooks and Gibson later became agricultural advisers; Watt and Macpherson became managers of State farms; and Quodling became the first director of agriculture.

Mahon aimed at turning out skilled operators in dairy manufacture. As the number of candidates for the dairy manufacturing course exceeded the number of places available, a special short course was introduced in 1903-04 for students who had had some experience in dairy production. Eighteen students were enrolled. Charles McGrath, the dairy instructor, resigned in 1906 and was replaced by Arthur Graham from New South Wales. Graham's stay lasted just under three years: he left to become general manager of the Queensland Farmers' Co-operative Dairying Company. (Graham rejoined the Department in 1915 as dairy expert and later became under-secretary.)

James Lyle, the College's engineer from 1906 to 1911, encouraged students to study for certificates in engine driving and boiler attendance, issued under the Shop and Factory Acts. By 1911, nearly all the older students left the College with certificates in steam-boiler attendance and engine driving, and could claim experience in handling and operating all types of farm machinery and farm engines.

Brünnich designed the College's basic courses in inorganic chemistry. When he moved to his Brisbane laboratory in 1899, his courses were taken over by Peter Sutherland, the science master, and F. van Nott, the assistant chemist.

Philip McKenzie Pitt taught English and mathematics and also conducted the College's entrance examinations. He found difficulty in arranging courses for students of different ages and varying levels of primary education. The entrance age was raised in 1906 to a minimum of seventeen years, but McKenzie Pitt continued to be concerned at the low academic standard of many students. In 1910, he replaced the English composition course with more practical lectures in business correspondence, bookkeeping and methods of acquiring land under the Land Acts.

In 1904-05 short courses for teachers were inaugurated, to be held in midsummer and midwinter. The scheme was a great success, and the courses were attended by teachers from all parts of Queensland, who passed on to the public and their students new methods in the treatment of animal diseases and the testing of milk and cream. The teachers' schools led to the establishment of experimental plots in schools to demonstrate suitable varieties of grasses and fodder plants for planting locally. These projects were the forerunners of the school agricultural project clubs of later years.

Mahon engaged external examiners to give impartial assessments of College students' work. Examination results were published in the *Queensland Agricultural Journal*, together with the examiners' comments. Seven students who had completed the full three-year course and another three who had completed the requirements in two years graduated with the Diploma of Agriculture in June 1900. These were the first of many graduates who, with the College diploma, were to make a significant impact on Queensland's agricultural development. Three of the original diplomates joined the Department; Dick Soutter had already joined the Department, in 1898, after completing only one year of his course.



Professor Edward Shelton, first principal of the Queensland Agricultural College



John Mabon, principal of the Queensland Agricultural College, 1898-1911



Student teams setting off to work on the College farm, 1913

Mahon's aim was to provide thorough practical training in agriculture, horticulture, dairying, livestock management, bacon-curing, blacksmithing, carpentry and engineering, backed by theoretical studies. 'There is no thought of turning out scientific men', he wrote in a report. 'But no effort is spared in aiding the development of men who will do credit to the institution as advanced agriculturists.'

The College reached a turning point in July 1911 when James Tolmie, the newly appointed Minister for Agriculture and Stock, initiated an inquiry into its educational standard. A former schoolteacher, Tolmie was interested in advancing education. He appointed a committee to review admission and examination standards. Its recommendations included an entrance examination and monthly examinations, an annual inspection, the appointment of external examiners, and the replacement of the system under which students did class work and field work in alternate weeks.

Mahon died on Christmas Day in 1911, aged forty-nine. The Queensland Agricultural College later dedicated the John Mahon School of Food Technology to his memory. On Mahon's death, Quodling became acting principal.

John Brown

The new principal, John Brown, took over from Quodling in January 1913. Deploing the entry of students with poor primary training, Brown framed new courses, a practical farm apprenticeship course for less academic students and a diploma course for the better-educated students. He favoured the affiliation of the College with the University of Queensland and the recognition of certain College courses as part of a Bachelor of Science degree in Agriculture. (This finally came about in 1927.)

Brown was impressed by the dairying course and the dairy facilities that Mahon had established. Anticipating an increased enrolment in 1914, he introduced a two-year course leading to a diploma in dairying. However, the demand for dairy technologists was so great that few students completed the full course but entered the industry with what training they had. Another of Brown's aims was to develop extension work from the College, with staff providing information to farmers through demonstrations and field days.

Brown resigned in 1915 after only two years' service. George Brooks, the instructor in agriculture, took over as acting principal until the appointment of Cuthbert Potts two months later.

Cuthbert Potts

Potts had taught at the Hawkesbury Agricultural College in New South Wales. He declared that the Queensland Agricultural College had had indifferent success as an educational institution, and introduced more scientific courses. He stressed the importance of the classroom for teaching fundamental agricultural principles, with students obtaining experience after graduation by working under a successful farmer.

At the same time, Potts envisaged a broader role for the College and had discussions with the War Council in 1916 on settling returned soldiers on the land.

He suggested that the College provide short courses in farming and also build up poultry stocks for the returned men to start their enterprises. In June of that year, the first returned soldiers arrived to take courses, four in poultry-raising and one in butter-making. In August 1917, John Beard, the College's poultry expert, and a Mr Harwood organised the first of several annual conferences intended to educate the public, returned soldiers and College students in poultry-keeping.

The concept of an agricultural high school was mooted in 1920-21. The committees of College View Primary School and Lockyer High School asked Potts to provide agricultural training for certain students on about two days a week. The students nominated were those who were planning to enter the proposed agricultural section of the Lockyer High School. The idea was adopted in 1925, and an agricultural high school was incorporated in the college system.

The opening of the University of Queensland early in 1911 brought a new educational force into the Queensland system. Professors Steele and Parnell had inspected the College as members of the Tolmie Committee. They believed the College's role was to supply students qualified for admission to a faculty of agriculture that would eventually be established at the University.

In 1916, the University Senate appointed a committee to inquire into agricultural education. The committee recommended that the Queensland Agricultural College continue with its existing functions but raise its standards to meet the conditions for affiliation with the University. The Senate approved the committee's report in December 1917. The Board of Faculties then proposed amending the statutes to allow the Department of Agriculture and Stock to be represented on the Faculty of Science. Harold Quodling (Director of Agriculture), Arthur Cory (Chief Inspector of Stock), Arthur Graham (Director of Dairying) and Cuthbert Potts (Principal of the Queensland Agricultural College) were appointed members of the Faculty of Science, enabling the Department to participate in decisions regarding agricultural education.

The final move to change the status of the Queensland Agricultural College began in 1921. Two public service inspectors investigated the College, and Public Service Commissioner J. D. Story passed on their findings to Agriculture and Stock Minister William Gillies. He pointed out that the College had been established to fulfil four functions: to provide scientific training in agriculture, dairying and animal husbandry; to give students practical training, through work on the College farm; to improve the quality of Queensland's stock by raising purebred livestock and selling the animals to agriculturalists at favourable prices; and to conduct experiments in agriculture. However, the inspectors had reported that the College was not fulfilling the purposes for which it had been established and that it was not achieving results commensurate with expenditure.

The Government then appointed a committee to advise on the reorganisation of the College. Its members were Ernest Scriven as chairman; Arthur Graham; Harold Quodling; R. M. Riddell, Inspector of Technical Colleges; and R. A. Wearne, Principal of the Central Technical College. Their most important recommendation was for the establishment of an agricultural high school and college, and a rural school for day scholars to link up with the high school.

The committee's report was approved in June 1923 and tabled in the Legis-

lative Assembly in the following month. In the same month, the Minister for Agriculture and Stock announced that the operations of the Queensland Agricultural College as it was then constituted would be discontinued. Instead, an agricultural high school and college would be established to provide both secondary and tertiary education in agriculture for youths aged fourteen to eighteen years. The change took place in September 1923.

Cuthbert Potts retired in 1923 and was replaced by J. K. Murray, a trained agricultural scientist. Administration of the new Queensland Agricultural High School and College passed from the Department of Agriculture and Stock to the Department of Public Instruction. But the Department of Agriculture and Stock, which had established the College and administered it for twenty-six years, maintained close links with that institution.

Scientific bodies and far-sighted primary producers pressed for the establishment of a faculty of agriculture within the University. This occurred in 1927. J. K. Murray became the first professor of agriculture, also remaining principal of the College. The College became an integral part of the university system, with University students obliged to undertake one year's practical training there. The limited finances of the State precluded the formation of a completely separate agriculture faculty, and the bond between College and University continued until 1951.

Conclusion

One of the most daring steps the infant Department of Agriculture could have taken in 1897 was to branch out into agricultural education. But southern colonies had established agricultural colleges and demonstrated their value as centres for formal experimentation and training of future agriculturalists. McLean had visited these colleges and felt Queensland should follow the example of its southern counterparts. Although the exercise had its share of problems, the College did raise the level of expertise of a generation of Queensland farmers and Department employees in the years to 1923. It laid a firm foundation for agricultural education in the State, later becoming a major tertiary institution for training agricultural scientists and technologists.

The sugar industry

Sugarcane was grown in Queensland as early as 1828, when it was used as a fence around vegetable gardens at the Moreton Bay Penal Settlement. The first sugar made in Queensland of which there is any official record was manufactured by John Buhôt in 1862 from canes grown in the Brisbane Botanic Gardens. Captain Louis Hope had eight hectares under cane at Ormiston in 1863.

When the Department of Agriculture was set up in 1887 it assumed responsibility for the sugar industry. One of its first tasks was to introduce new types of sugarcane, as many varieties then cultivated performed poorly and were susceptible to disease. In 1893 Henry Tryon and Ebenezer Cowley, manager of Kamerunga State Nursery, brought back many canes, including several wild varieties, from New Guinea. These were multiplied at Kamerunga and Mackay State Nurseries for distribution. One of Tryon's introductions, Badila, was the most popular variety in Queensland for many years.

Another responsibility conferred on the Department was the administration of *The Sugar Works Guarantee Act of 1893*, under which advances were made to farmers' cooperatives to build sugar mills. Before then, all sugar mills had been privately owned and based on large plantations. After subdivision of some of the plantations, the private mills had crushed for nearby farmers. But the system had proved unsatisfactory, and the Act was passed to enable growers to build centrally located mills, mortgaging their land as security for the loans. By June 1897, seven central mills had been built in this way. Administration of the Act and of central sugar mills was transferred to the Bureau of Central Mills, which was set up in the Treasury Department in 1904.

The Department was also called on to assist the sugar industry in disease identification and control. A disease called 'gumming', which made cane difficult to mill, appeared in 1894 and Entomologist Tryon diagnosed its cause as a bacterium that invaded the sap vessels of the cane. He recommended remedial measures including quarantine to prevent the introduction of diseased cane, and the establishment of a sugar experiment station to scientifically examine all phases of cane-growing.

The biggest problem for the sugar industry in the 1890s was cane insect pests, particularly the grub of the cane beetle. In 1895 Tryon published *Grub Pests of Sugar Cane*. His field investigations had shown that one species of grub could cut yields

by half by feeding on the cane roots. Tryon suggested, among other remedies, fumigation with carbon bisulphide. Local committees of sugar growers were formed in 1897 to fight the grub, but it continued to be a serious cane pest.

In 1895 Professor Shelton listed varietal testing, research into fertiliser usage and irrigation, and chemical analyses of cane as the immediate needs of the sugar industry. This list represented some of the work done by the Department and foreshadowed some of the work later undertaken by the Bureau of Sugar Experiment Stations.

The Bureau of Sugar Experiment Stations

By 1894, growers had begun agitating for sugar experiment stations and laboratories along the lines of those in certain overseas sugar-producing countries. They were dissatisfied with the State nurseries because of the lack of scientific investigation into soils and sugarcane varieties. Both Henry Tryon and Agricultural Chemist Johannes Brännich strongly supported the scheme, so in 1898 Thynne, the Minister, had a laboratory added to Mackay State Nursery, with Arthur Ramsay the first chemist in charge. The growers were appeased for a short time, then began agitating again for a full-scale sugar experiment station. In 1899 the Mackay State Nursery was closed, to become the site of a sugar experiment station. At the same time, the growers asked the Government to invite Dr Walter Maxwell, then Director of the Sugar Experiment Station of the Hawaiian Sugar Planters' Association, to visit Queensland and advise on the industry. He arrived in 1899 and reported on the industry, pointing out the need to establish sugar experiment stations. After Maxwell returned to Hawaii, Cabinet asked him to come to Queensland as director of sugar experiment stations. He was asked to name a salary and cabled back 'three thousand', meaning dollars, but his answer was misinterpreted: Maxwell was appointed at a salary of £3000 a year while his deputy, Harry Easterby, received only £125 a year.

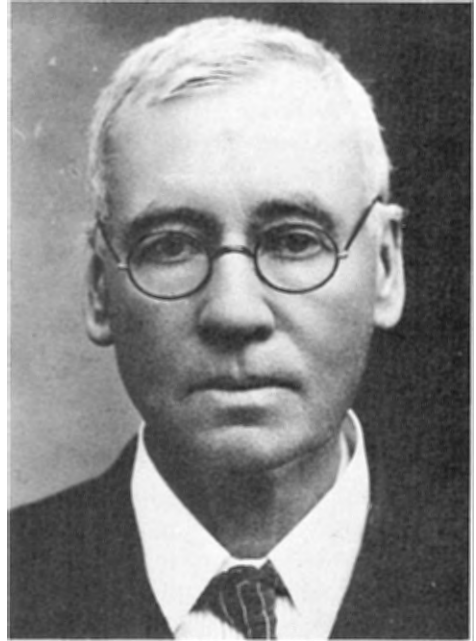
The Sugar Experiment Stations Act of 1900 provided for the establishment of a bureau to control sugar experiment stations and created a sugar fund at the Treasury. Cane received by mills was levied annually, with half the levy paid by the grower and half by the mill, and these contributions were matched by the Treasury. The director of the Bureau of Sugar Experiment Stations (BSES) was to submit an annual report direct to Parliament. Thus the Bureau began as a semi-autonomous body, with its own source of funds, set up outside the main administration of the Department to service a specific industry.

After he took up his appointment, Maxwell recommended establishing sugar experiment stations at the Bureau's headquarters at Bundaberg and at Mackay and Mulgrave. The existing station and laboratory at Mackay were used as headquarters until completion of the new headquarters and main laboratory at Bundaberg in 1901. The move to set up sugar experiment stations was timely, because sugar was fast becoming Queensland's most important agricultural crop.

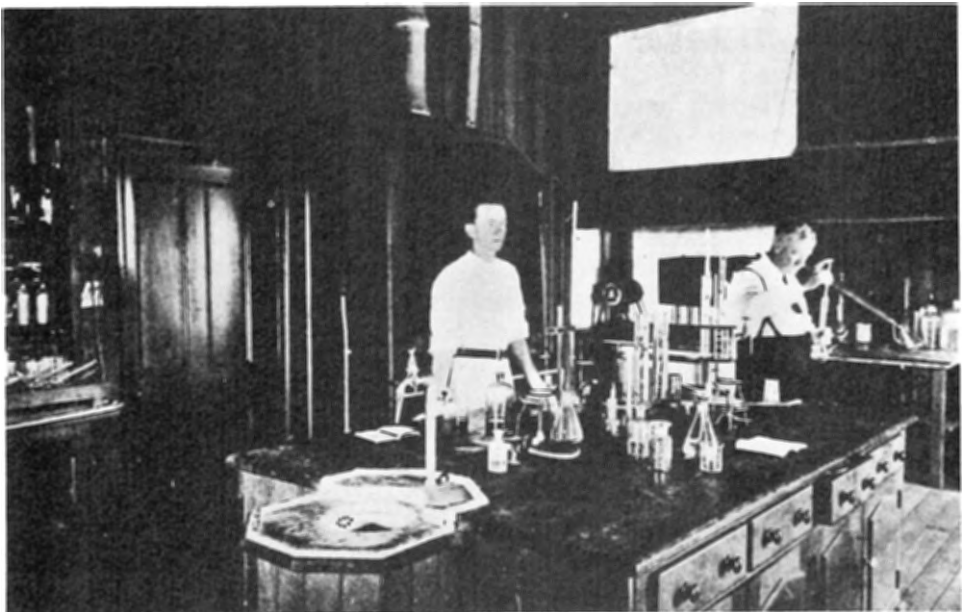
Harry Easterby was assistant director in charge of the Mackay station. The first chemists at the laboratory there were Firman Thompson (who returned to the United States in 1902), Dr A. J. Gibson, George Patten and Albert Anderson, a



*Dr Walter Maxwell, Director of the Bureau of
Sugar Experiment Stations, 1900-09*



*Harry Easterby, General Superintendent, Bureau of
Sugar Experiment Stations, 1912-21, and Director,
1921-32*



Laboratory at the Mackay Sugar Experiment Station in the 1920s

foundation diplomate from the Queensland Agricultural College. Alexander Henry, who was later secretary of the Central Sugar Cane Prices Board, was the Bureau's first secretary.

As director of the Bureau, Maxwell made some notable improvements to Queensland's sugar industry. For example, at his suggestion, in the 1904-05 season the quality of sugar, as ascertained by polariscope, was taken into account. Until then, only the weight of sugar had been recorded by the mills. A sugar content of 94 net titre (n.t.) was adopted as the quality standard.

Maxwell left the Bureau in March 1909. It then came under the control of the Department of Agriculture and Stock, with the Under-Secretary, Scriven, appointed its director. Scriven promised to extend experimental work in the Bundaberg and Cairns districts, introduce new varieties of cane, provide chemistry laboratories, improve milling practices, and educate cane-growers.

Easterby was appointed general superintendent of the Bureau but resigned in 1910 to take up a position with the beet-sugar industry in Victoria. He was succeeded by Dr Gibson, who served for twenty-two months. In 1912 Easterby returned to the Bureau, regaining the position of general superintendent, then becoming director in 1921, a position he held until his death in 1932. He made a major study of the sugar industry, published as a series of articles in the *Queensland Agricultural Journal* in the years 1930-32.

Since 1901 Bundaberg had been the headquarters of the Bureau, but in 1910 the laboratory and administrative office there were closed and the general superintendent transferred his office to Brisbane. In 1913 the Department bought 18 hectares of land in the Woongarra district for a new sugar experiment station.

In 1912-13 the Department commissioned T. H. Wells, of Childers, to collect sugarcane varieties in New Guinea. Wells had the foresight to leave a duplicate set of the varieties he had collected (almost one hundred and sixty), from mountainous areas, at the experiment farm at Hombron Bluff in New Guinea. Only fifty-nine varieties germinated at Mackay and the Department was able to draw on the duplicate material. These New Guinea selections were tested at Bundaberg and Mackay over the next few years.

Two instructors in sugarcane culture, one for the southern area and one for the north, were appointed in 1911 to implement Scriven's educational programme. An entomologist, Alexander Girault, was appointed at the request of growers to investigate the white grub of the greyback cane beetle. He set up a laboratory at Gordonvale, the modest beginning of the Bureau's entomological division which, when it moved from Gordonvale to Meringa in 1917, had as its members Dr James Illingworth, Edmund Jarvis, Alexander Girault and Alan Dodd.

Illingworth, appointed entomologist in June 1917, had been Professor of Entomology at the College of Hawaii and had worked with the Colonial Sugar Refining Company in Fiji. Soon after joining the Bureau he published *Australian Sugar Cane Beetles and Their Allies*, one of the finest treatises on sugar presented in this country. Illingworth remained with the Department until 1921, working with Edmund Jarvis, who continued his study of cane beetles.

An experiment station was established at South Johnstone in 1917 under Peter McWalters, who remained in charge until he retired in 1927. This station's main

function was plant breeding; it produced the popular 'S.J.' canes. In 1934 the station was transferred to the Department's agriculture branch and became the headquarters of the Bureau of Tropical Agriculture (see Chapter 17).

Sugar legislation

After Federation, the Commonwealth Government played a large part in the control of the sugar industry, leading to many changes. Commonwealth legislation enforced the repatriation of South Sea Islanders, who had worked as indentured labour in the canefields since the 1860s; the markets of the other States were now open to Queensland sugar through provisions for free trade between the States; and the Commonwealth imposed a protective duty on all imported sugar, with imported beet sugar attracting a much higher duty than cane sugar.

The first Act of the Commonwealth Parliament regulated and eventually prohibited the use of Islander labour, and the Islanders were repatriated by the end of 1906. Through Excise Tariff Acts in 1902 and 1905 and a Sugar Bounty Act in 1905, the Commonwealth encouraged growers to use only European labour and gave them financial aid. In 1910, the Commonwealth fixed wage rates and working conditions for the sugar industry. A Royal Commission in 1911 recommended abolition of the bounty and excise, provided the Commonwealth Government took whatever steps were necessary to promote the white labour policy and ensure the maintenance of a living wage in the sugar industry.

In 1913, the Commonwealth regulations that had governed the sugar industry since 1902 were abolished. The Queensland Government resumed responsibility for the sugar industry through a number of Acts covering payments to growers, wage rates and working conditions, labour preferences, the regulation of sugarcane prices and sugar-acquisition powers. These Acts were administered by the Department of Agriculture and Stock.

The Regulation of Sugar Cane Prices Act of 1915, an important piece of legislation, set up local cane prices boards and a central cane prices board, within the Department, to oversee their operations. Alexander Henry, the first secretary of the Bureau of Sugar Experiment Stations, was also the first secretary of the Cane Prices Board. The board employed an inspecting chemist and cane testers to ensure that payments to suppliers were based on correct sugar-content readings from independent juice analysis as farmers did not trust the mills to produce correct readings.

Conclusion

Early concern with the future of the rapidly developing sugar industry led to the establishment of the Bureau of Sugar Experiment Stations. The Bureau became the arm of the Department concerned with the production side of the industry, but operated entirely from trust funds derived from a production levy and government grant, and under its own Act of Parliament. Thus it was able to develop its own research, extension and regulatory activities, separate from the main body of the Department.

8

Other crop industries, 1887-1919

The Department played a part in the development of many crops other than sugar in its first few decades. Its officers concentrated on crops that would provide food for the State's population, but also gave attention to those with export potential. Many have become major industries that today make an important contribution to Queensland's economy, producing food and fibre for domestic use and for export.

Wheat

The Department's first major task was to address the problem of rust in wheat, the scourge of wheat production from Queensland's early days. In 1889 it obtained seed of wheat varieties that were claimed to be rust-resistant. This seed, which had come from many sources, was distributed to two hundred growers, but only thirty-eight succeeded in growing crops without serious loss from rust.

Shelton and McLean represented Queensland at the 1890 Melbourne conference on rust in wheat, at which delegates proposed that each colony experiment in rust control. As Queensland had no experiment farm, two farmers collaborated with the Department in rust-control trials. Neither trial was successful, and the treatments attempted indicate how little was known of the causes of rust at that time.

At the second rust in wheat conference, held in Sydney in the following year, delegates recommended that the colonies continue to import, select and breed wheat varieties to develop rust resistance. Delegates at the third conference, held in Adelaide in 1892, urged departments of agriculture to set up laboratories to carry out milling tests and appointed a committee, of which Shelton was a member, to systematise variety names.

The fifth conference, held in Melbourne in May 1896, was to deal with rust-resistant wheats and their milling qualities and was open to wheat growers, millers and scientists. Unfortunately, the millers boycotted the conference because of their preference for the older wheat types — the rust-resistant wheats were harder to grind and provided a darker flour. The conference was successful nevertheless, in that researchers and growers exchanged ideas and updated rust-research information.

Shelton, himself a former wheat breeder, took a particular interest in Queens-

land's wheat industry. In 1894–95 he extended his variety experiments from south to central and north Queensland. In the bulletin *Wheat Growing in Queensland*, published in 1892, Shelton had indicated where wheat could be grown. It was clear that there was room for improvement in the local industry, for while Queensland grew only 16 400 tonnes of wheat in 1896, the colony imported 23 500 tonnes of wheat and 33 500 tonnes of flour.

In his annual report for 1896, Shelton wrote that a farm was needed for wheat research. He forecast that the drier lands west of the Great Dividing Range would become the wheat-growing centre of Queensland and urged that a farm be set up in that area. Westbrook and Hermitage State Farms were established in the following year, and Roma was set up in 1906. All three farms trialled and selected wheat varieties, and produced seed for growers.

Maize

Maize was first grown in Queensland in the 1820s, at the penal settlements around New Farm and Bulimba and at Ipswich. By 1887 it was the major crop in south Queensland, grown mainly to produce grain for home consumption and for sale as stock feed.

By the 1890s farmers wanted better varieties. The Department imported seven varieties of seed maize from America in 1893. These performed reasonably well and set the scene for further maize improvement by the Department, which again imported seed from the United States in 1913–14. A maize-growing competition was arranged in 1914, and field staff of the Department initiated a maize-improvement scheme in 1915. Stud plots of the imported varieties were grown and seed was sold to farmers. Quodling, Director of Agriculture, also set up maize experiments.

By 1917, the Atherton Tableland led the State in maize production. But southern buyers offered lower prices because the moisture level of the northern maize was too high. To overcome the problem, the Department provided a moisture-testing meter at Kairi State Farm to check samples of the crop.

Rice

Rice was grown in the Brisbane Botanic Gardens and by Louis Hope at Cleveland in 1861. In 1869, Alexander Boyd, later editor of the *Queensland Agricultural Journal*, began growing rice on his sugar plantation, 'Ormeau', on Pimpama Island. Boyd used Japanese seed, which he distributed to local growers. The Acclimatisation Society distributed seed in 1871, and the Brisbane Botanic Gardens imported seventeen varieties of rice from India in 1878.

Only 233 hectares of rice were grown in Queensland in 1887, mainly by Chinese farmers around Cairns. But the continued use of local varieties caused yields to drop. Sir Thomas McIlwraith, a senior politician, obtained eleven varieties from India in 1891; these were grown at St Helena Penal Establishment and at the State nurseries. The Department also imported new varieties from India, China and Japan in 1892.

By the late 1890s rice-growing was concentrated in north Queensland,

although the industry still hung on in the Pimpama district south of Brisbane. But production had declined and in 1899 Queensland produced less than one-sixth of its annual rice consumption, the result of the Chinese growers in the north turning to the more profitable sugar and banana crops. By 1915, the area under rice in Queensland had dropped to only one hectare.

However, a farmer near Atherton obtained a good rice yield in 1916 and this aroused local interest. In 1917 the Department bought a rice mill to treat grain produced by growers on the Atherton Tableland. Northern Instructor in Agriculture Norman Pollock was interested in developing the rice industry in the north and the Department distributed a large quantity of upland rice seed to prospective growers.

Sorghum

One of Queensland's major cereal crops today, sorghum was late in reaching a position of prominence. Growers had concentrated on maize, which was easier and cheaper to hand-harvest, for their summer grain crops. But as grain production spread into drier areas, the growers realised that sorghum could replace maize. Demonstration and seed-propagation plots of some twenty sorghum varieties, including grain types, were planted throughout Queensland in 1915-16. However, virtually all the crop was used for silage production in the absence of the machinery necessary to handle the grain.

Potatoes

Potato-growing had been the small farmer's standby since the first settlement and improved varieties were constantly being introduced. The Department obtained a new variety from Victoria, White Elephant, which fortunately belied its name and gave good yields in all districts.

In 1891 Tryon identified a mild form of Irish blight, a devastating potato disease, when it appeared in the south-east corner of Queensland. A more serious outbreak occurred in 1909-10, and the disease quickly spread from the border to Bundaberg and west to the Dividing Range. Tryon again identified the disease and the Department sent a spraying plant into the affected districts, also giving demonstrations in disease control to farmers. Imports of potatoes were strictly supervised and no potatoes might be sent north unless inspected and awarded a certificate of health. In 1915-16, some forty imported potato varieties were grown at Stanthorpe for seed multiplication.

Arrowroot

Arrowroot (*Canna edulis*) was an important crop in the Logan district from the 1880s, processed by local mills. These mills had difficulty breaking into the London market, for West Indian arrowroot (*Maranta arundinacea*) was the only arrowroot registered under the Food and Drug Act of Great Britain. The West Indian planters had pressured for changes in the Act, so that the Queensland product, which was claimed to be inferior to the West Indian, had to be sold under

the distinctive name 'Queensland arrowroot'. However, the Department's agricultural chemistry laboratory found that the two products were of equal quality, and Queensland arrowroot was accepted on the world market.

Cotton

Cotton was one of Queensland's earliest crops, having been grown at the penal settlement on Stradbroke Island in 1827. Shortages caused by the American Civil War (1861-65) led to the first boom in cotton-growing in the colony. Cotton was the basis of many land-settlement schemes, and both John Dunmore Lang and Henry Jordan brought intending cotton farmers from England and Europe as migrants.

When the Department was formed in 1887, no cotton was grown commercially in Queensland. America had regained its dominance of the world cotton trade, and the local industry had declined rapidly after record production in 1872. But the Government promoted the industry, and in 1891 the Department imported a large quantity of seed from America. It was distributed to growers in the West Moreton district, where the crop proved highly satisfactory.

The control of bollworms in cotton was a major topic at the 1892 Beenleigh Agricultural Conference, at which mention was made of a 'strawsoniser', a device to spray insecticide on the crop. After the conference, the Department bought one of these machines. It was worked by a horse, covered one to two hectares an hour and sprayed vertically as well as horizontally. The insecticides of the day were, however, no match for the bollworm. This is a native cotton pest whose effects on productivity are similar to those of the American boll weevil.

The industry revived in the 1890s when the government-subsidised Ipswich Cotton Company began operations. The subsidy was to be £5000 for the first five thousand yards of cotton goods manufactured. The goods were made, but production ceased after the subsidy was paid. The company ceased operations in 1897 and the cotton industry again declined.

Cotton experienced a third revival after the 1902 drought, when the crop had given yields despite the dry conditions. At the same time, the British Cotton Growing Association was keen to extend cotton-growing in the British Empire because of a shortage of the raw material from America. In 1903 one of its representatives visited Queensland and, with Daniel Jones, Instructor in Cotton Culture, inspected areas in south-east Queensland and the Darling Downs, Maranoa and North Coast districts. Their reports were favourable and led to renewed interest in cotton-growing. Peter McLean predicted that cotton would become an important crop, but not a staple industry.

In 1904 the Department obtained three tonnes of cotton seed from the United States and sold it to growers at cost. In the same year, seed of thirteen varieties was supplied to Westbrook, Hermitage and Biggenden State Farms and to the Kamerunga State Nursery. Gindie State Farm and the Queensland Agricultural College also trialled cotton.

To handle the 1905 crop, the Department took over the premises of the old Ipswich Cotton Company and put the equipment in order. It ginned cotton for

growers from the Maranoa and Mitchell districts in the west to the central and Atherton districts. In 1906 an old saw gin was built at Kamerunga to handle cotton from small farms and the next year it was lent to the Yarrabah Mission to treat its crop. Kitchen and Sons also set up a ginning mill in Ipswich. Joyce Brothers, of Sydney, bought the Ipswich Cotton Mills from the Department in 1907.

Under the Commonwealth Government's *Bounties Act* 1907, ginned cotton and seed supplied to an oil mill were eligible for a bounty. This kept the industry alive, but production remained low. In 1913, the Queensland Government provided an advance on seed cotton and some new varieties were imported from the United States and Egypt. But the industry received a severe setback when the Commonwealth Government refused to give tariff protection to sacking and stockingette covers for bananas. These products had been manufactured by Joyce Brothers in their Ipswich mill, which they were forced to close in 1915.

When Joyce Brothers closed their mill, the Department tried to prevent the total abandonment of the cotton industry. It operated a gin in the William Street complex, and undertook to receive, gin and sell growers' cotton on a cooperative principle. The ginned cotton was sold to McDonnell and East, of Brisbane, who used it in the goods they manufactured. The Department also had growers' cotton ginned privately under contract.

Sisal hemp

The Department obtained one thousand sisal hemp plants from Mexico in 1892. Some were given to farmers and others were planted at Kamerunga State Nursery and on Fraser Island. Ebenezer Cowley, Kamerunga's manager, suggested that sisal might be used for defence, as it would be similar to a barbed wire entanglement: 'A grove of agave would be impassable to troops unless laid low by artillery', he wrote. Sisal plants and Mauritius hemp were sent to Thursday Island, to be used in coastal defences erected there.

In 1905 Under-Secretary Scriven reported that sisal-growing was established in areas where the temperature did not fall below 5°C and the soil was formed on limestone. A Brisbane engineering firm made scutching machines (machines to dress the fibre) for use on small plantations, and in 1906 the Department experimented with the machines, using sisal grown at St Helena. By 1907 the Department and private nurserymen had supplied nearly half a million plants to intending growers. Some forty-five thousand plants and bulbils were distributed from Kamerunga alone in just one year. Planting material was also exported to New Guinea, the Solomon Islands, Fiji and New South Wales.

Tobacco

In Queensland's early days some farmers saw tobacco as a viable cash crop, with markets both at home and abroad. Tobacco was first grown by Chinese farmers, who clung to their traditional methods and did little to improve the quality of the leaf. But Europeans started growing the crop in the Rockhampton area in 1879 and on the Dumaresq River near Texas in 1883.

In 1890 the Department appointed Samuel Lamb as tobacco expert for a three-year term. Lamb visited tobacco-growing centres from Port Douglas to Goondiwindi, and reported that tobacco had not been successful in north Queensland. To help growers, he wrote *Tobacco: Its Cultivation in North Queensland* (Bulletin No. 6, published in November 1890). At the expiry of his term, Lamb moved to the Department of Agriculture in New South Wales.

Shelton wrote in 1895 that everything connected with growing and curing tobacco in Queensland was out of date and that more progressive growers were needed, and Robert Nevill was appointed tobacco expert two years later. The Department decided to test the value of Queensland tobacco on the English market, but a shipment that had been cured and packed at the Queensland Agricultural College was declared by the London experts to be coarse and deficient in flavour.

The Department then set out to improve tobacco quality in Queensland and in 1900 established an experimental tobacco farm on leased land near Texas. Good-quality leaf was grown, and Nevill conducted varietal testing there from 1904. The Department gave up the experimental farm in late 1906, believing that sufficient demonstration had been given, and Nevill turned his attention to the north, where Proserpine, Bowen and Cardwell were the main tobacco-producing centres. He laid out experimental plots at Kamerunga State Nursery, where a curing shed was built in September 1908.

Nevill retired in 1913, after sixteen years as tobacco expert, and tobacco production declined. Manufacturers were allowed to import leaf and this restricted local production. In 1921, Quodling, Director of Agriculture, blamed the industry's decline on the lack of an instructor experienced in modern methods of growing and curing the leaf.

Coffee

Coffee was another crop that was heavily promoted by the Department in the early days but failed to develop into a thriving industry. It was grown in the Brisbane district as early as 1836, and in 1862 a nursery plantation was established in the Brisbane Botanic Gardens, from which the Department later sent out several thousand plants to prospective growers. In 1892, the Under-Secretary reported that the Department was receiving inquiries about coffee-growing and had supplied trees to farmers. In that year Kamerunga State Nursery, the supplier of seed for all the northern plantings, grew both Arabian and Liberian coffee, but the Liberian coffee did not perform well.

The Department hoped coffee would prove a viable crop for the colony, especially after the collapse of the coffee industry in Ceylon (now Sri Lanka) caused by coffee leaf disease. Importation of planting material from Ceylon was prohibited because of the disease, and in July 1899 a packet of coffee seeds from India was confiscated by the Post Office in Brisbane, despite protests by the consignee, to protect the Queensland industry.

The high cost of labour and the lack of a local market, with tea the preferred beverage in the colony, were barriers to the coffee industry in Queensland. Trial

shipments to London proved that the quality was satisfactory, but the colony's tea drinkers would not be converted. However, the Department continued to promote the industry. David Buchanan, the overseer of Mackay State Nursery, published several articles on the success of coffee-growing around Mackay in the *Queensland Agricultural Journal* when it was started in 1897. In 1898 Howard Newport was appointed instructor in coffee culture, based at Kamerunga, and 283 hectares were under coffee by 1901, with the beans all sold locally. In 1904-05, coffee-curing rooms were provided at Kamerunga and much of Newport's time was spent treating beans sent in from all parts of north Queensland. The Department sold this coffee in Sydney on behalf of the growers.

Coconuts

McLean's ill-fated coconut-planting scheme deserved a better outcome than it had. The coconut is not native to north Queensland and many palms growing today are no doubt the progeny of the Department's plantings in the 1890s. McLean devised a scheme to plant coconuts on the islands off the north Queensland coast to provide food for survivors of shipwrecks and to establish a copra industry: he believed the colony might gain revenue by leasing the trees.

McLean obtained planting material from New Guinea, Fiji and Tonga, and in 1890 appointed J. Armitage superintendent of coconut planting. Over the next two years, he set out 6700 coconut palms on islands between Mackay and Cairns, also planting mangos, guavas and kauris. In 1892, Joseph Griffiths took over the project. The Department expected the early coconut plantings to bear in 1896 or 1897 and hoped that the palms might be leased. But they failed to bear because of drought in 1895, and the project lapsed.

The Department found it could not protect the new plantations from fire and vandalism as the islands were easily accessible to camping and fishing parties. It later tried mainland plantings, putting in a demonstration plot of one thousand palms at the Townsville Stock Experiment Station when it was established in 1914.

Rubber

Rubber was another tree crop that seemed promising in the early years of the twentieth century. The Department vigorously promoted the crop but the expected profits did not materialise. In 1895, Ebenezer Cowley, manager of Kamerunga State Nursery, planted seed of several species of rubber, including the common Para rubber, obtained from New Guinea. Two years later, however, he reported that the climate was too dry and too cool for the plants he had tried.

In 1906 Howard Newport reported much interest in rubber in north Queensland; he held that the Kamerunga trials had shown that rubber could be grown successfully. In that year the demand for Para rubber seed exhausted the supply and Henry Tryon imported seed from South-east Asia. Newport then wrote several articles on rubber-growing, which appeared in the *Queensland Agricultural Journal*, and toured south India and Ceylon at his own expense to study the crop, publishing his findings on his return. In 1909, Newport listed a large number of

rubber-bearing plants under investigation at Kamerunga. Unfortunately, one of these was the rubber vine, *Cryptostegia grandiflora*, which is now a serious pest in coastal areas in central and north Queensland.

The demand for Para rubber seed was so great in 1910 that the Department proposed planting a seed-production area at Kamerunga. The State nursery continued to supply planting material and in 1911 some three thousand plants and five thousand seeds were supplied to a company planting Para rubber along the Daintree River. But when the price of rubber dropped substantially in 1913 the industry became uneconomic in Queensland.

Fruit

In the absence of an instructor in fruit culture, Colonial Botanist Frederick Bailey represented Queensland at fruit conferences held in Tasmania and New Zealand early in 1896. The staffing gap in the Department was filled by the appointment of Albert Benson as fruit expert in November. A year later, he was promoted to the position of director of State farms and instructor in fruit culture. In 1899–1900, Benson carried out insect-control experiments, concentrating on scale insects and the fruit fly. Samuel Voller, whose major interests were fruit-packing and the supervision of orchards on State farms, was appointed assistant instructor in fruit culture in 1898.

Queensland's main commercial fruit crops in the 1880s were bananas, pineapples and oranges. Fruit production expanded in the 1890s, when trial shipments of citrus fruit were sent to Canada and England and interstate markets for bananas, oranges, tomatoes and cucumbers were developed. By 1906, some half-dozen firms were canning pineapples, producing more than five thousand cases a year, and pineapple pulp sent to London by the Zillmere Canning Association brought good prices.

Benson resigned from the Department in 1910 to become director of agriculture in Tasmania, but returned to Queensland in 1915 as director of fruit culture. In his absence, the position of instructor in fruit culture was filled by Charles Ross, formerly manager of Hermitage and Westbrook State Farms. In 1918, Ross was transferred as senior fruit instructor to the Coominya vineyard set up near Gatton to produce phylloxera-resistant rootstocks.

Bananas

In the late 1880s, bananas were grown mainly by Chinese farmers around Cairns, Port Douglas, Cooktown, Mourilyan and Townsville. Plantings were later made in south-east Queensland, in the Maroochy and Logan districts. But the need to transport the fruit long distances to southern markets limited production, and the Department introduced banana varieties from Java and New Guinea in 1892, hoping that they might withstand longer sea voyages than the varieties then grown.

Since 1889, Victoria had refused to accept Queensland bananas unless they were accompanied by a certificate of cleanliness. In April 1905, Victoria prohibited the entry of Queensland bananas unless they had been covered for two

months before export to guard against introducing the Queensland fruit fly into that State. Departmental researchers found that stockingette, which was used to cover meat for export, was suitable for this purpose. In 1906-07 the Department bought a large quantity of the material and distributed it to growers in north Queensland.

After World War I a shortage of ships made marketing to southern States impossible, and the north Queensland banana industry declined. Sugar largely replaced bananas in the north, and banana-growing moved to the south-east. The introduction of the 'fast fruit train' service through Wallangarra in 1917 facilitated the marketing of south Queensland bananas in the southern States and accelerated the move.

Pineapples

Half Queensland's pineapples were grown in the Brisbane district in 1887, mainly at Nudgee and Nundah. Other production areas included Maryborough and Mackay, and within a decade the Cairns and Logan districts had entered the market. In 1892 thirteen cases of pineapples from Nundah were sent to San Francisco to test the American market. Packed in various ways, the fruit was found to travel best unwrapped in open cases. Unfortunately, though, the pineapples had been picked in hot weather and sent to Sydney for shipment. The fruit ripened too quickly because of the early heating, and the whole consignment was lost.

Citrus fruit

In the 1890s citrus fruit was grown mainly in south-east Queensland. The Moreton district was the main supplier, but small areas were planted at Maryborough, Rockhampton and Cairns. Oranges occupied 400 hectares in 1887, increasing to 800 hectares in 1897. Shelton experimented with cool storage of citrus fruit in 1892-93, and proved that it could be landed in England if cool storage chambers were provided in transit.

Viticulture

Several vineyards existed in south-east Queensland when the Department of Agriculture was founded, and the Department immediately set about improving production. In 1889, it imported American seed of the Riverbank grape variety, which was resistant to *Phylloxera*, a devastating disease, and was widely used in Europe and America as a rootstock. This seed was grown in Queensland to provide a nucleus of resistant rootstocks, and two years later the Department imported raisin and currant grape cuttings from South Australia and Victoria for distribution to growers in western Queensland.

In 1888 McLean had inspected the main vine-growing and wine-making centres in south Queensland, and recommended the appointment of a viticulture expert. Edward Rainford was appointed viticulturist from January 1898 and held the position until it was abolished in December 1903. He established vineyards on State farms and at the Queensland Agricultural College, and contributed a series of articles on viticulture to the *Queensland Agricultural Journal*.

The vineyards on the State farms were only moderately successful. Those at Gindie and Hermitage were abandoned by 1904, but the Roma vineyard survived anthracnose and marauding birds long enough for Richard Soutter to try his hand at grape breeding in the 1920s. The State farms did, however, supply large quantities of cuttings and phylloxera-free stocks to growers.

After the position of viticulturist was abolished, the remaining State farm vineyards were supervised by the instructor in fruit culture. An experimental vineyard was planted at Coominya in 1916-17, under Charles Ross, Senior Instructor in Fruit Culture. Its aim was to supply rootstocks resistant to *Phylloxera* and with some tolerance to anthracnose and *Oidium* diseases. Although the vines did well at first, by 1922 it had become clear that grapes grown on the coast were susceptible to fungal diseases and the vineyard was closed.

Pastures

Exotic grasses and legumes were introduced to improve the nutritive value of native pastures long before the Department was formed. By the early 1860s, lucerne was common around Brisbane and other pasture species were introduced by the Acclimatisation Society, the Botanic Gardens and private collectors.

Paspalum was the first successful pasture species the Department introduced. John Mahon, principal of the Queensland Agricultural College, obtained seed for experimental purposes in 1898. He found that the plant was suited to cooler areas with high rainfall, and distributed planting material to dairy farmers in south-east Queensland.

An interesting and important event occurred in 1913-14 when veterinarian George Tucker submitted for analysis a sample of a 'leguminous weed' that had been collected from the Townsville Quarantine Reserve. It was widespread around Townsville and cattle were said to thrive on it. The 'weed', which proved to have a high protein content, was *Stylosanthes humilis*, commonly named Townsville stylo. This tropical legume was highly valued in north Queensland, but in 1977 it was decimated by anthracnose.

In 1917, Government Botanist Cyril White was Queensland's representative on an interstate committee formed to collect and propagate promising grasses and fodder plants. In 1919-20, White obtained roots of kikuyu grass and distributed them around Queensland. This species proved suitable for subtropical dairying districts, particularly the Atherton Tableland.

Fodder conservation

Farmers soon realised that Queensland's dry, cold winters could not produce native pastures good enough for sustained milk production. This was especially the case in north Queensland, a fact that did not escape John Mahon. As manager of Travelling Dairy No. 2, Mahon had advocated growing supplementary fodder crops for winter feed. He was probably one of the first people in Queensland to see this measure as a way to plug the winter fodder gap.

Early agricultural advisers recommended that summer crops be grown and ensiled for use in winter. Before World War I, the Department encouraged silage-



Harold Quodling, Director of Agriculture, 1915-31 Albert Benson, Director of Fruit Culture, 1915-27



Instructor Burnett supervising the loading of pineapples grown at the Beerburrum Soldier Settlement, 1921

making. Experiments in silo construction, using various materials, were made at the Queensland Agricultural College, and in south and central Queensland. Silos were also used on the State farms.

In 1913-14, Agricultural Adviser Quodling demonstrated stack-silage methods and published a pamphlet on the subject. In the bad drought of 1915-16 the Department encouraged farmers to plant four hectares of maize for silage on each farm. In 1917, the scheme was again pursued and dairy inspectors were given a course in fodder conservation at the Queensland Agricultural College.

Weeds and seeds

The history of the spread of weeds of cultivation and pasture in Australia shows that most of the more serious weeds were brought in from overseas. For example, Noogoora burr entered this country in cotton seed from the United States. As early as 1907-08, the Chatsworth Farmers' Association (Gympie) asked the Department to inspect all imported farm seeds for contamination.

The Pure Seeds Acts of 1913 and 1914 came into force in January 1915, and Frederick Coleman was appointed inspector and expert. Nearly half the samples of seed he examined in the next three years were condemned, proof that the Acts were necessary. After the 1919 drought the Department leased commercial seed-grading and cleaning premises at Toowoomba to ensure that high-quality seed would be distributed.

Prickly pear

Prickly pear had become a serious weed pest in Queensland by the time the Department was formed, and in 1910, under the Local Authorities Act, it was declared a noxious weed. The first decisive action in the campaign against prickly pear was the formation of the Queensland Board of Advice on Prickly Pear Destruction, set up by the State Government in May 1911. Its members were Professor B. D. Steele (chairman), Henry Tryon (entomologist, Department of Agriculture and Stock), J. B. Henderson (government analyst), John Bailey (director of the Botanic Gardens), and Professor A. J. Gibson and Dr T. Harvey Johnston (of the University of Queensland).

In 1912 the Queensland Prickly Pear Travelling Commission was set up. Its members were Dr Harvey Johnston and Henry Tryon, with C. W. Holland of the Lands Department as secretary. The commissioners spent two years investigating natural enemies of the plant, visiting almost every country in the world where cacti were either indigenous or naturalised. When they returned to Queensland in 1914, they recommended introducing some of the natural enemies of prickly pear in the Americas. It is believed that they also brought back from the Botanic Gardens at La Plata, Argentina, *Cactoblastis cactorum*, a moth whose larvae fed on the prickly pear. But attempts to rear these larvae to maturity in Queensland failed.

In 1919, the Board of Advice was disbanded and the Commonwealth Prickly Pear Board was set up. Responsibility for the biological control of prickly pear passed out of the hands of the Queensland Department of Agriculture and Stock

and its representative, Henry Tryon. Ironically, the cactoblastis that Tryon had failed to acclimatise in 1914 ultimately brought about the destruction of prickly pear. The insect was reintroduced in 1925 by Alan Dodd and John Mann, and by 1930 had succeeded spectacularly in eradicating prickly pear. Dodd, an entomologist with the Bureau of Sugar Experiment Stations, had transferred to the Board in 1920. (The Lands Department northern weeds laboratory, in Charters Towers, opened in 1985, is named the A. P. Dodd Northern Weeds Research Centre in his honour.)

Conclusion

Although some cropping industries existed in Queensland before the Department was established in 1887, the colony had no facility to advise farmers on the best methods of production or obtain and test better varieties and new crops. The picture changed with the formation of the Department, especially with the appointment of experts in each of the major crop industries, and the establishment of State nurseries and State farms to introduce and test the various crops. Attention to pest and disease problems and regulations to improve seed quality also greatly improved Queensland's cropping industries.

9

Plant pests and diseases

From their beginnings, Queensland's agricultural industries were troubled by pests and diseases. Many problems had been caused by indigenous species, but some of the most devastating were introduced. From the start, scientists, administrators and even farmers advocated screening of all introduced material, both plant and animal. Alert officers made some notable interceptions, but many pests and diseases gained entry because there were too few officers — with too little authority — to exclude them.

In 1875, the Queensland Government set up a board to inquire into the causes of disease in livestock and plants. One board member, Colonial Botanist F. M. Bailey, recommended that all imported plants be carefully inspected and, if found diseased, treated to prevent the disease from spreading. But the greatest advocate of plant quarantine and disease control was Henry Tryon.

Henry Tryon

In 1886, Sir James Dickson, Colonial Treasurer, instructed Henry Tryon, Assistant Curator of the Queensland Museum, to investigate diseases of fruit trees and other crops in the Toowoomba district. Tryon compiled a 230-page report, which was issued by the Department of Agriculture in 1889 as *Report on Insect and Fungus Pests, No. 1*.

In 1891, a mild form of Irish blight of potato was discovered at Ravensbourne, near Crows Nest. This was the first discovery of *Phytophthora infestans* in Queensland. In 1893 it broke out on farms at Ravensbourne and Corinda. Tryon inspected the infected crops and suggested possible remedies. He also stressed the need for an agricultural college and experiment farm for disease research and for the appointment of a Departmental entomologist. In the same year, Tryon found that a disease affecting pineapple crops in Nudgee was caused by an unknown fungus.

In August 1894 Tryon was appointed entomologist in the Department of Agriculture. As the Department did not yet have a plant pathologist, he was also called on to identify plant diseases and suggest remedies. In recognition of his work, Tryon was given the dual title 'entomologist and vegetable pathologist' in 1902.

Farmers had reported damage by the native Queensland fruit fly in deciduous

fruit on the Darling Downs as early as 1853 and in Brisbane in 1864. Tryon recorded fruit-fly damage at a number of centres in the late 1890s, and estimated that the pest destroyed more than half the fruit grown in south Queensland. Froggatt, New South Wales Government Entomologist, gave the fruit fly its specific name, *Dacus tryoni*, in Tryon's honour.

In his first annual report, Tryon listed insect pests he had recorded on fruit, agricultural crops, vegetables, pastures, shade trees and stored products. The sugarcane borer, the bean and pea weevil, and codling moth and mussel scale of apples were among the undesirable insects that had been imported. Tryon also recorded the spread of useful parasitic and predatory insects. His report was the first comprehensive publication on insect pests in Queensland. Its most important recommendation was that Parliament pass an Act prohibiting or regulating the importation of any plant or merchandise suspected of harbouring any harmful insect, disease or fungus.

A board representing various interests had drawn up a Diseases in Plants Act, and the first draft of its regulations had been prepared by Henry Tryon. Introduced into Parliament in 1893, the Act had not been passed until 1896 because of opposition from commercial interests. Its regulations became effective from September 1897. By this time, the other colonies had already passed similar legislation, based on much of Tryon's draft material. The Act prohibited the importation of plant material from countries where specific diseases occurred, and paved the way for the development of a plant-quarantine service. Although it was criticised at first, the Diseases in Plants Act soon brought a much-needed improvement in the quality of marketed fruit. The first eight inspectors under the Act were appointed in March 1897; they included McLean, Benson and Tryon.

In 1895 Tryon discovered San Jose scale in three orchards in the Stanthorpe district. The insect was widely disseminated between 1894 and 1897 in apple and pear stocks from California supplied by two Sydney firms, and by 1897 was established in most fruit-growing districts. Had appropriate legislation been introduced when Tryon announced the presence of the pest in 1895, it might have been kept out of Queensland.

In 1896-97, Tryon reported that vines and vine cuttings were being brought into Queensland illegally, risking the introduction of *Phylloxera*. They were usually concealed in bundles of fruit trees. One illegal consignment of rooted vines had come from a country where *Phylloxera* existed. These vines were dug out and destroyed, and the soil was fumigated.

Tryon was kept busy reporting on and identifying insect pests, and urged farmers to report any new arrival immediately it was observed. In 1904-05, he tested the effect of temperature on the fruit fly maggot in fruit in transit; he found that ordinary cold storage made the larvae dormant, but that under temperatures approaching freezing point for fourteen days they died.

Tryon's keen interest in the biological control of pests foreshadowed today's trends in pest control. In 1903-04 he found two parasites, a mite and a wasp, that contained a grasshopper plague on the Darling Downs and in the Isis district. At the time, a locust fungus imported from South Africa, which was being cultivated by an entomologist in Victoria, was hailed as a possible counter to grasshopper

plagues; but Tryon claimed that any success against grasshoppers was owing to the native parasitic mite and not to the fungus. He also tried to introduce *Cactoblastis cactorum* in 1914 to control prickly pear; this attempt at biological control was not successful, although the moth was later introduced and its larvae did succeed. Tryon had also listed the attributes that would be necessary in a parasite for it to control the fruit fly. Unfortunately, no parasite measuring up to these criteria has yet been discovered.

In 1916, the banana beetle borer was discovered as far south as Cooroy, the Tweed River and Redland Bay, having been brought in infested planting material from Mourilyan. Tryon recommended that no more planting material from this source be distributed. He deplored the lack of early grower reports on the presence of the pest in the south, and said that banana growers had shown themselves blind to the interests of their industry.

The Bureau of Sugar Experiment Stations

Tryon worked on sugarcane pests before the Bureau of Sugar Experiment Stations was established. He visited Mackay in October 1894 to study the grub pests, and advised growers to capture the adults before they reproduced, destroy their feeding trees and fumigate the soil. He then collated his information, which was published in July 1895 under the title *Grub Pests of Sugar Cane*.

Soon after its establishment in 1900, the Bureau appointed its own entomologists to work on sugarcane pests. The first was Alexander Girault, who was stationed in north Queensland from 1911 to 1914. The Department's assistant entomologist, Edmund Jarvis, was transferred to the Bureau in Girault's place in 1915.

Like Tryon, the Bureau's entomologists made several attempts at biological control of insect and plant pests of sugarcane. In 1914 Girault inoculated grasshoppers with a specific bacterium discovered in Argentina. In the same year, Edmund Jarvis released a maggot, introduced from Hawaii, that he hoped would destroy the seed of lantana. Tryon reported in 1919 that this maggot had spread from the Mossman River in the north to the Tweed River and through coastal New South Wales to Sydney but had not controlled lantana.

The Queensland Museum

In its early years the Department was closely associated with the Queensland Museum, mainly through the people involved in establishing plant and entomological collections in Queensland. F. M. Bailey was appointed keeper of the Museum's herbarium in 1874 and temporary curator in 1881. In the same year, he was appointed colonial botanist. Bailey transferred from the Museum to the Department in 1887.

Henry Tryon was appointed to the Museum in 1882 and placed in charge of invertebrates. Tryon's services were in great demand after the Department was formed, as he was then the only entomologist in the Queensland Government's service. The recently published history of the Museum, *Time for a Museum*, suggests that Tryon's work with the Department led to conflicts with the Museum's



Henry Tryon (right) and Cyril White inspecting plants about 1920

administrators. His services were terminated by the Museum in the austerity measures brought on by the economic depression of 1893, and in 1894 he joined the Department as government entomologist.

Control of the Museum passed in 1902 from the Department of Public Instruction to the Department of Agriculture and Stock. Scriven was appointed one of the trustees, and the Museum Board's annual report was included as a short section in the Department's annual report. In September 1907 the Premier assumed control of the Museum and Scriven resigned as trustee.

However, the Department and the Museum maintained close ties, particularly in entomology. For example, Henry Hacker, who was seconded to the Department from the Museum in 1929, was in charge of both the Department's and the Museum's insect collections from 1929 to 1943. Entomologist Hubert Jarvis spent one day per fortnight at the Museum to maintain its collection in the years 1944-48.

Conclusion

By the time the Department could arrange appropriate legislation, the uncontrolled introduction of plants by societies and private collectors had allowed a number of serious pests and diseases into Queensland. The Department's function was clear: it must lessen the effects of pests and diseases already present in Queensland and prevent the introduction of further problems. It tried to do this by appointing an entomologist, who was also a plant pathologist, and, through legislation, to prevent the entry of plant pests and diseases and to control any outbreaks that did occur.

10

Dairying and farmyard industries

The Department was established in response to the pressures of closer settlement and one of its major aims was to help the struggling dairy industry. Farmers were running small herds of cattle for on-farm butter and cheese production, at a time when cream separators were almost unknown and dairy hygiene was often deplorable. The Department soon set up travelling dairies to educate Queensland farmers in the latest butter- and cheese-making techniques. This early exercise in programmed extension was completely successful, and farmers were soon sending milk to central creameries and factories for processing. Later, with government assistance, they set up their own co-operatives to manufacture butter and cheese.

Travelling dairies

In its moves to improve the quality of Queensland's dairy produce, the new Department of Agriculture looked to Victoria, where travelling dairies were operating successfully. A plant was bought in Victoria and brought to Queensland by Baron Jones, who was appointed manager of Queensland's first travelling dairy in March 1889.

Agricultural and pastoral societies supported the project, and each society nominated five farmers to receive instruction from the manager. Local farmers in each district visited supplied milk to be separated and processed and the butter and cheese made by the travelling dairies became the property of the suppliers. This was the first encounter many dairy farmers had with the cream separator. The first separator in Queensland had been installed in 1881 by Hugo William Du Rietz of Gympie, but few farmers could afford such machinery, even if they produced enough cream to justify its purchase. Most skimmed cream by hand from milk set out in shallow pans, an unhygienic practice that resulted in poor-quality butter.

The first travelling dairy started work at Tallebudgera in April 1889 and moved through south-east Queensland. It proved so popular that a second plant was bought to service north Queensland and started operations at Mackay in September 1889.

In 1890, an exhibition of dairy produce made by pupils of Travelling Dairy No. 1 was held in Brisbane. This dairy moved to the Wide Bay district in September

1890, and then to central Queensland. A scarcity of milk caused by drought brought the operations of Travelling Dairy No. 2 to an end in October 1896. Its manager, John Mahon, became the Department's dairy instructor and, later, principal of Queensland Agricultural College.

In their seven years the travelling dairies provided instruction to more than two thousand farmers. They were moved by rail so some districts not served by rail at the time, including the Atherton Tableland, were not visited. In all their operations, the travelling dairies had had no real hitches. Although arrangements were often made months in advance, no engagement was ever broken. John Mahon said the pupils showed unanimous appreciation of the Government's action in setting up the travelling dairies. They had enabled farmers to improve their manufacturing methods and, by supplying local markets, to keep in their own districts the money previously spent on imported dairy produce. The dairy industry, at its peak in the late 1930s the largest industry in Queensland, owed much to the work of the travelling dairies.

Dairy factories

The travelling dairies showed individuals and business groups the potential for central manufacturing plants, and factories sprang up in dairying districts. The first central dairy in Queensland was set up by C. H. Buzacott at Hampton, near Crows Nest, in 1887 and the first central cheese factory was built at Yangan, near Warwick, in 1893.

A butter factory was built at South Brisbane in 1890; by the end of that year, eight cheese and butter factories and five creameries were operating. Creameries were factories where the farmers' milk was separated; the cream was sold to a central butter factory and the skim milk was returned to the farmer. "Separator butter" was of better quality than farm-made or imported butter and sold at a higher price.

The first cooperative butter and cheese factory opened at Tiaro in 1890 and found a ready market for its produce in Gympie, then a thriving gold-mining town. However, it was short-lived as a cooperative and in 1892 was taken over by the Lowood Creamery Co., of Oxley. As they travelled around Queensland, the managers of the travelling dairies stressed the need for cooperative factories. But farmers did not have access to the capital needed to set up cooperatives.

The Government passed *The Meat and Dairy Produce Encouragement Acts of 1893*, administered by the Department, to help in the establishment of dairy factories. Funds raised through a tax on cattle owners were lent to build and equip dairy factories, but the funds proved inadequate and in 1896 most of the factories were still privately owned.

On the closure of the travelling dairies, John Mahon was appointed dairy instructor in July 1897, with Robert Winks and Charles McGrath as assistants. They addressed farmers on the advantages of cooperative factories. A cooperative factory was again established at Tiaro, near Gympie, and others followed at Bundaberg, Rosevale, Mackay and Capella.

Dairying made steady progress under the factory system, and Queensland's butter exports continued to grow. A private butter and bacon factory was built at

Cairns in 1904, stimulating the dairy industry in the north, especially on the Atherton Tableland, which was now serviced by a railway. By 1908 Queensland had fifty-one butter factories, of which twenty-eight were cooperatives.

Improved production

By 1896, Shelton, the Instructor in Agriculture, had reached the conclusion that further growth in dairying depended on improving the quality of dairy stock and better feeding, especially in winter. To improve milk production, the Department instituted three-day milking competitions. The owner of the cow with the highest average production was presented with a purebred Ayrshire bull from the Queensland Agricultural College herd.

Fodder conservation and pasture improvement to increase dairy production next engaged the Department's attention. Pastures in south Queensland were considered adequate, but those in the north appeared unsuitable for good dairy production. Mahon suggested supplementary fodder crops and conservation of hay and silage. As principal of the Queensland Agricultural College, Mahon introduced paspalum into the State to improve dairy pastures.

On his appointment in November 1908, Dairy Expert Arthur Graham advocated more frequent cream collection. He also recommended improving the quality of both dairy stock and winter nutrition. Official Departmental herd testing began in the West Moreton in 1910 with the appointment of Ludvig Andersen, but herds were recorded only when an officer was in the district and many were recorded only once in a lactation.

Butter export

Before 1895, large-scale export of butter beyond the Australian colonies was not attempted because of the difficulty of obtaining cool storage and the fact that Queensland's production fell short of home demand, leaving no surplus for export. But in 1895 McLean noted that export markets were needed as there was now a surplus of dairy products, and cited cool storage, quality products and regularity of supply as requirements of an export trade.

Mahon studied export practices for butter, cheese, pork and poultry in New South Wales and Victoria in 1894-95. In February 1895 he passed as fit for export a consignment of five tonnes of butter, which left Brisbane on the *Banffshire* and arrived in London three and a half months later in excellent condition.

In 1912-13 the Government built a central cold store at Roma Street, where export dairy produce could be held and inspected. This facility remained in service until the Hamilton Cold Stores were opened in 1924.

Dairy Produce Acts

George Sutherland Thomson was appointed government dairy expert in March 1904. His main duty was to frame and publicise *The Dairy Produce Act of 1904*, the first Act to govern the manufacturing side of the dairy industry in Australia. It provided for registration of dairies on farms and laid down hygiene requirements.

All inspectors under the Dairy Produce Act were also inspectors under the Diseases in Stock Act. Factories were to be registered, and were subject to inspection. Inspectors were also appointed to grade export butter, and compulsory grading of cream was introduced in August 1908. The inspectors reported that the benefits of improved techniques and grading of export butter were becoming evident. London merchants declared that Queensland produce was up to the standard of that from other States, but that its delivery was more reliable.

An interstate conference of Ministers for Agriculture held in the 1913-14 year decided on compulsory grading of butter, uniform compulsory cream grading and the adoption of various butter grades. Definitions of cheeses and prohibited additives were also adopted. In 1917 a London dairy authority complimented the Department on the standards and thoroughness of its grading of dairy produce, and asked that it do nothing to lower the standard of Queensland grading.

Margarine Act

The Margarine Act of 1910, formulated to protect the butter industry, placed restrictions on the manufacture of margarine. Its regulations were policed by dairy inspectors, who were given powers of entry and confiscation. The Act required the licensing of both margarine factories and shopkeepers selling margarine, and stipulated that margarine must contain one part per thousand of dry Queensland arrowroot (*Canna edulis*) starch and five parts per thousand of sesame oil. The addition of starch was required to enable the easy identification of margarine by a simple dye test. All margarine imported into Queensland also had to comply with these requirements.

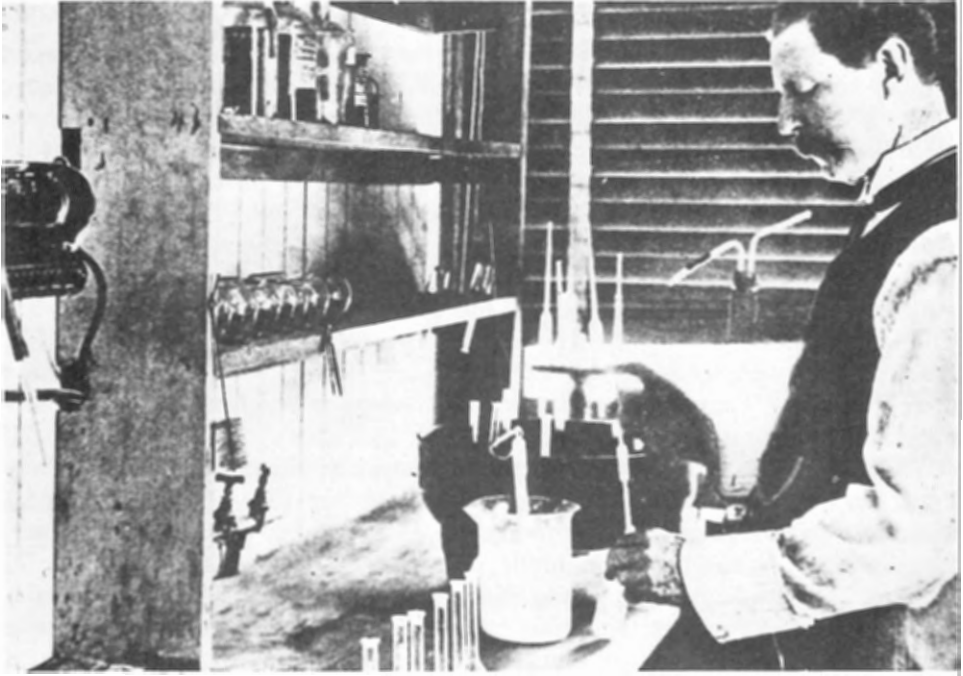
Butter was meeting strong competition from margarine on the London market. Australian regulations under *The Margarine Act of 1910* banned the colouring of margarine to resemble butter, but in London colouring was allowed. This competition led the Department to intensify its efforts to improve butter quality, especially by delivering cream to the factory more quickly and taking more care in manufacture.

Cheese production

Cheese production reached a record level in 1907-08 when thirteen thousand tonnes were exported to London, where reports on its quality were favourable. From 1911, pure lactic cultures (starters) prepared at the Yeerongpilly Experiment Station were distributed to factories to improve cheese quality.

The outbreak of World War I created an export market for cheese, needed in the United Kingdom for army rations. The wartime shortage of rennet to thicken the milk led to an interesting development in cheese manufacture: Graham suggested pepsin, which worked well. Atkinson Wilkin, the first instructor in cheesemaking, was appointed in August 1915 to service the expanding cheese industry. He resigned in 1917 and was replaced by Robert Snell.

European dairy herds suffered because of the war. This was an advantage to Queensland, which, by 1918, was supplying almost three-quarters of Australia's cheese exports.



George Thomson, first dairy expert, working in the William Street dairy laboratory about 1910



Departmental inspectors grading butter at the Roma Street Cold Stores, 1914

Poultry

Poultry husbandry received little attention from the Department in its early years. Poultry-keeping was carried on mainly as a small backyard or farmyard industry, with the birds kept as scavengers. Farmers carried out their own flock improvement, helped by Departmental publications. In 1896, the Department published *Practical Poultry Farming*, a booklet written by Mrs Lance Rawson of Rockhampton. Mrs Rawson wrote in the *Queensland Agricultural Journal* in 1898 that for sixteen years she had been trying to induce selectors, farmers and young people to take up poultry farming; she considered her correspondence of more than four thousand letters a year proof that she had increased public interest in the subject.

The Queensland Agricultural College became the Department's poultry arm. Breeding pens were set up there after 1900 and egg-laying competitions were held there from 1904. These continued until the College was transferred to the Department of Public Instruction in 1923.

The first poultry officer attached to the Department's head office was Matthew Fern, who was appointed poultry lecturer in January 1904. Like all new professional staff members, he was sent on a tour of the State to examine his industry. He judged at shows and visited exhibitors' farms as far north as Rockhampton and west to Longreach. An interesting discovery for Fern was an ostrich farm at Jericho where, in one year, the farmer had reared fifteen young birds from a single pair of ostriches. He had also plucked a large quantity of valuable feathers, in those days used as trimmings on fashionable clothes and hats.

Fern's services were dispensed with in 1908. No replacement was made until 1917, when John Beard, a long-time poultry breeder who had had successes at many agricultural shows, was appointed poultry instructor. Beard's services as a show judge were in constant demand and his decisions were never questioned by exhibitors. In 1919 poultry-keeping was still only a sideline enterprise, although Scriven believed that it had the potential to become a major industry if guided by the results of trials conducted at the Queensland Agricultural College.

Sericulture

The Department looked closely at many industries that might have export potential, including sericulture, the breeding of silkworms. Mulberry trees had been introduced by the Botanic Gardens, the Acclimatisation Society and Frederick Bailey in the 1860s, for silkworm culture. In 1893, the Department obtained and distributed a batch of Italian 'seed' (silkworm eggs), and later introduced other varieties. It obtained a reeling appliance for use in home spinning and placed it in its museum, as a model for those wishing to build their own, and published a bulletin, *Sericulture or Silkworms and How to Rear Them*. Many people reared silkworms. The Department bought the cocoons and exported them, but Australia's distance from the spinning centres of Europe prevented the growth of a silk industry.

Meat processing and preservation

The Department provided an advisory service in meat processing from 1892 to 1895. C. T. Allcutt, an American recommended by a friend of Professor Shelton,

was appointed instructor in meat processing in October 1892. His was a three-year appointment, at a salary twice that of the under-secretary. With J. C. Hutton and Company of Zillmere, Allcutt experimented with curing beef for export, and shipments to Holland and Belgium were judged equal to the best American beef. This success convinced Allcutt that, with refrigeration, Queensland meat could be delivered in good condition anywhere in the world.

The Meat and Dairy Produce Encouragement Act of 1893, administered by the Department of Agriculture, stimulated meat export by providing financial assistance for the establishment of meat-processing plants. The Act set up a fund financed by a levy on cattle and sheep, also compelling borrowers to mortgage their factories to the Meat and Dairy Board for security.

Ham and bacon curing

To help Queensland farmers compete with imported products, the Department hired William Watson for six months in 1890 to give instruction and demonstrations in ham and bacon curing. Watson, a prominent Victorian ham and bacon curer, wrote a pamphlet entitled *Pig Raising and Pork Making with Ham and Bacon Curing* for those unable to attend his demonstrations. This pamphlet was the first scientific advisory bulletin issued by the Department. Before its publication, Professor Shelton had presented it to the 1890 Beenleigh Agricultural Conference as a lecture.

The Department's success in improving and encouraging ham and bacon curing can be gauged from the statistics: in 1893, Queensland's bacon imports exceeded exports by three tonnes, but in 1897 exports exceeded imports by three hundred tonnes.

Conclusion

By the early 1920s Queensland was an important producer and exporter of quality dairy and farmyard products. The Department can claim much of the credit: for thirty years it had demonstrated better practices to farmers, arranged for the grading of products and promoted these products to both domestic and export markets. The Department appointed overseas, interstate and local experts, who imparted their knowledge and skills to Queensland's farmers and processors through its various advisory channels. At the same time, the Queensland Government enacted legislation both to improve dairy products by setting standards and to stimulate their processing and export.

The pastoral industries

After Queensland separated from New South Wales in 1859, the colony's pastoral industries were the responsibility of the Colonial Secretary's Department. At that time, wool was virtually the only pastoral product, as there were no markets for meat other than the small domestic market. On the appointment of Patrick Gordon as chief inspector of sheep in 1868, the Stock Branch was set up in the Colonial Secretary's Department to service the sheep and cattle industries.

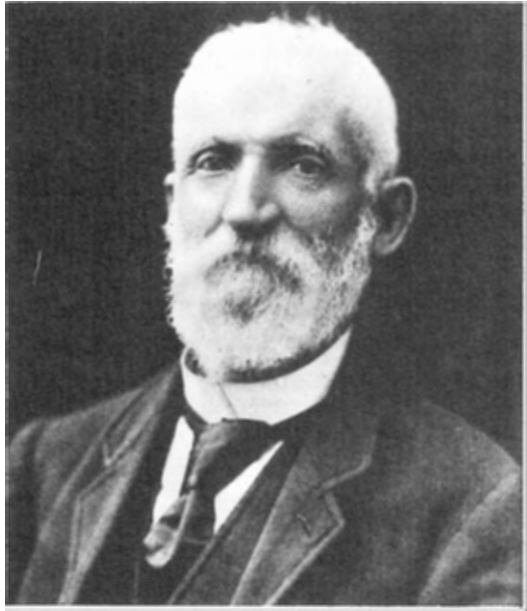
Chief inspector of stock

Although it had been set up to administer regulations of *The Diseases in Sheep Act of 1867*, the Stock Branch also became responsible in 1872 for regulations that required the branding of stock and registration of brands. Before the transfer of the Stock Branch to the Minister for Agriculture, several other major livestock Acts were passed, adding to the branch's responsibilities. One of these, *The Livestock and Meat Export Act of 1895*, under which Gordon became chief inspector of meat, required the inspection of livestock and meat for export.

The Diseases in Stock Act of 1896 was framed to prevent the introduction and spread of diseases in stock. It provided for the appointment of a chief inspector of stock and other inspectorial and administrative staff. The Board of Stock Commissioners was set up, empowered to operate a laboratory to supply vaccines and to investigate diseases, and the Diseases in Stock Fund was established, financed by a levy on cattle, to cover expenses.

James Patrick Orr was made secretary of the Board of Stock Commissioners and nineteen stock inspectors were appointed, all within the Colonial (Home) Secretary's Department. Gordon, Chief Inspector of Stock, administered all Acts dealing with livestock. When the Stock Branch was transferred to the Department of Agriculture in July 1897, Gordon brought his staff and the Acts with him. At that time, Gordon held the positions of chief inspector of sheep, chief inspector of stock, registrar of brands and officer in charge of the meat inspectors.

When Gordon retired in 1904, Scriven, the new under-secretary, assumed the position of chief inspector of stock. In 1915 Arthur Cory was appointed chief inspector of stock and slaughterhouses. He was also the registrar of brands, the chief veterinary surgeon and the officer controlling stock experiment stations and



*Patrick Gordon, Chief Inspector of Sheep, 1868-1903, and
Chief Inspector of Stock, 1896-1903*



*James Orr (right), Secretary of the Board of Stock Commissioners, farewelling Arthur Cory, veterinary surgeon, on
Cory's resignation to go to England in 1907 (Courtesy John Oxley Library, Brisbane)*

the sheep and wool branch. Cory had joined the Department as a veterinary inspector in 1901, then left and rejoined in 1908 as government veterinary surgeon.

Meatworks and meat inspection

Many meatworks were built in Queensland with the help of advances made under *The Meat and Dairy Produce Encouragement Act of 1893*. Under *The Livestock and Meat Export Act of 1895*, all livestock killed for export and meat exports were obliged to be inspected, a disease-control measure.

Nineteen meatworks, from Brisbane to Burketown, processed export meat between 1897 and 1900. Each animal was inspected before slaughter and the carcass was also checked by inspectors from the Department of Agriculture, who were identified by numbered tags attached to the carcasses. All cases of tinned meat were also checked and certified. Queensland's meat-inspection service was praised by overseas buyers for its conscientious officers.

The Slaughtering Act of 1898 dealt with meat for home consumption. It regulated the design and sanitation of butchers' shops, and provided for inspections to ensure that only high-quality meat was sold. In 1901, Gordon reported that sanitation in slaughterhouses had improved as a result of this Act; and also that, knowing that all diseased meat would be condemned, cattle buyers were more careful in their selection of animals.

Progress in improving sanitation was slow, however. Robert Ferguson, Meat and Dairy Produce Encouragement Board surveyor, inspected Queensland's slaughterhouses in the years 1901-03 and reported that most were unhygienic. His view was shared by Veterinary Inspector George Tucker, who supervised the slaughtering of meat in the Brisbane district.

Meat export

Agriculture Minister James Chataway moved to inaugurate an export trade in frozen meat in the late 1890s, arranging for weekly shipments of frozen butter and meat from Brisbane to Sydney, where the cargo was transhipped to outgoing mail steamers. The scheme was not a great success; all parties had overestimated the quantity of produce that would be available for the export contract, and the shipping company refused to cool the hold unless a large enough cargo were offered to make it worthwhile. But, despite the difficulties and the small quantities, the scheme established export markets for Queensland meat.

Meat for war supplies

Inspection services and the renovation of slaughteryards had contributed to an improvement in the quality of Queensland meat. In 1907 a representative of the United Kingdom War Office visited Queensland meatworks. He reported favourably on them and the War Office then bought supplies of tinned meat for the British forces.

During World War I all meat in Queensland was held at the disposal of the Imperial (British) Government for use by the British armed forces. This was done under *The Meat Supply for Imperial Uses Act of 1914*, administered by the Department.

Public abattoirs

In 1911 and 1912, Under-Secretary Scriven recognised the need for public abattoirs in Brisbane, where one-fifth of all the cattle, sheep and pigs killed in Queensland and two-thirds of the calves and lambs were consumed. Inspectors had difficulty in covering the thirty-two slaughterhouses then operating within sixteen kilometres of the General Post Office.

A Royal Commission was appointed in 1912 to inquire into the alleged deterioration in beef cattle. It also inquired into facilities for treating and marketing meat at home and abroad, and examined the necessity for establishing abattoirs or meatworks. The Commission found that the standard of export beef had not declined, but that the facilities for inspecting and slaughtering stock were insanitary. It recommended a public abattoir for the Brisbane Metropolitan Area, where all meat for local and overseas consumption could be slaughtered, inspected and graded.

Horses

Horses were the main means of land transport and traction at the end of the nineteenth century. The declining quality of Queensland-bred horses was of concern to the Department from the 1880s until the end of World War I. In an article in the *Queensland Agricultural Journal* of August 1900, Ernest Smith attributed the decline to the low prices offered for saddle horses, the lack of culling of mares and lack of discrimination in selecting stallions.

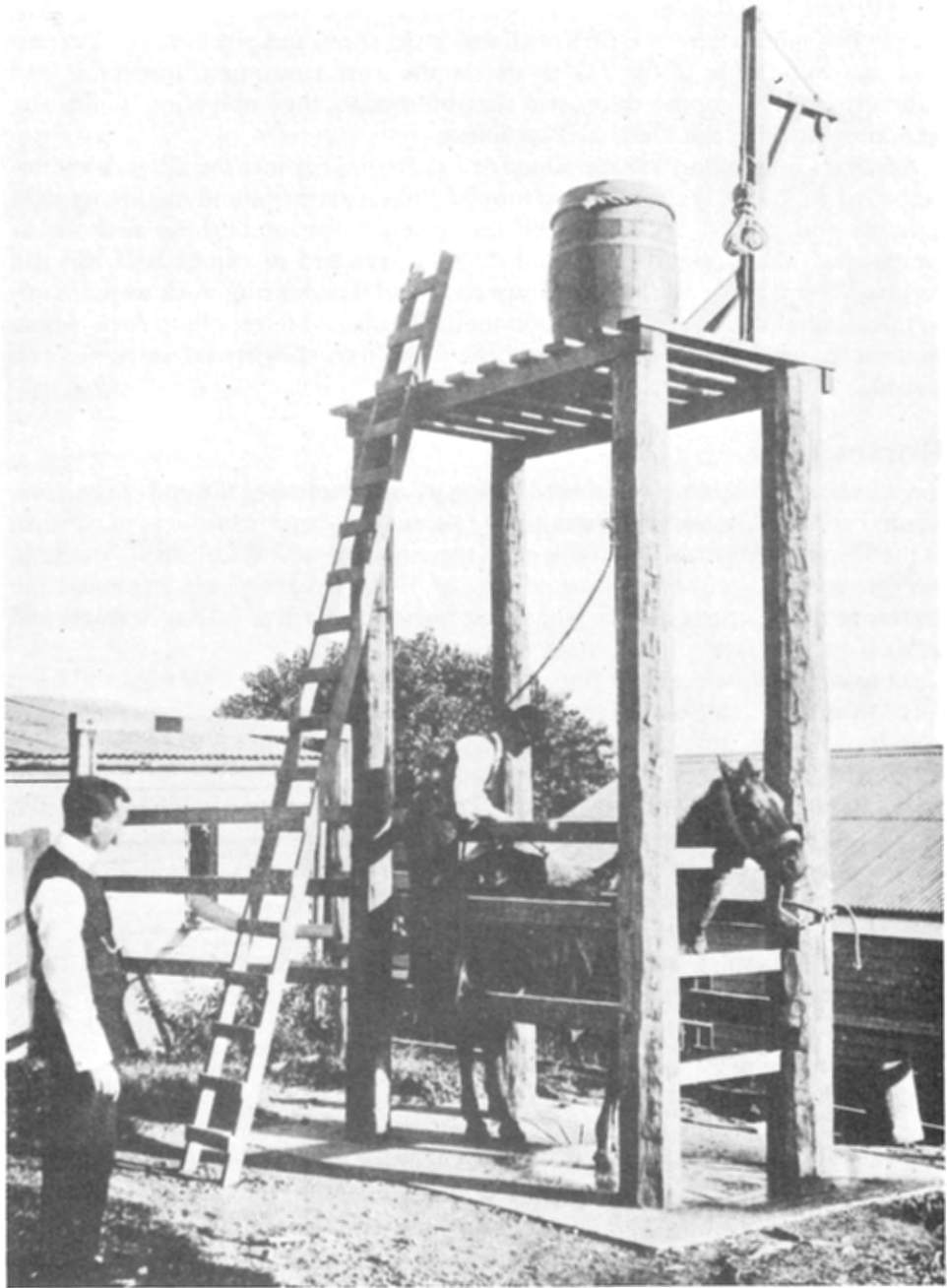
A big demand for remount horses came from India and South Africa and from German agents acting on behalf of China. Animals shipped to these markets were examined by government veterinary surgeons, and the shippers were issued with certificates of soundness. The Department became concerned at the number of mares leaving Queensland when half a million horses were exported in 1900-01. Finally, in 1905, Scriven recommended restricting the sale of mares to foreign buyers, the registration of stallions to ensure that only fit sires were used, and the establishment of a Departmental stud farm.

From 1900, Clydesdale stallions had been held at Queensland Agricultural College to service mares there and on farms nearby. This practice was extended to the State farms, with Suffolk Punch stallions stationed first at Roma and Gindie and later at Kairi. In 1912-13 Government Veterinary Surgeon Arthur Cory inspected and approved six hundred stallions held by the Department.

Sheep and wool

The first sheep properties in Queensland were on the Darling Downs, an area quickly occupied in the years after 1840, when wool production was by far the most profitable pursuit. When Gordon and his staff — that is, the Stock Branch — were transferred to the Department of Agriculture in 1897, the Department had its first official involvement with sheep. Its stock inspectors were called on to regulate the branding, marking and moving of sheep.

Joachim Schmidt, the original science master and secretary at the Queensland Agricultural College, resigned in April 1899 and was appointed assistant inspec-



Crush and spray used by the Department in Brisbane to disinfect horses before their movement to 'clean' country, about 1907

tor of meat in Brisbane in September of that year. In 1900 and 1901 he wrote a series of articles on sheep and wool for the *Queensland Agricultural Journal*, the Department's first advisory bulletins for woolgrowers.

The Queensland Agricultural College obtained a small flock of sheep in 1900, for fat-lamb breeding, to subdue weed growth and to provide rations. But the breeding experiments were abandoned in 1906 because of the depredations of neighbourhood dogs. In 1910, a few Lincoln sheep were introduced, and in 1911 a course in wool classing was started under James Carew. When John Brown became principal of the College in 1912 he reintroduced fat-lamb raising, but his period as principal was so short that the project produced little information.

In 1909, Scriven drew attention to a new problem arising from grazing farms being taken up by stockmen, shearers and other selectors who had little knowledge of marketing wool. Almost one-third of the State's wool clip was being offered by growers who produced only ten to fifteen bales a year, and the preparation of these clips was so poor that it lowered the market value of the wool. The Department sent an officer to teach these woolgrowers how to grade and bale the different parts of the fleece.

William Grierson Brown, who was appointed instructor in agriculture in April 1911, acted as sheep and wool expert. He published a series of articles in the *Queensland Agricultural Journal* under the title 'The Farmer's Sheep' and also wrote articles on designs for sheep yards, spray races and dips.

Sheep blowfly began causing serious damage in the Gindie flock in 1910-11. In 1913-14, Brown started dipping experiments there to control blowflies; he found that dipping did not prevent fly strike but did prevent infection from spreading. He also adopted crutching as a deterrent to fly strike. Brown decided that the best approach was to destroy the fly before it got on to the sheep, and in 1916-17 he began testing fly traps. The Department adopted a trap that caught and poisoned the flies. But it also poisoned the ants that ate the dead flies, and the resulting masses of dead flies only attracted more flies. Another trap, the *Destruo*, which caught the flies but did not poison them, was then adopted. Brown found that this trap, used in conjunction with jetting, gave good results, and that it was not necessary to crutch the sheep. In 1918-19, the sheep blowfly problem was delegated to a special board of inquiry connected with the Commonwealth Bureau of Science and Industry sitting in Brisbane. However, Brown continued his experiments at 'Dalmally' near Roma.

Under the Farmers' Wool Scheme, introduced in 1916-17, wool from flocks of fewer than 1500 sheep was classed and sold by the Department on the owner's behalf. The wool was classed at the Technical College of the Department of Public Instruction and the owner was paid 60 per cent of its estimated value in advance. A charge was made for classing, freight, handling, dumping, retailing and out-of-pocket expenses.

Goats

Little information is available about the goat industry in Queensland's early days. Goats were probably used to provide milk and meat in the mining areas and west-

ern parts of the State, where dairy cattle would not thrive. Goat teams were also used to draw light carts and wagons. Escapees from the early herds founded the widely distributed feral herds that became a pest in some parts of Queensland.

Angora goats were introduced for the mohair trade in the early twentieth century. A farmer at Maryborough started the first herd, introducing both Angora and Cashmere goats. Scriven, in his 1908-09 annual report, said the breeding of Angoras for mohair had 'long passed the initial stage'. But during this period goats were generally regarded as little more than pests, and Local Authorities Acts imposed penalties to deter owners from allowing their goats to stray.

Fauna protection

Before the Department was formed the Queensland Government enacted legislation to protect native birds. *The Native Birds Protection Act of 1877* listed the birds protected and provided penalties for people found guilty of destroying them. An amendment in 1884 permitted the government to proclaim crown lands as reserves for the protection and preservation of native birds, appoint rangers to ensure that the provisions of the Act were strictly applied, and impose penalties for any infringements. The Act was administered by the Stock Branch of the Colonial Secretary's Department, but on 1 July 1897 was transferred to the Minister for Agriculture. By 1905 Scriven felt compelled to report that the Act was 'practically a dead letter': Queensland was so large that it could not be policed adequately, and around the large towns the native bird population had been seriously diminished by excessive shooting.

Between 1877 and 1918 Parliament also passed a series of marsupial-control Acts, all aimed at preventing damage to cultivated land, pasture and livestock by marsupials and dingoes. They illustrated the change in government policy over the period, from outright destruction of Queensland's marsupial fauna to the realisation that they were a resource to be conserved and harvested, and, in some cases, protected. The first marsupial-control Act, *The Marsupials Destruction Act of 1877*, provided for the formation of boards to deal with marsupials. The boards paid bonuses on the destruction of kangaroos, wallaroos, wallabies and pademelons, financed by a levy on graziers. Amendments over the years dealt with the rate of bonus payments and the issue of permits. In 1895, dingoes were included in the Act. While the Marsupials Destruction Act was in force, scalp bonuses were paid on eight million kangaroos and wallaroos; seventeen million wallabies; one million bandicoots, pademelons and kangaroo rats; and more than fifty thousand dingoes and foxes.

The Marsupials Boards Act of 1897 repealed the Marsupials Destruction Act and allowed for the setting-up of boards to supervise the destruction of marsupials. These boards could enact by-laws for the destruction of marsupials and dingoes, require landholders to destroy marsupials or dingoes on their holdings, and fix the bonuses payable on scalps. Another important marsupial Act administered by the Department was *The Marsupial Proof Fencing Act of 1898*, under which the owner of a declared infested area could apply to have wire netting provided free of cost. The landholder was expected to maintain the fence.

In those years many native animals were destroyed for their skins and some were in danger of extinction. *The Native Animals Protection Act of 1906* provided a closed season of six months, during which a range of native animals might not be killed, captured or injured. In 1907 the Act was amended to wholly protect the tree kangaroo, wombat, platypus, echidna and flying squirrel; there was also pressure from conservationists to include the koala.

Conclusion

Queensland's pastoral industries had been serviced by the Stock Branch of the Colonial Secretary's Department since 1868, with the branch's main function the administration of Stock Disease and Brands Acts. After the Stock Branch joined the Department of Agriculture in 1897, a more production-oriented approach was taken to both the pastoral industries and the smaller pioneer-pastoralists. For example, the Department helped small woolgrowers in the classing of their wool clips, and became active in the establishment and regulation of meatworks. Fauna conservation and control of predators were important aspects of the Department's work.

12

Stock diseases

Long before the Department became involved with the pastoral industries, *The Diseases in Sheep Act of 1867*, aimed at controlling sheep scab and sheep catarrh, proved that soundly based legislation could lead to the eradication of disease. Patrick Gordon, who had drafted the Act, was appointed chief inspector of sheep in February 1868 in the Queensland Colonial Secretary's Department, and inspectors were also appointed to enforce the Act's provisions. Flock owners contributed to a fund that met the costs of the operation, and within twenty years scab disease, the major disease of sheep in Queensland, had been eradicated.

When the Stock Branch and the Stock Institute were transferred from the Colonial Secretary's Department on 1 July 1897, the Minister for Agriculture assumed responsibility for the control of stock diseases in Queensland.

The Stock Institute

The Intercolonial Stock Conference held in Melbourne in 1889 recommended the establishment of an Australasian stock institute, to be built in or near Sydney, to investigate diseases in stock. But the first stock institute in Australia was established in Turbot Street, Brisbane, in 1893. The Stock Institute was set up to research the nature and origin of stock diseases and to develop preventive measures. The costs of its establishment and maintenance were defrayed from the Brands and Sheep Fund. The Institute began under the Colonial Secretary's administration, but in 1897 was transferred, along with the Stock Branch, to the control of the Minister for Agriculture.

Charles Pound was appointed director of the Stock Institute. He had come from England, where he was considered one of the country's most expert microscopists, to New South Wales, where he was employed by the Central Board of Health, investigating stock diseases. In July 1899 Pound had been appointed government bacteriologist, based at the Stock Institute, in its new building at Normanby. His duties extended to research into human diseases, Hansen's disease (leprosy) being one of his particular interests. In February 1901 the Stock Institute was renamed the Bacteriological Institute and transferred to the Home Secretary's Department, but in 1906-07 it was returned to the Department of Agriculture and Stock.



Charles Pound in the Stock Institute laboratory, Turbot Street, about 1897 (From the Pound albums)



Pound (wearing boater, near centre of picture) demonstrating tick-fever inoculation to graziers at Rosedale, near Gladstone, about 1900 (From the Pound albums)

In 1907 Dr Sydney Dodd was appointed principal veterinary surgeon and bacteriologist at the Institute. He suggested that an experimental station, with land to hold large animals, be established to improve the efficiency of stock-disease research. The Department acquired 23 hectares of land and set up the Yeerongpilly Stock Experiment Station. Dodd resigned in 1910, eight months before the expiry of his three-year term, and Pound was restored as bacteriologist, taking charge of the station. Here he confined his work to stock diseases and responsibility for the Bacteriological Institute at Normanby was again transferred, this time to the Health Department. A regional laboratory was also opened at Oonoonba, near Townsville, in April 1914, under the control of George Tucker, to service the area north of Mackay. Oonoonba started with only 6.5 hectares of land but the area was soon increased to 83 hectares. It was on the main railway, enabling imported livestock to be railed direct from the wharves to the experiment station, where they were kept under quarantine.

Cattle tick and tick fevers

The cattle tick is the greatest scourge of beef and dairy cattle in northern Australia. It debilitates cattle by bloodsucking, causing loss of production and deaths, and is also a carrier of tick fevers. The cattle tick is believed to have entered Australia on a shipment of cattle from the East Indies landed at Darwin in 1872. Within about thirty years it had spread from Darwin through coastal and subcoastal Queensland to northern New South Wales. An unsuspecting and uninformed cattle industry suffered heavy losses of animals from fevers borne by the tick.

Veterinary authorities in Queensland were also taken by surprise as they had no knowledge of the tick or its effects. In 1894 Pound noted that losses in bulls taken to the north from south Queensland and New South Wales were as high as 50-70 per cent, and concluded that a tick-transmitted micro-organism was the cause of tick fever. The seriousness of tick fever was recognised, and a quarantine area was declared in October 1894. It included all of the Gulf Country and part of Cape York Peninsula. But the boundary of the quarantine area, referred to as the '1894 line', was merely a line on the map, so it is not surprising that in the following year cattle ticks were found to have spread east of it. New quarantine lines were declared in 1895 and 1896 as the ticks advanced southward and eastward. In 1898 they appeared near Brisbane, almost five hundred kilometres south of the 1896 line, and their spread continued into northern New South Wales until they had reached their environmental limit.

No experimental evidence had been advanced to link the cattle tick with the new devastating disease, tick fever, but in 1895 Dr J. Sydney Hunt, later government pathologist in Queensland, proved by experiment that an organism that caused tick fever was transmitted by ticks. In the following year, he proved that the disease could be transmitted to healthy cattle by injecting them with blood from a diseased animal. Dr E. R. Wynne, reporting on experiments at Hughenden in 1896, showed the first illustrations of the Australian parasite *Babesia bigemina*.

A commission was sent to the United States to inquire into America's 'Texas fever'. Its members were Dr Hunt and William Collins, of 'Mundoolun',

Beaudesert. Hunt compared blood smears he had taken with him with those held by the chief of the Bureau of Animal Industry in Washington, and found that the organisms that caused Queensland's tick fever were identical to those that caused Texas fever.

Requests made at the Intercolonial Stock Conference in Sydney in 1896 for remedies for tick fever brought nearly three hundred suggestions. Edward Hancock, a stock inspector at Mackay, and Veterinary Inspector Benjamin Meek of Bowen tested the suggested remedies, but found that none was effective.

Knowing that tick fever was transmitted by ticks and that blood from an animal that had recovered from the disease could impart immunity, Pound attempted inoculation. He arranged with William Collins to have some bulls that the latter had bought in New South Wales inoculated in Brisbane before sending them to 'Inkerman', a station on the Burdekin. All survived. Natural immunity was also building up in northern herds. Although tick fever had caused enormous losses, by December 1899 cattle in the northern areas through which it had first passed were now immune to the disease. However, in marginal areas cattle could lose their immunity and again become susceptible to the disease.

When Hunt was appointed government pathologist in 1898, he and Pound instructed central and south Queensland cattlemen and stock inspectors in the inoculation technique. Cattle that were injected with more than five millilitres of blood from an animal that had recovered from tick fever remained healthy when exposed to gross tick infestation.

Pound made a collection of illustrations showing the life history of the various ticks that infested native and domestic animals. He prepared a series of lantern slides illustrating the life history of the cattle tick, the micro-organisms causing tick fever, tick-infested cattle, country favourable and unfavourable to ticks, and maps showing the geographical distribution of the tick. He also assembled a series of photographs illustrating the various preventive inoculation experiments. Thus equipped, Pound delivered lectures in towns and on stations and demonstrated inoculation techniques to both cattlemen and stock inspectors. He also lectured on tick fever to delegates at the Dairy Conference at Hawkesbury College and to stock owners at the Sydney Chamber of Commerce.

By the end of 1898, it was clear that tick extension work was the major job ahead of the Department. In October 1899, Agriculture Minister Chataway authorised Gordon to experiment with dipping fluids to find a preparation that would kill ticks on cattle. Many preparations were tried at a dip built at the Department's Indooroopilly Experiment Station, but tests showed that arsenic was the only effective ingredient.

Dipping experiments continued until 1900. Agricultural Chemist Brännich prepared a mixture of arsenic, caustic soda, tallow, Stockholm tar and water that proved effective, becoming known as the 'Departmental dip'. Stock inspectors travelled through tick-infested areas urging owners to build dips and helping to ensure that the arsenic used in them was at the correct strength. Public dips were also built. Under the Diseases in Stock Act, these dips were required to be analysed by the Departmental chemist at least once every six months.

The Department had great difficulty in inducing cattlemen in Queensland's

southern coastal districts to adopt inoculation, and it was not until the Department began to carry out the operation free of charge that it was generally adopted. Alfred Barnes, Veterinary Surgeon at Rockhampton, demonstrated that blood for inoculation could be transported long distances. This removed the necessity of transferring 'bleeders' (cattle that had recovered from tick fever and from which blood was drawn to inoculate other beasts) to set up new centres. From 1910 Pound was involved in the preparation and sale of bleeders at Yeerongpilly, to distribute blood for tick-fever inoculation.

The Federal Farmers' Council Conference at Ipswich in 1909-10 proposed that, as an experiment, the West Moreton shire councils take over tick control in their areas. New by-laws gave the shire councils full control over diseased stock on roads and reserves. But when Departmental officers assessed the results of this move they found that nineteen of the twenty-seven shire councils were doing nothing about dipping and nothing to prevent stock straying or feeding on roads, and that the other eight were doing only a little. Local vested interests had caused the failure of the scheme. Although *The Local Authorities Act of 1902* had given local councils power to insist on the dipping of infected stock, most did not invoke the regulations.

In February 1912, J. G. Appel, the Home Secretary, declared the cattle tick a pest under *The Local Authorities Acts, 1902 to 1910*, and an area of the eastern Downs to be an affected locality. In October 1914, moves were made to enforce regular dipping within sixteen kilometres of the eastern boundary of this area, mainly the country around Helidon. Six months later, a local authority, the Eastern Downs Tick Board, was formed for the prevention and destruction of cattle ticks. By June 1917, the board had ten dips in operation, and three more were under construction. Activity in this area was increased, with cleansing areas declared at Warwick, Tallebudgera and the South Burnett by 1917, and a government dip at Julia Creek in north Queensland.

In his annual report for 1916-17, Under-Secretary Scriven suggested that the powers given to local authorities to deal with diseases should be taken from them because of the lack of results, and instead be vested in the Department. As a result, a board was set up in December 1917 for the control and eradication of the cattle tick in Queensland. Its members included the Minister for Agriculture and Stock, William Lennon, and the Chief Inspector of Stock, Arthur Cory. The board quickly established the Miles-Chinchilla Cleansing Area, and appointed sixteen new stock inspectors to regulate the movement of stock to protect tick-free areas. In the next two years, government dips were provided at crossing places on the northern railway to treat cattle moving from the Gulf of Carpentaria. Other dips were provided to treat cattle moving south from Cape York Peninsula and from the Northern Territory to Queensland, and inspectors were supplied with motorcycles to expedite the surveillance of moving stock. Some cattlemen were reluctant to cooperate at first, but they eventually saw the benefits to be gained.

The Stock Experiment and Quarantine Station at Ooononba, near Townsville, had been opened in April 1914. Local stock owners were quick to make the best use of the facility by having imported stock immunised against tick fever before they were sent to their properties.

During the 1915 drought, many Downs sheep were agisted on the coast and in 1916 some of these sheep carried mature cattle ticks. Pound removed the ticks and raised their progeny, which he then placed on cattle. The cattle did not develop tick fever and Pound found no tick-fever organisms in the ticks. He concluded that ticks that had developed on an unnatural host at once lost their disease-transmitting character.

Tuberculosis

Bovine tuberculosis was pandemic in the nineteenth century. In 1882, Robert Koch, a country doctor in Germany, isolated and cultivated the causal bacillus. His research led to the introduction of tuberculin testing to detect the infection.

When Pound became director of the Stock Institute he prepared tuberculin to test stock for tuberculosis and campaigned to arouse public awareness of the disease. He wrote a pamphlet, *Tuberculin, Its History, Preparation and Use*, which was distributed widely, and delivered lectures.

Veterinarians reported that tuberculosis was the most frequent cause of rejection of beef carcasses inspected at meatworks. In March 1897 Veterinary Surgeon Wilmot Quinnell also discovered tuberculous pig carcasses. Tuberculosis was not uncommon in pigs fed offal from infected beef carcasses. These findings underlined the need for public abattoirs, where cattle for local consumption could be killed and the meat inspected, and led to *The Slaughtering Act of 1898*, which required the inspection of meat for domestic consumption. The first slaughtering inspector, Francis Shepherd, was appointed in 1898.

In the same year, Dairy Instructor John Mahon reported a marked increase in tuberculosis in dairy herds and estimated that one-fifth of Queensland's dairy cows were infected. Pound set about eliminating the disease from herds run by government institutions, and by 1911 all State-owned herds in Queensland were free from tuberculosis. This programme resulted in an awareness of the disease and an increase in demand for tuberculin from the Stock Institute, the only laboratory in the Southern Hemisphere that was preparing it.

Pound showed that tuberculosis could be transmitted by pleuropneumonia inoculation if the pleuro serum had been drawn from a tubercular animal. He advised that all pleuro inoculum be obtained from the Stock Institute, where routine tubercular testing ruled out the risk of infection. But Pound had difficulty in persuading small dairy farmers around Brisbane to have their cows tested, although he pointed out that their best advertisement was to promote their herds as guaranteed free from tuberculosis. The Department made veterinarians available at no cost to the owner to test any herd for tuberculosis; the only proviso was that reactors be isolated from the remainder of the herd until destroyed. Even then, very few farmers responded and, as a result, amendments to *The Dairy Produce Act of 1904* provided for the testing of all herds supplying milk to major centres, beginning with the metropolitan area. However, lack of veterinarians delayed the implementation of the amendments. Pound recommended a compulsory campaign against tuberculosis similar to those in the United States, Canada, Argentina and several European countries, but this was not introduced until the 1970s.



Quarantine keeper Harry Beck (seated, smoking pipe) and family at the Indooroopilly Stock Experiment Station in the 1890s (From the Pound albums)



Opening of the Townsville Stock Experiment Station in April 1914

Other diseases

Pound reported symptomatic blackleg in Queensland coastal districts in 1898, mainly affecting animals from three months to two years old. He confirmed the presence of the causative bacilli, but did not have the facilities to produce a vaccine. When the Yeerongpilly Stock Experiment Station was established, Dodd prepared a double vaccine against blackleg, which was ready for use in December 1909 and proved effective.

Swine fever, a fatal virus disease common in the United States and England, broke out around Brisbane in July 1912. The Department took prompt action: all pigs on affected farms were destroyed, housing was thoroughly disinfected and a three-month quarantine of premises was imposed. Satisfactory control was obtained through these measures, but two further outbreaks were recorded in 1917-18, one in Brisbane and the other in north Queensland. Control measures used in the earlier outbreak were successfully applied again. In the north Queensland outbreak, Kairi State Farm suffered as all its pigs were destroyed and a new piggery had to be established later.

Poisonous plants

One of the earliest horse ailments to gain attention was Birdsville disease, which was first reported in April 1886, and continued to baffle scientists for many decades. The disease caused lack of coordination in horses and made them unrideable. Finally, in 1951, Selwyn Everist (later the government botanist) and Alan Bell (later the director of sheep husbandry) found that it was caused by horses eating the plant Birdsville indigo. Two other diseases were reported in 1919-20 by Veterinary Surgeon Adam McGown: they were walkabout disease, which was common in the Gilbert River, Georgetown and Forsayth areas, and Chillagoe horse disease, which occurred in the area from Charters Towers to Chillagoe. Both diseases were later found to be caused by poisonous plants.

Animal pests

The buffalo fly was discovered in Australia in 1912, when Dr A. Breinl, Director of the School of Tropical Medicine in Townsville, brought some flies back from an expedition to the Northern Territory and sent them to Tryon for identification. Buffalo fly later extended its range southwards and caused the Queensland cattle industry a great deal of expense. Cattle poisoning by sawfly larvae was also reported about this time.

Quarantine

William Henry Beck was appointed quarantine keeper at Lytton in October 1873. The position, which was in the Stock Institute of the Colonial Secretary's Department, was transferred to the Minister for Agriculture in July 1897.

In 1905, the Department prohibited the introduction of any livestock or carcass from any place outside Australasia except the United Kingdom, with entry of stock from the United Kingdom subject to some restrictions. Stock inspectors and

customs officers were told to exercise the greatest vigilance in enforcing this direction. Special instructions were given to officers at Darwin and Thursday Island. Rinderpest was the disease that caused most concern at the time, as it was one of the major world cattle plagues, and had not reached Australia or New Zealand.

Government Veterinary Surgeon Cory and Deputy Chief Inspector of Stock James Orr represented Queensland at a stock conference in Melbourne in August 1906, dealing with the need for uniform animal quarantine laws and inspection techniques throughout Australia. Delegates decided that importation of stock from India, Africa, the Philippines, the Malay States, the East Indies (now Indonesia) and New Guinea should be prohibited, to prevent the entry of a number of severe diseases. They also saw as undesirable the admission of cattle from the Northern Hemisphere from September to December, because of the danger of bringing in warble fly.

Under the Commonwealth *Quarantine Act* 1908, the State quarantine systems were abolished and all external quarantine was placed under Commonwealth control from July 1909. The administration of Acts and regulations relating to overseas animal and plant inspection and quarantine continued to be carried out by officers of the Department under an arrangement with the Commonwealth. The chief inspector of stock was also designated chief quarantine officer (animals).

These regulations could not replace constant vigilance. In March 1915 Pound detected warble fly in a draft of bulls from Scotland being held at Yeerongpilly for tick inoculation. Warble fly caused (and still causes) enormous losses overseas, damaging both hides and meat. Pound's acute observation and timely action prevented what might have been a costly introduction to Australia's cattle industry.

In 1916-17, the animal quarantine station at Lytton was closed and its facilities were handed over to the human quarantine station there. A new animal quarantine station was established at Colmslie.

Conclusion

Control of stock diseases was the major responsibility that passed to the Department with the transfer of the Stock Branch in 1897. At the time, diseases such as tick fever were ravaging Queensland's pastoral industries, and work to alleviate their effects claimed much of the small department's resources. The Department had to formulate and police regulations, set up internal and external quarantine barriers, and, through its team of stock inspectors, compel pastoralists to observe disease-control measures. It also conducted extension programmes for graziers. Many of the measures introduced are still valid and operative in the 1980s, a tribute to the foresight of our pioneering scientists.

13

Agricultural chemistry

Johannes Brünnich had been manager of the Colonial Sugar Refining Company's mill at Homebush, near Mackay. He was appointed agricultural chemist in the Department and lecturer in chemistry at the Queensland Agricultural College (QAC) in March 1897. The Department's first chemistry laboratory was built at the College, but a laboratory was included in the William Street rebuilding programme after the expansion of the Department in 1897. Brünnich worked at the QAC until July 1899, when he was transferred to Brisbane.

The agricultural chemist's duties were varied. Brünnich's first year in the Brisbane laboratory was taken up by analytical work, including analyses of tobacco, pasture, tan bark and fertiliser. Another of his early assignments was to investigate complaints of water pollution made against the Mount Bauple Sugar Mill and against the Moreton Central Mill at Nambour. He was able to recommend remedies to both mills.

Dr Walter Maxwell, the first director of the Bureau of Sugar Experiment Stations, took over supervision of the Department's chemistry branch on his arrival in November 1900. The chemistry laboratories at the Mackay and Bundaberg sugar experiment stations handled inorganic chemistry, while Brünnich was assigned to analyses of feedstuffs and products. He also worked out a satisfactory dipping mixture for the treatment of cattle tick (see Chapter 12).

In 1904, Brünnich was transferred as supervising chemist to the Bureau of Central Sugar Mills, which was in the Treasury Department. During his six-month absence, his assistant, Frank Smith, took charge of the laboratory in Brisbane and carried on its analytical work. One noteworthy finding was that Queensland arrowroot, disdained on the United Kingdom market, was in every way equal to the accepted West Indian arrowroot (see Chapter 8).

The Fertilizers Act of 1905 set out standards for fertilisers and required the packages to be labelled. The Act required that inspectors sample bags of fertiliser and have the contents verified by the agricultural chemist as true to label. Because of this extra work, the Brisbane laboratory staff was increased to six: Brünnich, Frank Smith, three cadets and a laboratory assistant. The general analytical work was continued, together with special projects such as manurial experiments on pineapples and fertiliser trials on tomatoes.

In 1909-10, Brünnich recommended that soil surveys be started in Queens-



*Johannes Brännich,
Agricultural Chemist,
1897-1933*



The Department's seed-testing trays at the Brisbane Botanic Gardens, 1914

land. This move was stimulated by his analyses of soils at Buderim, which became depleted after bananas were grown continuously on the same land. The number of soil analyses almost doubled in 1911-12, after the Department had taken charge of the Bureau of Sugar Experiment Stations on Maxwell's resignation.

At about this time, Brännich tried making silage from prickly pear. The result was a slimy pulp that horses and cattle would not touch, although it was eaten by pigs. Frank Smith supervised feeding experiments at the Prickly Pear Feeding Station at Wallumbilla in 1915-16, using freshly cut pear. He established that prickly pear was not a maintenance feed for cattle and sheep, but must be supplemented with high-protein concentrates.

The prickly-pear feeding trials were considered important at that time as the pear covered millions of hectares of valuable pasture land and was expanding rapidly. While the trials were in progress, the Brisbane laboratory worked at half strength, with Smith at Wallumbilla, James Pringle transferred to the Bundaberg Sugar Experiment Station and George Patten seconded to work in sugar mills. At the same time, Francis Keogh undertook analytical work at the Stock Experiment Station at Oonoonba.

When the Pure Seeds Acts came into operation in January 1914 Frederick F. Coleman was appointed inspector and expert, and seed testing became one of the agricultural chemist's responsibilities. In the first year, almost one-third of the seed samples tested were condemned, and Coleman later suggested that germination standards for some seeds be revised. The acquisition of a modern incubator in 1917-18 enabled him to test seed at all times of the year.

Queensland can take credit for being the first State to put pure-seeds regulations into practice. Victoria had enacted legislation earlier, but defects in that State's Act delayed its implementation.

Conclusion

The agricultural chemistry laboratory established by the Department in 1897 had immediate application to solving problems and answering questions related to Queensland's rural industries. What is the cause of sugar-mill pollution? How is the problem solved? Is prickly pear a good stock feed? What is an acceptable level of seed germination? These and many other questions were addressed by the Department's agricultural chemistry laboratory in its first twenty-five years of operation.

Education and publicity

In the supply debates in November 1887, when seeking funds for the Department of Agriculture, Lands Minister Henry Jordan pointed out the need for the application of science to the problems of agriculture. He believed the transfer of information to farmers and their sons through educational activities to be as important as the acquisition of scientific information through research and investigation.

Education

The travelling dairies, which operated between 1889 and 1896, were the Department's first major extension activity. The agricultural conferences, which started in 1889 and continued until 1906, were another major exercise in group extension methods.

Departmental officers lectured on a wide range of topics to students at the Queensland Agricultural College after its establishment in 1897, and the Department involved itself in educational matters affecting the rural community in other ways. For example, Veterinary Surgeon Wilmot Quinnell lectured in animal anatomy and physiology at the Brisbane Technical College in 1898. He also lectured at the Queensland Agricultural College on foods and their inspection to candidates seeking certificates as inspectors of meat and dairies and other establishments connected with public health.

In 1905-06, Henry Tryon, the Department's entomologist and vegetable pathologist, lectured at the Brisbane Technical College on insects, molluscs, crustacea and echinoderms. In that year, in an attempt to promote nature study, he inaugurated a field naturalists' club and was its first president. This club was still in operation in 1986.

An apprenticeship scheme to train boys unable to attend the Queensland Agricultural College was begun in 1906 at Hermitage State Farm. In 1906-07, the Department was allocated funds to enable its officers to lecture at schools where agricultural subjects were taught. Howard Newport, Instructor in Tropical Agriculture, gave lectures to State school teachers throughout Queensland in the years 1908-10.

Government Bacteriologist Pound lectured widely in his special field as he travelled the State dealing with tick control, tick fever and inoculation. He held

courses for teachers and returned soldiers at the Queensland Agricultural College, and brought them and farmers to Yeerongpilly Stock Experiment Station to demonstrate animal-husbandry and disease-control techniques.

The Queensland Agricultural Journal

From its establishment, the Department of Agriculture relied heavily on publications as an extension aid. Its pamphlets and leaflets were available to settlers who did not have access to its instructors in agricultural and animal-husbandry practices.

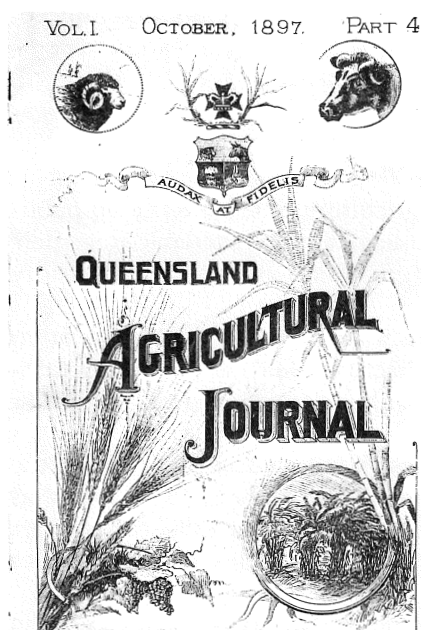
The Department's first set of advisory leaflets was a selection of papers written by farmers, entitled 'Papers for the People by Practical Men'. These were distributed to farmers and settlers and in 1888 were compiled and published, with other information, as *A Queensland Guide*.

After his appointment in 1890, Professor Shelton initiated a series of scientific advisory articles that updated and replaced the earlier papers, to be issued as Departmental bulletins. A second series of bulletins started in 1893, forerunners of the *Queensland Agricultural Journal* in that they included articles on several topics rather than a single subject.

In November 1896, Agriculture Minister James Chataway pointed out to the Legislative Assembly that the New South Wales, South Australian, Tasmanian and Western Australian agriculture departments each issued their own journal of agriculture. He suggested that the Queensland department might consider doing the same. Thus in May 1897 Alexander Boyd was appointed foundation editor of the *Queensland Agricultural Journal*. He was a colourful character. Born in France in 1842, he was educated at the Lycée de Versailles, and migrated to Queensland in 1860. Academically inclined, Boyd was also an adventurer and practical man. In Queensland he became a farmer and operated a cotton gin at Oxley in 1867, then a sugar mill and boiling-down works at Pimpama in 1869, and later owned a sisal hemp plantation, 'Woolhara Park', near Mt Gravatt. In 1905, Boyd had one of the two sisal-scutching machines in Queensland; the Department had the other. He was also a timbergetter.

Earlier in his career, Boyd had been a private school master, operating from a tent, a teacher with the Board of General Education from 1867 to 1875, a journalist and proprietor of the *Townsville Herald*, and a soldier. He was headmaster of Toowoomba Grammar School from 1888 to 1890, then returned to teach at his own school until he was appointed editor of the *Queensland Agricultural Journal* at the age of fifty-five. He acted as secretary at the Queensland Agricultural College for seven months in 1898-99.

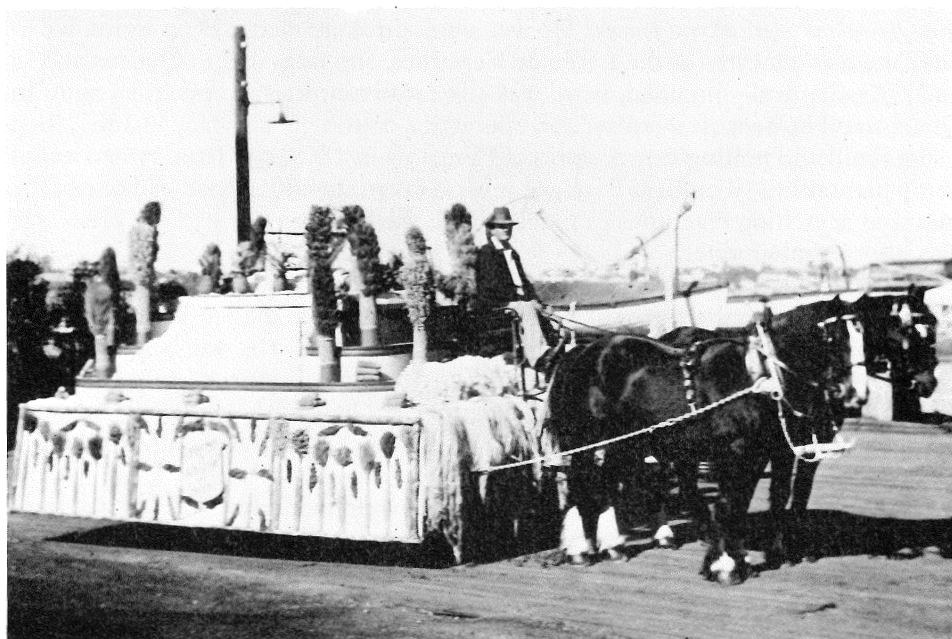
The *Queensland Agricultural Journal* (*QAJ*) was launched in July 1897 by Andrew Thynne. In the first issue, Boyd stated that it was the aim of the Department of Agriculture to give every possible assistance to those engaged in agriculture and that a journal seemed a more effective way of disseminating information than the spasmodic publication of special bulletins. His introductory remarks were followed by specialist articles on sweet potatoes, dairying, fruit, insects, rubber and beekeeping. The opening of the Queensland Agricultural College was announced



Cover of the first volume of the Queensland Agricultural Journal



Alexander Boyd, editor of the Queensland Agricultural Journal, 1897-1921



From its early years, the Department entered floats in local processions to show off the State's agricultural produce. This float is being readied behind the William Street building to take part in a Brisbane procession.

in the first issue, and a call was made for students to enrol. The College's activities were reported in subsequent issues. The *QAJ* covered the gamut of agricultural and pastoral activities. Dairy-herd production records, lists of stud breeders and the results of egg-laying competitions were published to guide prospective buyers of stock.

In 1902, Minister for Agriculture David Dalrymple reported that the *QAJ*'s annual circulation was sixty-seven thousand copies. At that time the *QAJ* was virtually the only agricultural publication regularly available to Queensland farmers.

Boyd wrote a series of lessons, 'First Steps in Agriculture', aimed at school-children because there were no suitable textbooks on agriculture in State schools in Queensland. Within six months, he had received several letters expressing approval. The journal *Tropical Agriculture* of Ceylon (now Sri Lanka) published the lessons as soon as they appeared.

When the Stock Branch became an integral part of the Department in 1904, the *QAJ*'s content was augmented by articles on stock. Specialist articles by Government Bacteriologist Charles Pound and Government Veterinary Surgeon Arthur Cory were mainly on tick fever and preventive inoculation.

As the *QAJ* started in July 1897, some confusion arose concerning its numbering and date system. To overcome this, a new series began with the January 1914 issue. In the same year policy changed, and the *QAJ* accepted advertisements related to rural production or to manufactured articles needed in rural production. For many years, the Department had not permitted the *QAJ* to accept advertising on the ground that it was intended only as a vehicle for information and instruction on agricultural and pastoral matters.

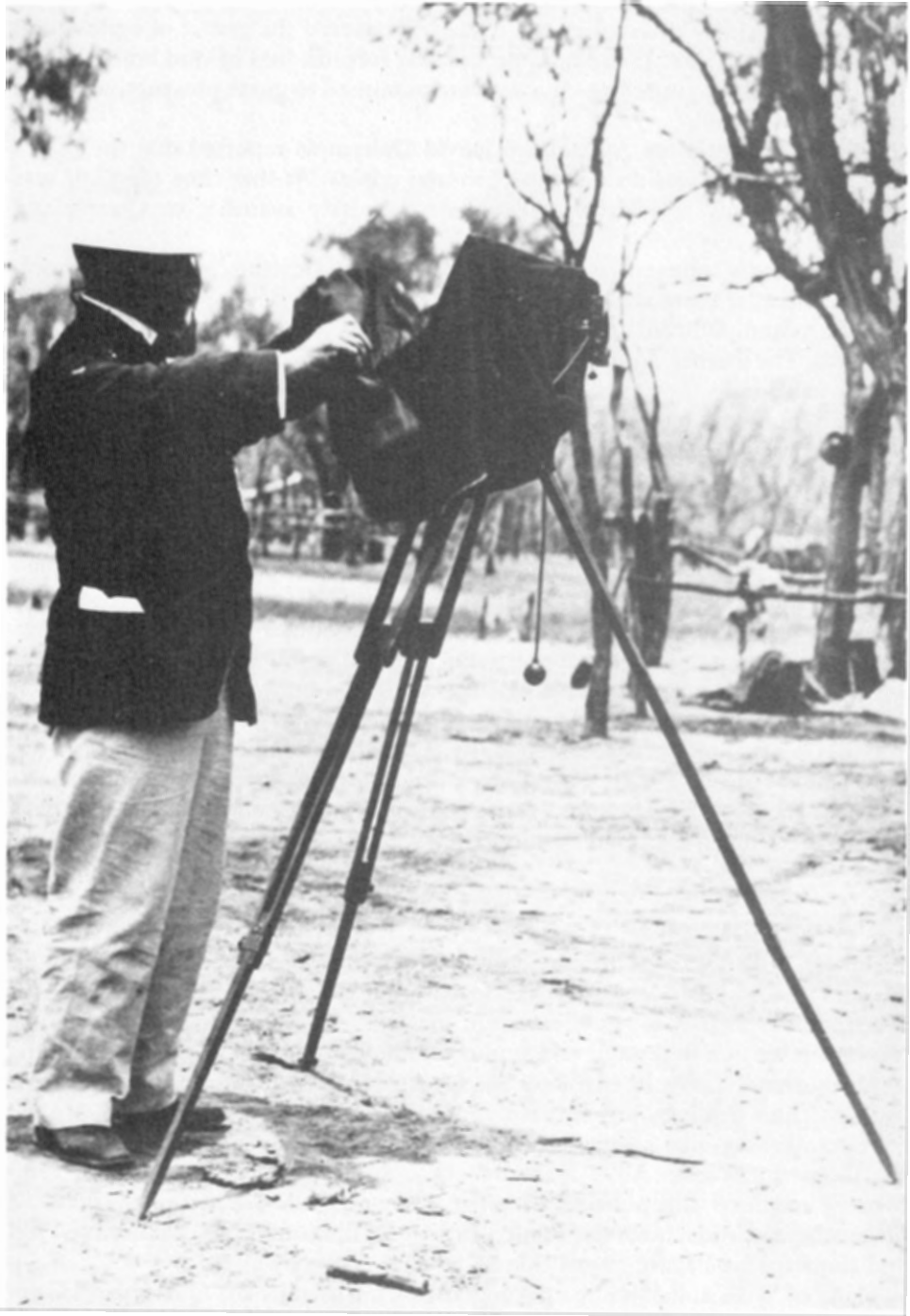
Believing that farmers most frequently get information on new practices from their neighbours, in January 1919 Boyd asked farmers to write about their experiences for the *QAJ*. His hope for a series of articles from 'the man on the land' was not fulfilled, but the journal continued to increase in popularity.

Photography

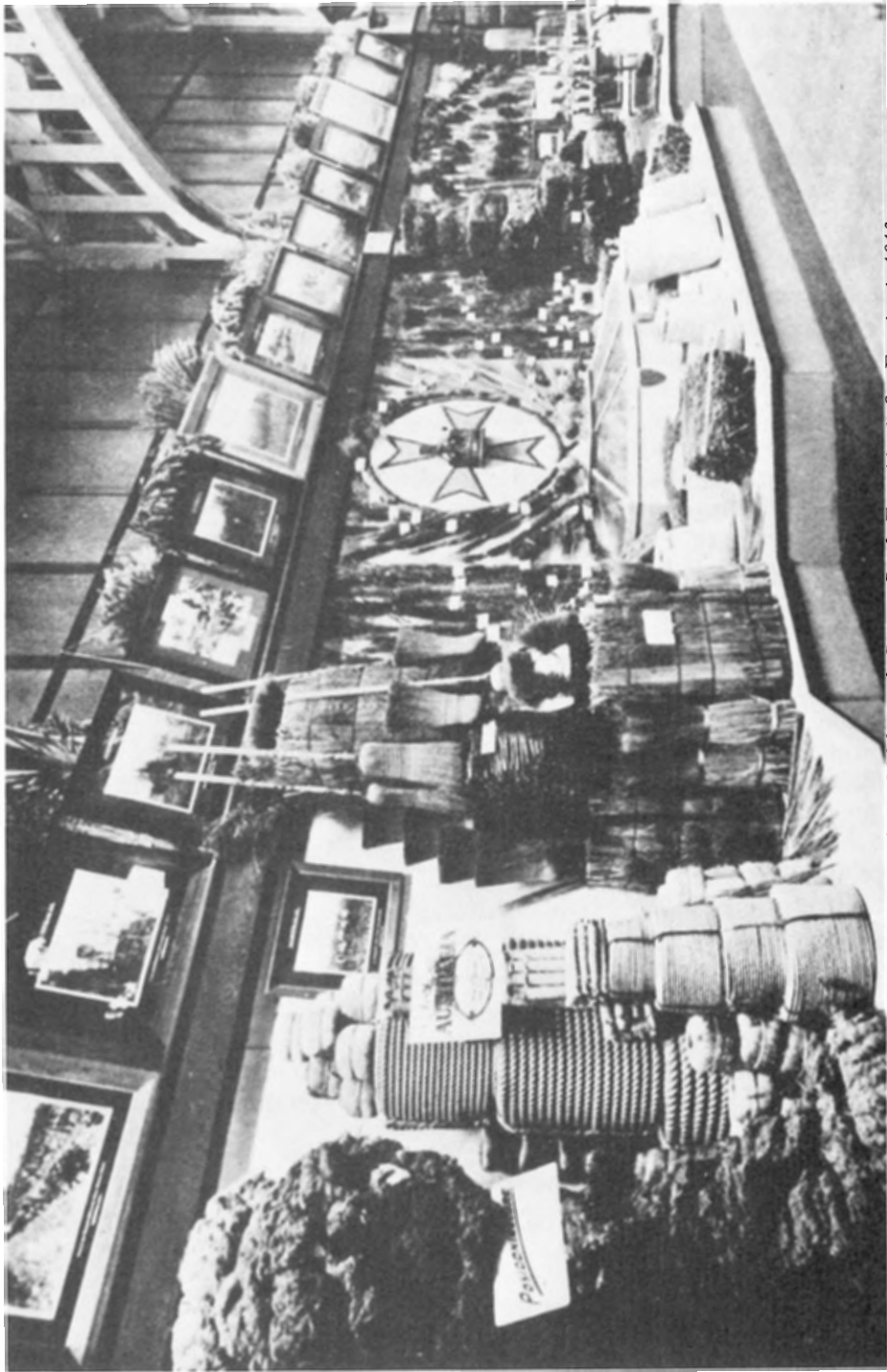
Frederick Wills was appointed photographer in the Department in March 1897. He was also a skilled illustrator, and was often called upon to draw botanical specimens, especially for publication in the *QAJ*. As well as making prints and lantern slides in a darkroom and studio that he designed, Wills pioneered films in Queensland. Those he made for the Greater Britain Exhibition in 1899 were the first films made by any Queensland government department.

Harry Mobsby, also a skilled artist, designer and photographer, had worked for the Department since 1899 as Wills' assistant. When Wills resigned in 1903 Mobsby assumed the position of artist/photographer. He set up displays of Queensland's products for the Franco-British Exhibition in London in May 1908 and the Panama-Pacific Exposition in San Francisco in 1914.

Many of Wills and Mobsby's photographs were used by the Queensland Government Tourist and Intelligence Bureau, which issued booklets about the agricultural, pastoral, mining and tourist potential of various parts of the State in the



Harry Mobsby, photographer and display artist, in action about 1905 (Courtesy John Oxley Library, Brisbane)



The Queensland display, put together by Molsby, at the Panama-Pacific Exposition in San Francisco in 1913

years 1910–20. Unfortunately, the glass-plate negatives of these photographs were destroyed by a fire in the William Street building in the late 1940s.

Wills' original camera, his films and his collection of books on photographic techniques were given to the Queensland Museum in 1955. At the time of writing, his films were being restored by the National Film Archive in Canberra. Some restored sections, including film of the sugar industry in the 1890s, were on display at the Queensland Museum in early 1987, along with his camera.

Exhibits

From its founding, the Department was called on to provide exhibits demonstrating the productive capacity and potential of Queensland's rural industries. For example, Colonial Botanist F. M. Bailey assembled a range of Queensland grasses for the Centennial International Exhibition held in Melbourne to mark Australia's centenary in 1888. He also set up an exhibit of Queensland timbers within the Department's Museum of Economic Botany.

The Department was represented at the Australian Natives' Association Exhibition in Melbourne in 1907, displaying fresh fruit from all parts of the State. Schools were given specimens of sugarcane, coconuts, wool and cotton, and literature was distributed. The officer in charge of the Queensland Court lectured on life in Queensland and the State's products and potential. The Queensland exhibit was highly praised by the Melbourne press.

The Department was also involved in the International Exhibition held at Bowen Park in Brisbane in 1897, and prepared exhibits for overseas expositions, including the Greater Britain Exhibition in 1899 and the Panama-Pacific Exposition of 1914. Much work went into the preparation of Departmental displays at the Brisbane Exhibition at Bowen Park, a means of contact with many thousands of Queensland farmers. By 1920, each of the Department's major sections had its own display, covering such areas as pure seeds, stock diseases, pastures, dairying, crops and fruit.

Conclusion

As an extension of its original function — advising new settlers on farm production — the Department soon turned to the publication of literature for farmers and prospective settlers. Additional demands followed, for the Department to use its resources to provide education and training in agriculture and to promote Queensland's rural industries and potential for development to a wider audience.

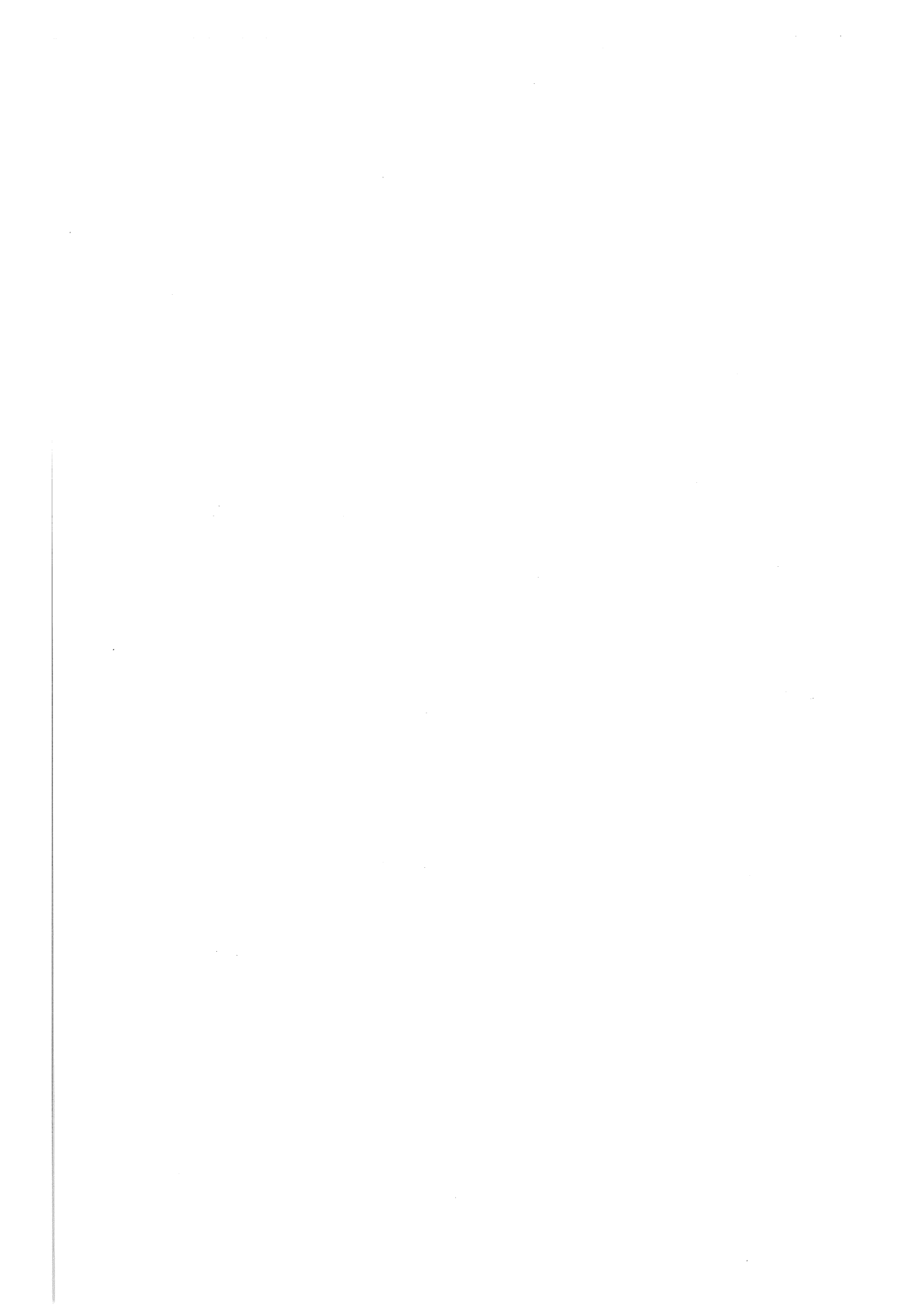
PART 2

ORGANISATION

By the early 1920s all of the old pastoral runs in Queensland's better-rainfall areas had been subdivided into thousands of small farming blocks. The small farmers supported the Labor Party, which ushered in an era in Queensland agriculture dubbed by historians the 'agrarian socialism' period.

The Labor Party won government in Queensland in 1915 but could not implement its more radical policies until 1922, when it arranged the demise of the State's upper house. That year saw the organisation of Queensland's cropping and dairying industries under the Primary Producers' Organisation Act and a complete reorganisation of the Department of Agriculture and Stock.

Through the organisational framework set up for them the small farmers demanded fair prices for their produce, higher-quality farm supplies and better advisory services. In response, the State Government passed new legislation and allocated funds to expand the Department's research, regulatory and advisory functions, an expansion that necessitated further reorganisation. This move was formulated in the 1930s but forestalled by the outbreak of World War II, when the Department devoted its resources to increasing agricultural production.



Administration

The Department of Agriculture and Stock was completely reorganised under *The Public Service Act of 1922*. This Act, designed to introduce greater professionalism into the Queensland public service through a review of positions, classifications, promotion, qualifications and salaries, led to an inspection of the Department by officers of the Public Service Commissioner's Department. They advocated a clearer definition of duties, and a grouping of the Department's twenty-one sections into more coordinated branches. The inspectors believed that experienced clerks could do some of the work of the Department's experts, and that the appointment of understudies might free the experts to spend more time in the field, and stated that coordinated training schemes for technical staff were needed.

W. N. Gillies

William Neal Gillies was the first of the four Ministers for Agriculture and Stock who administered the Department between 1919 and 1942. Gillies was born at Allynbrook, New South Wales, in 1868. At the age of fourteen he took up farming on the Richmond River, and in 1911 moved to the Atherton Tableland, where he selected land for dairying. Elected MLA for Eacham, he was appointed Minister without Portfolio in 1918, and in the following year became Minister for Agriculture and Stock.

When Gillies took office he had twenty-two Acts of Parliament to administer. During his term he had seven of these amended and added another fourteen, increasing the Department's responsibilities and necessitating the appointment of more staff. The transfer of the State Advances Corporation and its staff from the Treasury Department to the Agricultural Bank also increased the Department's numerical strength. Gillies was Chief Secretary (Premier) and Treasurer from February to October 1925. He died in Brisbane in 1928.

W. Forgan-Smith

William Forgan-Smith was born in Scotland in 1887. A house painter, he emigrated to Australia and settled at Mackay in 1911. There he joined the Australian Workers' Union, and became president of the local branch. He was elected MLA for Mackay in 1915 and held the seat for twenty-seven years.

After holding the Public Works portfolio from 1922 to 1925, Forgan-Smith was appointed Minister for Agriculture and Stock. He served in that position until the Labor Party's defeat in 1929, when he became Leader of the Opposition. Among the thirteen legislative Acts Forgan-Smith introduced were some that would bring significant changes in the marketing of agricultural commodities in Queensland.

On the Labor Party's return to government in 1932, Forgan-Smith held the Chief Secretary's portfolio until his retirement from politics in 1942. He died in Brisbane in 1953.

H. F. Walker

Harry Frederick Walker was born at Gympie in 1873. He engaged in mining before taking up dairying near Gympie. Walker became chairman of directors of the Wide Bay Co-operative Dairy Company and was elected MLA for Wide Bay in 1907. He was appointed Minister for Agriculture and Stock in A. E. Moore's Country Progressive National Party Government, which came into office in 1929. Walker lost his seat in 1932, when Moore's government was defeated by the Labor Party led by Forgan-Smith.

The Moore Government's term coincided with the worst years of the Great Depression, and few appointments were made to the public service. Despite such limitations, Walker initiated sixteen Acts, which were aimed mainly at pest and disease control and which necessitated the appointment of inspectors to enforce their provisions.

F. W. Bulcock

Frank William Bulcock was the first Minister for Agriculture and Stock to have both an academic and a practical background in agricultural and veterinary science. He was born in Victoria in 1895 and was educated in Sydney, graduating from the Sydney Technical College with first-class honours in agriculture. He then attended Wagga Agricultural College for further training in agriculture and animal husbandry, and became dux of the college, taking honours in bacteriology, plant diseases, dairy practice and sheep and wool.

On leaving Wagga, Bulcock worked on farms in the Riverina, taking a special interest in wheat breeding. In 1914 he came to Queensland to work in the pastoral industry and became an active member of the Australian Workers' Union. Bulcock was elected MLA for Barcoo in 1920 and held the seat until his resignation in 1942.

Bulcock's term, the second longest in the Department's history, was the greatest in terms of legislative activity. In his ten and a half years as Minister, he piloted through Parliament seventy-two Acts covering all aspects of agriculture in Queensland; twenty-four were new or replacement Acts. Bulcock also took a great interest in the day-to-day running of the Department and encouraged the employment of graduates in the agricultural and veterinary sciences to provide a more scientific approach to the solution of problems in Queensland's rural industries.



W. N. Gillies, Minister for Agriculture and Stock, 1919-25



W. Forgan-Smith, Minister for Agriculture and Stock, 1925-29



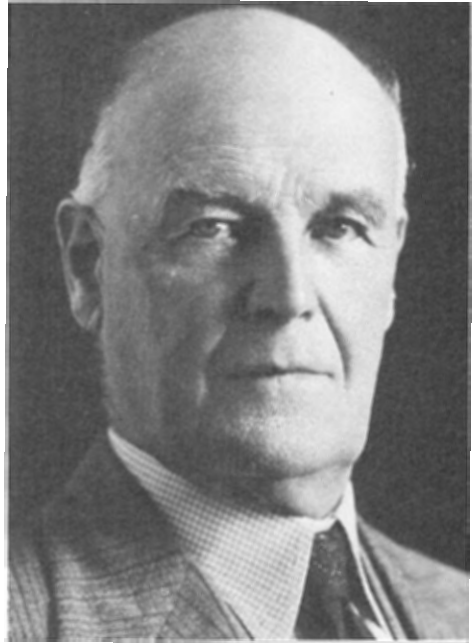
H. F. Walker, Minister for Agriculture and Stock, 1929-32



F. W. Bulcock, Minister for Agriculture and Stock, 1932-42



Arthur Graham, Under-Secretary, Department of Agriculture and Stock, 1924-38



Robert Wilson, Under-Secretary, Department of Agriculture and Stock, 1938-39



Richard Short, Under-Secretary, Department of Agriculture and Stock, 1939-47



Professor E. J. Goddard, science coordinator, 1936-38

Under-secretaries

Ernest Scriven, a foundation member of the Department and under-secretary since 1904, retired in December 1924 and was succeeded by Arthur Graham. Graham, born at Wagga Wagga, New South Wales, in 1876, had been a butter and cheese-maker and then manager of several dairy factories. He had moved to Queensland in 1906 and served as dairy instructor at the Queensland Agricultural College for one year before becoming manager of the Queensland Farmers' Co-operative. He had rejoined the Department in 1908 as dairy expert, became chief dairy expert in 1915 and director of dairying and cold storage in 1922. A new position, that of assistant under-secretary, was filled by Robert ('Digger') Wilson, who had been chief clerk.

Graham died in office in May 1938 and was succeeded by Wilson. Although he was the executive head of the Department, Wilson was not appointed under-secretary as he had reached retirement age on the day Graham died. Richard Short, who had been senior clerk, became acting under-secretary in 1939, and under-secretary a year later.

Science makes changes

Bulcock recognised the advantages of having trained scientists to research agricultural problems and promoted the employment of graduates in agricultural and veterinary science. The Department had been instrumental in setting up the Faculty of Agriculture at the University of Queensland in 1927, and took most of its graduates from 1930. In the early 1930s, when the Department had difficulty in recruiting veterinary graduates from other States, Bulcock supported government moves to establish a faculty of veterinary science at the University of Queensland, and in 1936 the Department enrolled two cadets as foundation students in the new faculty.

In the same year, Bulcock commissioned E. J. Goddard, Professor of Biology at the University of Queensland, to examine the Department's scientific and technical services. Goddard, who had supervised banana-disease research for the Department in the 1920s, was appointed science coordinator. One of his primary duties was to eliminate overlapping in research projects to ensure that research resources, both scientists and equipment, were used efficiently.

At Goddard's suggestion, the Research Branch was formed in 1936 and Robert Veitch was appointed director. Three experienced and highly regarded officers were appointed to deal with the practical application of research: Richard Soutter, Research Officer in Wheat and Maize; L. F. Mandelson, Research Pathologist; and David Atherton, Special Projects Officer. The branch was short-lived, however, and in 1937 the Division of Plant Industry (Research) was created by the Minister, acting on the recommendation of the Public Service Commissioner, with Veitch its director. The division included agronomy, agrostology, botany, plant physiology, breeding and pathology, horticulture, soils, entomology and biometry sections.

Goddard had suggested a complete reorganisation of the Department to 'break down the idea of disparate effort vested in independent branches', with branches



Staff of Accounts Branch, 1930. Front row (left to right): E. F. Bohan, W. Gettons, S. S. Hooper (Accountant), Miss E. N. Kernke, A. A. Salmon. Back row (left to right): E. F. Keefer, E. C. R. Sadler, J. A. Winders, W. J. Copley, W. E. Hamley



Major extensions were made to the William Street building in 1930.

grouped into five technical divisions. These were plant industry (research), animal industry, soils, agricultural industry and commerce, and extension and agricultural education. Only one division was created before the outbreak of war in 1939.

While Goddard was advising on the plant industry division, Professor H. R. Seddon, Dean of the new Faculty of Veterinary Science at the University of Queensland, was asked to advise the Department on the formation of a division of animal industry. This move was deferred because of the war, and only the Veterinary Services Branch was formed. Seddon was its first director, for a three-year term from 1940.

Conclusion

The reorganisation of Queensland's public service in 1922 extended to the Department of Agriculture and Stock. By the mid 1930s, the Department's expanding staff of scientists and technicians and its increasing scientific research undertakings made further reorganisation necessary. The Department sought guidance from experts at the University of Queensland to enable it to fulfil its role of providing research, advisory and regulatory services to the State's rural industries.

Marketing and standards

The period of unprecedented advancement in Queensland agriculture after the First World War was also one of low prices, when trade depression, financial stringency and scarce credit frustrated the farming community. Farmers were not organised, so had little bargaining power. The individual farmer, with few financial resources, was at the mercy of merchants who offered low prices for his produce.

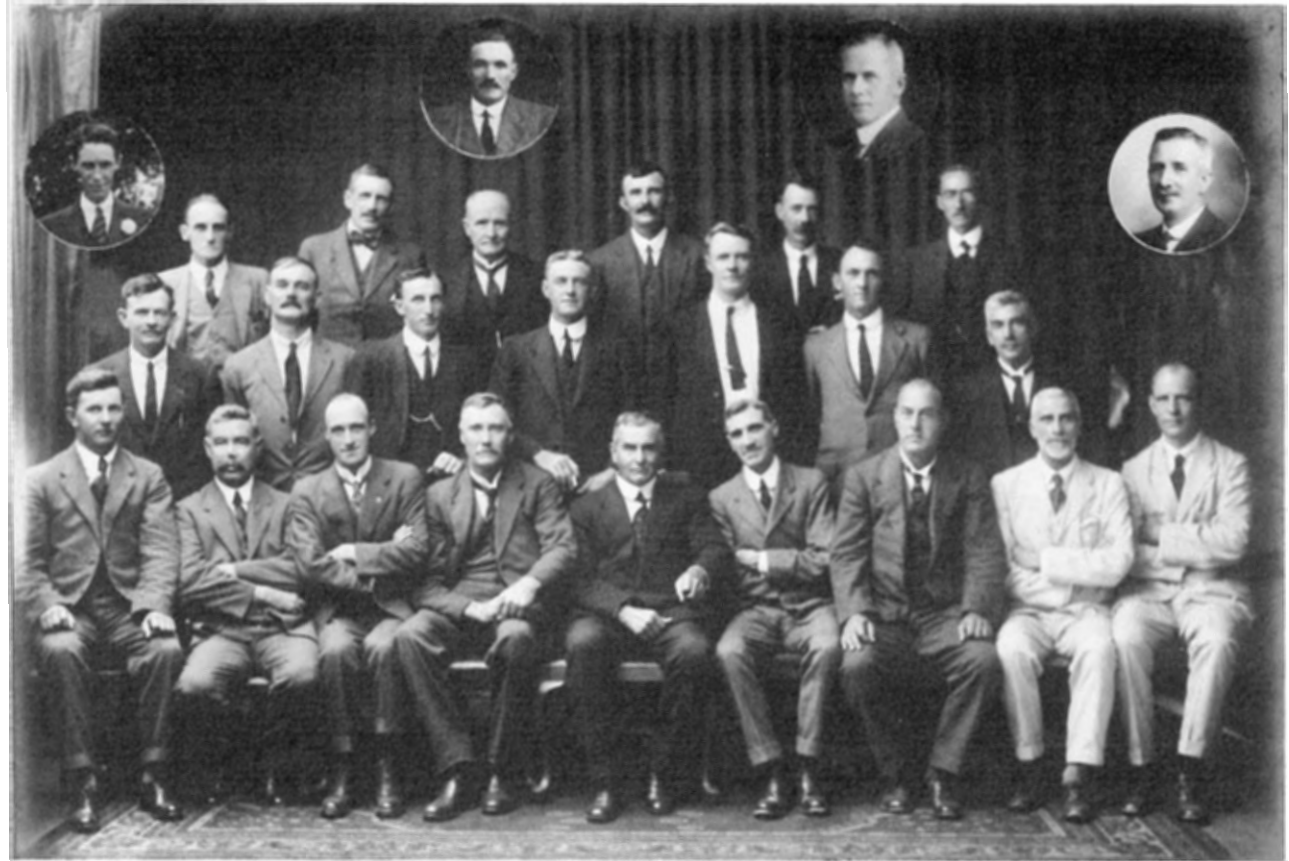
Farmers began to organise themselves into selling combines to increase their bargaining power. The Queensland Farmers' Union set up a trust fund in 1920, placing a levy on that year's wheat crop to fund a voluntary pool to gain higher prices. This move foreshadowed the Wheat Pool and Cheese Pool Acts of 1920 and 1921, which set up statutory marketing boards to arrange the pooling and marketing of wheat and cheese. *The Primary Products Pools Act of 1922* provided the general framework for the establishment of a statutory marketing board for any crop or dairy product if three-quarters of its producers voted in favour. Such organised marketing of agricultural produce was a unique concept, one that has since been adopted in many other countries.

Council of Agriculture

In 1922, recognising that his Government needed the support of small farmers, Labor Premier E. G. Theodore outlined an idealistic scheme for the organisation of Queensland's agricultural industries through a council of agriculture. His idea was to give small farmers not only bargaining power in the marketplace but also a voice in other areas, such as transport, finance, regulations and research.

The Primary Producers' Organisation Act of 1922 established the Queensland Producers' Association, which comprised a provisional council of agriculture, district councils and local producers' associations. Richard Lewis Macgregor was appointed director of the association in July 1922. Trained in banking and law in Scotland, Macgregor had managed an estate in India, and then had managed a fruit enterprise and a farmers' cooperative in Western Australia. Macgregor became a permanent officer of the Department, and was Queensland's highest-paid public servant.

In its first year, financed by the State Government, the Provisional Council dealt with such diverse topics as herd testing, fodder conservation, price stabilis-



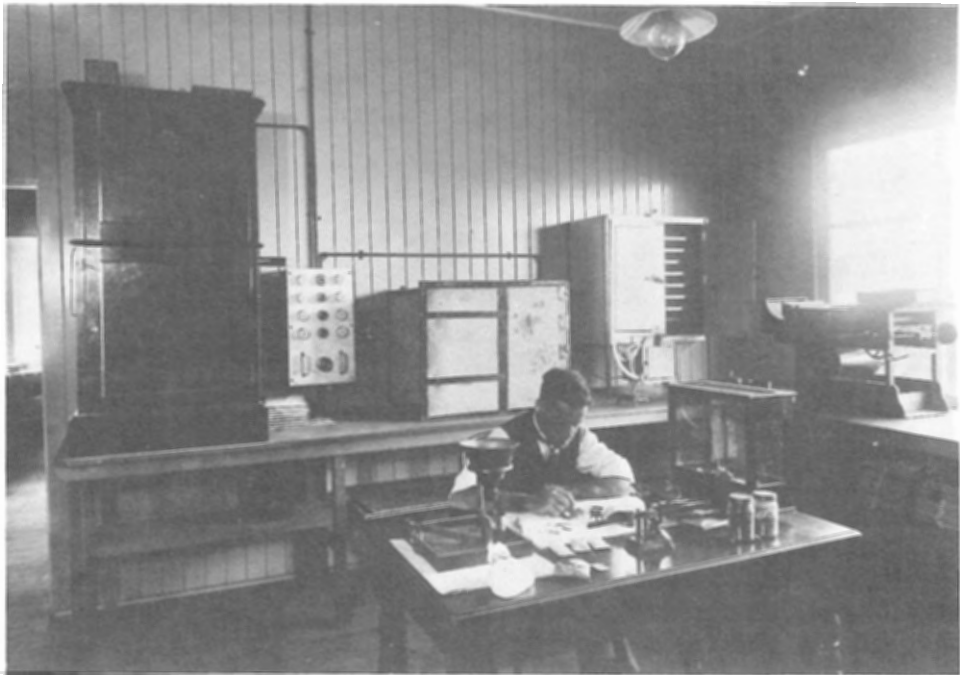
Members of the Provisional Council of Agriculture, 1922-23. Representatives of the Department were Arthur Graham, chairman of the Dairying Committee (second inset from left); H. C. Quodling, Director of Agriculture (third inset from left); R. L. Macgregor, Director (seated third from left); and W. N. Gillies, the Minister (seated at centre).



Harry Hunter, Director of Marketing from 1939



Fritz Coleman, officer in charge of the Seeds, Fertilisers, Stock Foods, Pest Destroyers and Veterinary Medicines Branch from 1935



Inside the seeds laboratory, William Street, in 1922

ation, pigs, tariffs, grain-growing, fruit, rail freights, rural credit, taxation and cooperative companies. Through the Council, farmers' associations had direct access to government departments on any matters relating to agriculture.

The first elected Council of Agriculture held office from March 1923 to June 1924. Its members were the Minister for Agriculture and Stock (president), the director of dairying, the director of agriculture, the general manager of the Bureau of Central Sugar Mills, the Commissioner of Railways, the Public Service Commissioner and representatives of nineteen district councils. Departmental staff served on the Council's seven standing committees.

In April 1926, about twenty-six thousand of Queensland's thirty thousand farmers were members of local producers' associations. But Theodore's scheme, which had been valid in theory, proved quite unworkable in practice: representation on a district basis failed because of the dominance of industry-based interests, which often cut across district boundaries. The Government repealed the Act that had set up the Council on a district basis and reorganised it on a commodity basis, under *The Primary Producers' Organisation and Marketing Act of 1926*.

The new Act repealed the Primary Products Pools Act and provided for the establishment of marketing boards, through which the Council of Agriculture would represent commodity interests. The Act also stipulated that no government nominees would be on the Council and that the Minister would not necessarily be president. The Government thus severed the close connection between the Department and the Council.

The 1926 Act provided for the appointment of a director of marketing within the Department of Agriculture and Stock. Macgregor was appointed to the position and remained there until his resignation in 1930, liaising between the commodity (marketing) boards, the Council and the Department.

The marketing boards were constituted on practically the same basis as the older pools boards and empowered to levy precepts to cover their costs. By 1939, sixteen products had been brought under controlled marketing arrangements. Sugar was the subject of a separate arrangement between the Queensland and Commonwealth Governments, as its marketing involved an embargo on imported sugar and a fixed home consumption price on the Australian market.

Another commodity for which special arrangements were made was fruit. *The Fruit Marketing Organisation Act of 1923* had set up the Committee of Direction of Fruit Marketing (COD), a body entirely separate from both Council and Department. The COD did not have complete ownership of commodities as did the marketing boards, but its legal powers could be applied to any portion of a crop that was difficult to market, for example, the portion used for processing.

Agricultural standards

Farmers had problems not only in selling their produce but also in obtaining agricultural requirements that suited their needs: the merchants who bought their produce at rock-bottom prices often sold them fertilisers, seeds and chemicals that were unreliable. The farmers made frequent complaints about these poor materials to the Department through local producers' associations.

The Department had been made responsible for the maintenance of agricultural standards set out in *The Fertilizer Act of 1905*, but the Act had many loopholes and the Department was not properly set up to administer its various regulations. In 1922, the Seeds, Fertilisers and Stock Foods Investigation Branch was set up, headed by Frederick Coleman. It took charge of agricultural standards, formerly the responsibility of the agricultural chemist, and began operating as the Pure Seeds Section within Agriculture (General) Branch.

The branch quickly expanded, and by 1923 carried out seed testing and the analysis of stock foods, fertilisers and pest destroyers. In 1935 it was given the unwieldy title 'Seeds, Fertilisers, Stock Foods, Pest Destroyers and Veterinary Medicines Branch'. Coleman died in 1935 and his son, Fritz Coleman, replaced him.

Many Acts passed in the 1920s and 1930s set standards and introduced regulations aimed at providing farmers with better-quality agricultural requirements. As a result, extra inspectors and staff were appointed to test and analyse various preparations.

The Pure Seeds Acts, 1913 to 1914 had helped set up the administrative machinery in the Pure Seeds Section to deal with agricultural standards, but the Acts themselves had few regulatory powers. They were replaced by *The Seeds Act of 1937*, under which inspectors were appointed. In 1941 the Seed Certification Committee was set up to ensure a supply of pure and certified seed from registered growers, inspected by Departmental officers. Earlier Acts relating to fertiliser and stock food standards were also replaced or amended to introduce stricter regulations; inspectors were appointed and given wider powers, and penalties were imposed for breaches of the Acts' provisions.

The Pest Destroyers' Act of 1923 was formulated to regulate the sale of insecticides, fungicides, pest destroyers and weedkillers. It was replaced by *The Pest Destroyers' Act of 1939*, which set up the Pest Destroyers' Board to assess the efficacy of chemicals and register them for sale. The officer in charge of the Seeds, Fertilisers, Stock Foods, Pest Destroyers and Veterinary Medicines Branch was appointed registrar of pest destroyers.

Similarly, *The Veterinary Medicines Act of 1933* set up the Veterinary Medicines Board, whose members were the agricultural chemist and the chief inspector of stock (both from the Department), a bacteriologist and a veterinarian. The board registered veterinary medicines and licensed sellers until 1938, when a registrar was appointed and suppliers were required to register their products.

Conclusion

The Department played a vital part in the organisation and regulation of Queensland's agricultural industries in the 1920s and 1930s. Its participation was demanded by small farmers, who were the victims of low commodity prices, manipulation by merchants and poor-quality agricultural inputs. No wool or beef marketing schemes were introduced, as small farmers were the main initiators and supporters of marketing legislation. They were also the main instigators of regulations formulated to raise the standards of the products supplied to them.

State farms and experiment stations

In 1922 the Department operated six State farms, Hermitage, Gindie, Warren, Roma, Kairi and Home Hill, which formed a regional network from Atherton to Warwick and west to Emerald and Roma. The State farms had been set up in part to provide planting material and stud stock, but they were soon supplanted by commercial suppliers. Further, by the 1930s, the work of those farms in assessing the types of agriculture suited to new regions and demonstrating good farming practices to settlers had largely been completed.

Leading agricultural scientists and administrators had already seen the need for change. Professor J. K. Murray, principal of the Queensland Agricultural High School and College, J. Irwin, of the Public Service Commissioner's Department, and Arthur Graham, Under-Secretary, formed a committee in 1927 to consider the future of Warren and Hermitage State Farms. They believed that the Callide Cotton Research Station at Biloela could provide better facilities than Warren, and regarded Hermitage as too limited in soil types and climate to cover the wheat-growing areas, and recommended leasing the two farms.

The transition from traditional State farms to modern research stations was made possible under *The Primary Produce Experiment Stations Act of 1927*, which empowered the government to run primary produce experiment stations and set out the conditions under which they would operate. Experiment stations along the lines of the sugar experiment stations could be set up to handle other crops. They would be financed by a levy and the Minister could direct funds to be used to investigate and eradicate pests and diseases. The implementation of these plans was delayed by the Great Depression and World War II, but in the meantime the Department set about dismantling its State farm network.

State farms

The main work at Hermitage in the 1920s was the testing of varieties of wheat, barley and oats to assess their suitability in the heavy black soils of the Darling Downs. Seed of these crops was sold to growers after cleaning and grading, and high-quality crossbred lambs were also offered for sale. In December 1927, tenders were called for the lease of the farm.

Warren's pig and dairy cattle stud herds provided good-quality stock to local farmers. Its staff gave demonstrations on silage-making and the growing of crops



*Charles McKeon, Director of
Tropical Agriculture, 1935-37,
then Director of Agriculture
until 1950*

*The Bureau of Tropical Agriculture,
South Johnstone, in 1935*



for stock feed, and instructed pupils at Stanwell and other local schools in saddlery, tinsmithing, the testing of milk and cream, the judging of stock and general agriculture. Warren was offered for lease for five years from 1927, then sold.

From the early 1920s, Gindie was used for the breeding of stud beef cattle and draughthorses for shows and for sale. Its animals won many prizes at shows in Brisbane and Rockhampton and sales were good. The farm was closed in 1932, after three years of low rainfall.

A wide range of crops was bred at Roma, but the emphasis was on wheat. Testing plots were planted throughout the Roma district, and suitable varieties were released to farmers through the State Wheat Board. The breeding work was transferred to the Darling Downs in 1934 and the farm was closed a year later.

At Kairi 200 hectares of land were surrendered for the settlement of returned soldiers after World War I, and the farm's stud dairy and pig herds provided foundation stock for the new settlers. The farm was closed in 1929, but continued to be used for maize trials and farm schools until it was abandoned to weeds, which had become a serious problem. In 1939 Kairi was leased as a commercial farm; in 1942, it was occupied by the Australian army to produce eggs and vegetables for troops based in north Queensland.

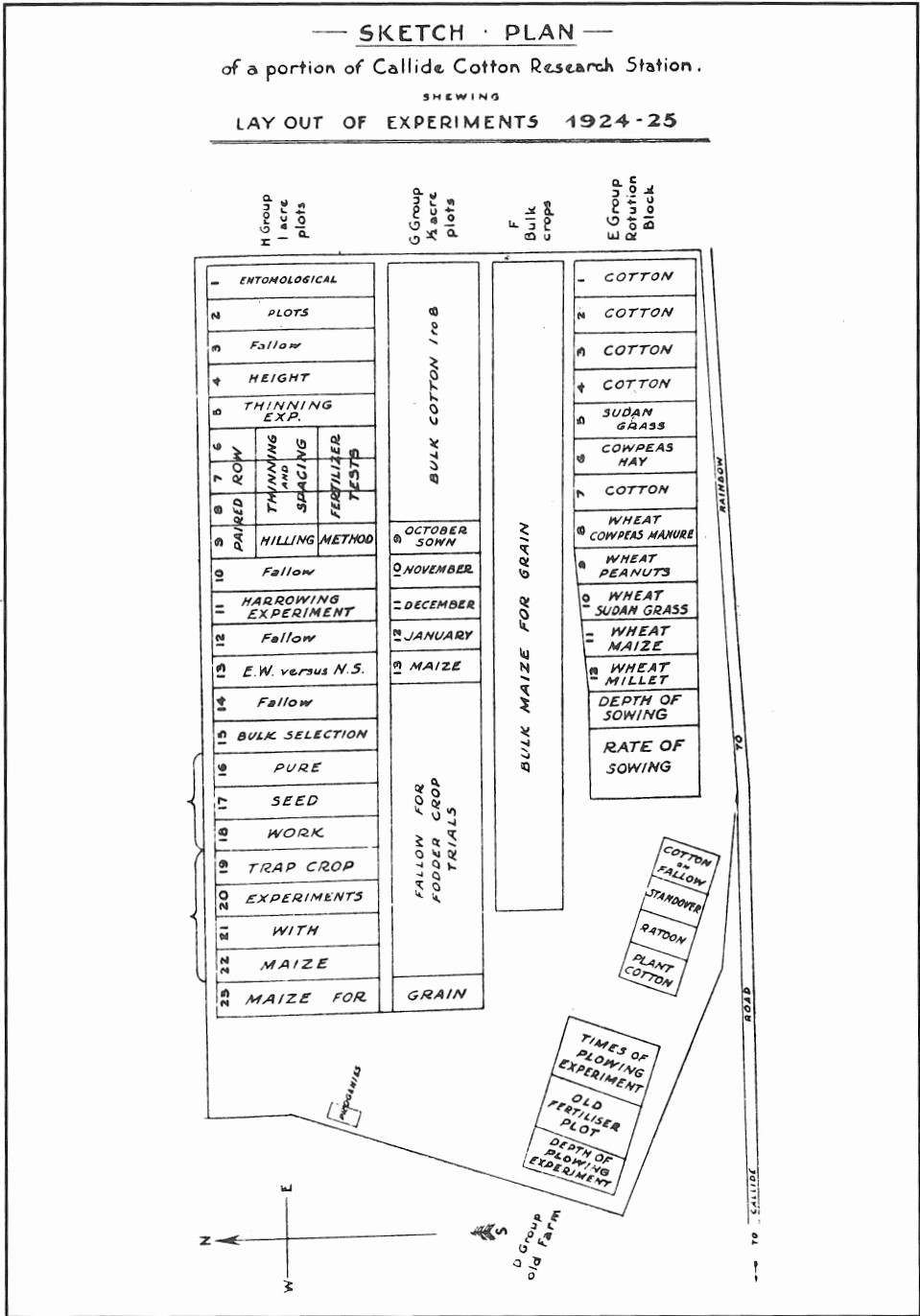
Home Hill State Farm was opened in 1920 for researchers to study irrigation methods and record production costs of irrigated sugarcane for the Sugar Cane Prices Board. A wide range of other crops was also grown there. The farm was closed in 1930, when it was considered to have fulfilled its purpose.

Experiment stations

The Bribie Island State Nursery was established in 1922-23, with James Mitchell, Assistant Instructor in Fruit Culture, in charge. The nursery was set up mainly to raise disease-free and pest-free banana plants for sale to growers, but, because of its relative isolation, it was also used as a plant introduction, quarantine and acclimatisation centre. Many different fruit species were introduced and varieties were selected and propagated for distribution. The nursery was closed in 1929 after the establishment of special banana experiment stations.

Two banana experiment stations were set up by the Department in association with the Committee of Direction of Fruit Marketing and under the terms of *The Primary Produce Experiment Stations Act of 1927*. One was at Kin Kin, near Gympie, supervised by H. J. (Joe) Freeman, and the other was at Bartle Frere, near Innisfail, under William Ross. The stations were designed to undertake experiments in banana nutrition, plant spacing and other matters, but both were closed in the early 1930s, little useful work having been achieved.

In 1924, cotton experiment farms were established at Biloela and at Monal Creek, near Monto, to assess the potential for cotton-growing in the newly developed Upper Burnett and Callide Valley land settlements. Cultural, fertiliser and rotation trials were laid down on both stations, but the Monal Creek farm was closed in 1925. Cotton research continued at Biloela, where a new insectary was built in 1939 to investigate control measures for cotton pests. During the war, important work on pest control and irrigation of cotton was carried out there.



The first report of scientifically conducted crop trials published in Queensland was of cotton trials planted by Walton Wells on Callide Cotton Research Station soon after the station's establishment in 1924.

The Barcaldine Date Experiment Station was established in 1935, on a site selected by Joe Freeman. In 1943 the plantation caretaker, G. Shave, sent several cases of dates to Brisbane but reported that birds had eaten most of the fruit. Shave, who was over eighty years old, resigned later that year, and as Bulcock, the driving force behind the farm, was no longer Minister, the plot was abandoned.

Bureau of Tropical Agriculture

When the sugar work was transferred from the South Johnstone Sugar Experiment Station to Meringa, near Gordonvale, in 1934, the Department established the Bureau of Tropical Agriculture at South Johnstone. Its objective was to examine the potential for growing crops other than sugarcane in north Queensland. Charles McKeon was appointed foundation director in July 1935. He brought with him plant breeder Dr L. G. (Gordon) Miles, analyst William Cartmill, pomologist G. W. (Bill) Agnew, and senior cadet C. J. Whitehead. McKeon also supervised the Department's general experimental work in north Queensland.

In 1937 McKeon was appointed director of agriculture in Brisbane, and John Schofield replaced him as director of the Bureau of Tropical Agriculture. Schofield had had considerable experience with tropical crops in South-east Asia, which proved valuable; the Bureau became important as a centre for tropical crop trials and a source of planting material during the war, when much of South-east Asia fell to the Japanese. Among the many tropical crops grown there in the war years were cinchona (used to produce quinine), rubber, tea and derris.

Conclusion

The 1920s and 1930s were a significant period, for they saw the complete closure of the State farm network that had operated for more than thirty years. By the late 1920s the State farms had fulfilled their original purpose, helping to establish agriculture in suitable areas and providing settlers with quality plants and animals. Special-purpose experiment stations were then established to address specific problems, but most of these were also closed during the Great Depression. At the start of World War II the Department operated only two research stations dealing with crops other than sugar, the Callide cotton experiment farm at Biloela and the Bureau of Tropical Agriculture at South Johnstone.

The sugar industry

In the early 1920s many new canegrowers entered the sugar industry, largely as a result of soldier-settlement schemes. The Department helped both new and established growers through the Bureau of Sugar Experiment Stations (BSES), founded under *The Sugar Experiment Stations Act of 1900* to undertake research, advisory and regulatory functions for the sugar industry.

The Sugar Cane Prices Board, a section of the Department, administered legislation under which returns were divided between growers and millers. Other sections also dealt with sugar matters, including marketing, prices and tariff protection, under arrangement with the Commonwealth Government.

The Bureau of Sugar Experiment Stations

The Department's Under-Secretary, Ernest Scriven, relinquished his directorship of the BSES in 1921 to Harry Easterby, whose former position, that of general superintendent of sugar experiment stations, was abolished. Easterby died suddenly on a visit to Cairns in 1932 and was succeeded by Dr H. W. (Bill) Kerr.

Kerr had joined the Department as a cadet in the Agricultural Chemistry Laboratory in 1917, then attended university as an evening student and graduated in science, with honours in chemistry. In 1924 he, Norman Bennett and Arthur Bell were awarded travelling scholarships to undertake scientific research work to benefit the sugar industry. Kerr spent two years at the University of Wisconsin in the USA and gained a doctorate for soil research. He returned to Queensland in 1928 to be appointed soils chemist in the BSES.

In 1929 the BSES was organised into four divisions: Soils and Agriculture, under Kerr; Plant Pathology, under Bell; Entomology, under Edmund Jarvis; and Mill Technology, under Bennett. Kerr's division took in experiment stations, plant breeders, and field staff, who handled the BSES's advisory work.

Pathology was not established as a separate unit until 1929, although in the years 1921-25 W. (Bill) Cottrell-Dormer, the first cadet pathologist in the BSES, had carried out a survey of sugarcane diseases in Queensland. Entomology, on the other hand, had quite a long history in the BSES. The first entomologist, Girault, had been appointed in 1911, and Edmund Jarvis had taken over from him three years later. The BSES's pest and disease work was combined in the Division of Entomology and Pathology, under Bell, in 1934. A year later, Bell was appointed

assistant director of the BSES, and became its director in 1945. Reg Mungomery replaced Bell as head of the division.

The Division of Mill Technology was established at Mackay in 1929, with laboratories at the sugar experiment station there. When Bennett resigned in 1932, its headquarters were transferred to Brisbane. A meeting of mill representatives later formed the Mill Research Programme Committee, which met annually to formulate the division's research programme for the next year.

Although the BSES was an integral part of the Department of Agriculture and Stock, it was financed mainly by a production levy on cane, paid equally by canegrowers and millers. In response to the increasing interest displayed by the sugar industry in the BSES's work, Minister Bulcock formed the Sugar Experiment Stations Advisory Board in 1933, with industry and BSES representatives; Bulcock was chairman of the board.

Soil surveys

The BSES instigated soil surveys and soil fertility studies, inspired by similar work in other areas of agriculture from the late 1920s. From the early 1930s, Norman King conducted soil surveys in the north Queensland sugar lands. Kerr undertook farm-based soil-fertility trials on a range of soil types, confirming the value of fertilisers and lime in sugarcane production. Irrigation trials helped scientists assess the potential yields of sugar-growing soils. Researchers at the Bundaberg Experiment Station in 1933 demonstrated the extra yield that could be expected on red volcanic soils when water and fertilisers were supplied to the plants.

Experiment stations and laboratories

In 1920, the BSES operated research stations at Bundaberg, Mackay, South Johnstone and Meringa, near Gordonvale. In 1934, the sugar work at South Johnstone was transferred to Meringa, where an entomological station had been operating since 1917. New laboratories for analytical work and a glasshouse for seedling production were built there.

The Mackay Sugar Experiment Station, where the BSES had started, was sold in 1935. Its buildings were transferred to a larger site at Te Kowai, near Mackay, where a glasshouse was built and an irrigation plant was installed. The land was subdivided and graded for field experiments. The Bundaberg station was upgraded by the addition of an office and juice laboratory in 1925, an entomological laboratory and an insectary in the following year, and a glasshouse in 1937.

The BSES acquired its own chemistry laboratory in the William Street building in Brisbane when it was extended in 1930. Most of its soil analyses had previously been done in the Agricultural Chemistry Laboratory.

Plant breeding

The sugar experiment stations' work included the development of higher-yielding, disease-resistant and better-adapted varieties of cane through breeding programmes. At South Johnstone ten thousand seedling canes were planted out



*Dr Bill Kerr, Director of the Bureau
of Sugar Experiment Stations,
1932-45*



*Aerial view of Meringa Sugar Experiment
Station, near Gordonvale, in the 1930s*

in 1929 alone. Fertilised arrows (tassels) were sent from there to the Mackay and Bundaberg stations in order to raise canes suited to different districts. By 1934, the BSES's officers had produced several varieties that were resistant to 'gumming' disease, and were working on building resistance to other diseases.

In 1935, an insect-proof quarantine house was built in the Domain, near the William Street offices in Brisbane. All imported cane varieties were fumigated on arrival and grown in the quarantine house for a year. Between 1934 and 1938, more than a hundred varieties were imported from Hawaii, Java, Mauritius, India, the United States, the West Indies, New Guinea and the Philippines.

Sugarcane diseases

The BSES was acclaimed for its pioneering work in cane diseases and Bell's *A Key to the Field Identification of Sugar Cane Diseases*, published in 1929, was applauded throughout the sugar world. But scientists in Queensland, which had the highest incidence of sugarcane diseases in the world, also benefited from contacts with overseas researchers. During a survey in 1929, a disease similar to leafscald had been noted; overseas pathologists at the International Congress of Sugar Cane Technologists in Puerto Rico in 1932 were familiar with the problem, known in Hawaii as chlorotic streak disease. The Hawaiians had found that hot-water treatment of the setts (planting pieces) before planting destroyed the disease, a remedy that was applied successfully in Queensland.

In 1929, the BSES listed farms in the Bundaberg district from which farmers could buy disease-free planting material. It issued approved variety lists in 1934, which named approved varieties of cane for the various mill areas, based on yield and other factors, especially disease resistance. But the lists were not enforceable and growers continued to plant varieties that were susceptible to disease.

The Sugar Experiment Stations Act of 1900 was amended in 1938, compelling growers to plant only the cane varieties listed by the BSES. Cane from non-approved varieties was treated as diseased, as was cane grown on non-assigned land. The amendment also declared that *The Diseases in Plants Acts, 1929 to 1937* should no longer apply to sugarcane, placing sugarcane diseases fully in the hands of the BSES and allowing for the setting-up in Queensland of quarantine areas specifically for sugarcane. A further amendment in 1941 empowered the Minister to order the destruction of any cane that threatened to spread disease, declare cane-disease areas and constitute disease-control boards, and also to declare a state of emergency for a specific period to prevent the spread of cane diseases.

Pest control

In 1935 Bell convened the first conference of cane pest boards, the forerunner of the annual conferences of cane pest and disease control boards that today update and coordinate sugarcane disease and pest control. Cane pest boards had been set up under a 1923 amendment to *The Sugar Experiment Stations Act of 1900* to levy growers and millers and carry out pest and disease control in mill areas.

Bell, the Queensland Government's representative at the Conference of the International Society of Sugar Cane Technologists in Puerto Rico in 1932, was

impressed by the giant American toad's success in reducing the cane beetle population in Puerto Rico. It had been introduced into Hawaii and had been successful there also. Tests had shown that the toad ate mainly harmful insects and had little effect on beneficial species. As the grub of the cane beetle was the single most important pest of sugarcane in Queensland at the time, Reg Mungomery was sent to Hawaii in 1935 to bring back a colony of toads. The creatures, which had not previously been bred in captivity, were placed in a quarantine pond, and in less than six months thirty-five females produced one and a half million eggs. Some of the toads were liberated in north Queensland and quickly multiplied, but the Commonwealth Health Department prohibited further distribution. In early 1936 an officer of the BSES reported: 'It is hoped, however, that further investigation will convince the Health authorities of the desirability of the more extensive release of these animals.' The ban was lifted later that year and liberations were made at several sites between Mossman and Maryborough. But the cane toad did not control the cane beetle in Queensland as it had overseas. It became, instead, a predator of beneficial insects such as bees and a nuisance to householders and domestic animals. It quickly spread through coastal Queensland into northern New South Wales, and today is considered a serious pest.

In 1935 William McDougall undertook an intensive study of the rats that infested canefields. The rodents were carriers of Weil's disease, which was transmissible to man, and cane-cutters in particular were at risk of contracting the disease from bites because all cane was cut by hand. The Health Department introduced regulations requiring cane to be burnt before harvest to lessen the risk. By 1937, McDougall had identified three species of native rat as the main offenders, and had also developed an effective rat poison. A factory was set up at the Bureau of Tropical Agriculture at South Johnstone to prepare and package rat bait for distribution to farmers.

Conclusion

The Bureau of Sugar Experiment Stations, although under the overall control of the Department of Agriculture and Stock, was largely autonomous from 1921, the year that Scriven, the Under-Secretary, gave up his directorship to Easterby. Its formation of divisions in 1929, a level of organisation not matched in the Department until 1937, and the creation of an advisory board in 1933 to oversee expenditure of industry funds are indications of the independence the BSES enjoyed.

It was this autonomy that enabled the BSES to concentrate its resources to improve production and increase efficiency in the expanding sugar industry. Its research, extension and regulatory activities embraced plant breeding, better farming techniques, and better pest, disease and weed control.



The grub of the cane beetle was a major pest of sugarcane before its successful control in the 1950s. This is a crop of grub-damaged cane at Behana Creek, near Cairns, in the 1940s.



Rats, another serious cane pest, carried Weil's disease, which could be transmitted to humans. This rat-bait factory was set up at the Bureau of Tropical Agriculture in the 1940s to prepare a bait formulated by entomologist William McDougall.

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Agriculture

Queensland's infant field crop industries expanded in the 1920s on land opened for returned soldiers after World War I and later on land opened up for closer settlement. Dairying, the planting of fodder crops and the growing of cash crops, such as sugar, cotton and tobacco, brought a significant increase in the area of cropping land and sown pastures in the State.

Agriculture Branch

The Department had, since 1890, employed instructors in agriculture to advise farmers on field crops and pastures and to undertake research. Experts in individual crops, such as tobacco and cotton, were also employed. In 1915 all were brought under the leadership of a director of agriculture, Harold Quodling; the group was later given branch status, in the 1922 reorganisation.

Quodling had studied veterinary science and agriculture in New South Wales, and operated a sheep property in Queensland before joining the Department as farm foreman at the Queensland Agricultural College (QAC) in 1897. He had served as manager of Westbrook and Hermitage State Farms in the years 1898–1905, to become agricultural adviser on Peter McLean's retirement. Quodling returned to the QAC as acting principal before his appointment as director of agriculture.

In 1931, Quodling was appointed manager of the Agricultural Bank and was succeeded by George Brooks. Brooks retired two years later but was retained as senior instructor in agriculture and carried out tobacco research in central Queensland until 1938. Alfred Gibson succeeded Brooks as director of agriculture. When Gibson died in 1937, Charles McKeon, Director of Tropical Agriculture at South Johnstone, was transferred to take over Agriculture Branch.

In 1924, Agriculture Branch had five instructors in agriculture and six field assistants at six centres. By 1937, it had fourteen instructors at eleven centres, supported by two agricultural research officers, an agrostologist and seven field assistants, as well as six officers stationed at the Bureau of Tropical Agriculture. Three factors contributed to this growth: first, agriculture was expanding, and established settlers in the new cropping areas needed agricultural advisers; second, land was being opened for settlement, and the new settlers increased the

workload of advisory staff; and, third, the application of science to agriculture necessitated more research to solve problems.

Goddard, in his 1936 review of the Department, saw the need to separate the branch's research work from its administrative and advisory work. Richard (Dick) Soutter, who had been manager, wheat experimentalist and then wheat breeder at Roma State Farm, was made senior research officer in 1937, and took responsibility for crop research. In the same year, Charles Winders was appointed agrostologist to concentrate on pasture research.

Grain crops

After World War I the wheat-breeding work at Roma State Farm was extended to other districts, and seed from there was increased at Hermitage to be sold to farmers. By 1924, seventeen varieties of wheat bred at Roma were available.

The Department and the State Wheat Board, which was established in 1920, devised a scheme to supply growers with wheat seed produced by commercial growers rather than by the Department. Before the 1926 season, the Department produced a small quantity of 'mother' seed of new varieties and gave it to seed growers to increase. The Board then bought the increased seed, cleaned and treated it, and sold it to grain growers.

The Department continued its seed-selection work, maintaining small nursery plots on State farms and commercial farms. About two thousand varieties of wheat were used in the selection work, which was done mainly on the Darling Downs, where wheat rust was more prevalent, although trials were also put down in central Queensland. By the mid 1930s, Queensland had the highest average wheat yields of the Australian States. Puora and Flora, varieties bred by Soutter at Roma, won Commonwealth championship prizes at the Sydney Royal Agricultural Show in 1937 and 1938; Soutter had bred fifteen of the thirty varieties sown in Queensland in 1938-39, representing 60 per cent of the total area sown.

Soutter also undertook barley breeding at Roma, and several of his crossbreds were tested in 1929-30. A few years later, the Department imported special malting barleys from England, which Soutter used to breed for rust resistance.

McKeon was in charge of maize breeding and selection to develop better-yielding varieties. Using new varieties imported from the United States in 1921-22, he established propagation plots on commercial farms, and the Department sold seed from these plots to maize growers. His trials on the Atherton Tableland were aimed at breeding for resistance to locally prevalent diseases. In 1926 McKeon was rewarded with a hardier, 'flint'-type maize he named Durum.

As upland rice had performed well on the Atherton Tableland, the Department imported several Japanese varieties in 1920, and Northern Instructor in Agriculture Norman Pollock planted experimental plots of these at Tolga and on the coast at Proserpine and Cardwell. Pollock also suggested growing lowland 'paddy' rice varieties under irrigation, with sprays used to control weeds, but in this he was ahead of his time: the technology and chemicals needed to put his ideas into commercial practice were not yet available.

Pollock had more success with sweet sorghum. In 1920-21 he tested varieties



George Brooks, Director of Agriculture, 1931-33



Alfred Gibson, Director of Agriculture, 1933-37



Richard Soutter, Queensland's first wheat breeder, started his breeding work in 1898 and retired in 1949.



Walton Wells, the Department's cotton specialist, 1922-45

introduced from the United States, one of which, 'Honey', was to find an enduring place in Queensland as a green fodder and silage crop. He also undertook trials with sweet sorghum on the sheep country of north-west Queensland in the late 1920s.

In 1933-34, the Department imported dwarf grain-sorghum varieties from the United States, Egypt and South Africa. These were multiplied at various centres and became the foundation of Queensland's grain-sorghum industry. Short-growing, they could be harvested by conventional machinery, and they outyielded maize in the drier grain-growing districts. In 1941, Dr Gordon Miles was transferred from the Bureau of Tropical Agriculture to the Callide Cotton Research Station at Biloela to concentrate on breeding grain sorghum.

Cotton

In 1922, cotton-growing enjoyed a resurgence in Queensland. The reason for this was the shortage of cotton caused by the ravages of the boll weevil in the USA. This led to an agreement between the State and Commonwealth Governments and British cotton manufacturers to guarantee prices and establish a marketing scheme to ensure a continuity of supply to the British cotton mills. An upsurge in cotton-growing followed the price guarantee, and a special attraction to growers was the availability of free seed from the Department.

A cotton section was set up in the Department in 1923, under the directorship of Colonel Geoffrey Evans, formerly director of agriculture in Bengal. Evans's appointment was for two years. In the same year, W. G. Wells, a plant breeder from the United States, was appointed cotton specialist, and Laurence Gudge, who had had classing experience in England and the United States, was appointed to instruct in cotton classing. Local staff were appointed as field assistants, inspectors and assistant graders, to carry out duties specified in the regulations of *The Cotton Industry Act of 1923*, especially in relation to the inspection of crops and the grading of cotton for payment. Many became experts themselves, and their names became household words in the cotton-growing districts.

With the development of experiment farms at Biloela and at Monto in 1924, as well as the cotton research done on experiment stations and State farms, the Department became involved in all aspects of the booming cotton industry. Its field officers conducted trials in cotton-growing districts, provided an advisory service and allotted seed-production plots to selected growers. These officers later inspected farms that were part of the Cotton Production Relief Scheme, which operated between 1932 and 1938 and was administered by the Department of Labour and Industry.

Tobacco

Tobacco-growing also experienced a boom, particularly in the Depression years of the 1930s when the Government was trying to settle many of the unemployed on the land. Tobacco was a cash crop that could be produced on small blocks by new settlers who had little capital, especially as the Department undertook to process the leaf to spare the growers the expense of building curing barns.

Pollock's experimental work on tobacco in 1927-28 at Mareeba and Charters Towers proved that north Queensland could produce much of the tobacco leaf required in Australia. Twenty-five tobacco farms were developed in 1930 around Mareeba, where the Department built a bulk sorting shed and two curing kilns. To give growers a start, agricultural advisers Richard Tarrant and Oswald Hassell planted a seedbed and distributed seedlings. Brooks conducted trials in central Queensland and the Department built curing barns at Miriam Vale, Rockhampton and Sarina. A curing barn and grading room were also installed at the Department's head office complex in Brisbane, where leaf from growers in the south-east of the State was graded, cured and packed for sale.

Tobacco expansion led to a rearrangement of Agriculture Branch's advisory staff in 1931-32. The high returns from the crop attracted many inexperienced growers, who made heavy demands on staff for advice. In the same period, the Beerburrum Group Settlement was set up to place unemployed people on old pineapple plantations to grow tobacco. It was administered by the Department, and leaf from the settlement was graded, cured and packed at William Street. Although some of these settlers were not suited to tobacco-growing, thirty-seven remained in 1933, when administration of the settlement was transferred from the Department to the Rural Assistance Board. The area was used for tobacco instruction for QAC diploma students.

Because of the large numbers of new tobacco farmers, the State Government passed *The Tobacco Industry Protection Act of 1933*, under which growers were registered and seed sellers were licensed to ensure disease- and pest-free crops. The Department also undertook a good deal of research work, such as varietal testing, and rotation and fertiliser trials, to improve the industry. Other research included entomological investigations into tobacco pests at Mareeba, financed by the Commonwealth Tobacco Grant, and trials in blue-mould control.

Peanuts

Peanut-growing expanded after the establishment of the Peanut Marketing Board and the introduction of protective tariffs in 1924. With the Department's assistance, the Peanut Pool at Kingaroy installed a peanut-shelling machine in 1925. The crop had previously been sold in-shell so that, although the growers got a fair return, the processing profit went elsewhere. The industry began to develop rapidly in the Kingaroy area, but peanuts were another crop that attracted farmers and settlers with little or no experience. Again, the State Government laid down pest- and disease-control regulations, in *The Peanut Industry Protection and Preservation Act of 1939*, to protect the industry from detrimental practices.

Root crops

In the 1920s the Department undertook research on several root crops, including potatoes, sweet potatoes, cassava and arrowroot. In 1924, Pollock began potato trials, hoping to provide local planting material on the Atherton Tableland; at that time all 'seed' had to be imported, at great expense, from the southern States. Pollock was unsuccessful, but his work contributed to the expansion of the indus-



The Department's administration buildings at the Beerburrum Group Settlement in 1933



Instructors and temporary staff grading tobacco from Beerburrum at the Department's William Street building in the early 1930s

try in north Queensland. Brooks, Instructor in Agriculture for central Queensland, experimented with sweet potatoes near Rockhampton; his selection and classification work with material that had been introduced earlier resulted in the first set of recommended sweet potato varieties in Queensland.

Cassava had been introduced in the 1860s to feed pigs, and was later used as a staple food for South Sea Islanders working on sugar plantations. In 1925 cassava was proposed as a feedstock for the Sarina alcohol distillery and Minister Forgan-Smith arranged for a consignment of cuttings, of different varieties, to be imported from Java. These were grown around Mackay and suitable varieties were selected, but molasses was chosen for the distillery. In the late 1970s, some of this plant material was brought together again and re-evaluated in another Departmental project to assess the potential of the crop for starch and alcohol production.

Fodder conservation

Queensland's low winter rainfall has always caused a lowering in livestock performance, especially in winter milk production. From its very beginnings, the Department encouraged fodder conservation to provide supplementary feed.

From the 1920s, trials in fodder crops for dairy and pig herds were carried out in all dairying districts. Assistant Instructor Charles Clydesdale supervised co-operative fodder-crop trials in south Queensland in 1921-22, while instructors in other districts encouraged the conservation of hay and silage. But progress was slow as high labour costs were a problem in the 1920s, so the Department's officers turned their attention to the growing of crops for grazing. On the Atherton Tableland, Pollock demonstrated the value of winter fodder crops for grazing dairy cattle, a practice that was adopted by most dairymen, who also grew summer grazing crops to supplement the normal summer-growing pastures. But when white grub became a serious problem in pastures on the Tableland in 1936, an officer was stationed at Atherton to advise on the construction of silos to hold summer crops, and the Bureau of Rural Development gave the farmers financial assistance to build their silos. This work was extended statewide in 1940, when a fodder conservation committee was set up within the Department.

Conclusion

In the early 1920s, Queensland did not have staple field crops other than sugar and maize to provide small farmers with a good income. Keen to establish staple crop industries in the State, the Department provided extra research and advisory services in crop after crop; in the case of tobacco, it even provided processing facilities and services. Some of the Department's efforts, for example its work on cassava, went unrewarded at the time, but most of its early research and development work provided a firm foundation for crop industries that would later become important.

Horticulture

Queensland's horticultural industries continued to expand from the early 1920s, partly thanks to the settlement of many returned soldiers in fruit-growing areas. The establishment of the Committee of Direction of Fruit Marketing (COD) in 1923, the completion of the Cairns-Brisbane rail link in 1924 and the extension of the standard-gauge railway line from New South Wales to Brisbane in 1930 improved the marketing of horticultural produce. During World War II horticulture was further expanded, to provide fresh fruit and vegetables for Australian and American servicemen stationed in Queensland and produce to be processed for combat troops.

Fruit Branch

Albert Benson, who had been appointed the Department's first fruit expert in 1896, left in 1910 to serve as director of agriculture in Tasmania. On his return to Queensland in 1915, he was appointed to lead the group providing research, advisory and regulatory services to the fruit-growing industries. In the 1922 re-organisation this group became the Fruit Branch, headed by Benson until his retirement in 1927. Benson was replaced by George Williams, who died in 1933, and a year later, Henry Barnes was appointed director.

John Ward, Fruit Expert for Tasmania, was appointed the Department's chief instructor in fruit culture in 1922, but left the following year to become director of horticulture in Victoria. His son, Keighley Ward, later became assistant director of horticulture in the Department and his grandson, David Ward, is a senior agronomist in the division of plant industry.

In 1924-25 the Department appointed three permanent inspectors and six temporary inspectors (for just the fruit season) at Stanthorpe, and two permanent inspectors for the coastal districts. These appointments were made because of the expansion in fruit-growing that had followed the settlement of returned soldiers in fruit-growing areas, mainly around Stanthorpe and Beerburrum.

The Department's horticultural research staff expanded further in 1937. W. A. T. (Alan) Summerville, entomologist in Science Branch, was made senior research officer in the horticulture section of the Division of Plant Industry (Research), and Hubert Groszmann was appointed assistant research officer, assigned to work on pineapple improvement.



*George Williams, Director of Fruit Culture,
1927-33*



*Henry Barnes, appointed Director of Fruit Culture in
1934*



The laboratory at the horticultural field station at Nambour in 1940, showing the results of bean trials

Bananas

Banana-growing was a major horticultural industry in the 1920s. Earlier in the hands of Chinese growers in the north, the industry had, by 1920, expanded in south Queensland, where most growers were European. The exclusion of Fijian bananas through a customs tariff and the introduction in 1917 of a special fruit train service to markets in the southern States via Wallangarra helped to establish the industry, although it was soon beset by pest and disease problems.

A major problem was the banana weevil borer. After representations from growers, Entomologist John Froggatt was appointed in 1920 to investigate the pest, and the Bribie Island State Nursery was established two years later to sell weevil-free corms to growers for planting. *The Banana Industry Preservation Act of 1921* was formulated to improve the level of pest and disease control in the banana industry, and especially to control the weevil borer; it was framed mainly because Chinese growers would not take Departmental advice on pest and disease control, and threatened the industry. Under the Act, all growers were compelled to take a dictation test in English that had been devised by the Department; any person who did not hold a certificate showing that he had passed the test was barred from growing bananas.

The most devastating disease to strike the industry was bunchy top. First noted in Queensland by Benson in 1916, it was not regarded as a serious problem until 1919, when investigations began at Currumbin. In June 1924 the Commonwealth, New South Wales and Queensland Governments set up the Bunchy Top Investigation Committee, which found that the disease was caused by a virus transmitted by the common dark banana aphid. Although quarantine areas were declared, the disease continued to spread, and the committee found that this was caused by the planting of infected material. With no resistant stock available and no known treatment the only remedy was the destruction of infected plants. The Department appointed inspectors empowered to order the destruction of infected plants, placed restrictions on the growing of bananas in home gardens and imposed conditions on the sale and transport of planting material.

Stronger legislation to deal with bunchy top and other banana diseases was enacted in *The Banana Industry Protection Act of 1929*, which repealed the 1921 Act. The Act discontinued the dictation test but provided for the annual registration of banana plantations, and established the Banana Industry Protection Board, whose four members included two Government representatives, to advise the Government on all aspects of banana-growing. The board demanded rigid adherence to the regulations of the Act, especially those requiring the cleaning of diseased plantations. The Banana Industry Fund, also established under the Act and financed by a levy on growers, covered the board's expenses and funded research on banana pests and diseases, particularly bunchy top.

From 1933, another serious problem, the blemishing of fruit by banana thrips, was investigated by the entomologist at Cairns, J. H. (Harold) Smith, and later by Norman Caldwell. An embargo on the movement of planting material from infested plantations prevented the transfer of the insect from north Queensland to the south.

In 1926 Benson had pleaded for a fruit research station, particularly for work



*J. H. Gregory, the Department's instructor
in fruit packing*

*Fruit-packing display at the Brisbane
Exhibition in 1939*



on bananas. His suggestion was put into effect in 1928, when banana experiment farms were established by the Department, working in conjunction with the COD, at Kin Kin, near Gympie, and at Bartle Frere, near Innisfail. Researchers undertook varietal and planting trials, manurial experiments and experiments with pest- and disease-control measures at these stations until both were closed in the early 1930s, during the Great Depression.

Other fruit crops

The growing of temperate fruit (such as stone and pome fruit) in the Granite Belt increased as a result of soldier settlement there after World War I, and by 1921 the major difficulty was finding markets for the extra produce. Benson emphasised the need for cool storage, which would extend the life of the fruit, and the Department carried out experiments to determine the ideal temperatures and best cold-storage systems. In 1922 a large cold-storage complex was built by the Queensland Government at Hamilton in Brisbane to store fruit as well as meat, eggs and dairy produce. It was controlled by the Department until 1926, when it was handed over to the Queensland Cold Storage Cooperative Federation Ltd.

The settlement of returned soldiers also brought an expansion of pineapple-growing at Beerburrum, where more than four hundred hectares were planted. Interest in the crop increased when the Commonwealth Government agreed to give advances on fruit used for canning, as growers had previously had to wait for the canned fruit to be sold before they were paid. The Department undertook trials at the Bribie Island State Nursery to develop a plant that bore fruit the approximate size and shape of the standard can. Other pineapple work in the 1930s included studies of physiological problems, research into chemicals used to induce flowering and ripening, fertiliser and mulching trials and the survey and analysis of pineapple soils. The work of H. K. Lewcock and, later, Hubert Groszmann was instrumental in improving pineapple yields.

In 1921 an assistant instructor in fruit culture had been appointed to deal specifically with citrus. The Department and growers cooperated in citrus research, undertaking trials at Palmwoods and Gayndah in tree husbandry, the use of fertilisers, pest control and the use of chemicals to colour fruit. In 1939 the Department established a plot at Gayndah to supply the industry with budwood from selected and certified citrus trees.

The Department became involved in plant breeding and selection of a number of fruits in the 1930s. A hybrid papaw variety was selected in 1932-33 and named Yarwun, after the district where it was developed. At the end of the decade G. W. (Bill) Agnew, pomologist at the Bureau of Tropical Agriculture, began breeding and selection work on papaws and mangos, but his breeding material was transferred from South Johnstone to Kamerunga during the war. In the 1940s these and many other tropical fruit species were under observation at Kamerunga and in a plot in the Cairns Botanic Gardens. Granadilla, lychee, mangosteen, cashew nut, vi apple, sugar apple, wampee, five corner, soursop, cochin-gogoraka, cucumber tree, star apple, sapodilla and woolmi were among the fruits studied, under the supervision of Instructor in Fruit Culture S. E. (Ernie) Stephens.

Coffee

At the turn of the century, Howard Newport, the Department's first instructor in coffee culture, had proved that coffee was a suitable and profitable crop for tropical and subtropical Queensland. Its growing had declined after the repatriation of South Sea Island labourers in 1906 and the Commonwealth Government's refusal to impose import restrictions to protect the industry, and by 1920 Australia was importing nearly 1200 tonnes of coffee per year. Gillies, the Minister for Agriculture and Stock, thought that Queensland should capture the trade and introduced a system similar to that organised for cotton: advances would be made on coffee beans consigned to the Department for preparation and marketing. In the same year, T. A. Bromiley, an experienced grower, was appointed instructor and inspector of coffee production. But the scheme came to nothing, and coffee did not become an established industry.

Tomatoes

Soldier settlers at Stanthorpe were encouraged to grow tomatoes, but over-production was a major problem by 1923. As tomatoes were grown there in summer, Stanthorpe's production came onto a market that was already well supplied by other centres. A tomato pool was set up to arrange for the disposal of the 1923 crop, and a large part of the crop was processed with the assistance of a government price guarantee. Tomato-growing at Stanthorpe soon declined, but the industry expanded at Bowen where fruit could be produced during the winter months.

In the mid 1920s the Department produced two wilt-resistant tomato varieties, which contributed to increased plantings in the northern coastal districts between Bowen and Cardwell. Northern Instructor in Agriculture Norman Pollock reported that trials with these varieties gave increased yields, particularly when fertiliser was applied. Seed of both varieties was produced commercially under Departmental supervision, and the Department produced pure tomato seed at its Moggill nursery during World War II.

Fruit packing

Legislation dealing with fruit cases and packaging, mainly regulating the size and type of cases used in the sale and export of fruit, had been passed in 1912 and 1916, and amended in 1922 and 1927. The 1922 amendment introduced the concept of grading fruit and vegetables, and a year later, recognising the need for correct packing, the Department appointed William Rowlands as its first instructor in fruit packing. Sadly, Rowlands died soon after, from wounds he had received at Gallipoli.

The Fruit and Vegetables Act of 1927 repealed *The Fruit Cases Acts, 1912 to 1922*; it specified the size and capacity of fruit cases, and set out hygiene requirements and packing standards. In 1929 James Gregory was appointed instructor in fruit packing, and in the 1930s he worked on packing house design and packing systems, as well as giving demonstrations in schools and arranging fruit-packing competitions.

Conclusion

Horticulture became a major industry in Queensland in the 1920s, with the emphasis on subtropical fruit. But, like other cropping industries, horticulture was plagued by pests and diseases, the need for better planting material and improved varieties, and, above all, the need for specialists to advise on both the growing and marketing of produce. The Department addressed these problems, its work laying the foundations for further growth of the State's fruit and vegetable industries.

Plant sciences

The Department's field staff, who carried out research and advised farmers on the growing of crops and pastures, were supported by laboratory staff, who identified plants, diagnosed plant pest and disease problems, and suggested methods of control. These plant scientists included botanists, who were based at the Herbarium in the Botanic Gardens (now City Botanic Gardens), and entomologists and plant pathologists, who worked mainly at the William Street complex.

Science Branch, created in the 1922 reorganisation, brought together the entomology, plant pathology and botany sections to deal with plant matters. Livestock diagnostic services were catered for at the Yeerongpilly and Oonoonba stock experiment stations. Henry Tryon, Government Entomologist and Vegetable Pathologist, retired in 1925 but was retained for four years as temporary vegetable pathologist. When he left, Robert Veitch was appointed to head the entomology and plant pathology sections, with a staff of seven entomologists, three plant pathologists and an illustrator. Cyril White, who had been Government Botanist since 1918, remained in charge of the botany section.

Science Branch maintained this rather loose administrative arrangement until 1937, when it was broken into its separate disciplines. Entomology, plant pathology, plant physiology and botany became sections within the Division of Plant Industry (Research), under Veitch. The entomology and plant pathology sections had been provided with new offices and laboratories when the William Street building was extended in 1930. At that time, entomological field stations were operating at Nambour, Cairns and Stanthorpe; plant pathology field stations were set up later, at Toowoomba in 1936 and Atherton in 1941. The Bureau of Sugar Experiment Stations (BSES) undertook its own entomology and plant pathology work in laboratories on the sugar research stations.

Entomology

Among the insect pests the Department researched in the 1920s were sugarcane grubs, the fruit fly, the codling moth, the cotton bollworm, the weevil borer and rust thrips in bananas, scale insects and the bronze orange bug in citrus, and grub pests of pastures. The range was extended in the next decade to take in grasshoppers and tobacco pests.

Dr James Illingworth, entomologist in the BSES, was responsible for investigations into cane-grub control, but when he returned to the United States in 1921 Edmund Jarvis transferred from entomology section to the BSES to continue his work. Jarvis achieved only moderate success in control of the grub.

Edmund Jarvis's brother Hubert was appointed in 1922 to study the fruit fly, a problem in the Granite Belt. He showed that alternative hosts of the fly, especially native fruits, were a source of infestation but that the main problem was the yearly migration of the fly from other areas. In 1926 temporary inspectors were appointed to ensure compliance with regulations covering the gathering and destruction of diseased and fallen fruit, and an entomological field station was set up in the following year at Stanthorpe, with two entomologists stationed there to work on the control of fruit fly and codling moth, the principal pest of apples. By the early 1930s they had had some success: Jarvis had liberated colonies of a parasite that attacked the codling moth, and the parasite had become widespread. Another release, the parasite of the woolly aphid, also helped to control the codling moth.

The cotton bollworm became widespread after the huge expansion in cotton-growing in the summer of 1923-24. Tryon recommended that growers use maize as a 'trap' crop to lure the insects away from the cotton plants, and plant early-maturing cotton varieties as the pest populations increased later in the season. Most work on the bollworm, and other cotton pests such as jassids and the web spinner, was done at the Callide Cotton Experimental Farm at Biloela. In 1939 an entomologist, D. L. Lee, was appointed to Biloela to work exclusively on cotton pests, his salary paid by the Cotton Marketing Board in a scheme aimed at decentralising research.

In 1920 John Lewis Froggatt was appointed entomologist in charge of investigations into the banana weevil borer, required to report directly to the Minister each month; he described the life history and feeding habits of the pest and made recommendations for control. Five years later, Veitch introduced a colony of Javanese beetles known to be predators of the weevil, and Froggatt liberated these for trial at Yandina.

Thrips were another major banana pest, causing discolouration of the fruit. Thrip infestations resulted in the quarantining of an area near Gympie in the late 1920s. North Queensland growers had achieved some control by covering bunches of bananas with stockingette bags, but in 1927 Froggatt advised dusting with calcium cyanide. Eleven years later, Norman Caldwell published a comprehensive paper on thrips, in which he suggested covering bunches with hessian and applying nicotine-based dusts to the fruit.

Scale insects and the bronze orange bug were the major citrus pests. Tryon investigated the latter in 1923, at the request of the Mapleton Local Producers' Association; he recommended beating the branches of the fruit trees to dislodge the bugs, which should then be destroyed. Summerville later worked on the orange bug at Gayndah and scale insect pests at Nambour.

In 1920-21, when an unidentified pest began destroying pastures on the Atherton Tableland, entomologists Alan Dodd (later famous for his part in the eradication of prickly pear) and Illingworth, who were working with the BSES at

Meringa, were sent there to investigate the problem. The pest was identified by Dr A. J. Turner, a Brisbane medical practitioner who was a collector of moths and a recognised authority on them, as the flat-headed pasture webworm, a moth larva. The pest usually attacked tree roots but had adapted to pasture roots after scrub was cleared.

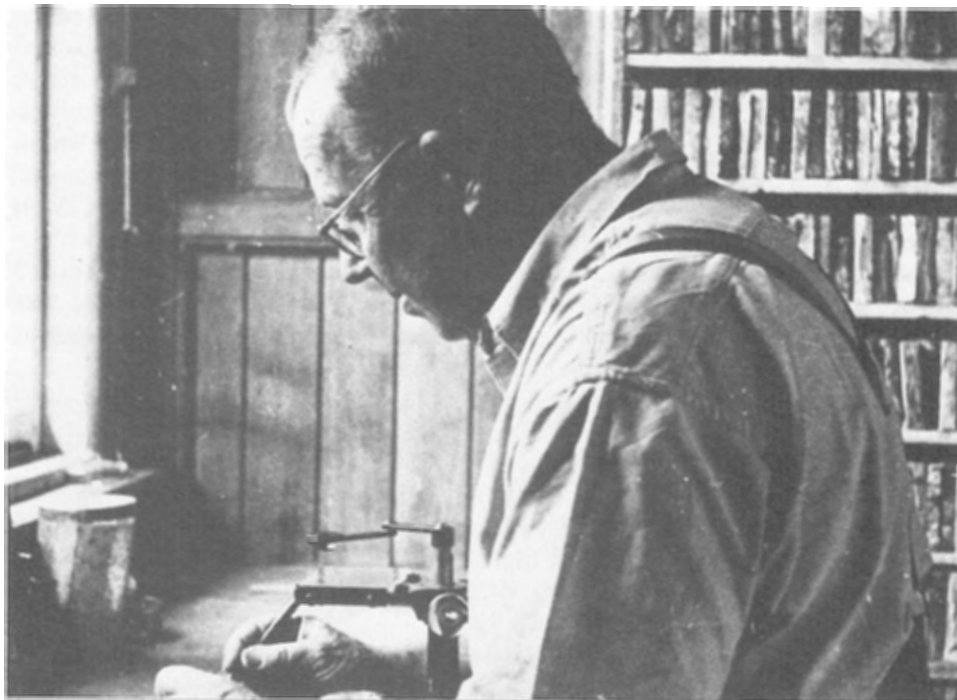
Pasture and crop pests continued to tax the resources of the Department's small entomology section. In 1932-33, army worms appeared in plague proportions on the Atherton Tableland, seriously damaging pastures and maize crops. A similar plague occurred in south-east Queensland in 1936. In the same year, a severe infestation of white grub in Atherton Tableland pastures led Minister Bulcock to set up the White Grub Investigation Committee to study the effect on the pest of fertilisers, pasture renovation, rotational grazing, crop rotations and free-range pig raising.

Grasshoppers also occurred in plague proportions; six Department entomologists were involved in the control of a major infestation of the Australian plague grasshopper in 1934-35. They also recorded other species, and developed a baiting technique to counter plagues. The insects were so serious a problem that the Queensland Government passed *The Plague Grasshoppers Extermination Act of 1937* to allow for stricter control measures. A plague grasshopper destruction committee was set up to implement extermination procedures in each district declared under the Act. In 1939-40, a campaign to bait hatching grasshoppers was initiated, involving shire councils and the CSIR (now CSIRO). The move led to the formation of a local grasshopper information service, with the Department's field officers acting as couriers.

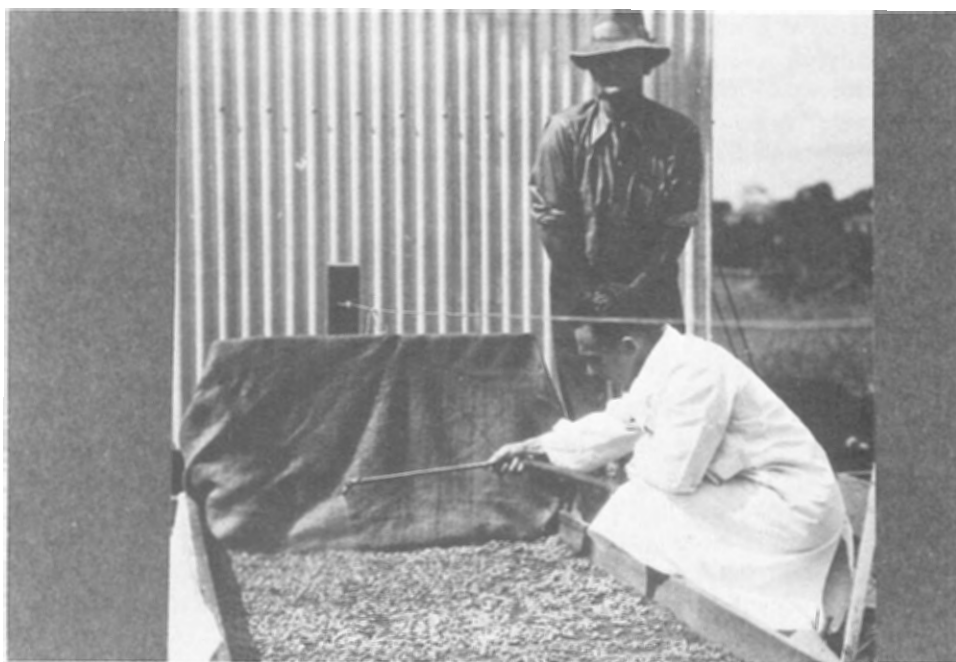
The Department was also responsible for the control of timber pests. Its work in this field was sometimes closely related to its other duties. For example, in 1922 Tryon identified and described the sawfly, whose larvae fed in large numbers on the leaves of the silver-leaved ironbark. Cattle, who were attracted to the dead larvae, were poisoned by them. The problem, which had been prevalent in the Maranoa for several years, was made worse by the large-scale slaughter of possums for their skins, as the marsupials had helped to keep sawfly numbers down. To allow possum numbers to build up again, the Department declared a closed season on the animals in 1924 and 1925. In the next decade, the Department's forest entomology work was done largely to help the timber industry. Harold Smith, the entomologist based at Cairns, carried out research on pinhole borers of the walnut bean, pests that caused problems in the veneer industry. Alfred Brimblecombe, who was made full-time forest entomologist in 1935, conducted research on the pine-bark weevil, which affected young stands of hoop pine.

Plant pathology

Jack Simmonds was appointed the Department's first full-time plant pathologist in 1926, and was given an assistant, Roy Morwood, three years later. When the Division of Plant Industry (Research) was created in 1937, Simmonds and Morwood became senior research officer and research officer, respectively, in the plant pathology section.



C. T. White, Government Botanist, 1918-54, at work in the Botanic Museum



Lew Mandelson, plant pathologist, spraying tobacco seedbeds in a disease-control trial at the Brisbane Domain in 1933

Banana diseases, particularly bunchy top, were the major plant-disease problems the Department had to contend with in the 1920s. Bunchy top had reached serious levels in south Queensland and northern New South Wales by 1919, therefore these States and the Commonwealth Government formed a committee to lead investigations. A laboratory was set up at Tweed Heads, and the Bribie Island State Nursery supplied disease-free banana planting material to growers. Charles Magee was appointed assistant plant pathologist (bunchy top) in 1924, with his headquarters at Coolangatta, and Henry Collard, an assistant instructor in fruit culture, was sent to Fiji to observe the disease there; both officers worked under Professor Goddard. Following his bunchy top research, Goddard was coopted to supervise research on 'squirter' disease of bananas, another widespread disease that attracted Commonwealth research funding.

The Department also investigated pineapple and citrus diseases. Tryon summarised his pineapple work in a 1928 report on diseases affecting both plant and fruit. In the 1930s, Dr T. B. Dickson, of the CSIR, and Simmonds studied water blister in pineapples, while H. K. ('Lew') Lewcock, a research officer, examined pineapple wilt and top rot, and yellow spot, a disease transmitted by thrips. Pathologists Lew Mandelson and Fred Blackford were responsible for most of the work in citrus diseases in that decade, although Mandelson also discovered a new disease of beans, angular leaf spot, in 1931.

Diseases continued to trouble the State's wheat industry and the Department worked on their control. The breeding of resistant varieties controlled rust to some extent, but other diseases were prevalent. Simmonds recommended burning wheat stubble to control flag smut, which was widespread in 1928-29. Morwood laid out trials at Roma State Farm to further investigate the disease and found a high degree of resistance in two varieties.

After the expansion of the tobacco industry in the early 1930s, control measures were required urgently to contain blue mould, the most serious tobacco disease. Mandelson's trials in 1936 proved benzol treatment, developed by CSIR officers, to be effective.

Forestry diseases were also the responsibility of the Department, and Harold Young was appointed in 1934 to work specifically on tree diseases. He was later awarded the first Doctorate of Agricultural Science from the University of Queensland for his thesis on fused-needle disease of pine trees.

Plant pest and disease legislation

Legislation dealing with plant diseases needed frequent revision to better define the powers of inspectors to deal with new diseases and cultural practices. Although *The Diseases in Plants Act of 1896* had been completely revised in 1916, inspectors' powers were still insufficient until a 1924 amendment empowered them to enter any land and seize infected plant material, and to order the owner or occupier to destroy infected plants or packaging material suspected of harbouring pests or diseases.

The Diseases in Plants Act of 1929 replaced the earlier Act and updated its provisions, enabling the Queensland Government to impose quarantine restrictions

within the State (overseas quarantine was handled by State inspectors under Commonwealth legislation), to declare fruit districts, diseases and pests, and to appoint inspectors, and requiring the registration of orchards and nurseries.

Legislation was passed to meet the needs of particular industries and covered specific pest- and disease-control methods used in those industries. For example, *The Banana Industry Preservation Act of 1921* and its replacement Act in 1929 were designed to control banana pests and diseases. Similarly, *The Cotton Industry Act of 1923*, *The Tobacco Industry Protection Act of 1933* and *The Peanut Industry Protection and Preservation Act of 1939* included special provisions for pest- and disease-control measures. *The Sugar Experiment Stations Act and Other Acts Amendment Act of 1938* declared that *The Diseases in Plants Act, 1929 to 1937* should not apply to sugarcane, thereby allowing for the specific needs of the sugar industry.

Botany

Cyril White held the position of government botanist throughout the 1920s and 1930s, retaining the title even when the botany section was absorbed into the Division of Plant Industry (Research). Botanical work in the period was expanded from plant identification to encompass ecological surveys, plant classification, poisonous plants, fodder trees, pasture degradation and weed control, necessitating the appointment of extra staff to the section.

William Francis was appointed assistant botanist in 1919. Six years later he published one of the few ecological surveys of Queensland done up to that time, dealing with the vegetation around Charleville and discussing the mulga, cypress pine and gidyea vegetation communities, and published *Australian Rain Forest Trees* in 1929. Francis succeeded White in 1950, and retired in 1954.

The 1930s were busy years for the botany section. The Australian part of the Herbarium was reorganised for reference purposes in 1930 and C. E. Hubbard of the Royal Botanic Gardens at Kew in England came to the Herbarium to classify Queensland grasses. Francis had spent a year at Kew in 1929, and in 1938 White also spent seven months there, as liaison officer. In 1940, Henry Tryon donated his private herbarium of native plants to the Queensland Herbarium.

The section's poison-plant work expanded, particularly in the dry years of the 1920s and 1930s when stock were short of feed. Plants were sent to the Herbarium for identification, and botanists undertook field trips to identify suspect plants. Feeding trials were also undertaken at the Yeerongpilly Animal Health Station. In 1937, the Departmental Poison Plants Committee was established under a grant from the Australian Wool Board. Its members were Professor H. R. Seddon, Dean of the Faculty of Veterinary Science at the University of Queensland; the Government Botanist, C. T. White; the Agricultural Chemist, E. H. Gurney; and the Director of Animal Health Stations, Dr John Legg.

Selwyn Everist, who was appointed in 1929, was especially interested in pasture degradation and fodder trees. In 1935–36 he selected sites in central Queensland for stocking experiments to determine the effects of stock on native pastures. He also studied the potential of fodder trees, such as mulga, as a supply of maintenance feed during droughts.

The increasing expertise and knowledge of the Department's botanists drew them into new areas of plant science. They were called on to determine the nutritional value of plants, and in 1938-39 they collaborated with the Queensland Nutrition Council, the Department of Health and Home Affairs and the Government Analyst to prepare publications on native plants in the human diet and food plants of the Aborigines.

Conclusion

Throughout the 1920s and 1930s the Department's work encompassed an ever-widening range of scientific research activities to find solutions to crop and pasture problems. Field research and advisory staff were joined by scientists and technical officers in entomology and plant pathology, who worked in laboratories in Brisbane and at key centres in agricultural districts on plant-pest and disease investigations. Botanists played an essential part in this service, by identifying host plants and contributing their findings in areas such as plant poisoning, nutrition, weed control and pasture degradation.

Land use and conservation

The settlement of returned soldiers after World War I and the reclamation of prickly pear country brought demands for information from the Department on the suitability of lands for closer settlement and the best farming systems for these lands. The Department's work, particularly in the areas of plant breeding and agronomy, dairy research, marketing and standards, contributed to the expansion of Queensland's cropping and dairying industries. Between 1920 and 1945 the area under crops increased from 228 000 hectares to 727 000 hectares, and the State's dairy herd grew from 373 000 animals to more than one million.

Land settlement and reclamation

After disastrous attempts at promoting closer settlement in 1893 and 1905, the Department shied away from direct involvement in such schemes. But it joined the Lands Department in 1923-24 on a committee set up to deal with land-settlement schemes, the most important of which was in the Upper Burnett and Callide Valleys. Director of Agriculture Quodling was a member of the committee, which dealt with almost two thousand applications in its first year.

The Department was also involved in the reclamation of prickly pear land. After the *Cactoblastis cactorum* succeeded in destroying prickly pear, the Department looked for ways to bring the reclaimed land back into production. In 1929 it set up a block of reclaimed pear land on 'Palardo', near Miles, for experiments. Pasture-grass seed was broadcast into the mass of decaying pear, which formed a mulch on the soil surface. Researchers found that this method of reclamation was successful, provided sufficient rain fell to wet the decayed pear and the soil below it, thus ensuring adequate moisture for establishment and growth of the pastures.

Land survey and conservation

In 1927, Agriculture and Stock Minister Forgan-Smith announced the formation of a committee to carry out a complete agricultural survey of Queensland. Its starting point was to be the coastal and subcoastal lands north of St Lawrence, but the survey was intended to cover almost all of the State. Subjects examined would include soil, climate, rainfall, temperature, vegetation, insect life, potential crops and marketing facilities. The committee met in February and the first survey

began three months later, when four field officers started work in an area south and west of Sarina. They submitted a report, and the agricultural chemist and a surveyor then made a more detailed study of part of the area. It soon became obvious that a complete agricultural survey of the State would take a long time; two years later this work was discontinued because of the Depression.

However, soils and soil fertility were still matters of great interest to Queensland's agriculturalists. In 1929, officers of the Department of Agriculture and Stock, the Lands Department and the Forestry Board were addressed by Professor Prescott of the Waite Institute (Adelaide), and initiated the survey, classification and mapping of Queensland soils. *The Soil Survey Act of 1929* was passed to empower officers to enter properties while conducting surveys, and in the following year Minister Walker invited J. K. Taylor, Commonwealth Soil Surveying Officer, to survey areas with development potential. Taylor assessed the suitability of soils between Toowoomba and Roma for the possible extension of wheat-growing.

Soil erosion in cropping lands was a problem by the mid 1930s. In 1935, A. F. (Frank) Skinner, a cadet in Agriculture Branch, surveyed and constructed contour banks over an area of 25 hectares on the grounds of what is now the Baillie Henderson Special Hospital in Toowoomba. Skinner's project, the first government soil-conservation work done in Queensland, prompted farmers to undertake similar work on their own properties. South Burnett farmers led in this, after the Department's Soil Erosion Committee, set up in 1936, found severe soil erosion in their area and recommended that contour banks be constructed to combat the problem. The Department's soil-conservation work was curtailed during World War II because of the greater need to concentrate on food and fibre production.

Agricultural chemistry

In the early 1920s analyses of plants, fertilisers and soils were the main work of the Agricultural Chemist, Johannes Brünnich. His tests of soils on the Atherton Tableland in 1920–21 showed that a serious depletion in nutrients had occurred since earlier analyses in 1908, and he recommended the application of fertiliser to remedy the situation. Brünnich's staff was increased by the appointment of William Cartmill and Neville Cassidy in 1922–23, the year in which he attended a conference of State agricultural chemists in Melbourne held to bring about uniformity in legislation, description, labelling and methods of analysis of fertilisers, standards for pest destroyers and legislation regarding stock foods.

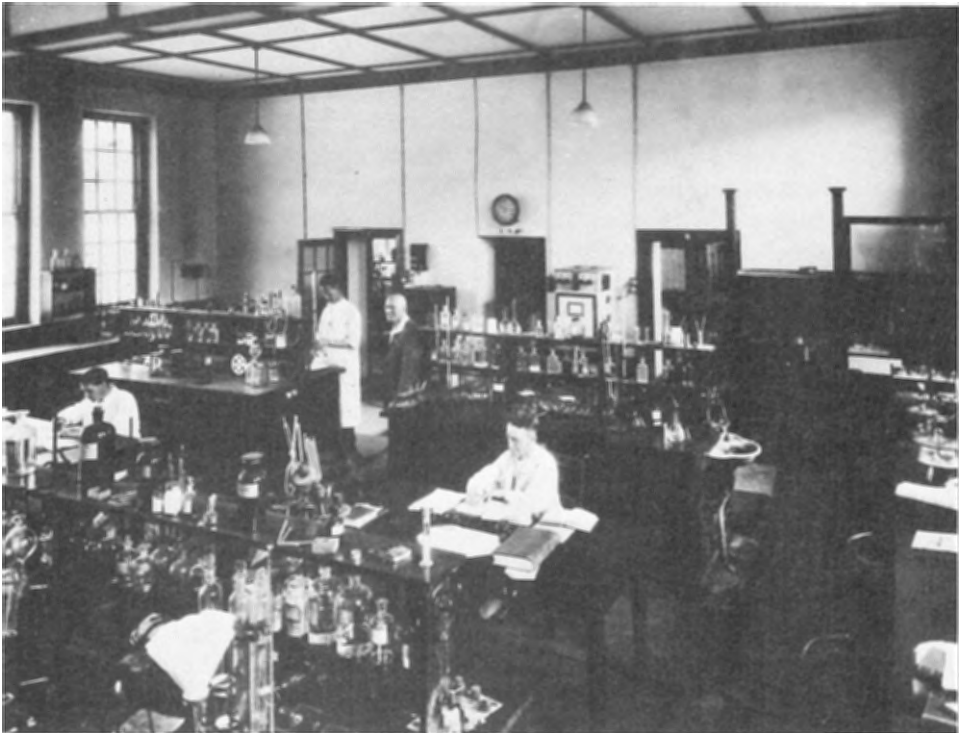
Chemists developed new techniques and methods of analysis in the 1920s; for example, they devised new ways of determining moisture content in meat extract. They also advised on drought feeding and on the design of fertiliser, pasture-renovation and fodder-crop trials, and conducted research in sheep-nutrition problems.

By the early 1930s, the Agricultural Chemistry Laboratory had become involved in the survey of Queensland soils through the many thousands of soil analyses it was called on to make. In 1934–35 Minister Bulcock formed the



*Elliott Gurney, Agricultural
Chemist, 1933-41*

*The Agricultural Chemistry Laboratory,
William Street, in 1930*



Departmental Experimental Committee to examine proposals for experiments. Crop varietal trials, fertiliser trials, green manuring, pasture and fodder-crop trials, and soil-conservation treatments, added to the laboratory's increased regulatory responsibilities, necessitated the appointment of more staff.

Elliott Gurney, who had replaced Brännich in 1933, retired in 1941. He was succeeded by a distinguished scientist, Dr Montgomery White, who had been the Department's animal nutrition research officer. After his appointment, White continued his work on the use of supplements for livestock grazed on native pastures.

Pastures

In the 1920s pasture improvement was promoted mainly by instructors in agriculture and managers of State farms. In the next decade the agricultural chemists, botanists and stock nutrition staff, as well as staff from Agriculture Branch, began to take a more active role in testing and demonstrating sown pastures and in improving and protecting native pastures.

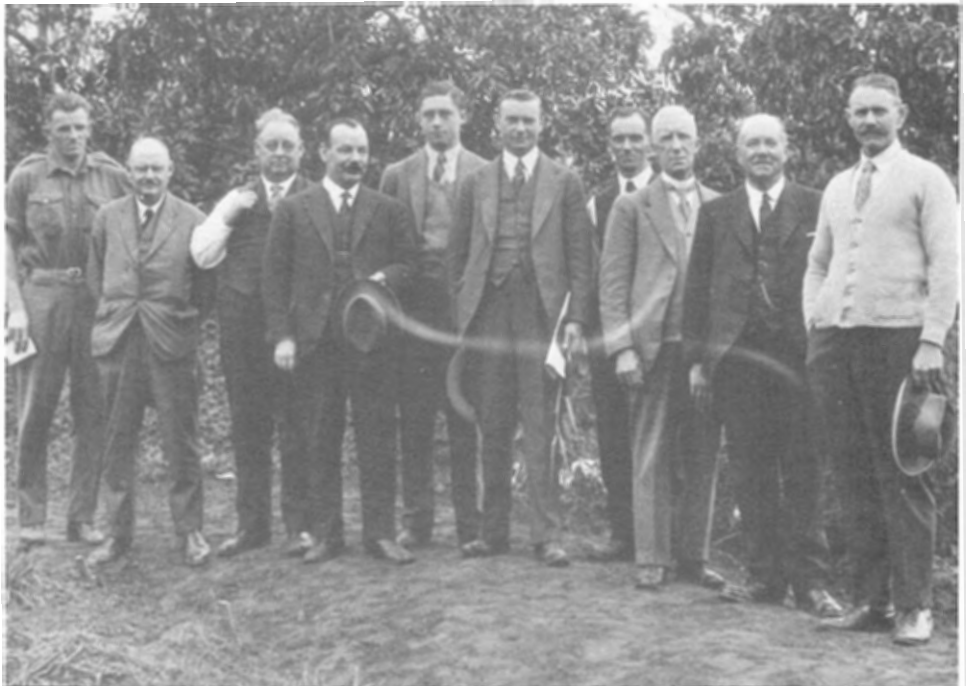
At this time the general aim of the Department's pasture work was to improve the productivity of dairying. Paspalum, introduced by John Mahon when he was principal of the Queensland Agricultural College, had been a marked success as a dairy pasture and had naturalised in south-east Queensland's wetter dairying areas. But by the early 1920s those pastures were starting to lose their productivity as a result of declining soil fertility and paspalum's tendency to form a dense sod that retarded air and water penetration. Charles Clydesdale, Assistant Instructor in Agriculture, began pasture-renovation experiments at Maleny and Cooroy in 1924 and found that ploughing and fertilising helped restore productivity.

When dairying expanded into drier areas, other pasture species were introduced. George Brooks, Instructor in Agriculture for central Queensland, reported that Rhodes grass was the major introduced pasture sown in his district, and set out to investigate other species. In 1928, the Archer brothers of Gracemere, near Rockhampton, allowed Brooks to plant trial plots of twenty-two summer-growing and twenty winter-growing pasture species on their property. Although one objective of these trials was to introduce a leguminous plant into pastures, many of the plants tested early in the programme were temperate species that were unsuitable in Queensland. Later plantings were of more potentially adaptable species. Brooks's nursery continued up to World War II, after being transferred to another location nearby in 1932-33. Plants and seed of promising species were distributed to landholders.

In 1931 Minister Walker set up the Pasture Improvement Committee, whose members were Arthur Graham (Under-Secretary and Director of Marketing), H. T. Anderson (Council of Agriculture), W. T. Harris (Australian Dairy Council) and Bruce Shearer (A.C.F. and Shirley's Fertilisers, Chairman). The committee was to oversee and coordinate the Department's sown-pasture trials. More than half the money for this work was contributed by A.C.F. and Shirley's Fertilisers Ltd in conjunction with Nitrogen Ltd of Melbourne, with other financial assistance from the Australian Dairy Council and the Council of Agriculture. The com-



The 'Palardo' experiments display at the Brisbane Exhibition, 1931



The Pasture Improvement Committee visiting the Lawnton pasture experimental plots in 1932. Departmental officers present were Arthur Kerr (first on left), Peter Rumball (fourth from right), Elliott Gurney (third from right) and Frederick Coleman (second from right).

mittee established pasture plots at Lawnton in 1931, on land owned by the Queensland Acclimatisation Society, and on privately owned land at Sherwood, and the Department invited dairymen to inspect the plots. At the same time, agricultural instructors laid out numerous pasture trials and demonstration plots both on private properties and at State farms. The Department obtained land at Moggill in 1939-40 to set up a plant introduction nursery that could provide a broader range of pasture and fodder species for this work.

In the early years of the war, the Director of the Bureau of Tropical Agriculture, John Schofield, assessed the potential of new tropical grasses and legumes at the Bureau's headquarters at South Johnstone. He then undertook grazing and fertiliser trials with a number of legumes to determine their suitability in the wet tropics. Tom Graham, who followed Schofield, was the first to combine these tropical grasses and legumes into effective pastures.

The Department also became increasingly concerned with maintaining the productivity of native pastures, the basis for Queensland's extensive pastoral industries. Wool, the State's most valuable export in the 1930s, was produced almost entirely on native pastures, which were at risk of being overgrazed during a serious drought in 1932. After the drought broke, Botanist William Francis made a detailed study of western pastures and found that by 1934 Mitchell and Flinders grasses were as good as ever on well-managed properties, while Mitchell grass had declined on properties that had been continually overstocked. In 1934, Stan Blake was awarded the Walter and Eliza Hall Fellowship in Economic Botany from the University of Queensland to investigate the pastures of western Queensland. He collaborated closely with Departmental officers in this work, and joined the Department's botany section in 1942.

As part of the continuing study of native pastures, Assistant Botanist Selwyn Everist made an ecological study of the flora of the Springsure and Clermont districts in July 1938. He reported a massive expansion of white spear grass in the native blue grass pastures. This posed a menace, as the plant's barbed seeds were a serious contaminant of wool. Everist saw overstocking, drought, burning and soil erosion as the main causes of the spread of this nuisance grass.

Weeds

The Department also became increasingly concerned about crop and pasture weeds: contaminated crops caused a decline in pasture productivity and, in some cases, were poisonous to stock. The weed problem was partly the result of the early uncontrolled introduction of plants, some of which became weeds in their new environment. It was also a consequence of disruption of the ecological balance by the clearing of land, the sowing of pastures, and cropping, which had allowed some native plants to spread unchecked and assume weed status.

In north Queensland, Norman Pollock, Northern Instructor in Agriculture, experimented in the control of inkweed on newly cleared land in the tropical rainforests in 1928, using Roberts' Prickly Pear Poison. But in this case control proved uneconomic, as the inkweed was replaced by the equally undesirable billygoat weed.

To help farmers identify weeds, the Department mounted a display of weeds and poisonous plants at the 1928 Royal National Association Exhibition at Bowen Park, Brisbane. Landholders were told that the Department would provide, free of charge, information on any weed or poison plant specimen they submitted.

The Queensland State Weeds Coordination Committee was established in 1940 to review weed problems in the State and to advise on the allocation of investigational work by Commonwealth and State authorities. CSIR, the Department of Public Lands and the Department of Agriculture and Stock were represented on the committee, with Robert Veitch, Director of the Division of Plant Industry (Research), as chairman. Japan's entry into the war at the end of 1941 caused a curtailment of the committee's programme, as the State's manpower and resources were directed to the war effort.

Flora and fauna conservation

In the 1920s and 1930s the Department was responsible for the administration of Acts relating to the protection and control of native animals and birds; it declared fauna sanctuaries and open seasons for hunting, and generally protected useful species, but also had to control both native and introduced species that were declared pests under the Dingo and Marsupial Destruction Act.

At that time, many rural families gained all or part of their income by harvesting native animals for their skins and animal pests for their scalps, on which a bounty was paid. Conflict arose between the needs of the poorer rural families and the effect their harvesting had on the State's fauna. For example, in 1922 and 1923 more than two million possums were harvested for their skins, placing the animals in danger of extinction. Koalas were also becoming endangered. As a result, the Department declared a closed season on both animals in 1924 and 1925, and took similar action from time to time in subsequent years.

Despite closed seasons and regulations to prevent the unlawful harvesting of native animals, the slaughter continued, especially during the Depression. The Department's few rangers could not effectively cover the State's large area as funds were short and transport was difficult, and some species were soon under threat of extinction. Koalas were, however, fully protected under *The Fauna Protection Act of 1937*, which repealed *The Animals and Birds Acts, 1921 to 1924* and gave the Government extra power to protect Queensland's fauna.

Provision was made for the protection of Queensland's native flora under *The Native Plants Protection Act of 1930*, with Departmental officers, field naturalists and other enthusiasts appointed honorary rangers. The Act set out penalties for the unlawful collecting of protected plants, and its protection was extended to islands off the Queensland coast, including those forming part of the Great Barrier Reef.

Conclusion

The 1930s might be regarded as the years in which the Department took on a vital role in improving and caring for the land and its resources. A recognition of the value of good land had grown out of the devastation wrought by the prickly pear.

Twenty-five million hectares of Queensland's land had been laid waste by the pear before its dramatic defeat through biological control, but pasture and crop studies on the reclaimed land demonstrated its potential for agricultural and pastoral settlement. At the same time, the need to maintain the productivity of land was appreciated: contour trials proved effective in halting erosion in cropping lands; analyses by the agricultural chemist showed the importance of fertilisers in maintaining soil productivity; and botanists and agricultural advisers demonstrated ways of introducing better pastures and maintaining native pastures. The damage being done to the State's fauna and flora resources also became increasingly evident, and the Department took steps to protect them from destruction.

Dairying

Queensland's dairy industry came to the fore in the 1920s, and entered its greatest development period after the introduction, in 1926, of an Australia-wide voluntary price stabilisation scheme. At the end of the decade the State had 22 500 dairy farms, supporting fifty-two butter and seventy-three cheese factories. It was estimated that 90 000 people, or one-tenth of the State's population, depended directly on dairying for their livelihood. By the late 1930s, dairying was the largest rural industry in Queensland, and butter was the State's most valuable export after wool.

Dairy Industry Advisory Board

The Dairy Industry Advisory Board was formed in 1922, after a conference attended by Premier E. G. Theodore, Minister for Agriculture and Stock William Gillies and dairy industry representatives. The delegates represented twenty-eight butter and twenty-five cheese factories and twenty other dairy concerns.

The board had seven members, three elected by butter producers, two by cheese producers and one by condensed-milk producers, and a government representative. Its chairman was the government representative, Arthur Graham, Chief Dairy Expert in the Department. The board was set up to investigate methods of production, manufacture, marketing, storage and distribution of dairy produce, and advise the State Government on ways to improve the dairy industry.

Dairy Branch

Arthur Graham's designation, 'chief dairy expert', was changed to 'director of dairying and cold storage' in 1922, reflecting the Department's increasing involvement in services to the marketing side of the industry. In the same year the Queensland Government started building cold stores at Hamilton to replace those at Roma Street. The new cold stores, among the largest in the Southern Hemisphere, were placed under Graham's supervision, but this arrangement did not last long: when Graham became under-secretary in April 1926, Dairy Instructor Charles McGrath succeeded him as supervisor in dairying but not of the cold stores. McGrath retired in 1935 and George Heers succeeded him. On Heers' retirement in 1939, Dairy Technologist E. B. (Brooke) Rice became director of dairying.

Appointees to Dairy Branch in the 1920s included herd testers, dairy instructors and dairy inspectors. One of the first new professional appointees during Gillies' term was the Instructor in Cheesemaking, Atkinson Wilkin, who joined the Department in 1920. He was immediately involved with administering sections of the Dairy Produce Act, and later helped to administer *The Cheese Pool Act of 1921*. Soon after Wilkin's appointment, John Ogilvie was appointed the first 'dairy inspector', with his headquarters at Ipswich.

Dairy Instructor Robert Winks retired in 1927. He had joined the Department in 1893, to work with the travelling dairy. On the passage of the first Dairy Produce Act in 1904, he became a grader of dairy produce intended for export. When compulsory grading was later introduced, Winks piloted this controversial issue to acceptance in the industry.

Herd testing had been accepted by dairy farmers by 1920 and some improvement in production had resulted, but production per cow in Queensland was low compared with that in the southern States. Two herd testers were appointed in 1923 to help Senior Herd Tester Ludvig Andersen to provide a more intensive service. Because of staff shortages during the Depression, the Department arranged for butter and cheese factories to test the milk samples of suppliers who were members of the herd-testing scheme, and Dairy Branch officers then handled recording work. Under a 'better bull' campaign, introduced in 1925, the Department subsidised buyers of approved bulls from dams who had gained entry to the Advanced Register for production.

Dairy research laboratories

The formation of a dairy research branch was foreshadowed by the appointment in 1930 of Oliver Kent. First charged with carrying out chemical and bacteriological examinations of dairy produce, Kent was appointed dairy science officer a year later, and worked on weed taints and other problems affecting the quality of butter and cheese.

A dairy research laboratory was established in the William Street building in 1935, with Kent in charge. He was joined by Rice, and later by Leslie Nichols, who was appointed to study cheese problems, and later still by analyst Len Burgess. A second dairy research laboratory was set up in Toowoomba in 1936, and a butter-testing laboratory was opened at Hamilton in 1938-39.

Butter improvement

In 1921 Graham had stated that the quality of butter would improve if factories pasteurised cream before manufacturing that product, and from August 1924 the Commonwealth Government prohibited the export of any choice or first-grade butter not made from pasteurised cream. Pasteurisation was then generally adopted by factories, and the proportion of first-grade butter rose from 68 per cent in 1925-26 to 83 per cent in 1927-28. Butter quality also improved as a result of better transport services to take cream from farms to factories. Motor transport replaced horse-drawn vehicles, and the Railways Department provided insulated rail wagons and more frequent services.

Cheese improvement

Pasteurisation was adopted progressively by Queensland cheese factories after 1921, but work was needed to solve specific quality problems that persisted. The principal of the Queensland Agricultural High School and College (Professor J. K. Murray), Government Bacteriologist Charles Pound and Supervisor of Dairying Charles McGrath were members of a committee that examined the causes of the downgrading of 'choice' and 'first-grade' cheese in the late 1920s and tried to find remedies for the defects.

In 1938 Brooke Rice was sent to Reading University for one year, then returned to Toowoomba to set up a travelling laboratory that would visit factories on the Darling Downs to advise on improving cheese quality. The laboratory operated in Toowoomba in 1939-40, under Leslie Nichols, who found that cheese starter cultures and their handling were important factors in maintaining cheese quality.

Cheese starters

Starter cultures are beneficial bacteria used as lactic souring organisms to produce, first, lactic acid and then cheese. The bacteriological laboratory at the Yeerongpilly Animal Health Station distributed naturally occurring mixed strains of starter cultures to cheese factories from 1911, and the new dairy laboratory in William Street took over this work in 1935.

Lack of efficiency in these starter cultures lowered cheese quality, and in the 1930s researchers found that bacteriophage infection was the cause. Bacteriophages are viruses that attack bacteria. In mixed starter cultures, at least one bacterium in the mixture might be susceptible to the race of phages present in the factory, and no control was possible to establish which bacterium was attacked, compounding the problem. The Dairy Research Laboratory therefore started to distribute single-strain cultures in 1942. If attack from phage were recorded, alternative starter strains could be sent to the factory. The distribution of single-strain cultures was transferred to the Toowoomba dairy research laboratory when Russell Smythe was sent there in 1947.

Dairy education

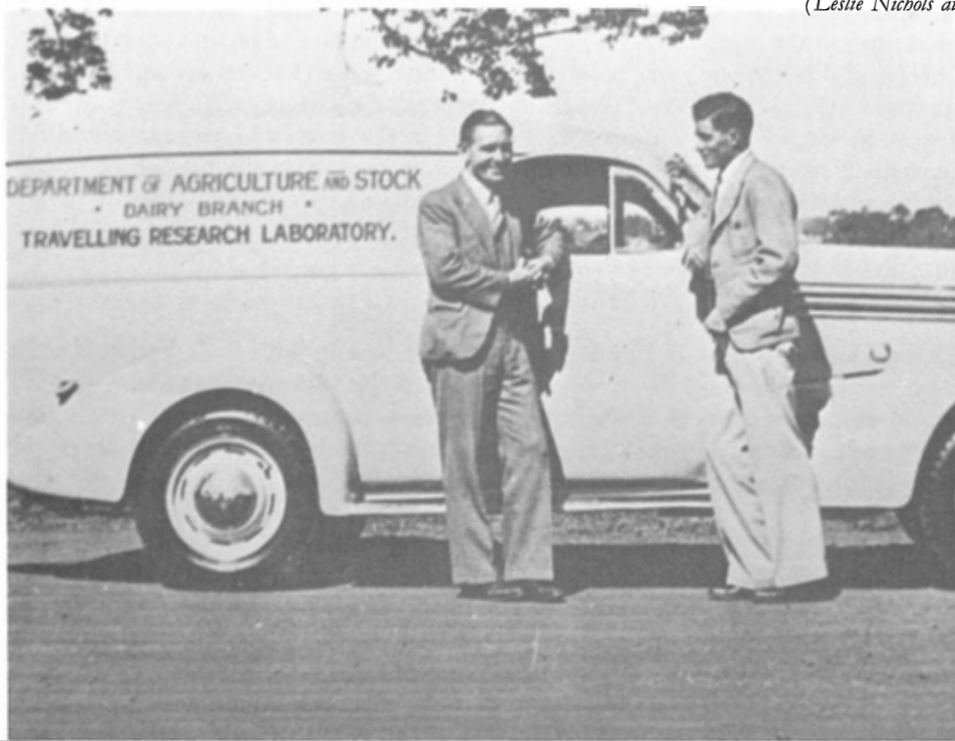
As the Queensland dairy industry grew, many people with little knowledge or experience of scientific dairy techniques joined the industry as farmers, factory employees and managers. The Department ran programmes to ensure that these people were educated in the latest dairy practices and acquired the skills necessary to maintain the productivity and quality standards that would keep the industry viable.

Courses for dairy-factory employees were begun at the Queensland Agricultural High School and College in 1926 and were held annually until 1936. At the end of each course, the Department examined the participants in milk and cream testing, grading, and butter- and cheese-making. The Department also organised short refresher courses in dairy science for employees at Malanda, Kingaroy and Toowoomba in 1933-34, and held dairy-science schools for butter-factory employees at its Brisbane laboratory in William Street in 1936 and 1937.



Oliver Kent, the Department's first dairy bacteriologist, in 1930

*The Dairy Branch Travelling Research Laboratory at Toowoomba in 1938
(Leslie Nichols at left)*



A dairy committee scheme was introduced in 1933 to expand the Department's educational activities and local committees were formed within local producers' associations. Dairy Branch officers prepared papers that were sent regularly to the associations for discussion at their meetings, and gave short courses for committee leaders, who then arranged for instruction to be given in the breeding and care of dairy stock and farm management.

Marketing

The Cheese Marketing Board was set up in 1922, after the passage of *The Cheese Pool Act of 1921*, to handle all Queensland cheese, which made up almost the whole of Australia's cheese exports to Britain in 1923-24. To advertise Australian cheese, the Pittsworth Cheese factory used more than fifteen thousand litres of pasteurised milk to make a mammoth cheese weighing one and a half tonnes. The largest cheese ever made from pasteurised milk at that time, it was the centrepiece in the Australian pavilion at the British Empire Exhibition in London in 1924.

The Queensland Butter Marketing Board was set up in February 1925 to control the sale of butter within the State. Export sales improved when the 'Kangaroo' brand was adopted for all high-grade Australian butter exported to Britain. Because of the high 1920-21 production, the Government had decided to improve and increase cold-storage capacity, not only for butter but also for fruit, eggs and other products. As the Railway Department's cold stores at Roma Street were too small, new stores were built near the wharves at Hamilton in 1922.

Departmental Economic Committee

The Minister, Forgan-Smith, appointed the Departmental Economic Committee, which held its inaugural meeting in January 1927. Its chairman, Under-Secretary Graham, voiced the need for an economic survey of land settlement, agricultural production and marketing systems, saying that settlers needed accurate information on crops, areas and stock-carrying capacity.

The Committee's first inquiry was into the dairy industry, and its first bulletin, issued in April 1928, reported on current dairy practices and the economics of those practices. A second bulletin stressed the importance of feeding and the necessity for herd improvement and herd testing. The third dealt with stock foods and the manufacture and marketing of dairy products.

Legislation

The Dairy Produce Act of 1920 repealed and replaced *The Dairy Produce Acts, 1904 to 1911*. It required the registration of all factories manufacturing dairy products, made obligatory the grading of all milk and cream received by a factory, and regulated the packaging, branding and dating of all dairy produce manufactured. It also required that all Queensland dairy produce be examined and graded by an inspector, that all farm dairies be registered, that inspectors be appointed to inspect the dairies for hygiene and stock for disease, and that stock owners report any diseased stock to the inspector.

Later amendments to this Act dealt with further details to ensure top-quality dairy produce, such as the stipulation that pigs be kept more than fifty metres from farm dairy buildings, and set out standards for the grading of butter and minimum qualifications of factory personnel. In 1938 the use of preserving and colouring agents and disinfectants in dairy produce was banned, and owners of dairy herds were required to obtain a certificate showing that their herds were free from tuberculosis. The following year, every farmer using milking machines was compelled to install a steam steriliser for cleaning dairy equipment, and two years later dairymen in registered milk areas were required to supply only specified factories.

The Dairy Cattle Improvement Act of 1932 provided for annual licensing of every dairy bull over the age of twelve months. Inspectors were appointed and given right of entry to inspect bulls on a property, with the power to castrate or destroy unlicensed or diseased bulls. The Act empowered the Minister to refuse to license bulls that were not well grown and of sound constitution, or that failed to show dairy characteristics, and set up the Dairy Cattle Improvement Fund, which was used to improve the standard of dairy cattle through production recording, the use of improved sires and disease control. Despite the Government's attempt to raise the quality of dairy cattle, the Act was never implemented because of opposition from farmers; it was eventually repealed in 1959.

The Margarine Act of 1910 was policed by dairy inspectors, who were given powers of entry on to premises and confiscation of products. It required that flour from Queensland arrowroot and sesame oil be used in margarine to assist in identification. But under an amendment in 1931 the Act held no specific reference to sesame oil and manufacturers were permitted to use skim milk containing less than 0.05 per cent butterfat as an emulsifying agent in the manufacturing process. A further amendment in 1939 required the registration and licensing of manufacturers, and empowered the Minister to determine margarine quotas. Wholesalers and retailers of margarine were also required to be licensed and the product was to be clearly labelled 'margarine'.

Conclusion

By the early 1940s dairying was the largest rural industry in Queensland, owing largely to the encouragement and support given by the Department since the travelling dairies had begun operating in 1889. In fifty years the industry had been transformed to a modern, efficient operation, turning out high-quality products and satisfying both domestic and export markets. The Department played a greater part in dairying than in other rural industries: it was involved at all stages of production, from herd testing to processing to grading butter for export. The Department's participation in every aspect of the industry helped it become an important export earner as well as a supplier of high-quality products for the home market.

Animal industries

Different sections of the Department were responsible for the animal industries between 1920 and 1945. The pastoral industries were serviced by the chief inspector of stock, who controlled the stock inspectors and the veterinary services, brands, sheep and wool sections, the stock experiment stations and the slaughtering and meat inspectors. The farmyard industries, such as poultry and pigs, were guided by sections in Agriculture Branch that were set up in 1922 and 1923.

The beef industry

In the 1920s the Department's main concern was livestock diseases, and its resources were, of necessity, concentrated on disease control. But the introduction of Zebu (*Bos indicus*) cattle into the State and the sowing of introduced pastures for beef cattle production drew the Department into animal husbandry work as well.

In 1933 some north Queensland cattlemen began importing Zebu bulls from the United States. Local graziers generally opposed the idea but four pastoralists and pastoral companies formed a syndicate with the Council for Scientific and Industrial Research (CSIR) and imported eighteen head of Brahman cattle and one Santa Gertrudis bull. The CSIR supervised a breeding project designed to find out whether crossbred animals would be resistant to tick infestation and tick-borne diseases, whether they would thrive in the northern climate, and whether their meat would be suitable for the British market, Queensland's major export market. By 1941, the syndicate had begun selling crossbred bulls, the beginning of the general adoption of *Bos indicus* blood in the beef cattle herds of central and northern Australia.

In 1937-38, Veterinary Officer C. R. (Rod) Mulhearn carried out nutritional studies with beef cattle on tropical pastures. At Tully, in a 3750 millimetre rainfall zone, highly productive introduced pastures were sown on commercial properties after rainforest had been cleared. Mulhearn found that, with good management and quality cattle, stock could be marketed throughout the year off these pastures. The Department did further work on wet tropical pastures, using introduced species, particularly legumes, at the Bureau of Tropical Agriculture at South Johnstone (see Chapter 22).



Classing and bulk-lotting wool on behalf of small wool producers in the Department's wool room at William Street in the 1930s



The Department's central meat inspection room at William Street, 1930

The sheep and wool industry

In the 1920s, the Department provided a valuable service to woolgrowers, mainly covering advice on the control of blowflies and intestinal worms, under the direction of its sheep and wool expert, William Brown. Brown was a member of a blowfly committee appointed by the Commonwealth Institute of Science, which began work in the Roma district in 1918, an extension of the Department's earlier work at Gindie. It examined methods of dipping and jetting, and assessed the effectiveness of different chemical preparations in blowfly control. When the committee's work ended, Brown travelled widely, lecturing and demonstrating techniques to new graziers in subcoastal districts and to established woolgrowers in the west of the State. He retired in 1927, after seventeen years' service, having been the Department's first sheep and wool officer.

The mules operation, developed in 1928 by the South Australian grazier J. H. W. Mules to counter fly strike, was recommended by the Department's sheep and wool officers from the early 1930s. It was successful in lessening the incidence of fly strike. However, research on blowfly control was still needed, and in 1936-37 the Queensland Government offered the CSIR some land in the Cunnamulla district for experimental work, including blowfly control. The property became the Gilruth Plains Field Station, operated by CSIR.

Fat-lamb production was promoted by the Department in the 1930s. James Carew, Senior Instructor in Sheep and Wool, concentrated on expanding the fat-lamb industry on mixed farms and suggested mating Corriedale ewes with Border Leicester or Dorset Horn rams. The scheme was not a great success, and, to make matters worse, much of the wool that entered the Department's Farmers' Wool Scheme for small producers was from these crossbred sheep, and was difficult to market.

The Department's sheep and wool section had few staff changes in the 1930s. Charles Swinburne was appointed instructor in sheep and wool in 1936 and in 1940 Clarence Payne became senior grader in the Department's wool room. Carew retired in 1942, after a remarkably diverse career in the Department: the original gardener at the Queensland Agricultural College in 1897, he later became horticulturist, and then horticulturist and instructor in wool classing; he next served in the sheep and wool section, moved to the cotton section, then returned to and retired from the sheep and wool section.

Horses

The 1920s saw the decline of the horse and the rise of the internal combustion engine. But Queensland continued to export horses, mainly to India, and in 1926 the Indian Government advised the Minister for Agriculture and Stock that it would require Australian cavalry mounts and draughthorses for some years to come.

The increasing use of the tractor led to a sharp decline in the number of draughthorses on Queensland farms. But the Department continued to breed improved draught stock on State farms for farmers who could not afford tractors or the fuel to run them. In 1922-23, the Department bought six stud Clydesdale

stallions and stationed them at the QAC. The Stallions Registration Act was passed that year and the Stallions Board was set up in 1925 to arrange for the services of these animals. The Department transferred some of its Clydesdale breeding stock to Gindie State Farm, where it operated Clydesdale and Suffolk Punch studs. When State ownership of stallions ended in 1929 the remaining animals were auctioned at the Royal National Exhibition in Brisbane.

The continuing shortage of draughthorses for farm work, especially in the canefields, led to attempts at breeding mules. The Department helped canegrowers to import three jack (male) donkeys from the United States to breed mules for work in the canefields, sending Joe Freeman, of Horticulture Branch, to the United States to choose the animals and bring them back to Queensland. One jack went to the Burdekin and two to the Fairymead Sugar Company at Bundaberg, where eleven mule foals were born to Clydesdale mares in 1936.

Pigs

When it became clear that the Queensland Agricultural College was to be transferred to the Department of Public Instruction, the Agriculture Branch assumed responsibility for the pig industry. Until then, advisory work on pigs had been handled from the QAC. The pig section in Agriculture Branch was founded in August 1923, when Ernest Shelton was appointed instructor in pig-raising, and advisory services were then provided from Brisbane.

Shelton instructed Queensland pig farmers in practices that would improve their industry, drawing attention to the pig industry's backwardness in organisation and sanitation and its subsidiary role to dairying. He advised on crossbreeding, and visited the pig sections on the State farms and the stud piggeries controlled by the Home Secretary's Department at State institutions at Dunwich, Ipswich and Toowoomba. He also sought to improve the quality of pigs sent for slaughter by asking bacon factories to report on the animals they were then receiving.

Pig, calf and garden clubs, modelled on American and Canadian schemes, had been set up by the Department of Public Instruction. When Shelton was appointed, the pig clubs were transferred to the Department of Agriculture and Stock. Shelton supported these clubs, seeing education as the industry's most basic need. At his suggestion, a pig farmers' school, Queensland's first, was held at the Queensland Agricultural High School and College at Gatton in June 1928. To further raise the level of pig husbandry education, Pig Branch staff prepared correspondence courses in pig-raising in 1931-32.

Shelton had represented Queensland at an interstate conference in Sydney in 1926-27, at which delegates proposed organising pig industry committees in each State to deal mainly with overseas markets and the expansion of local trade. The Queensland Pig Industry Committee was subsequently established, and in 1931-32 the committee and the Queensland Agricultural High School and College began crossbreeding experiments, with the Department contributing funds to the project. Feeding trials were conducted at the Yeerongpilly Stock Experiment Station by Jasper Ladewig.



Ernest Shelton, pig husbandry adviser, lecturing farm boys at the Brisbane Exhibition in 1930



Pig husbandry advisers demonstrating litter-recording techniques on A. C. Stewart's farm at Gympie in 1937

The Queensland Pig Industry Council was formed in 1932-33 to continue the work formerly done by the committee. It first examined carcass grading and payment on a quality basis, and systems of identifying live pigs and carcasses, then considered price stabilisation, standardisation of breed type and legislation, feeding and extension matters.

The Better Boar Subsidy Rebate Scheme introduced in 1933 resulted in a wider distribution of pedigreed boars. This scheme was replaced in the following year by one fostered by the Department and the Rural Assistance Board of the Agricultural Bank, which offered loans to help finance the importation of pedigreed boars. In 1935 the Department began to promote litter recording to improve herd productivity, and its officers demonstrated methods of recording to pig producers.

As early as 1929-30, Shelton had warned farmers that the market was now demanding lean meat from light, early-maturing animals. In 1934 he was made supervisor of grading as well as senior instructor in pig-raising, and three years later he introduced a new system of pork and bacon carcass appraisal, under the control of Les Downey. This system, devised by Dr John Hammond of Cambridge University, was based on both measurement and visual assessment, and revolutionised the appraisal of both pig and cattle carcasses.

Poultry

Until 1923, the Department's main contact with the poultry industry was through egg-laying competitions, which were conducted at the Queensland Agricultural College. The travelling instructor in poultry husbandry, John Beard, who had been appointed to replace Matthew Fern in 1917, had also advised farmers.

Beard died in 1923 and was succeeded by Percy Rumball, who had been poultry instructor at soldier settlements at Mt Gravatt and Enoggera. Because of the growth of the industry in north Queensland, William Keany was appointed northern poultry instructor at the same time. John McLachlan was appointed poultry inspector in 1928.

The Queensland Egg Board, set up in 1923, handled the export of eggs, under Rumball's supervision. Export and cold storage, in the Department's Hamilton Cold Stores, helped stabilise the industry and thereby contributed to its expansion. When a conference of State Ministers for Agriculture in Brisbane in 1926 agreed on the need for uniform grade standards for eggs, a Departmental committee was instructed to draft such standards.

Queensland firms started to produce prepared rations, which had previously come from southern States, and the Department established a poultry experiment station at Mt Gravatt in 1929 to conduct feeding tests. These tests confirmed the suitability of locally produced rations. As little was known at that time of the influence of feed on poultry production, egg-laying competitions were also transferred to Mt Gravatt from the Queensland Agricultural College.

Mt Gravatt Poultry Experiment Station closed in 1932 and poultry research was transferred to the Animal Health Station at Yeerongpilly. In 1932-33 chicken-raising and nutrition experiments were done there.

In the late 1920s and 1930s a good deal of time was devoted to work with the

poultry clubs organised by the Department of Public Instruction, and officers of the Department of Agriculture and Stock provided technical information on poultry-raising. Rumball encouraged commercial farmers to combine poultry-raising and fruit-growing: the birds would help control orchard pests, and would provide organic fertiliser as well as an alternative income. He also encouraged sideline poultry enterprises on grain farms to use inferior grain.

The meat industry

The Meat Industry Encouragement Act of 1923 was formulated to improve the meat industry. The State Meat Advisory Board was established to advise the Minister on all matters relating to the Act, declare levies and deal with all measures designed to increase the production of beef and mutton and their products. Levies imposed to establish the Meat Industry Fund became the property of the Australian Meat Council, and each year the board chose four of its members to sit on the council.

One of the most pressing problems facing the Department was the poor quality of Queensland meat. When Gillies became Minister for Agriculture and Stock in 1919 many of the thirty-eight slaughteryards in the metropolitan and suburban area were substandard and unhygienic. Five years later the number of slaughteryards had grown to forty-one, and nearly all the premises that previously had not complied with the provisions of the Slaughtering Act had been brought up to standard. Three new inspectors had been appointed, two veterinary officers had been assigned to make periodic inspections, and four officers had been assigned to bacon factories. In December 1922 the Department had set up a central depot in the William Street building for the inspection of pork and veal carcasses to ensure the production of better-quality meat at the small slaughterhouses around Brisbane.

Departmental inspectors found that diseases and bruising were the most common problems in stock at slaughter. A Royal Commission appointed in 1924 to look into bruising of cattle recommended that information be kept on the incidence of bruising; that the construction of trucking yards and cattle trucks be improved; that an electric device be used to prod fallen cattle; and that a producers' representative attend meatworks during killing operations.

A Commission was appointed in 1927 to inquire into aspects of the Queensland beef cattle industry and recommended the establishment of public abattoirs in Brisbane. The metropolitan abattoir was set up under *The Abattoirs Agreement Ratification and Meat Industry Act of 1930*, which ratified an agreement for the State Government to buy the Swift Meat Company's abattoirs at Cannon Hill. The Act also set up the Queensland Meat Industry Board to maintain and control abattoirs in the Metropolitan Abattoir Area, which embraced the City of Brisbane. With centralised killing facilities available, many substandard private slaughterhouses were closed.

The abattoir opened in 1931, a licensed export facility as well as a domestic abattoir, where meat inspection was done by both Commonwealth and State officers. To rationalise the situation, the Commonwealth agreed to inspect meat for

domestic consumption, and four officers were transferred from the State to the Commonwealth public service. This agreement was ratified by *The Queensland Meat Inspection Agreement Act of 1932*.

Regulations under the 1930 Meat Industry Act also resulted in the upgrading of retail butcher shops by the installation of modern meat-handling equipment. All retail meat establishments were inspected by Departmental officers.

Conclusion

Significant changes took place in Queensland's animal industries in the 1920s and 1930s. The pig and poultry industries were no longer subsidiary to dairying, and the Department expanded to provide the specialist attention they needed. The beef industry continued to grow and, with the Department's help, improved its transport and processing systems to provide better-quality meat for the domestic market and take advantage of overseas marketing opportunities. The Department also addressed the problems of the sheep and wool industry, particularly the blow-fly scourge and the classing and marketing of small wool clips.

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Livestock health

In the 1920s and 1930s two groups shared the Department's work in the control of pests and diseases of livestock. The first group was the field staff, headed by Arthur Cory, Chief Inspector of Stock, and comprised stock inspectors, meat and slaughtering inspectors and, later, veterinary staff. The second was the laboratory group at the animal health stations at Yeerongpilly (Brisbane) and Oonoonba (Townsville), headed by Charles Pound, Government Bacteriologist.

Field staff

Stock inspectors were instrumental in the control of stock diseases in the 1920s. Although not trained veterinarians, they reported the appearance of new diseases, the spread of existing ones and the results of disease-control measures. Their reports provided material for the identification of and research into diseases, and were vital in the drafting of legislation. With the slaughtering inspectors, the 'stockies' provided an important link between the Department's diagnostic staff and the producers and processors of livestock.

In 1923 two part-time veterinary officers were appointed to work in central and north Queensland. After the passage of new legislation relating to stock diseases and slaughtering in 1930 and 1932, many more stock and slaughtering inspectors were appointed to various districts and full-time veterinary staff were also taken on to supervise animal-health programmes.

Frederick Roberts joined the Department in 1930, after service with the Commonwealth Prickly Pear Board, the first appointee to a veterinary entomology position in Australia. He began working in a new laboratory at Yeerongpilly in 1933 and was later sent overseas to study the control of parasitic diseases in stock. He also studied parasites of domestic animals, discovering a new tapeworm in pigeons, and becoming the first scientist to find trichostrongyles in rabbits. Roberts served in World War II and then rejoined the Department, but in 1947 he transferred to head CSIR's veterinary parasitology laboratory, also at Yeerongpilly.

Between 1933 and 1941, thirteen veterinary graduates from Sydney University were appointed to the Department, the first of its full-time field veterinary staff. The Department enrolled two candidates, Les Newton and Tom Abell, in the

Faculty of Veterinary Science at the University of Queensland on its establishment in 1936. Abell withdrew, but Les Newton and two other graduates, George Moule and Owen Brooks, were appointed on their graduation in 1942. All were also QAC diplomates.

Until 1940, Chief Inspector of Stock Cory was the administrative head of all field officers involved in animal health. After Cory's retirement in 1940, Veterinary Services Branch was created from these staff. Seddon, Professor of Veterinary Science at the University of Queensland, who earlier had been asked to review the Department's veterinary work, was appointed to head the branch for a three-year term, and was succeeded in 1943 by Dr John Legg.

Laboratory staff

Pound's staff at Yeerongpilly and Oonoonba carried out an ever-widening range of work in the 1920s. Engaged in constant tick-fever research, they also analysed water samples for butter factories, checked condensed milk for mould fungi, examined pathology specimens and tested milk for disease organisms. Bacteriologists supplied lactic starter cultures for cheese factories and prepared vaccines against diseases such as tick fever, blackleg, contagious bovine pleuropneumonia (pleuro) and mastitis.

On Pound's retirement in 1932, the stock experiment stations at Yeerongpilly and Oonoonba were renamed animal health stations. Government Veterinary Surgeon John Rudd was appointed director at Yeerongpilly, with St George Thorne as bacteriologist. D. Stewart replaced Rudd as government veterinary surgeon. John Legg, who had been appointed director of the Oonoonba Stock Experiment Station in 1921, and was senior veterinary surgeon from 1935, became director at Yeerongpilly on Rudd's resignation in 1941.

The Department handed Oonoonba over to the CSIR in 1931 to enable that body to investigate animal health problems in northern Australia but continued to be involved in programmes there. Legg was seconded to CSIR and continued working at Oonoonba. In conjunction with CSIR, the Department studied mineral deficiencies in cattle at the Helenslie Field Station near Charters Towers, and Legg continued his work on tick fevers. CSIR entomologists sought a natural enemy of the buffalo fly, while other staff developed a blood test to detect carriers of pleuro. When Oonoonba reverted to the Department in 1936, Veterinary Officer Rod Mulhearn took over as acting director and diverted research work to the control of pleuro.

Disease control

Most of the stock diseases the Department dealt with in the 1920s had been met previously. The most troublesome were pleuro and tick fever, and the two stock experiment stations were kept busy preparing vaccines against them. Field and laboratory staff also dealt with other, less widespread, diseases, some of which had the potential to become endemic if not diagnosed and controlled quickly.

Quarantine became increasingly necessary as a means of controlling disease outbreaks and threats. An outbreak of swine fever in the Boonah district in 1923

was countered in this manner, and a rinderpest outbreak in Western Australia in the same year led the Department to impose an embargo on the introduction of stock and fodder from that State.

Ephemeral fever (three-day sickness) first appeared in Queensland cattle in 1936. An outbreak was recorded at Burketown by Mulhearn, and by the end of the year the disease had spread to northern New South Wales. Departmental officers and entomologists from the University of Queensland and CSIR began studies on the disease at Yeerongpilly.

Work on pleuro and tuberculosis, both endemic in Queensland, continued into the 1930s, when tuberculosis was the most common cause of carcass condemnation at the Brisbane abattoir. In April 1935 the Department began publishing in the *Queensland Agricultural Journal* lists of cattle herds that had been certified by the Department as tuberculosis-free, to enable producers to find a source of disease-free stock.

Porcine brucellosis (contagious abortion in pigs) was also a problem. In 1940-41, the Department started a brucellosis-free herd scheme and from that time all pigs imported into Queensland had to be kept in isolation until proven free of the disease. The only exception to this rule was made for pigs consigned to Cannon Hill for immediate slaughter.

Cattle ticks

Cattle ticks were the major pest of cattle in the 1920s, and tick fevers were a continuing problem. The Tick Board concentrated on suppressing the pests in areas where sporadic outbreaks occurred, minimising tick populations in infested areas, and preventing their spread to clean areas. It did this by proclaiming cleansing areas, in which cattle were required to be dipped before being moved.

For many years it had been thought that tick fever was caused by a single blood parasite transmitted by ticks, but in 1921 Legg reported that there appeared to be two tick-fever organisms. Investigational work at Oonoonba showed that several parasites were transmitted by cattle ticks, but that only two caused tick fever. By 1939 a bivalent vaccine had been developed, at times incorporating a less virulent organism from South Africa.

Buffalo fly

The buffalo fly migrated from the East Indies (now Indonesia) to Australia in the nineteenth century and by the late 1920s had reached Queensland. In 1929 entomologist Harold Smith and stock inspector John Clegg reported on the extent of intrusion, whereupon the Department declared the pest a disease under the Diseases in Stock Act.

The Queensland Government then tried to prevent the fly from spreading by imposing quarantine measures prohibiting the movement of cattle from infested to clean areas. But the Commonwealth Government, which was then in charge of buffalo fly research as the pest had spread across State borders, would not provide funds for a clean muster of infested areas and the fly continued to spread. Control trials were carried out in north-west Queensland in 1931-32 and a spray

plant was erected at Kajabbi to treat stock moving out of the area. Queensland wanted to set up a buffer zone but the Commonwealth disagreed with such a move, and by 1944 the fly had spread to Clermont and Bowen.

The Buffalo Fly Control Act of 1941 was passed by the Queensland Government to impose stamp duty on cattle sales to provide funds for the control and eventual eradication of buffalo fly. Under the Act, the Buffalo Fly Control Fund was established in the Treasury for this purpose.

Other livestock problems

Many other pests plagued the State's livestock. Those affecting sheep were studied by Veterinary Entomologist Frederick Roberts after his appointment in 1930. In 1931 he identified the various sheep blowflies that were troublesome in Queensland, and held field days with the help of advisers and other veterinary officers from Yeerongpilly and country centres to demonstrate identification and control methods. Roberts also discovered new internal parasites in sheep and recorded the distribution of internal parasites in other livestock. He identified seasonal activities of these pests and devised drenching formulae and techniques. He was instrumental in enabling the Department to provide farmers with an efficient advisory service on the control of external and internal parasites.

Diseases in Stock Act

The Diseases in Stock Act of 1915, the major piece of animal-health legislation in Queensland, was constantly amended in response to changes in the occurrence and treatment of animal diseases. Changes to regulations related mainly to the Stock Diseases Fund, stock assessments and the movement of stock. With the establishment of Veterinary Services Branch in 1940, the designation 'chief inspector of stock' was changed to 'director of veterinary services branch' in several pieces of legislation, including the Diseases in Stock Act.

The principal Diseases in Stock Act was drafted at a time when livestock such as pigs, poultry and bees were run only as sideline enterprises. Its basic provisions therefore related to the control of pests and diseases in extensive grazing systems and were mainly directed to control methods used outside the farm boundary, such as dipping, permits and controls on the movement of stock, and checks at slaughtering. The Act did not properly provide for pest and disease control on the farm, and the increasing specialisation of the pig, poultry and beekeeping industries meant that other measures were required. These industries required special provisions for on-farm control to quickly prevent the spread of diseases. This was especially important in areas where stock were intensively housed. Consequently, in the 1930s several Acts were passed to empower Departmental staff to enter premises and impose pest- and disease-control measures.

Pig diseases

The Department made a concerted effort in the 1930s to identify and eliminate pig diseases. Pig Branch officers, entomologists and parasitologists surveyed

Dr F. H. S. Roberts, the first veterinary entomologist in Australia, was entomologist and parasitologist in the Department from 1930 to 1947.



Dr John Legg (centre) and Ross Knott (right) conducting a tuberculosis inoculation experiment at the Animal Research Institute, Yeerongbilly, in 1939



piggeries to determine the sources of liver infection, kidney worm and the infestation of pork products by the bacon fly and weevil. Veterinarians Keith McIntosh and Arthur Clay researched pig diseases and advised on their control. They found that many occurrences of disease in piggeries could be traced to poor nutrition and unhygienic conditions.

The Pig Industry Act of 1933 gave the Department greater powers to enforce improved hygiene in piggeries and thereby control pig diseases. All piggeries were required to be registered, and the owners must hold certificates. Inspectors appointed under the Act were also inspectors under the Dairy Produce Acts, the Diseases in Stock Acts and the Slaughtering Act, and had the authority to order premises to be cleaned, diseased pigs to be isolated or removed, and pure water and wholesome food to be provided.

Poultry diseases

The Department's involvement in poultry diseases was expanded with the introduction of *The Diseases in Poultry Act of 1923*, which permitted the appointment of inspectors and other officers for disease control; every member of the police force was an *ex officio* inspector, and the Minister could appoint honorary inspectors. The Act empowered the Government to declare quarantine areas to contain outbreaks of poultry disease.

An amendment in 1937 was framed to cover the day-old-chick industry: hatcheries had to be disease-free, the seller had to specify the sex of chicks, and chick-sexers had to be licensed by the Department. A further amendment in 1940 included regulations on the sale and slaughter of poultry for human consumption and made minor changes to regulations covering the egg industry.

Diseases in bees

American foul brood disease was first recorded in Queensland in 1931 in the Pine Rivers district. Henry Hacker of the entomology section inspected 116 apiaries within 22 kilometres of the Brisbane Post Office but found no other infestation. In the same year, Roy Morwood, plant pathologist, published a detailed article in the *Queensland Agricultural Journal* to alert apiarists to the symptoms of this disease so they could act quickly to contain any outbreak.

The disease prompted the drafting of *The Apiaries Act of 1931*, which provided for the registration of beekeepers and required them to report outbreaks of disease. The Act set out the conditions for operating an apiary, empowered the Government to appoint inspectors to police its provisions, and prevented the introduction of any bees or beekeeping appliances not certified free from foul brood or Isle of Wight disease.

Conclusion

Pests and diseases continued to be problems for Queensland's animal industries in the 1920s and 1930s. The Government invoked more regulations and applied more resources to counter diseases because of their effect on livestock pro-

ductivity, and on the general health of the population. Stock diseases also lowered the market acceptance of livestock products, an important economic consideration, as Queensland was becoming a major exporter of meat. For the first time, disease legislation was aimed at specific industries, such as pigs, poultry and bees, because disease in these intensive industries could not be controlled effectively under the more general provisions of the Diseases in Stock Act. The appointment of qualified veterinary scientists to the Department was also an important step forward in the continuing battle against stock pests and diseases.

Publicity and education

In his investigation of the Department in 1922, the Public Service Commissioner recommended that a branch be formed in the Department to study marketing problems, establish an agricultural library, publish the *Queensland Agricultural Journal* and other Departmental bulletins and pamphlets, and publicise the Department's activities. Publicity Branch was formed during the 1922 reorganisation. It did not, however, undertake market studies: that was left to the director of marketing, who was appointed in 1926.

Publications

The publications section was incorporated in the new branch, with the editor, John Reid, given additional responsibility for the library and photographic section; his title was changed, to 'Editor, Queensland Agricultural Journal, and Editor, Departmental Publications'. Alexander Boyd, editor of the *Queensland Agricultural Journal (QAJ)* since its inception in 1897, had retired in May 1921 to be succeeded by John Reid. Boyd was an outstanding figure in Departmental history. In his twenty-four years as editor he had become the friend of nearly every farmer in the State, and under him the *QAJ* had attained a high standard as an official publication, considered both a credit to the Department and an asset of the State. The *QAJ*'s policy did not change under Reid; it continued to provide information to farmers and graziers on agricultural and pastoral topics. Besides containing purely advisory articles, the journal served as a medium for officers to publish information on the science, economics and practice of agriculture. Researchers were constantly adding to the store of agricultural knowledge, and the *QAJ* performed a useful service in disseminating this knowledge.

The branch stopped including information specific to the sugar industry in the *QAJ* in July 1933, when the Bureau of Sugar Experiment Stations initiated the *Cane Growers' Quarterly Bulletin*. Although this bulletin was put out by authority of the Minister for Agriculture and Stock, it was not published by Publicity Branch.

The *QAJ* continued to make a valuable contribution to the rural industries until December 1941, when Japan bombed Pearl Harbour: the climate of uncertainty this act engendered caused the suspension of publication. However, it was resumed in July 1943 to meet the need for information to help in the production of much-needed food during the war.

The Queensland Agricultural and Pastoral Handbook, a four-volume work, was published in the years 1938-41. The third volume, its two parts covering insect pests and their control, and plant diseases and their control, was the first to appear; this work updated *Pests and Diseases of Queensland Fruits and Vegetables*, compiled by Robert Veitch and John Simmonds in 1929. Other parts of the handbook were *Volume I, Farm Crops and Pastures* (1941); *Volume II, Horticulture* (1940); and *Volume IV, Sugar Cane and Its Culture* (1939). The four volumes contained all the information compiled on Queensland crop industries to that time and became standard references for advisers, farmers, agribusinessmen and students.

The *Queensland Journal of Agricultural Science (QJAS)* was started in 1943 to make Departmental scientific papers available to research and extension workers, who would relay the information to farmers. Charles Winders, who became the Department's first agrostologist in January 1937, became editor of the *QJAS* and held that position until his retirement in 1973.

News services

In 1927-28 the Department arranged to supply the Queensland Government Radio Service with radio programmes on agricultural and pastoral topics. Officers gave talks on seasonal conditions and advice on specific topics and the latest scientific developments, as well as general agricultural information.

The Department also started a news-sheet in 1936, entitled *Weekly News Bulletin: Seasonal and Other Notes for the Man on the Land*. The bulletins, compiled from contributions by the Department's technical officers, were issued to the metropolitan and provincial press.

Librarian

The Department's first librarian, appointed in October 1922, was a multilingual Frenchman, Comte Gontran Louis de Tournouer, who had migrated to Australia before World War I and joined the State Government Savings Bank. When war broke out, de Tournouer joined the Australian Imperial Force and served in the Middle East and France. Invalided back to Queensland, he rejoined the bank and then transferred to the Department of Agriculture and Stock.

De Tournouer's knowledge of European languages proved valuable as much of the scientific literature of the time was written in French or German. In 1925-26 alone, he made fifty-two translations of works and documents. His services as an interpreter were also enlisted by other government departments.

Photographic section

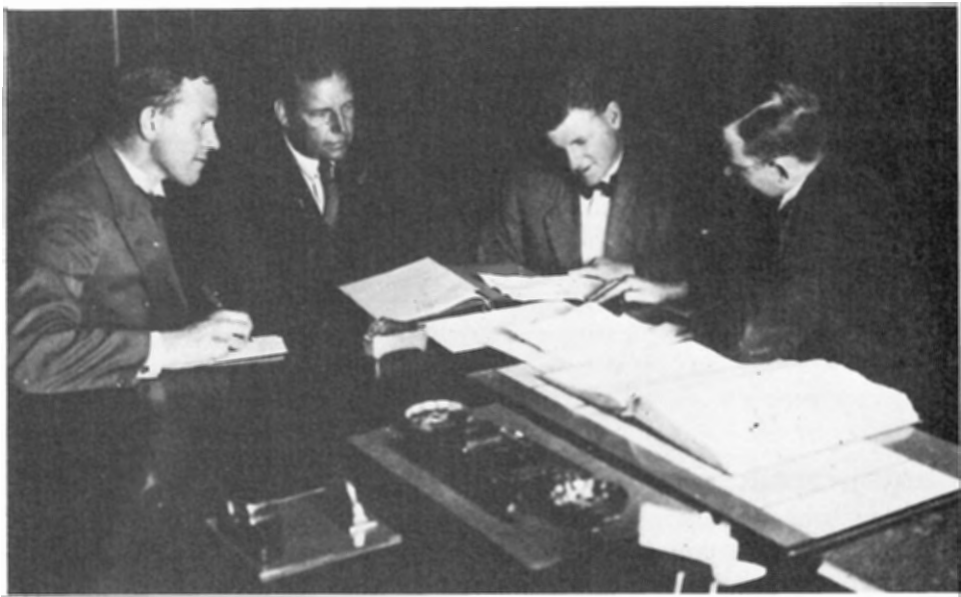
The Department's photographic section was also called on by other bodies, for example, to provide educational material for the Department of Public Instruction and display and publication material for the Queensland Government Tourist Bureau. The making of films showing the development and progress of the major primary industries was an important part of its work, and Alfred Burne was appointed cinematographer in 1923.



John Reid, editor of the Queensland Agricultural Journal and other Departmental publications from 1921



Comte Gontran Louis de Tournouer, the Department's first librarian



A meeting in 1927, held to set up regular broadcasts of rural reports compiled by Departmental officers. From left to right are Mr Sparrow (Brisbane Newspaper Co. Ltd), John Reid (Department of Agriculture and Stock), R. Wight (Market Reports Officer, 4QG) and J. Robinson (manager of 4QG, the Queensland Government Radio Service).

William Sanderson, assistant photographer since 1907, was appointed official photographer on Harry Mobsby's retirement in 1932. Five years later, Albert Salmon, a clerk in the chief clerk's office, was appointed assistant photographer. William Manley was appointed illustration assistant in 1940.

Exhibitions

Queensland's display at the British Empire Exhibition at Wembley in 1924 was mounted and supervised by Harry Mobsby. More than six and a half million people visited the Australian pavilion, where the Department of Agriculture and Stock exhibited wool and other pastoral products, cotton, sugar, cereals, grasses and edible shrubs, fresh and dried fruit and refrigerated products. The magnificent 1.5 tonne 'Pittsworth cheese' was a great drawcard. The Department also prepared a series of films on Queensland's rural industries, featuring the wool and sugar industries, mainstays of the State's economy.

Mobsby was officer in charge of the Queensland exhibit at the New Zealand and South Seas Exhibition in Dunedin in November of the following year. More than three million visitors to that exhibition saw films of Queensland's cotton and banana industries, and inspected displays of wheat and other grains, tropical agricultural products, canned fruits and meat, and cotton. Copies of the *Queensland Agricultural Journal* were distributed to visitors.

The Department sponsored a 'departmental court' at the Royal National Exhibition in Brisbane each year. Its branches prepared displays, staffed by specialist officers who could explain the material to visitors and answer questions. Departmental publications were available, either for sale or distributed free.

Departmental officers were in demand as judges at agricultural shows, especially in provincial centres, and often helped in their organisation. The Department regarded this work as an essential service to the rural community.

Education

On the recommendation of Public Service Commissioner J. D. Story, a new co-ordinating body, the Board of Agricultural Education, was set up under *The Agricultural Education Act of 1922* to coordinate all the activities of the State that had as their objective the development of agriculture and primary production generally. The board's chief concern was the scientific side of agriculture. Its seven members represented the Departments of Agriculture and Stock and Public Instruction, the University of Queensland, the Queensland Agricultural High School and College, the Committee of Direction of Fruit Marketing and several commodity boards concerned with the business side of rural enterprise. The Minister for Agriculture and Stock was chairman. The board studied investigational work in progress to determine what overlap, if any, existed, and completed a register of agricultural research and experimental and demonstration work.

Mention has already been made of the Department's assistance to the agricultural project clubs that were established in schools from the 1920s. The Department continued to provide technical support to these and other agricultural clubs after they were placed under the control of the Department of Public Instruction.

St Lucia Farm Training School

Late in 1932, during the Depression, Minister Frank Bulcock suggested training unemployed youths, especially city boys, in farm work. Representatives of government departments and members of Rotary, Legacy and the New Settlers' League formulated a scheme, and the St Lucia Farm Training School was set up on University of Queensland land at St Lucia and at Moggill. Groups of fifty boys would undergo training for six months in mixed farming, dairying and poultry and pig-raising at St Lucia, and general timber work at Moggill. A recruiting committee selected the boys, who were all aged between fifteen and twenty, in good health, and with five years of primary education. No fees were charged. Housing was provided for twenty-five students and day students were given their fares. Each trainee spent some time as a resident, and was taught to cook, to milk and to test milk and cream.

F. O. Bosworth, English master at the Queensland Agricultural High School and College, was seconded for duty as principal for the first term of the St Lucia school. J. A. (Arthur) Kerr, a stock inspector, was then placed in charge of the school, on behalf of the Department of Agriculture and Stock, which also provided officers to give lectures and demonstrations. Groups of boys were sent to the Beerburrum Tobacco Group Settlement for instruction in growing, curing and grading tobacco. Others visited the Roma Street markets, the Kingston butter factory and a local piggery.

Two boys from each group were granted scholarships to enter the Queensland Agricultural High School and College. In 1933-34, ninety-four boys were placed on farms, four were awarded scholarships to the Queensland Agricultural High School and College, and fourteen found other employment. Sixteen proved unsuited to farm work and left before completing their six months' training. By June 1937, more than three hundred trainees had been successfully placed on farms.

The introduction of a subsidy scheme for juvenile farm labour in June 1937 brought about the end of the farm training scheme. The subsidy scheme was more attractive to untrained youths and resulted in a drop in the numbers of those seeking training. In 1938, Kerr was transferred to Kingaroy as instructor in agriculture and the farm training school was closed.

Conclusion

The need for a special branch to coordinate the information and publication activities and services of the Department had been recognised by Public Service Commissioner J. D. Story in his review of the Department in 1922. The formation of the branch made the Department better able to meet the growing demand for scientific, advisory and general agricultural information generated by the State's developing rural industries, its new settlers and its expanding markets. The Department also played a large part in agricultural education and training, through the Board of Agricultural Education, agricultural project clubs and the St Lucia Farm Training School.



General view of the St Lucia Farm Training School



St Lucia Farm Training School display at the Brisbane Exhibition in 1935

Wartime agriculture

The Second World War had a great impact on Queensland's agricultural industries and on the Department's operations in the years 1939-45. The British Commonwealth was demanding manpower and food production, while Japan's entry into the war in 1941 caused an influx of a million American servicemen into Queensland, to be fed despite shortages of labour and material.

When war broke out in Europe, the Commonwealth Government took control of much of Australia's agricultural production, and Great Britain agreed to buy the exportable surplus of commodities such as wheat, wool, sugar, butter, cheese, eggs and meat. But as the war went on, and extended to the Pacific theatre, enlistments and the demands of the munitions industry caused such a shortage of farm labour that, at times, soldiers had to be released temporarily from the army to work on the land. Many of the Department's officers enlisted, and others were called to the Commonwealth service for extended periods to apply their technical expertise to the war effort. In all, about one-third of the Department's staff were involved in activities associated with the war, and heavy demands were made on those who remained.

Emergency supplies

Under wartime national security regulations, the States were given power to set up emergency-supplies schemes. The Queensland scheme was under the direction of the Minister for Agriculture and Stock, with the Departmental Advisory Committee assisting in the preparation of plans. The Department's field officers were among those appointed local supply officers. The scheme ensured that reserve supplies of essential commodities were available in all parts of the State, a measure that was especially necessary in the north because of wartime transport delays.

District war agricultural committees

In September 1942 the Australian Agricultural Council set up district war agricultural committees to oversee the production of food. Each committee was under the control of the department of agriculture in its State, with an officer of that department as chairman. Each State's department of agriculture provided a chan-

nel for communication with the Commonwealth Department of Commerce and Agriculture. In the same year, Queensland's Minister for Agriculture and Stock, Frank Bulcock, resigned to become Commonwealth Director-General of Agriculture at the request of Prime Minister John Curtin.

The Queensland body was made up of forty districts, with subcommittees to ensure assistance from marketing boards, primary producers' cooperatives and selected primary producers and businessmen. The central executive operated within the Department of Agriculture and Stock and was chaired by the Minister. It included the under-secretary and the heads of the various branches.

The purpose of the committees was to decentralise the wartime administration of agriculture and attain the production objectives fixed by the Food Production Executive of the Federal Cabinet. By the end of June 1944, more than three thousand service personnel had been released to work in the dairying, poultry, vegetable-growing and meat industries. Permanent camps for the Women's Land Army were established at Birkdale, Victoria Point, Redland Bay and Buderim to house women working on vegetable crops. Seasonal camps were organised to harvest fruit and vegetables at Stanthorpe, cotton in the Dawson and Callide Valleys, citrus at Gayndah and vegetables at Home Hill, Ayr, Gladstone, Gympie and Buderim. Prisoner-of-war control centres were also set up in a number of areas and the prisoners worked on local farms.

Agricultural production

Although the Department was short-staffed during the war, its officers were called on to help increase production. Rationing and allocation of supplies were administered by Fritz Coleman, who was in charge of the Seeds, Fertilisers, Stock Foods, Pest Destroyers and Veterinary Medicines Branch, under *The Agricultural Requirements Control and Conservation Act of 1939*. The Act set up the organisation to control the distribution of fertiliser and other agricultural requirements during the war. Machinery was released to primary producers under permit from W. H. Bechtel, an agricultural adviser who was appointed machinery control officer.

Cotton was needed during the war, not only for clothing but also for munitions and tyres. In 1939, the Cotton Marketing Board brought from the United States one of the first mechanical cotton harvesters manufactured in that country, and in the following year cotton advisers were stationed at ten districts to encourage and supervise cotton-growing.

Queensland fruit was also in demand, especially for canning and jam-making. Production was expanded and research work continued. As the United States and Australian forces stationed in Australia created a huge demand for vegetables, the Vegetable Production Committee was set up by the Commonwealth Government in 1942. Contracts were issued to farmers by the Department of Agriculture and Stock on behalf of the Commonwealth Government, and the Commonwealth appointed the Committee of Direction of Fruit Marketing (COD) as the buying authority for the fruit and vegetable requirements of the forces in Queensland and New Guinea. The Queensland Government bought agricultural machinery with American lend-lease support, and a Departmental advisory committee allocated



Lieutenant-Colonel David Atherton, an entomologist, served with a malaria-control unit in World War II. He later became director of agriculture.



Sorting requests for release of agricultural requirements during World War II. From left to right are Blair Linnett, Accounts Branch; Lucille Barber, officer in charge of enquiries and mail; Joan Clark, Accounts Branch; and Fred Easton, Records Branch. (Photo courtesy Blair Linnett)

this equipment to farmers, giving priority to vegetable growers and producers of fodder for the dairy industry.

The Department continued to foster the State's grain industries during the war. Queensland's contribution to the nation's wheat production was all the more valuable, as wheat could be grown here without the addition of superphosphate, which was scarce. Soutter's varieties made up more than half the crop, and the Department's wheat-breeding programme was continued. Seed from maize selections developed for the Atherton Tableland was moved to Biloela for safe storage because of the threat of invasion. Grain sorghum, which was replacing maize in stock feeds, was also considered important, and Gordon Miles's breeding and selection work at the Biloela Research Station was continued.

The sugar industry was particularly hard hit by manpower shortages and transport difficulties, and soldiers were released from the army to cut cane. Yet the area under sugarcane declined, and production fell because of a shortage of fertiliser. Civilian rationing of sugar was imposed in 1944. In order to increase production from the smaller area cultivated, the staff of the Bureau of Sugar Experiment Stations worked to find ways to increase yields. H. W. (Bill) Kerr and his staff gave advice on growing leguminous green manure crops to replace nitrogenous fertilisers; Norman King and Jim Buzacott experimented with green manure crops at Bundaberg and Meringa. As many canegrowers used horses to save fuel, the Department provided advice on their nutrition and care. Arthur Bell continued to supervise cane pathological work, while Mungomery and Buzacott dealt with cane pests and McDougall advised on rat control.

Wartime tobacco work was mainly concerned with varietal trials and crossbreeding to improve disease resistance. Because of the shortage of nitrogenous fertilisers, Royce Cannon investigated leguminous green manure crops that were not susceptible to nematodes to reduce the build-up of those pests on tobacco lands.

At the outbreak of war, Queensland's dairy industry was in a sound position. The United Kingdom agreed to buy all surplus butter and cheese at a satisfactory price and farmers were well recompensed. But enlistments and the transfer of manpower to better-paid munitions jobs led to reduced production, and shortages of cement, barbed wire, machinery and fertilisers further limited production. The Department's dairy officers devised labour-saving practices but the industry continued to decline. Butter was rationed to Australian civilians in June 1943, and more stringent rationing was introduced a year later. Less butter was manufactured because of transport problems, but the demand for cheese increased. Fifteen new cheese factories were established in Queensland under the Cheese Production Expansion Scheme, and thirty-five existing factories were enlarged and improved. The Department recalled Robert Snell from retirement and appointed him acting instructor in cheese-making in 1942.

Beef cattle numbers in Queensland remained at the pre-war level of about six million head throughout the war. The State's processors supplied chilled, frozen and canned meat to the United Kingdom, the armed forces and the civilian population. But rationing of meat was introduced in January 1944 for civilians and, because of drought, further rationing was imposed in May 1945.

Britain bought the whole of Queensland's exportable surplus of eggs during the war. In 1941-42, veterinary officer Les Newton and poultry expert Percy Rumball produced a series of articles on poultry farming in an attempt to increase production.

The United Kingdom also took the whole of the Australian wool clip for the duration of the war and for one year after. Sheep and wool instructor James Carew promoted the fat-lamb industry to increase meat supplies. Pest- and disease-control measures were maintained because of their effects on productivity, and in 1941-42 refresher schools on sheep parasites were conducted for Departmental officers at the McMaster Field Station near Sydney. Two schools were conducted subsequently in Queensland at the Yeerongpilly Animal Health Station under the direction of Frederick Roberts, and schools on blowfly control were also held in New South Wales.

The war caused a break in the supply of many imported products, particularly those from wet tropical areas, and the Bureau of Tropical Agriculture at South Johnstone played an important part in the search for substitutes. It worked on the production of insecticides and fibres, and, in conjunction with CSIR, the Department investigated the production of ipecacuanha and strychnine, and quinine for malaria prevention.

Madagascar rubber vine, considered a possible source of much-needed rubber, was studied in the Charters Towers-Ravenswood-Georgetown area, and a small area at the Yeerongpilly Animal Health Station was set aside for a study of promising rubber-bearing plants (including guayule) in south-east Queensland. The native rainforest plant *duboisia* was cultivated in the Woombye area to produce the heart and sea-sickness drugs hyoscyne and hyocyamine, and other drug plants were tested by the Department.

The Bureau of Investigation of Land and Water Resources, administered by the Lands Department, was established in 1943 to investigate the State's land and water resources. Arthur Bell represented the Department of Agriculture and Stock on the bureau and later became its chairman. As irrigation had proved valuable in the early years of the war, the Queensland Government considered it necessary to set up an irrigation research station. The facility established by the bureau in 1946 became, three years later, the Department's Gatton Research Station; it is still in operation.

Conclusion

The Department played a large part in the war effort during the Second World War, when increased production of food and fibre was critical to the success of the Allied forces in Europe and in the Pacific. The Pacific War, in particular, placed Queensland in the front line, with a consequent need to service the fighting forces with locally produced food. The Department had both the skilled officers and the network of country-based staff to enable the State to provide supplies despite shortages of manpower, fertiliser, fuel, machinery and transport, while dealing with the ever-present climatic, pest, disease and weed problems.

PART 3

DEVELOPMENT

Once its foreshadowed reorganisation had been carried out in 1945, the Department was in a position to expand its facilities and services to guide the State's agricultural development and increase the productivity of its rural industries. The general emphasis in Queensland agriculture after World War II was on reconstruction, development and increased production. Public and private investment in rural industry were matched by government investment in services to agriculture.

However, the expansion and intensification of agriculture were not without problems. Soil erosion, poor-quality irrigation water, and increases in weed, pest and disease problems increased the Department's work. It appointed specialists and set up laboratories in country areas to address these problems, laying the foundations for the tremendous expansion that was to come.

Administration

During World War II, one-third of the Department's officers served with the armed forces or on assignments related to the war effort. This disruption brought administrative changes to a virtual standstill, and when the war ended the immediate need was to implement the reorganisation that had been started in 1937 but postponed. The reorganisation was finally carried out in June 1945, and then began the slow process of reappointing qualified staff and providing research facilities and equipment for them to rebuild and advance the State's rural industries. Three ministers implemented government policy through the Department of Agriculture and Stock in the closing years of World War II and during the period of recovery and reconstruction that followed.

T. L. Williams

Thomas Lewis Williams was born at Ipswich in 1886, the son of a coalminer. He joined the Department of Public Instruction and became a headmaster, then later worked on the staff of newspapers in Ipswich and Brisbane and was active in numerous community organisations. Williams was Member of the Legislative Assembly (MLA) for Port Curtis from 1932 and was appointed Minister for Agriculture and Stock in December 1942, when Bulcock resigned to become Commonwealth Director-General of Agriculture. Williams held the portfolio until March 1946, when he became Minister for Public Instruction. During his ministry the Department played a vital role in the wartime production of food and fibre and underwent a major restructuring that laid the foundations for the organisation as it exists today.

H. H. Collins

Harold Henry Collins was born in 1887 in Victoria. The son of a farmer, he was educated at King's College, Melbourne. After moving to Queensland in 1909, he spent some years as a shearer and sheep station manager before settling on a farm on the Atherton Tableland. In 1935 Collins entered Parliament as the Member for Cook, and became MLA for Tablelands in 1950. He held the Agriculture and Stock portfolio from March 1946 to August 1957, the longest term of any minister in the Department's history.



Top left:
T. L. Williams, Minister for Agriculture and Stock,
1942-46

Top right:
H. H. Collins, Minister for Agriculture and Stock,
1946-57



O. O. Madsen, Minister for Agriculture and Stock,
1957-63

Collins organised the reconstruction of agriculture throughout the State. Many of the Department's basic activities had been suspended during the war, but the return to peace allowed the allocation of resources to the continued development of the State. A major achievement of the Collins administration was the re-establishment of the network of research stations that had been allowed to decline through the Depression and World War II.

O. O. Madsen

Otto Ottosen Madsen was born of Danish parents at Warwick in 1904. Educated at Warwick, he took up coalmining and then dairy farming in the district, and was active in several farmer organisations. Madsen became MLA for Warwick in 1947; after the defeat of the Labor Government in 1957 he became the first Country Party Minister for Agriculture and Stock. In 1960 he was also made responsible for the Public Lands and Irrigation portfolio, but resigned his commission in 1963 because of ill-health.

A feature of Madsen's ministry was a building and land-acquisition programme, with several new scientific laboratories built and land acquired for two major laboratory complexes in Brisbane, at Wacol and Indooroopilly. The Otto Madsen Dairy Research Laboratory, built at Hamilton in 1963, was named in his honour.

Under-secretaries

Three under-secretaries headed the Department in the postwar years, when the most significant administrative development, apart from reorganisation, was the appointment of highly qualified scientist-administrators as under-secretaries.

R. P. M. Short

Richard Patrick Montfort Short was the last under-secretary to be drawn from the Department's clerical ranks. He joined the Department as a junior in the stock branch in 1898, later becoming senior clerk of the branch and registrar of brands. Short was appointed the Department's senior clerk in 1925, chief clerk in 1933, and under-secretary on Arthur Graham's death in 1938. He retired in 1947.

A. F. Bell

Arthur Frank Bell was the first qualified scientist to hold the position of under-secretary. He joined the Department in 1916 as an assistant in the Agricultural Chemistry Laboratory, and completed a science degree at the University of Queensland in 1923. Awarded a sugar research travelling scholarship, Bell completed a Master of Science degree at the University of California, then gained the Diploma of the Imperial College at London University. On his return to Australia, he was appointed pathologist in the Bureau of Sugar Experiment Stations, to become acting director in 1943 and director two years later.

In 1944 Bell was appointed deputy chairman of the Bureau of Investigation of Land and Water Resources. In the same year he and John Irwin, of the Public Service Commissioner's Office, were asked to review the structure of the Depart-

ment. In the ensuing reorganisation, Bell was appointed assistant under-secretary (technical) in the Department, while still director of the Bureau of Sugar Experiment Stations. When he was appointed under-secretary in 1947 he gave up his directorship of the Bureau.

Bell received the Medal of the Australian Institute of Agricultural Science for 1954, the first Queenslander so honoured; two years later he was awarded the Farrer Memorial Medal at the annual congress of the Agriculture Bureau of New South Wales. He died in his office from a heart attack in 1958. Bell's service to Queensland agriculture is commemorated by the Queensland branch of the Australian Institute of Agricultural Science through the A. F. Bell Memorial Medal, awarded annually for the best research project submitted by a final-year student in the Faculty of Agricultural Science at the University of Queensland.

W. A. T. Summerville

Dr William Alan Thompson Summerville succeeded Bell as under-secretary, a designation changed in 1959 to 'director-general and under-secretary'. He had joined the Department in 1922 as learner in entomology and advanced through the positions of entomologist, senior plant physiologist, director of horticulture, director of the division of plant industry and assistant under-secretary (technical).

Through part-time study, Summerville gained a science degree from the University of Queensland. His early work on scale insect pests of citrus, published in the *Queensland Agricultural Journal* in 1944, is still a standard reference. In that year, the University of Queensland conferred on him its highest degree, that of Doctor of Science, for his research on the physiology of the banana plant.

Summerville was a member of the Bureau of Investigation of Land and Water Resources and of the Senate of the University of Queensland. He sat on many boards and committees concerned with furthering agricultural development and was president of the Australian Institute of Agricultural Science in 1957. In 1963 he was awarded an honorary doctorate of laws by the University of Queensland.

Summerville left the Department in 1964 to take up the position of agent-general for Queensland in London, and was knighted during his six-year term. He died in Brisbane in 1980, aged 76 years.

Reorganisation

The need for a reorganisation of the Department had become apparent in the mid 1930s. By then, initial assessment of land capability had been completed, trial and practice had identified many crops climatically and economically suited to Queensland, and many problems of the livestock industries had been addressed. However, new projects now demanded attention: animal nutrition, fertiliser usage, soil conservation, market intelligence, plant breeding and crop and animal protection needed properly designed, in-depth experimentation by full-time scientific and technical staff.

In 1937 Professor E. J. Goddard had proposed a reorganisation of the Department, after being invited by Minister Bulcock to review its research organisation, but only the division of plant industry (research) was created before World War

II broke out. The question was taken up again by Minister Williams and in 1944 Irwin and Bell drew up their plan, which differed from Goddard's in that it placed more emphasis on industries than on Departmental functions. Goddard had not suggested that dairying be a separate division, and had recommended a division of agricultural education and extension, while Irwin and Bell proposed five divisions, namely, administration, plant industry, animal industry, dairying and marketing.

The division of administration was led by the under-secretary, Richard Short, supported by assistant under-secretaries Arthur Bell (technical) and M. L. (Lorne) Cameron (administration), and a special administration officer, Harry Barnes. The division took in the publicity branch, under John Reid, and personnel, records and accounts sections, under the accountant, William Gettons.

The division of plant industry took in the agriculture, horticulture and science branches, the Bureau of Sugar Experiment Stations, the agricultural chemical laboratory branch and an experiment stations section. Robert Veitch, who had been director of the division of plant industry (research) since 1937, was appointed director.

The division of animal industry combined the sections that had worked on animal health, stock breeding and management, and livestock production. Dr John Legg was appointed acting director of the division. The division of dairying, under the directorship of Brooke Rice, was formed out of the former dairy branch. The dairy research branch was created as the investigational arm of the division and was headed by Oliver Kent.

The division of marketing, comprising the marketing and standards branches, was placed under the directorship of Harry Hunter, director of the former branch since 1939. Fritz Coleman remained the Department's standards officer.

Staffing and accommodation

The Department's staff more than doubled in the period 1945-63, despite the loss of about forty members of the Bureau of Sugar Experiment Stations (BSES) who, in 1951, ceased to be employed under the Public Service Act. Such rapid expansion meant office accommodation was a constant problem. The BSES moved to Gregory Terrace in 1958, leaving more space at the head office building in William Street, but this was soon filled. The shortage of both office and housing accommodation in new country centres serviced by the Department in the post-war years also created problems until the late 1950s, when the Works Department began a building programme to provide government rental housing in country towns.

Another problem in the postwar period was the difficulty of attracting and keeping experienced scientific and technical staff. In his annual report for 1950-51, Bell blamed staff difficulties on 'reduced outturn by Universities, and low rates of recruitment, during the depression and War' and added: 'acute competition for experienced trained technologists has reacted strongly against any organisations which have not maintained competitive salary rates.' In 1962-63 the problem was still acute. In that year, 148 officers were appointed to perma-



*A. F. Bell, Under-Secretary, Department of
Agriculture and Stock, 1947-58*



*Dr W. A. T. Summerville, Director-General
and Under-Secretary, Department of Agriculture
and Stock, 1958-64*



*Until 1960 the Animal Research Institute at Yeerongpilly was the Department's only major laboratory complex,
apart from its headquarters at William Street.*

ment scientific and technical positions, but fifty-two experienced officers were lost. However, the state public service university scholarship scheme introduced in the 1950s was starting to produce results. Under that scheme, scholarships were awarded to students who were then bonded to work for the Queensland Government on graduation.

Conclusion

The period 1945–63 was one of significant administrative change for the Department. The divisional structure recommended by Goddard in 1937 was implemented in 1945 by the Irwin-Bell reorganisation, which rationalised the multitude of unconnected branches and sections that had existed before the war and made the Department better able to expand its scientific work. The period was also one of significant growth, when, despite staffing difficulties, numbers rose almost threefold. Such growth reflected the general expansion of the State's rural industries, the re-establishment of the network of research stations, and the added responsibilities of new legislation.

Resource development and conservation

The end of World War II gave rise to an era of optimism, characterised in the rural sector by agricultural development and expansion. Memories of wartime food shortages, added to the continuing postwar shortages in Europe and Britain, brought a greater appreciation of the importance of food production, which was supported by an unprecedented level of public and private investment.

Northern development

Immediately after the war, when memories of the danger of a Japanese invasion were still fresh, interest in northern development was high; the theory was that a large population in the north would deter potential invaders. Many inquiries and conferences were held on northern development, many plans were made and many schemes suggested. But although there was an expansion in sugarcane growing on the wet tropical coast, grazing, tobacco production under irrigation at Mareeba and dairying and cash crops on the Atherton Tableland, no economically sound new rural industry emerged.

Before the war the Department had established a number of research facilities in north Queensland to gauge the region's potential for closer settlement, to service new developments and to improve the productivity of established industries. Those still operational during the war were the long-established sugar experiment stations at Gordonvale and Mackay, the Bureau of Tropical Agriculture at South Johnstone and the Oonoonba Animal Health Station at Townsville. Kamerunga State Nursery, which had lain in virtual disuse since 1916, was used as an army staging camp, and Kairi State Farm, near Atherton, disused since 1932, was used by the army for vegetable production.

In the decade after the war the Department expanded its northern network, one of its earliest moves being the reopening in 1946 of Kairi State Farm as a regional experiment station. Another regional experiment station was opened at Ayr two years later, and a farm was established in 1949 at Wrotham Park, a cattle property at the base of Cape York Peninsula, to assess the feasibility of supplementary crops for feeding beef cattle. This farm operated until 1954.

Other research facilities set up in north Queensland in the immediate postwar period included a tobacco experiment farm at Mareeba, with substations on the

Herbert and Burdekin Rivers, a sugar experiment station at Ayr, and two cane-breeding substations at Babinda and Mackay. A horticultural substation was re-established at Kamerunga in 1946 and a pasture substation set up at Utchee Creek in the following year served as an adjunct to the Bureau of Tropical Agriculture at South Johnstone. The Toorak Sheep Field Station near Julia Creek was acquired in 1951, and a year later an experiment station was established at Millaroo in the Burdekin Valley. In 1954-55 the Department set up regional laboratories for soil survey at Ayr and Atherton, plant pathology laboratories at Ayr and South Johnstone and an entomology laboratory at South Johnstone.

Irrigation development

Research work during the war had shown that irrigation could increase production, and studies were made to assess the irrigation potential of Queensland's cropping lands and to identify areas suitable for irrigation development. The Bureau of Investigation of Land and Water Resources was constituted in 1944 under *The Land and Water Resources Development Act of 1943*, which was administered by the Department of Public Lands, to classify lands and to record physical land and water developments in each district. The Bureau's first chairman was Sir John Kemp, Co-ordinator-General of Public Works and Main Roads Commissioner. His deputy was Arthur Bell, of the Department of Agriculture and Stock.

All public service departments were instructed to cooperate with the Bureau, which had three field officers: pastoral research officer J. F. (Jack) Kennedy, agricultural resources officer Percy Skerman and soil conservation officer A. F. (Frank) Skinner. Skinner had been in the agriculture branch and later rejoined the Department. Skerman later joined the staff of the University of Queensland. (He is the senior author of this book.) These officers carried out wide-ranging soil and vegetation surveys, while the irrigation commissioner handled investigations into proposed water resource developments. The Department of Agriculture and Stock was involved in the Bureau's investigations through the agricultural chemist, who analysed soil samples collected by the field officers, and the government botanist, who confirmed plant identification.

The Bureau set up the Gatton Irrigation Station in 1946 under irrigationist Alfred Nagle, seconded from the Department of Agriculture and Stock. Control of this station later passed to the Department; as the Gatton Research Station, it is used today for research on irrigated crops. A substation set up by the Bureau at Theodore was transferred to the Department soon after.

Proposals for an irrigation scheme fed by a large dam on the Burdekin River had long been debated. In response to the revived interest in northern development and irrigation in the postwar years, the State Government passed *The Burdekin River Development Act of 1949*, which established the Burdekin River Authority. Although the proposed scheme did not go ahead, the Department's officers were closely involved with subsequent agricultural developments in the Burdekin Valley. In 1952 the Department established a research station at Millaroo, in conjunction with the Authority, to service a soldier-settlement scheme based on irrigated tobacco near Clare. A year later, the Gorge Weir was built on the Burdekin.

An era of large irrigation schemes then followed, starting with Tinaroo Dam, which was built in 1957 to service the Mareeba and Dimbulah tobacco-growing lands. In the next twenty-five years, fifteen dams and six large weirs and barrages were built to irrigate coastal and subcoastal lands extending to the Queensland-New South Wales border. Although the Irrigation and Water Supply Commission was responsible for these water storages, the Department advised on land use, irrigation practices and crop production, and still provides a research and advisory service to irrigators.

The Peak Downs Scheme

An important land-development and food-production scheme initiated in the late 1940s was the Peak Downs Scheme, a venture undertaken by the Queensland-British Food Corporation in the central highlands district of Queensland. The corporation was set up under *The Queensland-British Food Production Act of 1948*, which was administered by the Premier's Department, and empowered to acquire property, to produce and process food, and to market that food to the United Kingdom.

Percy Skerman was seconded from the Bureau of Investigation to select and map the arable land, and large areas of open downs between Springsure and Clermont were planted to grain sorghum in 1948-49. Skerman established that planting rates were important as seed germination was a major problem, and initiated a research programme before being recalled to the Bureau. In 1950, supported by Skerman, Jock Hart applied for the position of district agriculturist, a position the Department had established at Springsure, to continue the research and to take charge of the corporation's southern properties. Hart obtained good results by careful husbandry to conserve moisture, timing of seeding, rolling to help germination, and controlling weeds. His work, coupled with methods earlier adopted by experienced farmers from the Darling Downs, laid the foundations for the later expansion of grain-growing in the area.

However, it became obvious in the early 1950s that the venture had failed. There were several reasons for its failure: climatic problems included unexpected early frosts, flooded ground, heatwaves and droughts; little was known about cropping in the area; and the remoteness and size of the operation led to machinery and labour problems. The only successful aspect was the fattening of cattle on failed crops and stubble. The corporation was wound up and its assets were disposed of, its land and machinery being acquired by private landholders. The under-secretary, Bell, was a member of the committee of inquiry that examined the reasons for the corporation's failure and submitted a report to the Queensland and British Governments.

Land settlement

The Royal Commission on Pastoral Land Settlement, set up by the Queensland Government, conducted hearings in 1950 and 1951. The Commission, of which Bell was a member, looked at land policy, production, development and other aspects of the pastoral industry. Departmental officers prepared submissions re-

commending the planting of improved pastures and the use of better cattle, with supplementary feeding and controlled breeding to improve productivity. Their recommendations provided the blueprints for future Departmental research and extension for the pastoral industries.

The Royal Commission on Progressive Land Settlement was appointed by Premier Nicklin in 1958. The Commissioner (W. L. Payne) asked Skerman, by then Senior Lecturer in Agriculture at the University of Queensland, to prepare a paper on the brigalow country. Skerman's paper, entitled 'The Brigalow Country as an Asset to the State', appeared as an appendix to the Commission's report, which was published in 1959. On the basis of Skerman's contribution and other findings, Payne recommended that Queensland seek Commonwealth assistance to develop the State's remaining brigalow lands.

After the Bureau of Agricultural Economics had investigated the proposed scheme, the Commonwealth agreed to assist and, under an agreement signed in 1962, provided funds for the development of specific areas in which tracts of brigalow scrub were held under pastoral lease. Some 4.5 million hectares were subsequently developed in the Fitzroy Basin (Brigalow) Land Development Scheme. The Queensland Government administered the scheme through the Land Administration Commission. Technical advice came from the Department of Agriculture and Stock, whose development planning branch was established in 1962 to service the scheme. Its officers classified land for property planning, while officers of the agriculture and cattle husbandry branches advised new settlers on crops, pastures and beef cattle husbandry.

Soil conservation

By the mid 1930s it was clear that existing land-use practices were leading to a massive soil-erosion problem in Queensland, and Frank Skinner, an adviser in agriculture branch, established the State's first contour banks at Toowoomba. Other officers of the branch then set up soil-conservation experiments on the Darling Downs and in the Kingaroy district, but these experiments were discontinued during the war, when all work was directed towards the production of food and fibre.

The Department was represented on the Commonwealth Standing Committee on Soil Conservation, which was set up in 1945. In the following year Skinner moved to the Bureau of Investigation of Soil and Water Resources as its soil conservation officer, but was made available to the Department. He was assigned to survey the eastern Darling Downs and, with the help of Departmental officers, to select sites for soil-conservation demonstration areas.

The first step towards establishing a soil-conservation service in Queensland was the appointment in 1947 of Jasper Ladewig as acting soil conservationist and the establishment within the agriculture branch of a soil-conservation group. Ladewig, earlier an officer of the Queensland Department of Agriculture and Stock, was recruited from the Soil Conservation Service of New South Wales. He set up farm-based demonstration projects with the threefold objective of training staff, demonstrating the soundness of recommendations and obtaining additional



Dick Tallam, of the soil conservation branch, Toowoomba, drawing farm plans



Frank Skinner, of the soil conservation branch, Toowoomba, explaining the use of a theodolite to farmers at a soil conservation field day in 1962

information from research trials. Field officers were based on the Darling Downs and at Kingaroy and Atherton. The group's status was elevated with the appointment of William Cartmill as chief soil conservationist in 1951. Ladewig became chief soil conservationist five years later, when Cartmill became director of regional experiment stations.

The Soil Conservation Act of 1951 set up the Advisory and Co-ordinating Committee on Soil Conservation. The Department's duties, as set out in the Act, were to ascertain the nature and extent of soil erosion throughout Queensland; to carry out experiments and establish demonstration areas; to publish information on soil conservation; and to instruct and assist landholders in all matters relating to erosion. The regional experiment stations set up after the war contributed greatly to this work: conservation research programmes were conducted at the Kairi and Hermitage Regional Experiment Stations and at the Maroochy Horticultural Research Station.

The Department provided free plans for conservation works and advisers marked out sites for contour banks, waterways and other conservation structures; many farmers also adopted the Department's recommendation to introduce a pasture phase into their cropping programmes. Departmental officers discouraged the practice of burning crop residues, promoting stubble mulching and cover cropping instead, and undertook trials to find pasture species suitable for stabilising waterways. In consultation with local authorities and farmers, they developed a system of group planning to deal with larger areas, particularly on the Darling Downs, where three voluntary groups were formed in 1957-58. Research work included infiltration studies in the black earths of the Darling Downs, and investigations of the value of spraying waterways with asphalt emulsion to hasten the establishment of grass.

Conclusion

The postwar period was one of unprecedented development in Queensland's cropping industries. Increased investment in machinery and expansion in irrigation and land clearing brought greater demands for advisory services, and publicly funded schemes undertaken by the Queensland and Commonwealth Governments accelerated the State's agricultural development, also adding to demands for technical expertise. At the same time, the huge expansion in cropping extended the area vulnerable to soil erosion, a problem worsened by the extremely wet years of the 1950s, so that significant resources had to be directed to soil-conservation work. Such rapid development required an equally rapid growth in the Department's staff numbers to meet the demands of farmers in the new cropping districts.

Research stations and laboratories

At the end of World War II the Department operated only seven research stations: sugar research stations at Mackay, Bundaberg and Meringa; animal health stations at Yeerongpilly, in Brisbane, and Oonoonba, in Townsville; the Bureau of Tropical Agriculture at South Johnstone; and the Callide Cotton Research Station at Biloela. No new facilities had been built since 1924, when Biloela was established, and all of the State farms and many experiment stations had been closed.

Administration

In the 1945 Irwin-Bell reorganisation the Department's crop experiment stations were grouped in a section within the division of plant industry, under the former director of cotton culture, Walton Wells. The section was raised to branch status in 1947, and Wells became the first director of regional experiment stations, followed ten years later by William Cartmill.

Increasing work in animal husbandry and dairying led to the formation in 1961 of the Research Stations Board to administer the stations. Its members were the deputy director-general (chairman), and the directors of the divisions of animal industry, plant industry and dairying. The regional experiment stations branch was disbanded and a research stations section was set up, under senior agronomist Gordon Allen. At this stage only the six regional research stations (Ayr, Biloela, Gatton, Hermitage, Kairi and Millaroo) were administered by the section; other research establishments and laboratories were administered by the relevant branches.

Regional experiment stations

After World War II, the Department established a network of experiment stations to service Queensland's main agricultural regions. Kairi State Farm, near Atherton, was reopened in 1946 after several years of army occupation; Hermitage State Farm, near Warwick, was reoccupied and converted into a regional research station; and the Callide Cotton Experiment Station at Biloela was upgraded for research on a range of regional crop and livestock problems.

A new regional experiment station was established at Ayr, on a site developed by the Commonwealth Department of Commerce and Agriculture to grow fresh

vegetables for the armed services during the war. The Department took over the property in 1948, dividing the station into two areas, one for general agricultural investigations and the other for irrigated pastures to finish beef cattle. Another area was leased for studies on horticultural crops.

Millaroo, which had been established in 1952 to service the Burdekin Valley irrigated tobacco settlement, was brought into the network in 1956. Gatton Irrigation Research Station was acquired from the Bureau of Investigation of Land and Water Resources the following year and became the regional experiment station for the Lockyer Valley. The basic network of regional experiment stations was now in place, but it was also necessary to establish special-purpose research facilities to cater for particular industries or to address specific problems.

Horticultural research

New facilities were set up for research into fruit and vegetables. The Maroochy Horticultural Research Station was established at Nambour in 1945 for work on plantation crops, especially pineapples and bananas. An office-laboratory and glasshouse for pineapple research were built there in 1961-62.

Research on vegetable crops was assigned to the Redlands Horticultural Research Station, set up in 1947 at Ormiston on red soils typical of the Redland Bay district. Ten years later the Committee of Direction of Fruit Marketing financed the construction of a glasshouse at Redlands for work on plant-improvement projects.

The old Kamerunga State Nursery (Cairns) was reopened as a horticultural sub-station in 1946 and an additional area was acquired from the lessees. In 1954 a manager (Frank Butcher) was appointed and Kamerunga Experiment Station resumed its work on tropical horticultural crops.

The CSIRO field station at Applethorpe was transferred to the Department in 1962-63. As the Granite Belt Horticultural Research Station, it was used to integrate research programmes formerly carried out by State and Commonwealth bodies and to liaise more closely with the horticultural industries in the district.

The food preservation laboratory, which had been established in 1956-57 to study the preservation, storage and transport of fruit and vegetables, was upgraded, with a new facility built at Hamilton in 1960. It formed the new food preservation research branch.

Field-crop research

Most field-crop research was done at the regional experiment stations, but the growth of particular industries and developments in certain areas required the establishment of specialised stations and laboratories. In 1949 an exploratory farm was established on a leased area at Wrotham Park Station, north-west of Mareeba, to determine the feasibility of growing summer fodder and grain crops for supplementary livestock feeding. But the area chosen had good clay soils not found elsewhere on Cape York Peninsula, so the results of the study could not be extrapolated for more widespread northern development. The farm closed in 1954.

Experiment stations and laboratories were set up to service the expanding tobacco industry. An experiment farm was established at Mareeba in 1948-49, with substations at Clare in the Burdekin Valley and at Abergowrie College near Ingham. Four years later, work on the Mareeba farm was transferred to the tobacco experiment station at Parada, near Dimbulah. The Inglewood Tobacco Field Station was established in the same year to service tobacco settlements along Macintyre Brook and the Dumaresq River. In 1957 a tobacco research laboratory, operated by the agricultural chemical laboratory branch, was opened at Northgate, the Brisbane suburb in which the tobacco selling floors are located. Chemists at Northgate studied the chemical composition of leaf from the Department's field trials as well as analysing water, soil and leaf samples for growers, and laboratories were added to the tobacco research stations at Parada and Inglewood in the early 1960s.

Walkamin Experiment Station was established in 1961 in the Mareeba-Dimbulah Irrigation Area to investigate the irrigation of soil types considered unsuitable for tobacco production. In the following year, the Wheat Research Institute was opened in Toowoomba. Controlled by the Queensland Wheat Industry Research Committee and financed by a wheat research levy and a government loan, the Institute was administered by the Department's agriculture branch.

Pasture research

In 1953 the Australian Meat Board acquired two cattle properties for research. 'Brian Pastures', near Gayndah, was used for pasture work — species evaluation, grazing trials and related projects — and was staffed by the Department, with agrostologist Tom Graham its first manager. Within two years 'Brian Pastures' Pasture Research Station had been developed for research work under the guidance of a technical committee. The other property, Belmont Research Station, near Rockhampton, was developed and staffed by CSIRO for breed and genetic studies.

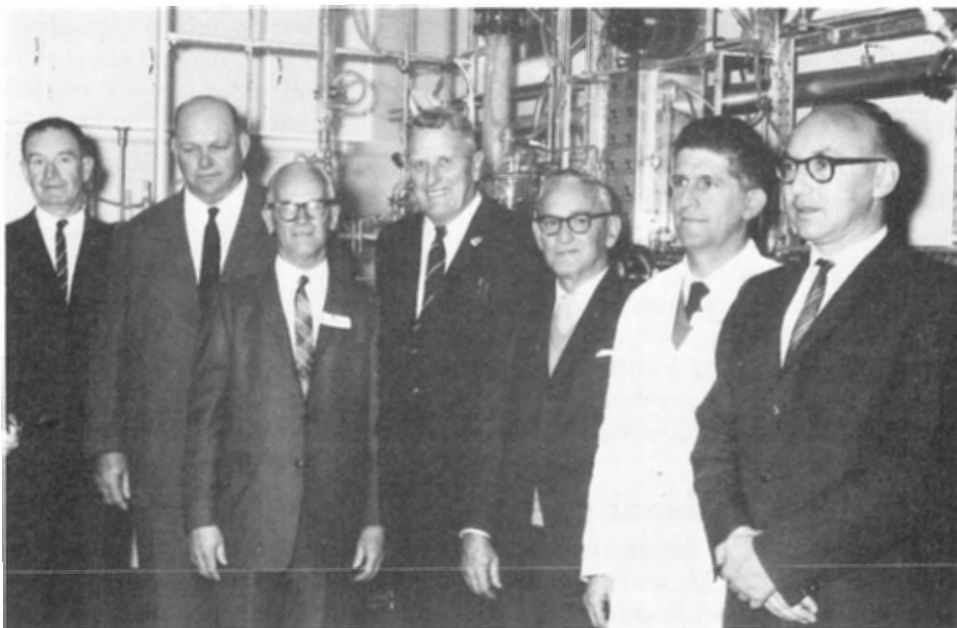
The development of wallum land also occupied the Department's attention. The wallum country is a large tract of infertile land stretching from south of Brisbane to north of Maryborough that is well-watered and well-served by transport and other facilities. It was considered suitable for development for cattle fattening provided soil infertility problems could be overcome, and the Department established a research station at Coolool to concentrate on improved pastures.

In July 1957 the Department acquired the Bureau of Investigation's irrigation demonstration farm at Theodore. Renamed the Theodore Research Station, it was operated by technical staff from Biloela, who worked mainly on irrigated pastures and cotton. Pasture studies were also undertaken on the regional experiment stations.

In the late 1950s the Bureau of Tropical Agriculture was disbanded and its research facility at South Johnstone was renamed the South Johnstone Research Station. The station undertook studies in improved pastures for cattle fattening in the wet tropics and studies in tropical crops other than sugarcane. A substation



A tobacco research trial at Inglewood Tobacco Experiment Station in the late 1950s



At the opening of the Food Preservation Research Laboratory, Hamilton, in 1961. From left to right are Bill Webster, assistant under-secretary (technical); O. O. Madsen, Minister for Agriculture and Stock; Dr S. A. Trout, director of the laboratory; G. F. R. Nicklin, Premier of Queensland; Dr W. A. T. Summerville, Director-General; Roly Leverington, food technologist; and William Knox, MLA for Nundab (the laboratory was in his electorate). The group is standing in front of an ester recovery unit, designed by Roly Leverington to produce fruit-juice concentrate.

established at Utchee Creek in 1947 was used to study tropical pasture utilisation under continuous grazing conditions.

Livestock research

Toorak Sheep Field Station was established in the Julia Creek district in 1950-51, with financial assistance from the Commonwealth Wool Fund. Under Dr George Moule, sheep and wool branch director, its first projects were studies of the problems of seasonal infertility in rams and neo-natal deaths of lambs in the sheep-grazing areas of north-western Queensland. In the same year, the Wool Biology Laboratory was established at the Department's William Street complex to provide accurate measurement of wool samples and of clean yields from greasy wool. Graziers could have wool tested there to assess their husbandry methods as well as their breeding and selection strategies. The Toorak Field Station Technical Committee, comprising representatives of the United Graziers' Association and of the Department, held its first meeting at the station in June 1961.

In 1952 much of the land occupied by the Yeerongpilly Animal Health Station was resumed for a power station and the Rocklea Research Farm was set up nearby for animal-husbandry research. In 1957-58 a pig-progeny testing station and a poultry-research unit were established on the farm.

Swan's Lagoon Cattle Field Station, on eighty square kilometres of open forest country in the Burdekin River Basin, was acquired in 1959. The Australian Cattle and Beef Research Fund supplied funds to develop the station, and local graziers gave advice on layout and equipment. It was stocked with Shorthorn heifers and bulls from northern properties to establish a foundation herd for research on the reproductive behaviour and performance of beef cattle under tropical conditions.

Dairy research

The Department had built a butter-testing laboratory at the Hamilton Cold Stores in 1938-39 as part of the Butter Improvement Service. When the Queensland Butter Board built new processing facilities at Hamilton in 1955, it allocated space for the Department to set up a butter-testing laboratory. In the same decade, the Department set up and staffed small dairy laboratories at the Malanda and Murgon cooperative dairy companies, while the dairy laboratories established in William Street and at Toowoomba in the mid 1930s also continued to operate.

Plant science laboratories

Regional agricultural chemistry laboratories for soil surveys were set up at Ayr and Atherton in 1955, and plant pathology laboratories were established at Nambour, Stanthorpe, Rockhampton, Ayr and South Johnstone. Most of these laboratories were small, staffed by one officer working in a single room. A new agricultural chemistry laboratory was established at Mareeba in 1962 to analyse soil and plant samples from pastures and other crops that had previously had to be sent to Brisbane for processing.

In 1962 the Department acquired land at Indooroopilly, in Brisbane, and began

to develop a plant-industry research complex to relieve the pressure on the William Street building. Entomology buildings and an agricultural seed store were built that year, a virology glasshouse laboratory followed in the next, and then a plant quarantine house, financed jointly by the State and Commonwealth Governments. Other facilities were added over the ensuing years.

Conclusion

The period 1945-63 was characterised by a tremendous expansion in the Department's research facilities, reflecting both the increasing application of science to industry problems and the demands for guidance of agricultural developments, particularly those involving irrigation. It is significant that the only stations closed were those operating on land that had been leased for short periods. Thus, by the end of 1963, even though the four sugar research stations had been transferred with the Bureau of Sugar Experiment Stations in 1951, the Department operated sixteen research stations, as well as five large laboratories, three laboratory and research complexes, and numerous regional laboratories.

Field crops and pastures

Queensland's cropping industries expanded after the war, with the total area under crops doubling between 1945 and 1963, largely owing to increased grain growing, particularly in the western Darling Downs, Maranoa, Dawson-Callide and central highlands districts. The area sown to introduced pastures also doubled. In the postwar period, research and extension services in the field crops — except for sugar, after 1951 — and pastures were the responsibility of the agriculture branch, part of the division of plant industry.

Administration

The 1945 restructuring of the Department left Robert Veitch as director of an enlarged plant industry division, formerly the division of plant industry (research). Because the Irwin-Bell reorganisation had not followed Goddard's recommendation for a separate extension and education division, advisory staff had remained in the various industry divisions. In 1947 Veitch was appointed assistant under-secretary (technical), and Dr W. A. T. (Alan) Summerville became director of the division. When Veitch retired in 1956, Summerville succeeded him and Walton Wells took over the directorship of the division. On his retirement in 1958, Wells was replaced by W. J. S. (Stuart) Sloan, who had been director of agriculture.

Charles McKeon, director of the agriculture branch, was seconded to the Queensland-British Food Corporation from 1948 until 1950, when he resigned from the Department. David Atherton, acting director, then became director of the branch. The increase in the Department's work in north Queensland, where forty-five officers of the plant industry division were stationed, and its distance from Brisbane, led to the reappointment in 1954 of a director of tropical agriculture, who would have the status of an assistant branch director and be responsible for all agriculture branch activities north of Bowen. (The position had been created in 1935 and was held by McKeon, but was discontinued during the war.) Atherton, the appointee, was based at the Bureau of Tropical Agriculture at South Johnstone, but later moved to Cairns. When he went to north Queensland Sloan became director of agriculture until 1958, when he moved up to the divisional director's position and was replaced by Dr L. G. (Gordon) Miles.

The agriculture branch was enlarged by the appointment of agronomists, agrostologists, plant breeders, agricultural advisers, and specialists such as agricultural engineers, soil conservationists and advisers in silo construction. Its numbers rose from forty-six in 1947 to one hundred and sixty in 1963, an increase partly attributable to its involvement in soil-conservation work.

Grain crops

The Department's main work in grain crops was breeding to obtain varieties that gave higher yields, were disease-resistant and were better suited to Queensland's different cropping environments. Most breeding and selection work was done on the regional experiment stations. Other work included agronomic studies to establish the best cultural techniques for grain cropping.

Dick Soutter's earlier work in wheat breeding had come to fruition during the war, when more than 80 per cent of the wheat crop came from varieties bred by the Department, and testing of new crossbred wheats continued after the war. Soutter retired in 1948, after fifty years spent breeding a range of high-yielding varieties that produced the highest-protein wheat in Australia. In 1951, although he had no formal qualifications, Soutter was awarded the first honorary life membership of the Australian Institute of Agricultural Science for his work.

A triumph for the Department's wheat breeders was the release, in 1951, of Spica, which dominated Queensland plantings for many years. In 1955-56 breeders succeeded in incorporating resistance to stem rust, leaf rust and mildew in Puora, Soutter's 1932 variety, but new strains of stem rust began to appear in the late 1950s. Two new rust-resistant wheats were released in 1959. A new race of rust appeared in 1960-61 and a new variety was released to combat it, along with one bred at Sydney University. At this time the Department's plant breeders at Hermitage Regional Experiment Station, near Warwick, faced four races of stem rust that could attack all the commercial varieties in Queensland. Breeding for resistance became a continuing challenge for the Department's wheat-breeding team, which was transferred to the Queensland Wheat Research Institute at Toowoomba, set up in 1962. Other wheat research included depth-of-sowing trials, and nutrition and quality studies. In the early 1950s millers and bakers had expressed concern at the fall in quality of flour from mottled wheat, and researchers had found that nitrogen deficiency was responsible.

As Queensland-grown barley generally had too high a protein content for malting, the most lucrative end use, the Department paid little attention to the crop until 1953-54, when special malting varieties were tested. Increased plantings of those selected were then made.

The oats crop in Queensland is used mainly for grazing dairy cows or finishing beef cattle in winter and spring, therefore the main experimental work was in the selection of varieties that would provide continuity of grazing. In the early 1950s crossbreeding was done and produced excellent results, but serious oats diseases began to appear in Queensland. Plant breeders at Hermitage screened more than eighty introduced varieties in 1958-59 and found two that were resistant to the major diseases. These became the standard varieties grown in the State.



Division of plant industry refresher course, William Street, Brisbane, in 1947. Front row (left to right): D. O. Atherton, assistant director of agriculture; C. J. McKeon, director of agriculture; W. T. Gettons, assistant under-secretary (administration); A. F. Bell, Under-Secretary; H. H. Collins, Minister for Agriculture and Stock; R. Veitch, assistant under-secretary (technical); Dr W. A. T. Summerville, director of the plant industry division; W. G. Wells, director of regional experiment stations; C. S. Clydesdale, senior adviser in agriculture; and J. A. Kerr, senior adviser in agriculture. Second row (left to right): G. Rasmussen, J. A. Mobbs, S. E. Stebbens, L. G. Trim, K. G. Fisher-Webster, A. J. Crocker, W. G. Ferguson, R. W. George, N. E. Goodchild, and K. V. Henderson. Back row (left to right): F. A. L. Jardine, K. D'R. Hoffmann, J. McG. Wills, E. F. Tree, T. Graham, and E. J. McDonald.

The Department's seed-selection work on open-pollinated maize varieties for south Queensland ended in the 1951-52 season, after suitable hybrid maize strains had been developed at the Queensland Agricultural High School and College, Gatton, and by the New South Wales Department of Agriculture. Three years later the Department conducted trials with both open-pollinated and hybrid varieties; the hybrids proved superior in all districts except the Atherton Tableland. In 1960 the Department appointed Ian Martin as plant breeder at Kairi. He introduced rust-resistant South American maize strains to produce hybrids suitable for the Atherton Tableland, where tropical rust was a problem.

By the late 1940s grain sorghum was replacing maize as a summer-growing grain crop in areas with lower rainfall. As the dwarf strains introduced by the Department in the early 1930s could be planted and harvested with wheat-growing machinery, sorghum was also considered a viable alternative to wheat in areas that had reliable summer rainfall. Gordon Miles and Arthur Kerr conducted a sorghum-breeding programme at Biloela and Kingaroy and Alpha, an open-pollinated variety selected by Miles in 1944, was released in 1950. It proved outstanding, in one season becoming the major sorghum variety grown in the State.

Male-sterile (hybrid) lines of grain sorghum were introduced in 1958 after Sloan, the director of agriculture, visited the United States, and were used as the basis for a breeding programme at Hermitage, under the direction of plant breeder Ron Moore. Hybrids gave consistently higher yields in trials than the open-pollinated varieties then used. By 1963, introduced hybrids and hybrids developed by Moore were starting to replace open-pollinated grain sorghum varieties, particularly on the Darling Downs.

Rice trials were continued after the war at the Bureau of Tropical Agriculture, with the testing of varieties of swamp and upland rice from India, Ceylon (now Sri Lanka), the United States and New Guinea. Commercial trials of several varieties at Tully in the 1950s demonstrated the need for further research.

Sugar

After the war the Bureau of Sugar Experiment Stations (BSES), a separate branch of the division of plant industry, continued to service the sugar industry. In 1951 the BSES was separated from the Department, and the Department ceased to be directly responsible for research and extension services to the sugar industry.

In the early postwar years, BSES researchers focused on correcting deterioration in sugarcane soils that had been under continuous cultivation for many years, testing green manuring and other measures to improve soil structure. Entomologist William McDougall showed that drainage was effective in reducing wireworm damage, while Jim Buzacott examined rind hardness of cane varieties as a factor in borer control and tested many of the newer insecticides. The borer was almost eliminated by field sanitation and pre-harvest burning.

Buzacott was appointed senior plant breeder in 1947, and G. Wilson took over from him as entomologist. Wilson showed that benzene hexachloride (BHC) was effective in controlling white grubs and in 1950 it was estimated that the savings effected by the previous year's application of BHC amounted to many times the

money spent on all sugarcane entomological investigations done in Queensland since they had begun in 1911. The Queensland Cane Growers' Association expressed its appreciation of the BSES entomologists' work in cane-grub control by presenting a bronze plaque, which was set up at the Meringa Sugar Experiment Station and unveiled by Prime Minister R. G. Menzies in April 1957.

Ratoon stunting disease was another problem that faced the sugar industry in the late 1940s, and researchers aimed at breeding resistant varieties. In 1950-51, Colin Hughes and Jim Buzacott made a collecting trip to New Guinea and selected commercial and wild canes for testing to provide suitable breeding material.

Tobacco

Tobacco leaf quality was a major concern of the Department in the 1950s. To qualify for tariff concessions, manufacturers were required to use a certain percentage of Australian leaf in manufactured tobacco, but they rejected most of the 1952 crop, arguing that it was inferior to the imported leaf. After an appeal made by the State Government and growers, the minimum required percentage of Australian leaf was doubled.

The Commonwealth Government established the Tobacco Industry Trust Account in 1955 to finance research and extension by CSIRO, State departments of agriculture and research institutions. The Commonwealth Government and manufacturers contributed to capital expenditure, while growers met some maintenance costs. State and Commonwealth advisory committees were formed to allocate the funds to facilitate industry participation in the tobacco-improvement programme. Queensland was allocated funds for capital expenditure and maintenance, to provide undergraduate scholarships, and to finance an overseas visit by a Departmental officer; part of this allocation was used to equip the Parada and Inglewood Tobacco Experiment Stations.

A tobacco laboratory was established in 1957 at Northgate, in Brisbane, to study the chemical composition of leaf from the Department's field trials, and tobacco-grading schools were held at Inglewood and at Yelarbon in the same year, presided over by senior agronomist Vern Wagner. Two years later, when water from the Tinaroo Dam became available, tobacco production in the Mareeba-Dimbulah Irrigation Area began to expand and the Department established small laboratories for more intensive research at Inglewood and Parada.

Cotton

Cotton breeding continued at the Biloela research station both during and after the war. By 1946 Stan Marriott had developed hairy-leaved strains that were resistant to sap-sucking insects and gave improved yields, but these proved unsuitable for mechanical harvesting, which was introduced at about the same time. Breeding work continued in the 1950s, and new cotton varieties with improved yield and fibre quality were introduced. Experiments at Biloela proved the value of supplementary irrigation at critical growth stages, with the average yield of seed cotton from irrigated crops more than double that of raingrown crops. Other experimental work dealt with rotations, defoliation before harvest, and the selec-

tion of varieties suitable for mechanical harvesting. A demonstration crop planted in the St George Irrigation Area in 1958–59 showed that cotton was well suited to this new district, even though the Bureau of Agricultural Economics believed it was not viable, given the economic climate of the day. St George subsequently became Queensland's most productive cotton-growing area, regularly recording the highest average district yields in the State.

Grain legumes

Navy, or canning, beans — at first little more than a curiosity crop — were the basis of a substantial industry during World War II, when they were widely used in rations for the armed forces, as baked beans. Supplies from the United States were restricted, so navy beans were grown locally. Australia's requirements still exceeded local supplies after the war, creating an opportunity for the development of a local industry, but as the standard variety then used was not entirely suited to Queensland conditions Hubert Groszmann of the horticulture branch and Arthur Kerr of the agriculture branch began a breeding programme in the Burnett. One of the navy bean varieties they bred was named Kerman.

Departmental peanut work involved selection within the main varieties, seed treatment, fertiliser trials, the development of direct harvesting methods and leaf spot control. By 1954 the peanut crop was being harvested mechanically, but special drying units were needed on the Atherton Tableland, which usually experienced wetter conditions at harvest, and Colin Wragge was appointed to the agriculture branch as agricultural engineer to study the factors involved in artificial drying. His appointment marked the start of the Department's involvement in agricultural engineering.

Numerous soybean varieties and strains were tested at Kingaroy, at the Moggill plant introduction nursery, and at other sites throughout the State in 1945–46. In the same year, McKeon travelled to the United States as part of a Commonwealth team to study the soybean industry there. However, low yields and poor adaptation to climatic conditions led to stagnation of the crop until better-adapted varieties became available in the 1960s. New strains from Africa, introduced by CSIRO, were tried at Walkamin Research Station in 1961–62, and varieties subsequently bred by the Department yielded well.

Other crops

A small tea plantation had been established at the Bureau of Tropical Agriculture before World War II and work on tea continued there after the war, particularly on mechanical harvesting methods and improved planting layout. Hedgerow plantings made in 1952 gave much higher yields than the original garden.

Work on oilseed crops included trials on linseed varieties from Uruguay and dwarf sunflower varieties obtained from the Queensland-British Food Corporation in the early 1950s. These were tested at the regional research stations, along with safflower, and seed selected from the best varieties was supplied to commercial growers.

The agriculture branch remained responsible for the heavy vegetables

(potatoes, sweet potatoes, pumpkins, onions and garlic) when vegetable work was transferred to the horticulture branch in 1945. The Department's potato research in the years 1945-57 included fertiliser, variety and spacing trials, done mainly in the Burdekin, Lockyer and Fassifern Valleys. In response to calls from growers for locally grown seed potatoes, the Department did tests, but proved that Tasmanian and Victorian seed potatoes were superior. Propagation plots of nineteen of the better varieties of sweet potatoes for table use were established at Rockhampton, Mackay, Atherton and the Bureau of Tropical Agriculture, where the New Jersey variety yielded more than sixty tonnes per hectare.

Pastures

Charles Winders had been appointed the Department's first agrostologist in 1937. (Before then, instructors in agriculture had carried out pasture work as part of their normal duties.) He concentrated on south Queensland pastures, but also wrote many bulletins, now standard references, on the main pasture species used throughout the State. As well as being the only agrostologist in the Department until 1948, Winders was editor of the *Queensland Journal of Agricultural Science* from its first edition in 1943 and associate editor of the *Queensland Agricultural Journal* when publication was resumed in the same year. He left pasture research in 1948 to head the information branch and edit the *Queensland Agricultural Journal*.

On his appointment as director of the plant industry division in 1947, Summerville established an agrostology section in the agriculture branch to expand the Department's work in pasture research and improvement. He appointed Stan Marriott leader of the section, and over the next decade Marriott, who became chief agrostologist in 1955, stationed agrostologists in representative parts of the State. Much of the agrostologists' early work was in the selection and adaptation of introduced pasture species. 'Brian Pastures' Pasture Research Station was opened near Gayndah in 1953, and the first turnoff of steers from a grazing trial there two years later showed that the liveweight gain per hectare from introduced pasture was three times that obtained from native pasture. This and other studies provided the economic basis for the expansion of sown introduced pastures in Queensland's higher-rainfall areas.

Work was also done on irrigated pastures. The Bureau of Investigation of Land and Water Resources had set up an irrigation research station in 1946 on land held by the Queensland Agricultural High School and College at Gatton, and a sub-station at Theodore a year later. Alfred Nagle, seconded to the Bureau from the Department of Agriculture and Stock, set up trials with irrigated pasture mixtures for use in south-east Queensland. The Department took over the irrigation research station in 1957, but Nagle was retained and continued his pasture trials. Irrigated pasture trials were also done on the Bureau's demonstration farm at Theodore after it was transferred to the Department in the same year.

Pasture research elsewhere in Queensland gained further impetus with the establishment of the regional research station network in the late 1940s. The Department, in conjunction with CSIRO, conducted studies at Ayr Regional Experiment Station and established plots at the Biloela and Hermitage Regional

Experiment Stations. At the request of suppliers to the Maleny Butter Factory, an agrostologist and officers of the plant nutrition section of the Agricultural Chemical Laboratory joined forces to investigate and try to remedy deteriorating dairy pastures on the Maleny plateau.

Between 1952 and 1966 agricultural advisers and agrostologists conducted pasture trials and laid out demonstration plots in dairying areas from the Atherton Tableland to the New South Wales border in a programme organised by the Dairy Pasture Improvement Committee, with financial assistance from the Australian Dairy Produce Board. Interest in improved pastures became so great that seedsmen could not keep up with the demand for pasture seed.

Plant nutrition officers and agrostologists collaborated in a project to improve the wallum country in coastal Queensland by the application of fertiliser and the establishment of improved pastures. A small area at Archerfield, on the outskirts of Brisbane, and a large area at Coolum were acquired in 1951-52 to conduct research in relation to the project. In the following year the State Pasture Improvement Committee was set up, its members including representatives of CSIRO, the University of Queensland and the Department of Agriculture and Stock, to expand pasture research, prevent overlapping and bring research and extension closer together. Other organisations also began to take an interest in pasture development in Queensland. In 1954, the Royal National Association introduced annual pasture-improvement competitions, in which Departmental field officers acted as assessors and Marriott served on the panel of judges. At an FAO conference on livestock production under tropical conditions, held in Brisbane in 1955, Marriott described recent advances in tropical pasture studies in Queensland to delegates from many countries.

From about the mid 1950s, settlers, advised by Departmental field staff, began clearing large areas of gidyea and brigalow scrubs in the central and southern inland to sow introduced pastures. Species such as Rhodes, green panic and buffel grasses were sown, usually from the air, after the scrub had been pulled and burned.

Bureau of Tropical Agriculture

John Schofield, director of the Bureau of Tropical Agriculture at South Johnstone, moved to Brisbane as agrostologist during the war and resigned in 1946. Tom Graham, an agricultural adviser who had been appointed to South Johnstone in 1940, took over supervision of the centre in 1945.

The Bureau's immediate postwar activities consisted largely of grazing trials organised by Graham, using mixtures of introduced tropical grasses and legumes. In 1947, a small area of rainforest was cleared at Utchee Creek, west of South Johnstone, for continuous grazing trials with various pasture mixes. Researchers evaluated the tropical pasture species available and made recommendations on pasture mixtures and stocking rates. The Bureau of Tropical Agriculture was disbanded in 1955-56, but the work on pastures and tropical crops continued, under the control of the director of agriculture, at the newly named South Johnstone Research Station.

Fodder conservation

The Department had long been concerned with the conservation of fodder to feed livestock in dry seasons and droughts. In 1940 Minister Bulcock set up the Fodder Conservation Committee, which advocated that the Department encourage fodder conservation through education, financial assistance and advice on the building of silos. In 1946 the Department's marketing division surveyed the economic aspects of fodder conservation and in the following year the Minister, Collins, convened a conference of industry representatives to look into the question. At the same time, the Department set up a technical committee to advise farmers on suitable fodder crops and various types of silos. The pamphlet *The Case for Fodder Conservation* was printed and distributed to farmers and Harry Woodings was appointed field silo construction officer in the agriculture branch.

Towards the end of 1952 a small interdivisional committee of Departmental officers was formed to study fodder conservation in pastoral areas and to make recommendations. One of the committee's activities was to review the available literature on the major grass species in pastoral areas and their use as bush hay.

After the severe drought of 1951, Departmental officers had encouraged the conservation of bush hay, mainly Mitchell and Flinders grasses, in the downs areas of central and northern Queensland. But farmers faced harvesting problems and low yields, and the feeding value of the hay had to be assessed. The nutritive value of the main species at various stages of growth was determined at Toorak Field Station in 1955.

Weed control

The first full-time weeds agronomist in the Department was John Rawson, who was appointed in 1955. In the early 1960s another four agronomists were appointed, to work solely on weed control. As new and more efficient chemicals became available, Departmental officers monitored them both for their efficacy as weedicides and for crop tolerance. They also worked out application rates and the stage of crop growth at which treatment gave the best results. A major advance was the introduction of weedicides that gave almost complete control of wild oats, a serious weed in wheat, barley and linseed crops.

Conclusion

Accelerating expansion in the field-crop industries and sown-pasture plantings after World War II and increasing demands for solutions to crop and pasture problems necessitated staff increases in the Department's agriculture branch. Trained scientists were appointed and sent to country centres and research stations to undertake research into crop and pasture problems and to extend the results of their work to farmers and graziers. Other specialists were appointed to the branch to work in areas such as pasture research, agricultural engineering, fodder conservation and weed control.



Field assistant Bart Bartholomew hand-picking tea in an experimental plot at the Bureau of Tropical Agriculture in 1950



Harry Woodings, silo construction officer in the agriculture branch (far right), advising farmers on methods of constructing concrete silos in the early 1960s

Horticulture

The fruit and vegetable industries increased their production during World War II to supply troops stationed in Queensland. After the war, these industries continued to grow to service markets in the southern States, which had expanded as a result of immigration. At the same time, improved transport and handling systems enabled the further development of these markets.

Horticulture branch

The horticulture branch was set up within the division of plant industry in the 1945 reorganisation to help the State's fruit and vegetable industries. Its predecessor, the fruit branch, had been responsible only for fruit crops, while the agriculture branch had looked after vegetables. In 1945, 'salad' vegetable crops, such as lettuce, tomatoes and carrots, were transferred to the horticulture branch and 'heavy' vegetables (potatoes, onions, pumpkins, sweet potatoes and garlic) stayed with the agriculture branch.

Dr Alan Summerville, former head of the horticultural research section in the division of plant industry (research), was appointed director of the horticulture branch. Dr Stanley Trout came to the Department from CSIRO's food preservation division to be assistant director, becoming director when Summerville was appointed head of the division of plant industry.

The establishment of the food preservation research branch and the opening of its laboratory at Hamilton in 1960 brought a rearrangement of the horticulture branch's staff. Officers involved with the preservation and storage of fruit and vegetables were transferred to the new branch, with Trout as its first director. Harold Smith, who had moved from the entomology section to become assistant director of the horticulture branch in 1948, replaced Trout as director of horticulture.

Horticultural research and extension services were expanded after the establishment of the branch in 1945, and the maintenance of close contacts with the fruit and vegetable industries became more important. Such contacts were formalised through a number of technical advisory committees, formed of Departmental officers and representatives of the various sectional group committees of the Committee of Direction of Fruit Marketing (COD).

Pineapples

A pineapple section was set up within the horticulture branch in the late 1940s to service the expanding pineapple industry. Its research headquarters were at Maroochy Horticultural Research Station, and field specialists were stationed at Townsville, Ayr, Gympie and Caboolture and at research laboratories in Brisbane.

The Maroochy station, which had been set up in 1945, was the centre for trials in fertiliser mixes and the storage of canned pineapple. The station also supplied selected planting material to growers until 1952-53, when the COD farm at Beerwah took over the scheme, using material based on Maroochy selections. Planting material was also distributed in the north from Ayr Regional Experiment Station.

Equipment was installed at Maroochy in the 1950s to study surface run-off and soil losses, a serious problem in pineapple plantations. Researchers' recommendations included the use of inter-row drains, the stabilisation of waterways with coal tar, and the use of mole drains and agricultural pipes to improve drainage.

The Pineapple Research Laboratory at Maroochy, supported by a COD levy on pineapple growers, did work aimed at improving the processing industry, including studies of the use of chemicals to induce flowering, delay maturity and increase fruit size. As canning was the main end use of pineapples after the Golden Circle Cannery opened at Northgate in Brisbane, researchers also worked on the long-term selection of clones for fruit shape, yield, sugar and citric acid content, slip and sucker production, and yield. Their trials led to an improved fertiliser schedule for pineapple growers by 1961-62.

Bananas

Trials at Maroochy showed that banana yields, which had declined in the 1950s because of a decrease in soil fertility, could be improved by the use of green manure cover crops such as cowpeas. Studies there also confirmed the need to apply fertilisers soon after planting.

Queensland pioneered the 'one bunch, one sucker' system of plantation management that became standard practice. Trials had shown that leaving more than the one sucker necessary for the ratoon crop not only slowed down the growth of the parent plant but also decreased the size of the bunch and could affect the quality of the fruit.

Although the Maroochy trials provided valuable information on the growth characteristics of the banana plant, variability in planting material affected their accuracy. To overcome this, stocks of clones from selected plants of the Cavendish, Mons Mari and Lady Finger varieties were built up in 1958-59 for experimental purposes. At the same time, researchers discovered some cold-resistant Cavendish strains.

In the 1950s the Department also did much work on the post-harvest treatment of bananas, including aspects such as artificial ripening, packaging, methods of determining maturity, and extending storage life. This work was aimed at improving the transportability and market acceptance of the fruit, especially in the southern States.

Banana diseases continued to trouble the industry in that decade. The Banana Industry Protection Board monitored outbreaks, especially of bunchy top, and inspectors maintained a constant vigil to detect evidence of diseases and apply control measures. Abandoned plantations often harboured diseases, and the Department developed new eradication methods, using improved chemicals, as well as a spray programme to control leaf spot, which was prevalent in north Queensland.

Citrus

The Department's main contribution to the citrus industry was the supply of selected grafting budwood (scions) and rootstock seed to nurserymen through the Citrus Budwood and Seed Distribution Scheme. Much of the budwood was used to produce trees for sale to home gardeners. Research was done to overcome the problem of incompatibility between rootstocks and budwood, using the 'trifoliata' stock, which had been successful in southern Australia. This work was done at a nursery established at Newtown, near Maryborough, in 1954-55, with financial assistance from the Citrus Sectional Group Committee of the COD.

In 1951-52 an orchard of the main citrus varieties was established at Gatton to provide disease-free material should existing sources of budwood be affected by virus diseases. The project allowed an assessment of the merits of nucellar trees, and the part they might play in citrus improvement. Nucellar strains are virus-free and are produced by raising seedlings of varieties that grow true to type from seed. In the late 1950s nucellar material was distributed to districts where budwood was cut to supply nurseries. However, the nucellar strains were later found to be excessively vigorous and thorny, and their use for budwood was discontinued.

Stock-scion trials, sponsored by the Citrus Advisory Committee, began in 1958, and in 1960-61 the Department began stock-scion trials in all citrus-growing districts, seeking resistance to *Phytophthora* root rot and burrowing nematodes. The horticulture branch also continued to supply budwood to commercial growers. Other citrus work included the fumigation of trees to control fruit fly and the use of ammonia gas to control mould growth during the colouring of oranges. The storage life of mandarins was determined, and maturity standards for citrus were altered to include palatability.

Other fruits

Papaw varieties bred by the Department were tested at Yeppoon and Yarwun in central Queensland and at Brookfield and Sunnybank in Brisbane in the early 1950s. Some strains were also tested for suitability for canning at the Koongal Cannery in Rockhampton. In 1959 breeders at Maroochy and Redlands produced a hybrid that was suitable for southern Queensland; and work continued at Kamerunga to breed a suitable hybrid for the north.

Experiments on deciduous fruit in the Stanthorpe district were concerned mainly with plant nutrition and the effect of trace elements. Trials in the use of hormone sprays to prevent pre-harvest fruit drop also revealed that hormone



Crate of Washington navel buds being despatched at the Redlands Horticultural Research Station, 1957



Trimming, weighing, photographing and recording in citrus stock-scion trials at Redlands Horticultural Research Station in 1960

treatment could advance maturity in apples and enable the fruit to be picked earlier for the overseas market. Cold-storage trials developed methods by which apples could be held from harvest in March through to October.

In 1946-47 the Department leased a small area at Severnlea, near Stanthorpe, to investigate grape problems, especially planting distances and the use of phylloxera-resistant stocks imported from other States. The Department also investigated grape nutrition problems at Stanthorpe, and developed appropriate treatments for mineral deficiencies.

By the late 1940s, the main strawberry variety grown in Queensland, Phenomenal, had become variable in quality and yield and increasingly susceptible to diseases, so the Department established the Strawberry Runner Approval Scheme in 1949-50 to provide growers with virus-free planting material. Plant breeders began work at Redlands in 1960 to find a new variety more suitable for processing than Phenomenal. The Department also undertook fertiliser, mulching, weed-control and time-of-planting trials, and research into processing methods that would ensure that quick-frozen strawberries retained their flavour and texture after thawing.

In the 1950s, diseases such as fusarium wilt, woodiness virus and brown spot plagued the passionfruit industry. A plant-improvement programme begun at Redlands in 1949-50 showed that fusarium wilt infection could be eliminated by grafting purple passionfruit scions onto golden passionfruit rootstocks. Nurserymen adopted this practice in 1957-58, and commercial growers readily accepted the grafted plants.

The main avocado problems addressed by the Department in the 1950s were propagation, the short production period of the varieties then grown and fruit maturity at harvest. Stock-scion propagation trials were done at Redlands to determine the best combinations, as sales of poor-quality fruit from seedling trees were generally lowering market acceptance of avocados. Introduced varieties were also tested at Redlands in the late 1950s to extend the production period beyond April-September. The Department's tests established maturity standards, and the Avocado Advisory Committee then set out requirements.

Ginger growing was revived at Buderim soon after the war, but a lack of suitable planting material hampered the growth of the industry. The Department imported a consignment of planting material from China in 1954, and undertook time-of-planting trials at Maroochy and curing and processing experiments in the food preservation research laboratory. During these experiments Departmental tests solved the problem of stringiness in ginger by showing that harvesting early and allowing rhizomes to ferment slightly during processing gave a product that was free from fibre and had the flavour and aroma of imported ginger.

Macadamia stock-scion trials were done at Maroochy to meet increased demands from nurserymen for scion wood and by 1963 successful propagation had been achieved. Stock-scion studies in custard apples were also done at Redlands in an attempt to solve the problem of erratic cropping.

The Department adopted maturity standards for mangos, based on total solids content, to prevent immature fruit reaching the market. The Department's experiments in quick-freezing mangos were successful and a private commercial plant

was built at Gladstone in 1959-60 to process fruit for southern markets. Other research included trials on new mango varieties from the United States.

A continuing problem in fig production was that figs intended for the Christmas trade as glacé fruit had to be stored for a long time if they were processed soon after harvest. The Department's researchers found that fresh figs could be kept in a solution of sulphur dioxide for eight months and then processed satisfactorily.

Vegetables

Redlands Horticultural Research Station was established as the centre for most of the Department's salad-vegetable research, while heavy-vegetable research was based at Gatton Regional Experiment Station. In north Queensland research on the production of both groups of vegetables was done at the Ayr Regional Experiment Station.

Two French bean varieties were produced at Redlands in 1957-58 by plant breeder Hubert Groszmann, and released to the industry. They combined rust resistance with high yield and good pod quality. Two years later another variety, resistant to angular leaf spot, was released. Culinary bean selections were also made at Ayr, and six varieties were released in 1960-61.

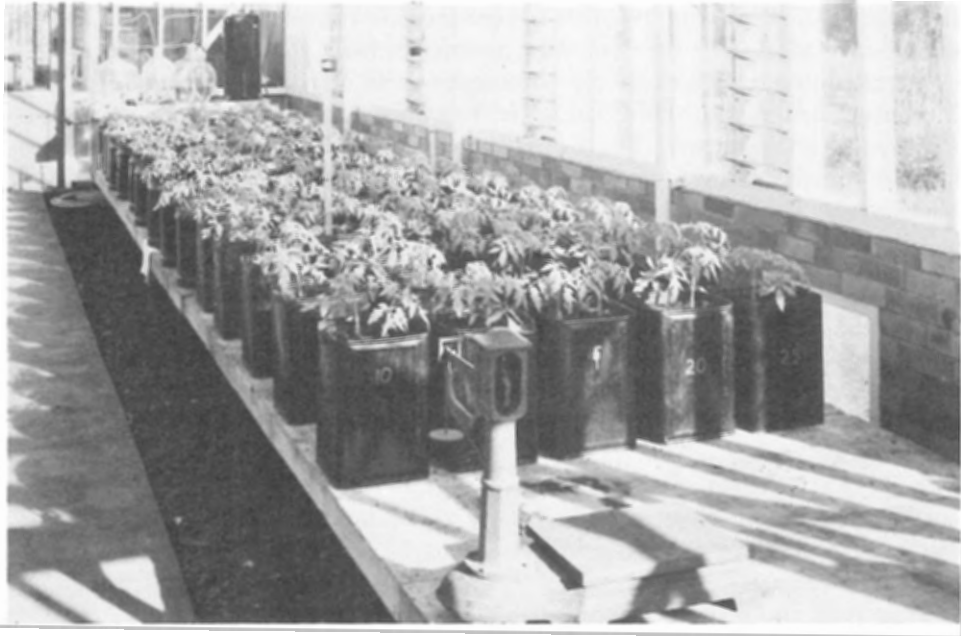
Breeders at Redlands did extensive work to produce tomato varieties that were resistant to leaf-shrivelling virus and adapted to cool growing conditions. A hybrid they developed became an important commercial winter-growing variety for south Queensland, while researchers at Ayr selected varieties that were suitable for the dry tropics. Varietal crossing also resulted in a plant that had satisfactory resistance to fusarium wilt and that could be grown in the Bundaberg area. Other work at Redlands included varietal trials on lettuce, cucumbers, cauliflowers, cabbages and rockmelons, and tillage-method trials in carrots.

Refrigerated transport

The Agriculture and Stock and Railways Departments conducted joint experiments with refrigerated transport in 1946, and proved that fruit and vegetables could be carried successfully from Brisbane to north and western Queensland. The COD provided cool-storage facilities at Charleville, Longreach and Blackall to help the investigations. Cardboard cartons proved suitable for the refrigerated transport of soft fruits such as grapes and tomatoes, and also reduced costs. In 1955-56 the Department imported fan equipment from California and in the following year a consignment of peaches and plums was loaded at Glen Aplin into a fan-equipped wagon and taken to Cairns. It arrived in excellent condition, although similar fruit transported in a louvred wagon did not survive the journey.

Regulatory work

Under *The Fruit and Vegetables Act of 1947*, the horticulture branch was given the task of inspecting fruit and vegetables at wholesale markets and a number of inspectors were appointed. This work was transferred to the standards branch in



A tomato trial in the glasshouse at Redlands Horticultural Research Station in 1959



Horticulture branch officers Jim Ablers (left) and Bill Kurth making a plant quarantine inspection of immigrants' luggage at the Brisbane wharves in 1952

1956, but the horticulture branch continued to administer the Diseases in Plants Acts and the Banana Industry Protection Acts. Its staff were responsible for disease control and movement of plant material and soil both between quarantine areas and between States, and administered quarantine relating to the import or export of plant material, under arrangement with the Commonwealth Government. The agreement provided for the appointment, in each State, of a chief quarantine officer (plants), a position held in Queensland by the director of the horticulture branch.

The vigilance of the Department's quarantine officers has proved its worth on many occasions. For example, in the 1950s large consignments of building timber were imported, often from countries with poor export surveillance, and the American wood wasp was discovered in 1950-51 in crates containing agricultural machinery. Whole shipments of timber, pre-fabricated houses and materials crated in wood were treated to eradicate this pest, which, left unchecked, could have destroyed Queensland's forest resources.

Conclusion

Queensland's potential as a horticultural producer became evident during World War II, when fruit and vegetable production expanded to service the large garrisons stationed here. After the war these industries benefited from the introduction of better transport and handling facilities, thanks largely to the Department's successful trials in post-harvest handling and refrigerated transport. Plant breeding and selection, propagation and yield improvement by the Department also enabled Queensland's horticultural industries to take advantage of the increasing demands from southern States for a wider range of fresh fruit and vegetables. Market acceptability of fruit and vegetables was improved by the Department's work in testing and setting maturity standards and ensuring these standards were met through the fruit and vegetable market inspection service.

Plant industry sciences

The science branch created in the 1922 reorganisation had comprised two sections: the government botanist and Botanical Museum; and the government entomologist and vegetable pathologist. A separate plant pathology section was added in 1935, but the branch was abolished two years later and absorbed into the division of plant industry (research). In 1945 those sections were again drawn together to form a science branch within the new division of plant industry.

Harold Smith was appointed officer-in-charge of the 'new' science branch, but Jack Simmonds, who had been awarded an MBE for his services in malaria control during the war, made a successful appeal against the appointment. Smith was then appointed senior entomologist. Simmonds also held the position of senior pathologist. In 1953-54 each section became directly responsible to the divisional director. Simmonds then became government plant pathologist, a position he held until his retirement in 1961.

When Smith became assistant director of horticulture in 1948, Dr William McDougall, of the Bureau of Sugar Experiment Stations, was appointed government entomologist. Cyril White was government botanist until 1950, when he was succeeded by William Francis. Francis retired in 1954, and Selwyn Everist became government botanist.

Government botanist

White was government botanist from 1918 to 1950. Highly regarded throughout Australia, he made a valuable contribution to the knowledge of botany in Queensland. In 1946 the Australian and New Zealand Association for the Advancement of Science (ANZAAS) awarded him the Muller Memorial Medal for his contributions to botanical science, and two years later the University of Queensland conferred on him an honorary Master of Science degree.

Francis, who followed White, was most widely known as the author of *Australian Rain Forest Trees*, published in 1929 and revised in 1951. Throughout his career he also dabbled in theoretical research on the structure of living organisms; Everist, in his 'History of the Queensland Herbarium and Botanical Library, 1855 to 1976', published in *Austrobaileya* in 1982, outlined some of Francis's abstract theories. For example, he had postulated that the ultimate molecular structure of

protoplasm was in the form of linked, double helical spirals, but had lacked the technology to confirm his ideas. Everist wrote: 'It is a pity that Francis did not live long enough to read the works of Crick, Watson and others who elucidated the double helical arrangement of atoms in the molecules of DNA.'

Everist, government botanist from 1954, had joined the Department as a cadet clerk in 1929, become a junior assistant botanist in the botany section three years later and completed a Bachelor of Science degree at the University of Queensland in 1936. During the war, he had served with the RAAF as a meteorological officer, stationed at Charleville. Everist was an Australian delegate to the Sixth International Grasslands Congress in the United States in 1952, and afterwards visited the Royal Botanic Gardens at Kew and other botanical institutions. In the same year, at the request of the South Pacific Commission, he visited New Caledonia and Fiji to advise on grassland problems.

Botany work

After the war the Department's botany section was asked to assist in resource surveys for development purposes. It worked with organisations such as the CSIR (later CSIRO) and the Bureau of Investigation of Land and Water Resources, as well as with other sections of the Department, to assess forest, agricultural and pastoral resources in Queensland, other parts of Australia and overseas.

In 1945 White surveyed the forestry resources of the British Solomon Islands, and in the following year Francis joined a CSIR team to undertake an agricultural and pastoral survey of parts of the Northern Territory. Another Departmental botanist accompanied a CSIRO team to the Burdekin in 1949-50, and a year later the botany section cooperated with CSIRO in a survey of drug plants in north Queensland's tropical rainforests.

The botany section was also involved in many resource utilisation and development projects in Queensland. Everist was particularly interested in the use of native trees as fodder for livestock. In 1946-47 he drew up a list of suitable trees for the Department's Fodder Conservation Committee, paying special attention to mulga (*Acacia aneura*), the main fodder tree of south-west Queensland. When droughts in 1951 and 1957 made it necessary for many graziers to cut mulga the Department published Everist's findings on the best ways to use the tree as fodder to ensure tree survival.

Everist's studies of the acacias took another direction in the 1950s, when large areas of brigalow (*Acacia harpophylla*) were cleared for pasture and cropping. Investigations into the control of brigalow began at Yuleba in 1951 under his supervision. Everist used new growth-regulating herbicides, which he had seen used on mesquite in the United States, and by 1957 had devised ways to convert areas of dense brigalow suckers into useful grazing land by aerial spraying. His brigalow-control work was taken to a successful conclusion by botanist Bob Johnson, whose booklet *Ecology and Control of Brigalow in Queensland*, printed in 1964, is the major reference on the subject.

Botanists were also involved in the identification of weeds, surveys of their distribution and experiments in their control. As government botanist, White had

been appointed to the noxious plants consultant subcommittee set up in 1947-48 under *The Stock Routes and Rural Lands Protection Act of 1944*, administered by the Minister for Lands. A weeds section was set up in the science branch in the following year, and Dr Harold Young, senior weeds officer, and an assistant were assigned to undertake surveys into the distribution of weeds and experiments in their control. Young resigned almost immediately and was replaced, but in 1952 the section was absorbed into the botany section.

The identification and study of poisonous plants took up much of the botanists' time. They carried out feeding tests at Yeerongpilly, in conjunction with the division of animal industry, to verify suspected plants. Between 1945 and 1957, forty-six plants were studied and several significant causal relationships were identified; for example, after many years of investigation, researchers found in 1949 that Birdsville disease of horses was caused by a native legume, *Indigofera linnaei*.

Entomological work

The Department's entomological staff were largely occupied in testing new insecticides, especially DDT and other chlorinated hydrocarbons, from 1945 onwards. DDT, used during World War II to control mosquitos, proved effective against a range of pest species and Queensland's farmers finally had an effective insecticide at their disposal.

BHC (benzene hexachloride), the chemical that gave spectacular results in controlling the cane grub in the late 1940s, also proved effective against grain insects. However, studies showed that grain treated with BHC could not be fed to poultry or dairy cattle as it tainted eggs and milk. Another new chemical compound tested by entomologists for general pest control was endrin, which was found to be more effective than dieldrin, the chemical then in use, and investigations revealed that the fumigants DD and EDB (ethylene dibromide) were effective against nematodes.

Entomologists were also called on to identify insects and collect information on new species. They published a key to the identification of the common Queensland fruit fly to assist quarantine officers and research workers. After the European red mite was first recorded in Queensland in 1956-57, entomologists undertook a survey of mite species and the effectiveness of organophosphates in their control.

The Department remained responsible for forest entomology. Alfred Brimblecombe was in charge of this area of research from 1934 to 1961, when the Queensland Department of Forestry took over the work. (It is interesting to note that the Forestry Department's first entomologist was Neil Heather, who transferred from the Department of Primary Industries.) Brimblecombe was the Department's representative from 1955-56 on an interdepartmental committee set up to control infestations of the European house-borer, which had been introduced in imported timber. In 1958 he found that the borer was present in several Brisbane houses and the State Government engaged contractors to fumigate those houses. Brimblecombe also investigated insect pests in exotic pine plantations. In 1962, he was appointed deputy government entomologist.

Entomologists undertook surveys to gain a better knowledge of pest populations and their distribution. After a survey of banana pests in north Queensland in 1958, research into nematodes, rust thrips and scab moth was intensified. Nematodes (tiny soil-dwelling, worm-like organisms that attack plant roots) came in for special attention when the Department's first nematologist, Robert Colbran, undertook a statewide survey and recorded and described several new species.

Entomologists also did research in pest-control programmes. By 1963 they had devised effective control measures for a number of fruit pests, and the spray programmes they recommended more than doubled the yields of saleable tobacco. Control strategies against three nematode pests of pineapples in south Queensland were established and put into practice by commercial growers.

Before the war, entomological field stations had been operating at Stanthorpe, Cairns, Nambour, Atherton and Toowoomba. Stations were set up at the Bureau of Tropical Agriculture at South Johnstone in 1954-55 and at Ormiston and Rockhampton four years later. In 1959-60 an entomologist was appointed to work at St George on marsupial programmes and cotton pests.

Beekeeping

The entomology section also served the beekeeping industry. A small industry at the end of World War II, beekeeping expanded gradually with the increase in Australia's population and the development of export markets. In 1947 Charles Roff, of the entomology section, was appointed inspector of apiaries. His main duty was the inspection of apiaries for disease control, but by the early 1950s he was also providing an advisory service to the industry.

Roff administered *The Apiaries Act of 1947*, and by 1959 had registered more than 1300 beekeepers. As adviser in apiculture, he dealt with all types of beekeeping problems. One, the congregation of toads at the entrance of beehives, he solved by suggesting that beekeepers place their hives on stands. In 1959, Roff and Stan Blake, botanist, published *The Honey Flora of South-Eastern Queensland*, still a valuable reference for Queensland beekeepers.

Fauna and flora conservation

Roff was designated protector of fauna and flora under *The Fauna Conservation Act of 1952*. As a result of this Act, the Department increased its work in fauna studies, for which the entomology section was responsible. In the early 1960s pens for use in wild duck studies were built at Oonoonba Animal Health Station and enclosures for marsupial studies were built at Hermitage Research Station. The Department organised the Interstate Fauna Conference held in Brisbane in 1960 and two years later Queensland became a participant in the Australian Bird Banding Scheme. The first broad survey of the kangaroo industry was completed in the same year.

The Department published *Queensland Fauna Sanctuaries* in 1962 to satisfy the increasing demand for reliable information on declared fauna sanctuaries, and as a first step in rationalising wildlife refuges. In the same year, 4400 hectares of



Robert Colbran, the Department's first nematologist, examining nematode infection on the roots of a carrot in the entomology laboratory at William Street in 1958



The Department's science branch display at the Brisbane Exhibition in 1949 showed the wide range of its responsibilities.

wallum country north of Noosa were reserved for fauna and flora conservation, under the control of the Department as trustee. This area, now the Cooloola National Park, was transferred to the National Parks and Wildlife Service in 1974.

Plant pathology work

Plant disease research expanded after World War II as a result of greater knowledge of biology and new research techniques. In this period the Department's plant pathologists diagnosed disease symptoms, identified diseases, recorded outbreaks and devised control measures.

Despite improving techniques, some diseases continued to baffle scientists. Papaw dieback, for example, was recorded throughout the 1940s and 1950s, usually after heavy summer rains. In 1951-52 losses from dieback were up to 80 per cent of plantations. After exhaustive chemical and microbial tests, plant pathologists concluded that the disease was probably caused by a virus that could not be identified with the available technology.

Fungus diseases were a constant problem, and plant pathologists were called on to identify new species and to test the effectiveness of newly developed fungicides. A disease that caused havoc in North Coast ginger plantations in 1954-55 was found to be caused by a new species of fusarium fungus. A breakthrough was the discovery, in the 1950s, that seed dressing, seed-piece dipping or seedbed fumigation with fungicides could prevent some seed-borne fungus diseases.

Similar advances were made in the control of fungal diseases in tobacco. It had been common practice to burn ant nests to provide tobacco seedbeds free of blue mould, but a survey of north Queensland crops by the Queensland Tobacco Advisory Committee in 1958 showed that blue mould infection existed in the field even before seedbeds were planted out. Benzol fumigation of seedbeds was recommended, followed by spraying with fungicides to control moulds in the field after planting out. A regional plant pathology laboratory was set up at Mareeba in 1962 to concentrate on tobacco disease research.

In the same year, the Queensland Wheat Research Institute (QWRI) was built at Toowoomba. The Institute took over work on wheat diseases in the following year and plant pathologists were appointed to work there. Before this laboratory was opened, plant pathologists and plant breeders had battled, with inadequate facilities, against new races of rust that continually developed and attacked wheat crops. But with better facilities they could more easily breed new wheat varieties to replace those that had become susceptible to new strains of rust.

Plant breeding was the major form of disease control in many other crops; these included some fruits and vegetables, in particular beans and tomatoes. Breeding work was done at the Redlands Horticultural Research Station, where the COD built a glasshouse in 1957. As with wheat, breeders aimed at developing varieties that were resistant to several diseases.

An officer of the plant pathology section was assigned to full-time work on soil microbiology in 1953-54, mainly to select and propagate effective *Rhizobium* strains for inoculating pasture legume seeds. He distributed legume inoculum free of charge until 1961, when commercial firms had adequate supplies. The Depart-

ment then concentrated on selecting efficient *Rhizobium* strains for tropical legumes to serve as mother cultures for the University-Department of Agriculture Laboratory Service (UDALS), the New South Wales body that controlled the standardisation of commercial inoculum in Australia.

Chemical laboratories

The Agricultural Chemical Laboratory, headed by Dr Montgomery White, remained within the division of plant industry in the 1945 reorganisation. White had joined the Department in 1936 and had been agricultural chemist since 1941. The laboratory was also associated with the division of animal industry, and White was designated biochemist. After White's death in 1955, C. R. (Roy) Von Steiglitz, head of the laboratory's plant nutrition section, was appointed agricultural chemist. In the same year, the biochemistry and toxicology sections were transferred to the division of animal industry to set up the biochemical branch (see Chapter 36).

Von Steiglitz headed the Agricultural Chemical Laboratory until his retirement in June 1961. The laboratory was then redesignated the agricultural chemical laboratory branch, with William Cartmill as director, W. R. Winks as assistant director and W. T. (Tom) Kelso as chief chemist. The branch was decentralised, with greater emphasis placed on work at regional laboratories and research stations. Staff were trained in Brisbane then posted to country centres where they had a direct association with research and extension staff and a closer involvement in the experiments they carried out.

Regional agricultural chemical laboratories had been set up from the early 1950s, mainly to meet the heavy demands for soil surveys and associated analytical work. Laboratories were set up at Ayr in 1952-53 and at Atherton in the following year. The laboratory at Millaroo Research Station, built in 1952, was staffed by a soils physicist and a chemist. An agricultural chemistry laboratory was built at Parada Research Station for tobacco analyses. When a new laboratory was built at Mareeba in 1962, the Atherton and Ayr laboratories were closed. At the end of 1963 the branch operated laboratories at head office and at Northgate in Brisbane, at Mareeba, Millaroo and Parada, and at the Queensland Wheat Research Institute in Toowoomba.

Chemistry work

The chemical laboratory was subdivided in 1945 into general analytical, plant nutrition, biochemistry and toxicology sections. The general analytical section was responsible for the testing of medicines and insecticides to see that they met prescribed standards, and for the examination of dipping fluids and fodder samples. This section also joined in interdepartmental investigations, such as a fluorosis study in which all water samples submitted for analysis were tested for fluorides. Other projects included fertiliser trials (done in collaboration with other plant industry branches), and investigation of the effect of irrigation on soil physical condition, done at the Brisbane and Millaroo laboratories in the early 1960s. Tobacco leaf from all districts was analysed at the Northgate Tobacco

Research Laboratory, set up in 1957 under agricultural chemist Harry Green. General analytical work included examinations of variability in cattle dips and the oil content of linseed and sunflower varieties.

The plant nutrition section analysed soil samples taken in surveys done by the Bureau of Investigation of Land and Water Resources, as well as those taken for War Service Land Settlement Areas and by officers of its own branch. Such surveys provided much of the section's work from 1945 to 1957. In 1951-52, a detailed survey of the Millaroo section of the Burdekin Irrigation Scheme was completed to enable the Irrigation and Water Supply Commission to proceed with farm planning.

The cereal chemistry section, set up in 1952-53, monitored the quality of wheat from different rotation and fertiliser treatments. A new laboratory for this section was built at the Queensland Wheat Research Institute in Toowoomba in 1962, where correlations between laboratory data and field performance could be more easily established.

The biochemistry section made in-depth studies of fluorosis in Merino sheep and devised a management system that minimised the harmful effect of fluoride. The results were published by Dr Jim Harvey in the *Queensland Journal of Agricultural Science* in 1952 and 1955. The section found that copper deficiency in sheep and cattle was widespread, and investigated other problems such as nitrite poisoning, and avitaminosis in rams and calves. The toxicology section determined the cause of death of farm animals. In 1955 the biochemistry and toxicology sections were transferred to the animal industry division, thus breaking the laboratory's fifty-eight-year link between the plant and livestock industries.

Conclusion

The Department provided analytical and identification services to the State's rural industries, and to its own research staff, mainly through its science branch and chemical laboratory. These activities had a long history in the Department, originating in the appointment of Frederick Manson Bailey as botanist in 1887, Henry Tryon as entomologist in 1894 and Johannes Brünnich as agricultural chemist in 1897. After World War II increasing numbers of highly trained scientists were appointed and, with the better technology available to them, the importance of their services grew. These sections recorded many successes in subsequent years and established their relevance in the Department's overall objective, the improvement of Queensland's rural industries.

Dairying

The dairying industry peaked in 1938–39, but remained vitally important after the war. In terms of farmer numbers, dairying was Queensland's largest rural industry; and with the transporting, processing and marketing side added, it was the State's largest single industry. The Department was involved in all aspects of dairying, from the development of pastures and herd recording through to market milk testing and cheese and butter grading. The agriculture branch gave advice on dairy pastures, the division of animal industry dealt with pests and diseases of dairy cattle (see Chapter 36) and the division of dairying was responsible for the production and processing sides of the industry.

Division of dairying

The division of dairying, with E. B. (Brooke) Rice as director, was established in the 1945 reorganisation of the Department. Rice had been director of the dairying branch since October 1939. His series of articles, '100 Years of Queensland Dairying', published in the *Queensland Agricultural Journal* in 1959, is a major historical account of the dairy industry in the State and the role the Department played in its development to that date.

The investigational branch of the division, the dairy research laboratory, remained under the control of Oliver Kent, who had been in charge of the laboratory since it had expanded its services to the industry in 1937. When Kent resigned in 1946, Les Nichols took his place as assistant director of dairying and senior dairy technologist.

On the retirement of the Department's first herd tester, Ludvig Andersen, Samuel Pegg took over the herd testing section and was appointed senior adviser in 1947. Ernest Sutherland was appointed the first dairy adviser (machinery) in 1946.

The dairying division's staff doubled in four years, largely thanks to the Commonwealth Government's assistance in promoting efficiency and better practices in the industry. In 1950, because of this rapid increase, two branches were created in the division: dairy research, under Nichols, and field services, under Robert Paul, from the Western Australian Department of Agriculture. Paul resigned in 1954 and was succeeded by Frank Coleman, who retired in 1961 and was replaced by V. R. (Russ) Smythe.

The field services branch was the advisory and instructional arm of the division. It dealt with production statistics and herd recording, administered the Commonwealth Dairy Industry Efficiency Grant for developing demonstration farms, organised cheese and milk cooling demonstrations and dairy farm competitions, and operated a mobile film unit. In 1952 the branch consisted of the inspection and instruction section, with forty-eight advisers and dairy officers at thirty-nine centres, the herd testing section, and the butter and cheese grading section.

The dairy research branch did the division's analytical, testing and research work. After scholarship holders W. D. (Dave) Mitchell and Terrence Morris completed dairying courses at Massey Agricultural College in New Zealand, they took up duties as assistants to dairy technologists in 1951. This specialised training, unavailable in Australia at that time, contributed much to the Department's dairy research.

Dairy farm efficiency

In 1945-46 the Commonwealth Government provided the Commonwealth Dairy Industry Efficiency Grant to fund a programme to improve the efficiency of dairy farms throughout Australia. The Department reorganised its advisory services, placing more emphasis on extension projects to initiate improvements than on routine inspections of farms. Officers worked from dairy factories, which provided a central contact point.

The dairy research and dairy field services branches provided technical assistance and advisory services to both factories and farmers. Special attention was given to the care of dairy machinery on farms, and field days were held with the cooperation of local branches of the Queensland Dairymen's Organisation. The 1950s were a period of great development, with new dairy machinery continually submitted to the Department for testing. Bulk handling of farm milk was introduced in the early 1960s, as were new machinery advisory programmes for farmers, transport operators and processors. At the same time, general improvements were made in milking-shed design and in dairy hygiene following the extension of electricity supply to country areas.

Herd recording

The Department had carried out herd testing and production recording since 1910, but the tests had been too infrequent and the number of cows tested too small to provide sufficient data to improve herd efficiency. By 1946, when only thirty-four herds were recorded, the scheme had virtually collapsed. But in that year the Commonwealth Dairy Industry Efficiency Grant provided funds for herd recording, and in the following year two officers were brought from New Zealand to advise on the establishment of a uniform herd testing and recording scheme for all States. An Australia-wide scheme was then set up, financed jointly by the Commonwealth and State Governments and participating farmers. A district herd recorder visited each farm at regular intervals to test milk and farmers were given

a monthly statement of results. But by 1958 only 7 per cent of Queensland's dairy herds were being production-recorded because of the uncertainty of the overseas markets, the cost of herd recording and adverse seasonal conditions.

The Department next introduced a system of group herd recording, with extension programmes to show how the data could be used to improve dairy husbandry practices. By 1962, more than a thousand dairy farmers were participating in the scheme. Recording of goat milk production began in 1955-56.

Dairy research laboratories

The Dairy Research Laboratory was established in the William Street complex in 1935, and a small laboratory was set up in Toowoomba a year later. Brooke Rice ran a travelling laboratory from Toowoomba from 1938. The Department's butter testing laboratory in the Hamilton Cold Stores, built in 1939, was transferred to the Queensland Butter Board's new premises at Hamilton in 1955.

The country laboratory network was expanded in 1953, when the Malanda Dairy Research Laboratory was established at the Malanda Milk Factory. A similar facility had been provided by the South Burnett Cooperative at Murgon a year earlier. By 1962-63 plans were under way for new laboratories at Hamilton and Malanda and extensions to the Murgon laboratory.

The staff of the dairy research laboratories tested milk, butter and cheese samples sent in by field officers and factories, and provided reports and analyses. They also investigated any matters affecting the quality of dairy produce, and gave technical assistance in field programmes designed to improve dairy efficiency and product quality. Research was done on factors that affected the composition or quality of milk, such as the intake and quality of roughage, the level of protein, mineral supplements and seasonal variations. Researchers also studied the effect on milk quality of penicillin used to control mastitis in dairy cows.

The Department continued to encourage the pasteurisation of milk, but its researchers found that thermophilic bacteria, which are resistant to pasteurisation temperatures, reduced the keeping quality. Departmental officers devised a test for thermophilic organisms that could be performed by factory staff, and an immediate improvement resulted. With the sale of table cream a valuable sideline, dairy research branch officers, in association with the Health Department, determined processing, chemical and bacteriological standards for cream.

In 1937 the Dairy Research Laboratory introduced the Butter Stabilization Scheme to help factories to control the moisture and salt contents of butter. When bacteriological tests were included in 1939 the scheme became the Butter Improvement Service, and moved from William Street to the new butter testing laboratory at the Hamilton Cold Stores; it was subsequently widened to include pH tests, microscopic examination and testing for extraneous matter and copper content. The service investigated problems such as mottling of butter and poor butter quality from over-neutralisation, and found remedies for both conditions. It also devised methods to eliminate metallic taints caused by corrosion of factory equipment. Surveys showed that contamination could be overcome by using stainless steel equipment, which was then installed progressively by both farmers



Stan Ives (right), dairy adviser, of the field services branch, discussing herd recording with Tony Pagan, a dairy farmer, at Beenleigh in 1960



J. Elrington, senior adviser (machinery), of the field services branch, testing the efficiency of a farmer's milking machine in 1960



Departmental staff instructing farmers at a dairy practice field day at Mt Mee in 1947

and factories. A quality improvement drive initiated in 1959 lifted the amount of choice-grade butter from 34 per cent to 46 per cent in just two years.

In the mid 1940s the Council for Scientific and Industrial Research (now CSIRO), aided by Departmental field officers, investigated weed taints in dairy produce. A survey showed which weeds caused tainting, and factory techniques were modified to combat the problem, with the modifications tested at the Hamilton and Toowoomba laboratories.

More extensive research into the removal of weed taints in milk and cream was done by the Department, the University of Queensland and CSIRO in the early 1960s. Successful removal of weed tainting substances from butter oil led to trials to develop a commercial process. Researchers also looked at the modification of some farm practices; for example, they found that removing herds from pastures infested with pepper cress four hours before the afternoon milking reduced that taint.

Much of the Dairy Research Laboratory's cheese-improvement work was in the control of bacteriophage in cheese starter cultures and the production of cultures free from viral contamination. Pure, single-strain starter cultures had been distributed to cheese factories from the William Street laboratory since 1943, but when Russell Smythe was sent to Toowoomba in 1947 he took the cultures with him and continued the service from there.

Research staff studied and overcame several other major problems, including cheese-mite infestation and deterioration in processed cheese. The Department's success in cheese improvement can be measured by the increase in cheese quality gradings — from 37 per cent first grade in 1937-38 to 88 per cent first grade twenty years later.

The laboratory studied different methods of cheese-making to improve efficiency as well as quality, and carried out successful experiments in the waxing and storage of cheese. In cooperation with the Society of Dairy Technology, the Department conducted a school at the Queensland Agricultural High School and College in 1957-58 to demonstrate and teach new developments in cheese-making technology.

Artificial insemination and bull proving

The Department began artificial breeding of cattle in the early 1950s. Artificial insemination (AI) was seen initially as a means of controlling vibriosis and trichomoniasis (venereal diseases of cattle): semen from interstate was used to evaluate AI as a disease-control method in a dairy herd that was infected with trichomoniasis. However, in 1955 four young Jersey bulls entered the Husbandry Research Farm at Rocklea as foundation sires in a Departmental programme to provide locally produced semen to improve the genetic worth of Queensland's dairy herd. Semen was distributed to commercial dairy herds, and when the daughters of the bulls on test completed their first lactations their production was analysed so that the bulls with the best genetic potential could be identified. The project, expanded in 1958 to include Australian Illawarra Shorthorns, was a joint venture by the dairy field services, cattle husbandry and animal husbandry

research branches. Field officers selected the cooperating farmers and recorded the production of the progeny; the animal husbandry research branch, under John Ryley, collected and processed the semen; and veterinarian Graham Fallon, of the cattle husbandry branch, led the team that carried out health checks on the co-operators' cows and performed the inseminations.

A collection and processing centre was established at the Kairi Regional Experiment Station in 1956 to supply liquid semen to the dairying industry on the Atherton Tableland. In the late 1950s the Department encouraged farmers to establish cooperatives to provide on-farm insemination services, and several cooperatives began operations in the early 1960s. An artificial insemination centre was opened at Wacol, near Brisbane, in 1962 to supply chilled liquid beef and dairy semen to the major dairying areas in south-east Queensland and to conduct research on bull fertility in a subtropical environment.

A significant development in that period was the introduction of freezing techniques for the storage of semen. The successful freezing of semen, allowing for the long-term storage of valuable genetic material and the introduction of new genes from interstate, changed the face of the animal industries, and enabled the Department to embark on an ambitious export programme.

Tropical dairy breed

In 1959–60 work began at the Ayr Regional Experiment Station to develop a breed of dairy cattle that would be tick-resistant and perform well in the tropics. The Sahiwal breed, from India and Pakistan, was crossed with European breeds and the lengthy process of selection began. The Sahiwal sires were supplied by CSIRO. Sahiwal × AIS crosses came from the Biloela Regional Experiment Station, Sahiwal × Friesian crosses from Kairi, and Sahiwal × Jersey crosses from Ayr. The progeny were tested at Ayr, where new dairy buildings were built in 1960–61.

Dairying Acts

A number of legislative measures were taken to improve the dairy industry between 1945 and 1963. The main Act under which the dairying division operated in 1945 was *The Dairy Produce Act of 1920* and its amendments. This Act was further amended in 1959 and 1963 to clarify procedures for the registration of dairy premises and the supply of milk and cream, to set new minimum standards for dairy products and to include goat milk.

The Margarine Act of 1958 replaced *The Margarine Acts, 1910 to 1950*, consolidating and amending the law relating to the manufacture and sale of margarine. Manufacturers were required to be licensed, and every licensee had to register his brand, with different brands used for table and cooking margarine. The Act allotted quotas to licensees and prohibited the use of butter in margarine manufacture, but still required the addition of starch for identification purposes.

The Filled Milk Act of 1958 regulated the manufacture and sale of 'filled milk', which was defined as any liquid or powder containing the non-fat solids of milk to which any fat other than butterfat or cocoa butter had been added. The Act did

not apply to invalid or baby foods, but a committee made up of representatives of the Departments of Agriculture and Stock and Health and Home Affairs and the Queensland governing body of the British Medical Association was set up to advise the Minister on these products.

Conclusion

Queensland's dairy industry began its long period of adjustment in the 1950s. Dairy cattle numbers started to decline as the industry moved away from its almost complete dependence on butter, but expanding markets for milk, cultured butter, varieties of cheese other than cheddar, casein and other by-products helped to diversify the industry and provided some stability.

Through this period, the Department became more closely involved with all aspects of the dairy industry, from farm production through processing to marketing and product standards. Standards applied to dairy products had to be reviewed constantly in the light of better technology and product diversification, and the introduction of mechanisation and bulk handling brought demands for specialist advisory services, while constant research was required to solve emerging problems in the industry.

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Animal industries

Queensland's livestock industries expanded after World War II, when shortages in Britain created a market for lamb, pigmeats, beef and eggs, and the revival of the European textile industry increased the demand for Australian wool. The domestic market also grew as a result of post-war immigration. The growth potential of the State's livestock industries was limited only by productivity at the farm level, a problem the Department addressed by focusing on better husbandry to increase production per animal.

This chapter discusses the activities of the branches guiding the production, or husbandry, side of Queensland's livestock industries: sheep and wool, pig, poultry, animal husbandry research and cattle husbandry. The activities of the branches dealing with animal health (animal health stations, research, veterinary services, biochemistry and pathology) are covered in Chapter 36. (All these branches operated within the division of animal industry after the war.) It is not always possible to make a clear distinction between 'husbandry' and 'health' aspects, as they are interwoven in the overall improvement of livestock.

Division of animal industry

In 1945 the sections concerned with animal health, stock breeding and management and livestock products other than dairy produce were grouped to form the division of animal industry, which had five branches: field veterinary services, animal health stations, sheep and wool branch, pig branch and poultry branch. The cattle husbandry branch was added in 1947; animal health stations became the research branch in 1955, then the pathology branch in 1958; the biochemical branch was created in 1956; the pig and poultry branches were amalgamated in 1957; and the husbandry research branch was added in 1958. Thus in 1963 the division had seven branches.

In the 1945 reorganisation Dr John Legg, who had joined the Department in 1914 and been director of veterinary services since 1943, was appointed acting director of the division. William (Bill) Webster was recruited from the New South Wales Department of Agriculture two years later to head the division, and Legg then became director of research, in charge of the animal health stations. He replaced F. H. S. ('Ossie') Roberts, who had resigned.

In 1949, an additional position, that of assistant director of the division, was created. It was filled by Arthur Clay, who had been divisional veterinary officer at Toowoomba. Clay became director of the division in 1958. C. R. (Rod) Mulhearn, his assistant director, also continued as director of veterinary services until 1965.

In 1956-57 a technical advisory committee on animal diseases was set up; its members were an extension officer, a research officer, a biometrician and a representative from divisional administration. The committee's role was to keep researchers aware of industry problems by providing feedback from extension officers, thus ensuring better integration of the division's research and extension services.

Sheep and wool branch

After the war plans were made to improve extension services to the sheep and wool industry, and the sheep and wool branch was created. Veterinarian G. R. (George) Moule was appointed head of the branch in 1947 on the retirement of J. L. (Lloyd) Hodge, senior sheep and wool adviser. Moule, one of the first three veterinary graduates from the University of Queensland, joined the Department in 1941 and served at Blackall before coming to Brisbane. He then built up the branch's extension service by recruiting advisory staff from the industry and giving them short intensive courses before posting them to their districts.

From a small section with only one field officer stationed outside Brisbane, sheep and wool became an active service branch. By 1950, it had field officers stationed in twelve sheep-grazing districts, which enabled the extension of improved practices to a large number of woolgrowers. As well as increasing the number of advisers, Moule appointed veterinary graduates as husbandry officers. To back up his advisory team and branch research staff, Moule established a fleece-testing unit in the Department's wool biology laboratory in Brisbane in 1951, with Maurie Richards appointed senior technical assistant.

In 1947 the branch was granted research money from the Commonwealth Wool Research Trust Fund to investigate summer sterility of rams. The fund particularly helped the study of the low reproductive rates of sheep in the tropics. The Department bought the Toorak Homestead Block of 15 000 hectares near Julia Creek in early 1951 to continue this work, and five years later a nucleus Merino flock was built up at Toorak to study lambing performance.

After the severe drought of 1951, sheep and wool branch officers did research on the drought feeding of sheep, followed by a campaign to conserve fodder, financed by the Commonwealth Extension Services Grant. This campaign resulted in bush hay and silage being conserved on several western properties. Moule and Percy Skerman, senior lecturer in Agriculture at the University of Queensland, researched the problems of fodder conservation and found that the cost of machinery was a major problem, although generous depreciation allowances eased the cost of this equipment. However, they also established that the need for adequate soil moisture and the depredations of pests such as grasshoppers, rats and birds were limitations that could not be overcome.



Ken Gillies, pig husbandry officer, weighing a pig on a farm as part of the recorded litter programme in 1958

The sheep and wool branch's priorities in the 1950s were extension in the wool-growing districts and research at Toorak, backed by data from the Wool Biology Laboratory. Field days were held throughout the Merino sheep areas as an extension aid, and the branch held residential schools for woolgrowers at Blackall, Tambo, Mitchell and Barcaldine.

In 1957, Alan Bell, who had been in charge of the Oonoonba Animal Health Station, was appointed director of the sheep and wool branch. He replaced Moule, who resigned to join a private land-development scheme in Western Australia and then later joined the CSIRO.

Pig branch

Fred Bostock was appointed officer-in-charge of the pig branch, which was set up in the 1945 reorganisation. At the end of World War II, Tom Abell returned to the Department and was stationed on the Atherton Tableland as the first district adviser in pig husbandry. Advisers were stationed at Brisbane, Toowoomba and Murgon in 1948, Warwick in 1952 and Biloela in 1954. The Department's correspondence course in pig husbandry, begun in 1932, was continued until 1948-49, when control passed to the Department of Public Instruction, with pig branch officers making periodic checks of the technical content.

In the same year, carcass competitions based on the Hammond system of appraisal were introduced at Queensland shows. These were sponsored by the Australian Meat Board until 1957. Les Downey then worked out modifications to the system, making it more relevant to Queensland's needs.

The Department used different breeds of pigs to establish piggeries for feeding experiments (with locally produced feeds) and local extension work. A Tamworth stud was set up at Kairi in 1948-49, a Berkshire stud at Hermitage in 1953-54 and a Large White stud at Biloela in the following year.

The Pig Progeny Testing Station at the Department's Rocklea Animal Husbandry Research Farm began operating in 1958, with a proving trial done on pigs brought in from the regional experiment stations. An advisory committee was appointed to supervise the work of the station, which was soon made available for the testing of commercial stud stock.

Poultry branch

The poultry branch was also set up in 1945, under Percy Rumball. He stationed poultry husbandry officers at Cairns and Rockhampton in 1945-46 and by 1954 had officers at Brisbane and at seven country centres. F. N. J. (Noel) Milne, a poultry husbandry officer who had joined the branch in 1941, replaced Rumball when he retired in 1955.

The branch's extension activities covered nutrition, management and disease control, with demonstrations financed by the Commonwealth Extension Services Grant. Increased funding in 1956 enabled the Department to institute the Queensland Poultry Improvement Plan: sheds were built at Rocklea and Kairi and random sample testing of housed hens began in the following year. The main characteristics tested were average egg production, food conversion efficiency

and mortality over a standard period. Other projects that occupied the branch in the mid 1950s were the use of artificial lighting for winter egg production, the introduction of laying cages, crossbreeding for greater egg production, and poultry nutrition experiments at Kairi.

Pig and poultry branch

Early in 1957, the Department combined the two small pig and poultry branches to make a new branch, of equal status with others in the division of animal industry. It was placed under the directorship of Arthur Clay, who also retained the assistant directorship of the animal industry division. Milne was in charge of the poultry section, and Fred Bostock remained in charge of the pig section. After the merger, a technical advisory committee was set up to liaise between the two industries and the Department.

Poultry industry legislation

The Poultry Industry Act of 1946 significantly increased the Department's duties and responsibilities in relation to Queensland's poultry industry, and later amendments to the Act further increased the workload. The Act set up the Poultry Advisory Board, comprising the Minister (chairman), the officer in charge of the poultry branch, another Departmental officer and four industry representatives, to advise on problems within the industry, to assist in experimental work and to advise on the accreditation of breeding establishments and hatcheries. It also provided for the registration of stock suppliers, poultry dealers and suppliers of chickens or hatchery eggs, the licensing of chicken sexers and the marking of male chickens, and set out disease-control procedures. The Department appointed a chief inspector, egg graders, live and dressed poultry graders, inspectors and other officers to do this work.

An amendment to the Act in 1950 established the Poultry Industry Fund, which was supported by a government grant, a levy through egg marketing boards and licence fees. The amendment also provided for inspection of poultry slaughterhouses, inspection fees and nomination of representatives to the advisory board by egg marketing boards.

Cattle husbandry branch

The cattle husbandry branch was set up within the division of animal industry in 1947 to serve beef producers and dairymen, under veterinarian Bob Chester. The branch had a technical staff of five in 1950, as well as scholarship holders who took up duties on completion of their university courses. Chester resigned in 1955 and was replaced by Don Sutherland, who had been divisional veterinary officer in Townsville. During Chester's term the branch expanded its influence throughout the State, with officers stationed in Brisbane and at fourteen country centres.

The branch encouraged the use of improved pastures for maximum returns in beef and dairy production, investigated crop fattening and supplementary feeding of cattle, and provided an extension service in animal nutrition, breeding and

management. Short-term research projects were conducted to give the basis for extension. The first, done with the help of the herd recording section of the dairying division, was on improving dairy production through better feeding. An experimental Jersey herd was established at Kairi in 1949 to demonstrate the value of good-quality bulls in upgrading dairy herds. Young bulls were used so that their potential could be proven before they were sold to farmers, with the option of repurchase if they proved especially good sires.

Veterinarian Graham Alexander, a member of the veterinary services branch at Rockhampton, joined the cattle husbandry branch in 1955 and moved to Brisbane. When Sutherland became officer in charge, J. G. (Greg) Young took charge of advisory services for the dairy industry and Alexander for the beef industry, and husbandry officers were appointed to country centres.

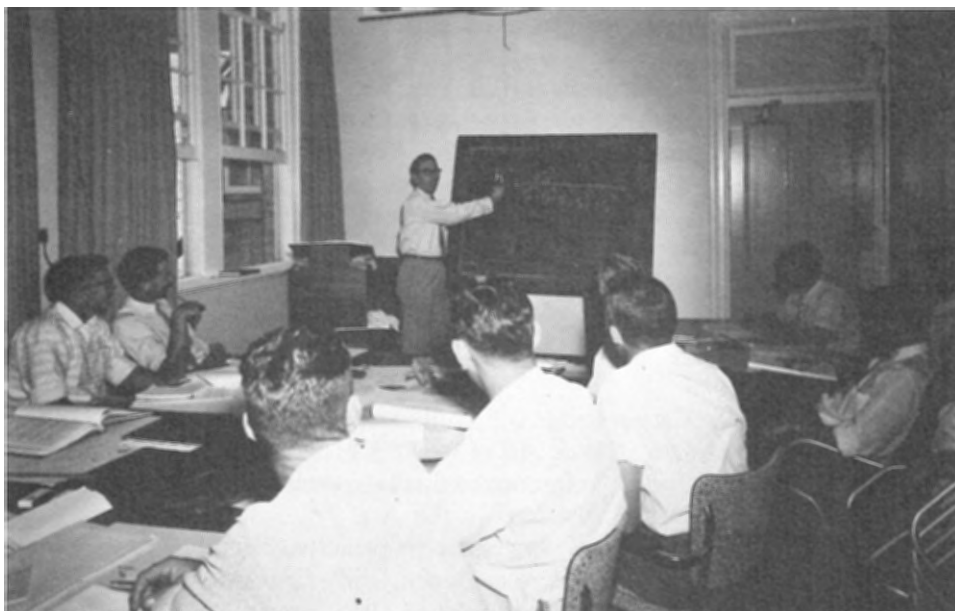
Although the demand for beef increased tremendously after World War II, the British market became selective, requiring carcasses from animals less than three years of age and without excessive fat, and producer schools were held in 1957-58 to explain the new requirements for both beef and dairy production. Cattle husbandry officers also investigated growth rates of beef cattle under natural grazing conditions and on improved pastures. The latter trials were done at the Bureau of Tropical Agriculture, South Johnstone, at the Ayr Regional Experiment Station and at 'Brian Pastures' Pasture Research Station, Gayndah. In 1959 the 'Swan's Lagoon' Cattle Field Station, inland from Ayr, was set up to carry out cattle husbandry studies, particularly in the dry tropics of north Queensland. Other important beef cattle investigations in the late 1950s included drought feeding trials with bush hay on the central highlands, dentition studies, time-of-calving trials and crop fattening studies. The branch held schools for producers to explain ways to improve beef production.

In 1960-61 the branch surveyed resources and production methods on dairy farms, with funds provided by the industry and by the Commonwealth Government and administered by the Australian Dairy Produce Board Research Committee. The survey, which showed that the land was used to only two-thirds of its potential, that farming plant was inadequate and that purchased fodder accounted for a large expenditure, was used as a basis for extension work to improve dairy production. A survey of the fertility status of the State's dairy cattle, funded by the Commonwealth Dairy Industry Extension Grant, showed that infectious fertility diseases were the main causes of wastage in reproduction. Other surveys showed that fertility could be improved through better nutrition.

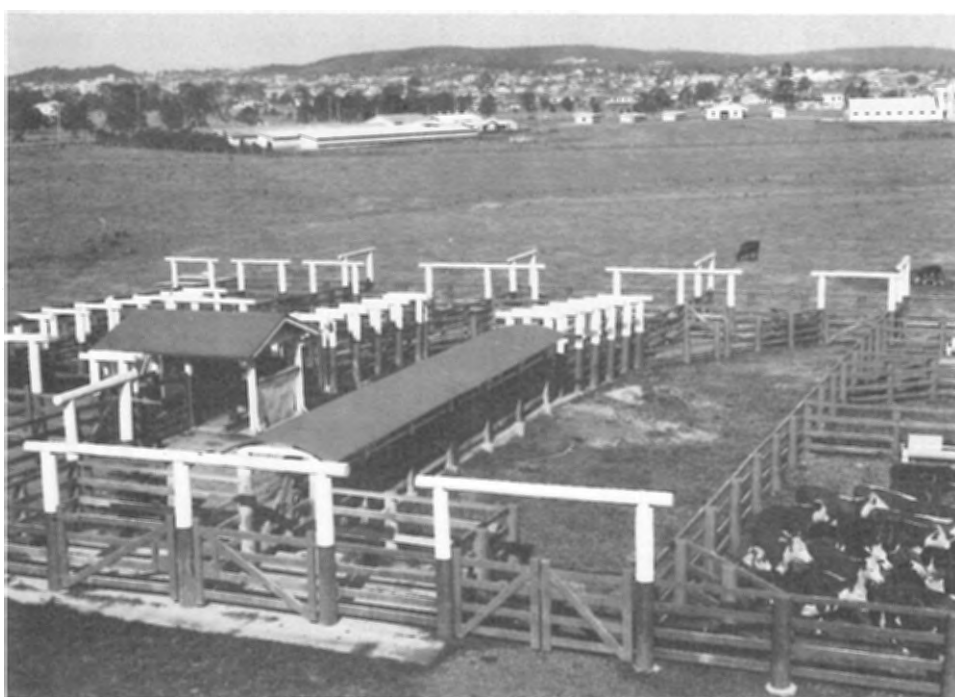
The Department set up a beef cattle husbandry research committee in 1962-63 to define the problems of the beef cattle industry that required research. Its members were the directors of the cattle husbandry, biochemistry and husbandry research branches.

Husbandry research branch

In 1954, the husbandry section was formed within the research branch (previously animal health stations) to concentrate on problems associated with feeding, breeding and managing livestock. In 1957 this section became the animal



Dr Graham Alexander, who had just completed his doctoral studies in the United States, lecturing on genetics to cattle husbandry branch officers at a training school in William Street in 1960



The Animal Husbandry Research Farm, Rocklea, in 1959. The cattleyards are in the foreground, poultry pens are in the left background, and the pig testing station is on the right.

husbandry research branch, with its headquarters at the Animal Research Institute, Yeerongpilly, but its name was changed to husbandry research branch in the following year. The main experimental facilities for the branch were at Rocklea.

Nutrition, feeding and drought rations experiments — on both cattle and sheep — were major branch projects in the late 1950s. Staff from the biochemical branch and the plant industry division cooperated in the research. Feedlot studies in the early 1960s showed that hormone implants increased weight gains. Other studies included a genetic analysis of the Large White breed of pigs, assessment of the effect of different feed regimes on sheep behaviour, and testing of rations for chickens.

The Stock Acts

The main piece of legislation under which the Department serviced the pastoral industries was *The Diseases in Stock Act of 1915*. A clause in a 1953 amendment changed the title to delete the reference to diseases, done because of the increasing emphasis on husbandry provisions in the Act.

The Stock Acts Amendment Act of 1953 had as its principal objective the provision of animal husbandry services to improve Queensland's flocks and herds. Since the creation of the division of animal industry in 1945, research into and investigation of animal industry problems had expanded considerably, and substantial finance was required to provide services to the animal industries. The Stock Fund, established under the new Act, provided funding for these services. Revenue for the fund was derived mainly from a levy on cattle, sheep and horses. Amendments in 1959 and 1960 related to administrative changes to provisions of the Act, including changes to the Stock Fund. Other amendments to the Stock Acts, dealing with disease, are covered in Chapter 36.

Conclusion

The postwar period was characterised by an expansion of the Department's animal husbandry advisory services to the various livestock industries to improve animal production at the farm level. Increased farm productivity was essential as markets were available but costs were rising, so the Department created several branches charged with improving animal husbandry practices through research and survey and employed trained staff to extend these improvements to the farmer and grazier. For the first time, legislation was introduced to encourage better husbandry practices in Queensland's livestock industries.

Animal health

After the Second World War, the Department's animal health services continued to be provided by stock inspectors and veterinary surgeons in the field, backed by laboratory staff at the animal health stations at Yeerongpilly and Ooononba. As well as offering a diagnostic and analysis service, the animal health stations provided vaccines and other preparations for treating animal diseases, and later acted as centres for veterinary research work.

Animal Research Institute

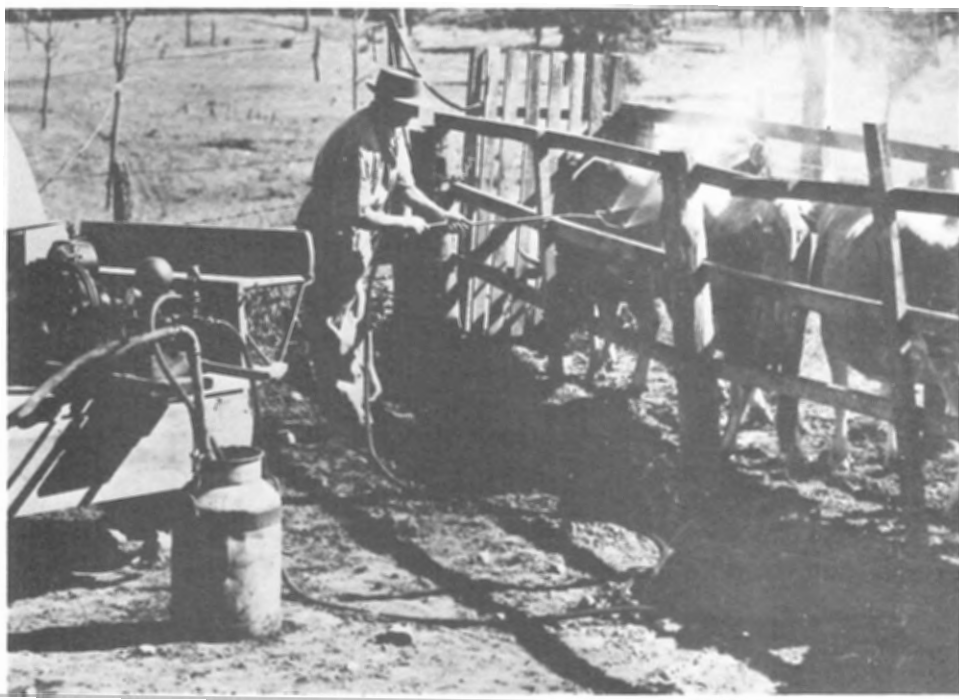
Dr F. H. S. ('Ossie') Roberts was acting director of research in the division of animal industry in 1945 and supervised the animal health stations. He resigned in 1947, to be replaced by Dr John Legg, who had been acting director of the division since its foundation two years earlier. The name 'animal health stations' was changed to Animal Research Institute (ARI) in 1954, to include facilities and laboratories at both Yeerongpilly and Ooononba.

Yeerongpilly began to expand in the early 1950s, because of the Department's broader involvement in the husbandry side of the livestock industries. In 1952, when part of Yeerongpilly was resumed for the Tennyson Power Station, the Department acquired land at Rocklea to conduct animal husbandry studies.

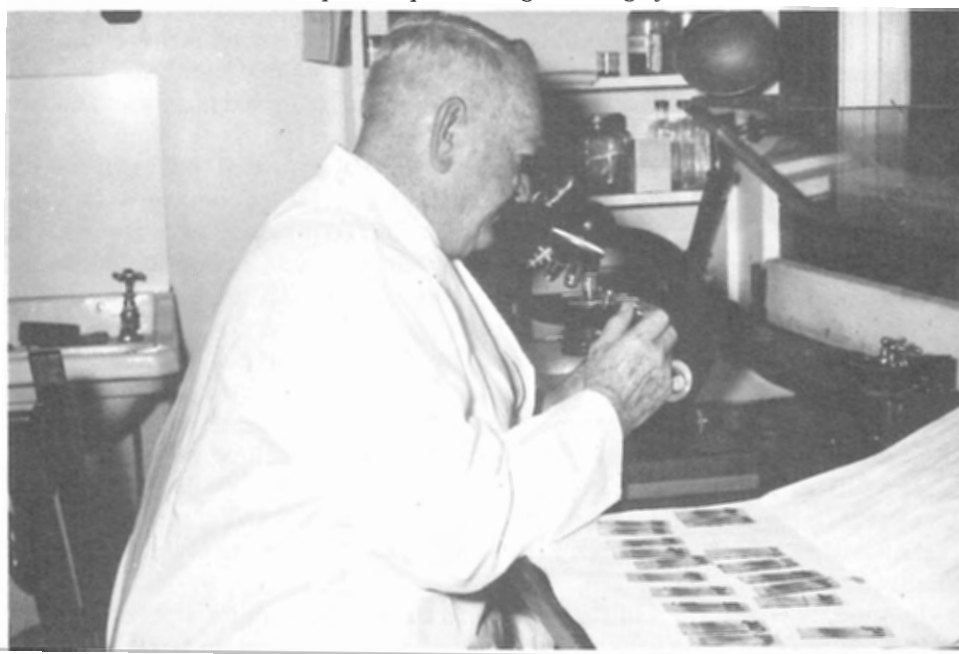
Between 1954 and 1959, the branches located at ARI were reorganised to streamline the Department's animal health and husbandry work. In 1955 the animal health stations branch became the research branch, which, in 1957, became the pathology branch. The toxicology and biochemistry sections of the Agricultural Chemical Laboratory, based at Yeerongpilly, were transferred to the division of animal industry in 1956 and became the biochemical branch.

The animal husbandry research section was set up in 1954 and became a branch three years later. It undertook research at its headquarters at Yeerongpilly and at the Animal Husbandry Research Farm at Rocklea. In 1958 the branch name was changed to husbandry research.

In 1963, ARI consisted of the office and laboratory complex at Yeerongpilly, the laboratory and other facilities at Ooononba, and the Rocklea farm. The pathology, biochemistry and husbandry research branches had their headquarters at Yeerongpilly.



Steve Smith, district stock inspector at Ipswich, testing a new range of tick-control chemicals in 1950



Geoff Daly, who served as assistant bacteriologist from 1914 until his retirement in 1962, conducting research on tick-fever vaccination of cattle at the Animal Research Institute, Yeerongpilly, in 1960

Veterinary services branch

The field staff involved in animal disease and pest control were part of the veterinary services branch. Dr John Legg, its director since 1943, was appointed acting director of the division of animal industry in 1945. The branch was renamed field veterinary services in the 1945 reorganisation; its five divisional veterinary officers, assisted by nine veterinary officers, reported to Legg. Laurie Carey remained in charge of stock inspectors, slaughtering inspectors and brands officers.

In 1947 Jack Maunder replaced Carey. Two years later, his position was changed to director of veterinary services and chief inspector of slaughterhouses, and the inspectors and veterinarians were amalgamated into the field veterinary services and Acts administration branch. When Maunder resigned in 1951, C. R. (Rod) Mulhearn replaced him and the branch name was changed to veterinary services. Mulhearn was promoted to the position of assistant director of the animal industry division in 1958, also retaining his directorship of the branch.

The branch's officers monitored and supervised animal health in the field and policed regulations set down in the various stock disease control Acts. They checked stock for evidence of disease, both on the farm and in slaughterhouses, confirmed the presence of diseases and undertook the necessary control measures, and were also responsible for the surveillance and quarantining of imported animals and their products and exported animals, carried out under Commonwealth legislation. (The director of the branch was designated chief quarantine officer (animals) for Queensland for this purpose.)

Cattle diseases

The identification and control of cattle diseases and pests were the main work of the veterinary services branch. Problems in cattle included ticks and tick fever, tuberculosis, contagious bovine pleuropneumonia (pleuro), buffalo fly, infertility diseases and plant poisoning.

Tick fever was the major disease problem. Preventive inoculation gave protection from the diseases carried by ticks, while ticks themselves were controlled by dipping. By the mid 1940s, however, ticks had developed arsenic resistance and the chlorinated hydrocarbon DDT was introduced to control them. Many dips were still charged with arsenic, but those in special cleansing areas (between ticky and non-ticky country) were changed to DDT. In the 1950s tick-control trials were done using other chemicals, such as BHC, toxaphene, organic phosphates, dieldrin and parathion. These proved useful as, by 1962, ticks had developed resistance to DDT, which was then replaced by organic phosphate compounds.

Tuberculin testing of dairy herds supplying milk to Brisbane began during the war, as tuberculosis was a widespread disease affecting dairy cattle and could be transmitted to humans through milk. Testing was gradually extended to all dairying districts by the employment of private veterinarians; this freed staff and encouraged private veterinarians to practise in country districts. As a relatively high incidence of tuberculosis was recorded in cattle slaughtered in north Queensland, a tuberculosis-control programme for stud herds was started there in 1950-51, and within four years forty stud herds were under test.

As pleuro continued to affect north Queensland beef herds and was present in cattle travelling south, preventive inoculation was required before permits were issued for store cattle travelling from or through a suspected area. Slaughtering inspectors reported any diseased stock at abattoirs, and extension officers then traced such stock back to their property of origin. However, such measures were of little avail as pleuro was transmitted into south Queensland in 1959-60 in a load of cattle brought by sea from Darwin. A protected area was then declared from Rockhampton south to the New South Wales border and west to Wandoan. The National Pleuropneumonia Fund was established in 1961 by contributions from all mainland States and staff were appointed to concentrate on pleuro eradication. Properties on which pleuro was detected were quarantined, then clinical cases were destroyed and remaining cattle were vaccinated, with quarantine not lifted until six months after the last known case had been detected. This action gave immediate results: the incidence of pleuro in the field in 1961 was the lowest ever recorded in Queensland.

Sterility diseases including brucellosis, vibriosis, trichomoniasis and leptospirosis were also common in this State, and suitable treatments were introduced, but the incidence of these diseases was significantly reduced only after the Department introduced artificial insemination in the mid 1950s. Poisonous plants continued to cause heavy losses in cattle and branches at Yeerongpilly cooperated with the botany branch to identify both the plants and their effects.

Sheep diseases and pests

The Department's animal health officers were involved in identifying and treating a number of sheep diseases including pregnancy toxæmia, which was prevalent on the Darling Downs, and ovine brucellosis in British breed rams, also prevalent on the Darling Downs and in the Burnett district. After blowflies developed resistance to certain chemicals, sheep and wool advisers were called on to explain and demonstrate alternative methods of control, including the newly developed mules operation.

Pig diseases

A detailed study of pig disease occurrences in 1961 showed that most outbreaks and losses from infectious diseases were the result of salmonellosis and pneumonia (including virus pneumonia). The Certified Brucellosis-free Tested Herd Scheme for stud herds had been set up in 1957 by the pig section and the veterinary services branch, and 139 herds had been declared free by 1961. When outbreaks of swine fever occurred in New South Wales and Victoria in 1961-62, Queensland prohibited the entry of all pigs and pigmeats from these States.

Poultry diseases and pests

The poultry branch was responsible for the testing of breeding flocks for pullorum disease. After the scheme's inception in 1937-38 the number of birds tested increased dramatically, owing to the expansion in breeding flocks to supply

chickens for sale to broiler growers. From 1959-60 flock owners could apply for 'pullorum-free' or 'pullorum-clean' status, depending on the occurrence of reactors in their flock.

Stickfast flea appeared in the Boonah district in 1941, its first appearance in Queensland, and four years later was infesting flocks in the Brisbane area. Several properties were quarantined, but by the late 1950s the pest had become endemic. Although it could be controlled by DDT, Departmental staff had to continually monitor its populations and act quickly to control any outbreaks.

Leucosis was the disease most frequently reported by officers in the poultry section in the early 1960s. It was found to be a problem in the broiler chicken industry and was reinfesting growing flocks from batch to batch, but Departmental trials showed that cleaning sheds and equipment before introducing a new batch of chickens helped to break the chain of infection. This method of control was adopted by broiler growers and the incidence of the disease declined.

Biochemical branch

In 1956 the biochemical branch was created out of the two sections within the Agricultural Chemical Laboratory that dealt with livestock matters: toxicology and biochemistry. Dr James Harvey, who had joined the laboratory in 1933, headed the branch, which grew quickly from a staff of seven at its creation to twenty in 1963.

The branch provided a diagnostic service for field staff and collaborated with other branches in livestock research projects. Its toxicology section diagnosed livestock poisonings, analysed dip samples, and investigated a range of livestock problems, largely in relation to plant poisoning. The biochemistry section investigated mineral deficiency disorders in livestock and the use of supplements and additives in stock feeds, and undertook drought-feeding experiments and digestibility trials. In 1960 the biochemistry section was split into the nutritional biochemistry and clinical biochemistry sections, the former concentrating on stock food analyses and the latter on analyses of nutritional or clinical disorders.

Pathology branch

The pathology branch was formed in 1957 from the diagnostic and analytical sections of the research branch, and diagnostic pathology, histopathology, protozoology, bacteriology, serology and parasitology sections were set up. The branch operated laboratories at Yeerongpilly and Oonoonba where its officers examined specimens for diagnostic purposes and undertook serological tests as an aid to diagnosis. As well as providing vaccines, the pathology branch did much tick fever research, addressing the problem of chemical resistance in ticks and testing new chemotherapeutics, work that resulted from the change from chlorinated hydrocarbons to organo-phosphorus acaricides.

The finding of unacceptable levels of pesticide residues in New Zealand meat led to research in Queensland on residues resulting from the use of chemicals to control the cattle tick and buffalo fly. Researchers found that cattle dipped in DDT carried residues in fat above the tolerance permitted in the United States,

and legislation was introduced in Queensland prohibiting the use of acaricides based on chlorinated hydrocarbons, as those based on organic phosphorus compounds were found to offer a lower residue risk.

In 1958–59 a virus disease resembling equine infectious anaemia appeared in central Queensland, and serum from infected horses had to be taken to Japan for testing. The disease had not appeared in Australia previously, and reliable tests were not available. However, the pathology branch soon developed a satisfactory method for confirming its presence.

The branches at ARI also undertook nutrient-deficiency surveys of grazing properties. While a significant number were found to be phosphorus- and calcium-deficient, copper deficiency was a major concern as it was widespread, affecting wool growth in sheep and restricting weight gains in cattle. A team of crop and pasture specialists was assigned to work with livestock officers on the problem. Trials at Rocklea showed that sheep maintained adequate copper reserves, but work pursued in cattle has failed to elicit consistent liveweight gains.

Animal health legislation

The Diseases in Stock Act of 1915, renamed the Stock Act in the 1953 amendment, was the main piece of legislation that enabled the Department to enforce and finance animal health measures. *The Diseases in Stock Act and Another Act Amendment Act of 1944* established the Stock Diseases Compensation Fund at the Treasury, into which all stock assessments were paid, together with any payments from Consolidated Revenue appropriated by Parliament. Under this Act, a levy was placed on milk supplies to the City of Brisbane and government veterinary officers were empowered to test animals for tuberculosis.

An amendment in 1946 allowed the Minister to declare a 'protected area' for any disease and provided for payment of compensation for cattle destroyed by order of an inspector. Further amendments in 1948 provided for the appointment of 'approved veterinary surgeons' and authorised a levy on milk and cream producers to pay compensation for dairy cattle destroyed because of tuberculosis, brucellosis or mastitis. A campaign to free dairy herds from tuberculosis was financed by a levy on milk and cream under the Act.

The main objective of the 1958 amendment was to provide for compensation payments for cattle condemned and destroyed because of tuberculosis. It also permitted stock owners who were outside the zones of compulsory tuberculosis testing to enter the scheme and entitled them to the same compensation. Departmental officers were empowered to seize and destroy reactor cattle if the owner refused to destroy them.

Another section of the Act covered artificial insemination of stock and provided for the setting-up of a committee to advise the Minister, with the majority of its members representing the livestock industries. Controls that existed in other States were applied in Queensland to prevent the spread of disease through artificial insemination. Other Acts were introduced from time to time to provide for action on specific diseases.

The 1954 amendment to the Stock Act had provided for emergencies resulting



Sheep blowfly control schools, such as this one at Yeerongpilly in 1941, demonstrated the new technique of mulesing to field officers.



Merv O'Bryan, assistant adviser in the cattle husbandry branch, assisting with a liver biopsy at the Animal Husbandry Research Farm, Rocklea, in 1959 as part of the copper-deficiency research programme

from the introduction of foot and mouth disease and *The Foot and Mouth Diseases, Expenses and Compensation Fund Act of 1958* formalised an agreement between the Commonwealth and the States on financial arrangements should an outbreak of the disease occur: those States not affected would give financial assistance to the State or States in which the outbreak occurred to ensure that prompt and efficient control and eradication measures were applied. Powers to deal with the disease and pay compensation were provided by the Stock Acts.

The Swine Compensation Fund Act of 1962 was aimed at providing compensation following any outbreak of swine fever, a disease that had occurred in Australia in 1903-06, 1927-28 and 1942-43. These outbreaks had been controlled by strict quarantine and slaughter of all pigs on affected properties, but no compensation had been paid. The Act provided for a compensation fund to pay owners of pigs slaughtered in a control programme. The fund would be financed by a swine sales stamp duty, supplemented, when necessary, with loans.

Slaughtering section

As well as servicing the production side of the animal industries, the Department maintained high standards in the processing of livestock products. This was done through inspection of processing facilities and operations under the Slaughtering and Abattoirs Acts. *The Slaughtering Act of 1951*, which repealed *The Slaughtering Act of 1898*, empowered the government to appoint a chief inspector of slaughterhouses, to declare defined areas and to appoint inspectors, as well as defining the inspectors' powers and duties. A 1958 amendment strengthened inspectors' powers, enabling them to call a police officer or other competent person to their aid. Regulations were also extended to cover accommodation for inspectors at slaughterhouses and the transport of meat. A list of diseases in stock and meat was set out to clarify the application of regulations under the Act.

The setting-up of district abattoirs at Townsville, Ipswich, Toowoomba and Bundaberg in the years 1958-60 helped to rationalise meat inspection in country areas. In the same period Boyd Parkinson was appointed head of the slaughtering inspection group, and a senior veterinary officer was appointed to each of the district abattoir boards. Restrictions on the introduction of meat into the Brisbane area came into force and a carcass-branding system was introduced at the Cannon Hill Abattoir. Because of increased work at abattoirs throughout Queensland, the slaughtering section was established within the veterinary services branch in 1960-61, under Parkinson.

Conclusion

Animal health problems continued to demand much of the Department's attention after World War II. Problems already present were compounded by new pest and disease outbreaks, increased resistance to chemicals, and market demands for high-quality meat products. These problems were addressed by the Department through the appointment of better-qualified staff and reorganisation of the branches that dealt with animal health. Stronger legislation also empowered the Department to handle disease outbreaks quickly and effectively.

Marketing, economics and standards

The division of marketing was established in the 1945 reorganisation of the Department and given responsibility for the supervision of marketing boards and cooperative societies, the monitoring and analysis of market trends, the regulation of agricultural standards and investigations into the economics of industries and practices. The division initially comprised the marketing and standards branches, which were later joined by the economics research branch.

Harry Hunter, who had been appointed director of marketing (the branch) in 1939, became director of the marketing division. H. K. ('Lew') Lewcock was appointed acting assistant director of marketing and senior marketing officer in 1946. On his resignation in 1948, he was succeeded by C. H. P. Defries, production statistics officer since 1945.

Hunter was an *ex officio* member of all the commodity marketing boards set up under the Primary Producers' Organisation and Marketing Acts and of the Committee of Direction of Fruit Marketing. To cope with the increasing number of marketing authorities being established, the Acts were amended in 1954 to allow him to deputise other officers to represent him.

As director of marketing, Hunter represented the Department in other areas. In 1951-52 he served on a committee made up of representatives of several Queensland Government departments to examine bulk handling of wheat in Queensland, and in 1957 he represented the Department on the Prices Advisory Board provided for in an amendment to the Profiteering Prevention Acts.

Marketing branch

In the 1945 reorganisation, the marketing branch was strengthened by the appointment of a number of marketing officers and inspectors. Its main role was to monitor the operations of the various producer-controlled marketing boards in relation to the requirements of the Marketing Acts. Reviews of the boards' activities were published each year in the Department's annual report, but after 1948 they were published as a separate document.

The branch was also given the task of establishing and operating a crop reporting and forecasting service. Its first report, on the south Queensland autumn potato crop, was issued in 1947. From time to time other industries were added



The Department's Organised Marketing display at the Brisbane Exhibition in 1946

and by 1954 the scheme covered potatoes, wheat, maize, grain sorghum, barley, peanuts, tobacco and poultry. The branch introduced a monthly report on production trends, with information on all agricultural production, meteorological data, reports from marketing boards and cold storage firms, and wholesale prices of fruit and vegetables. This and other branch reports were widely distributed to farming organisations and agribusiness, government authorities and market researchers.

In 1947 the Market Reporting Service, covering Brisbane wholesale fruit and vegetable markets, was established and daily market reports were issued from April of that year. Reports on the price and quality of fruit and vegetables and other produce on offer at the Brisbane market were broadcast each weekday on the 'Country Hour' on ABC radio. They became accepted as standard quotations for market produce.

The branch reviewed and commented on marketing arrangements established under Commonwealth legislation. In 1950-51 Hunter was appointed to the Commonwealth Standing Advisory Committee established to advise on tobacco marketing arrangements and was similarly involved in other national marketing schemes for other commodities.

Standards branch

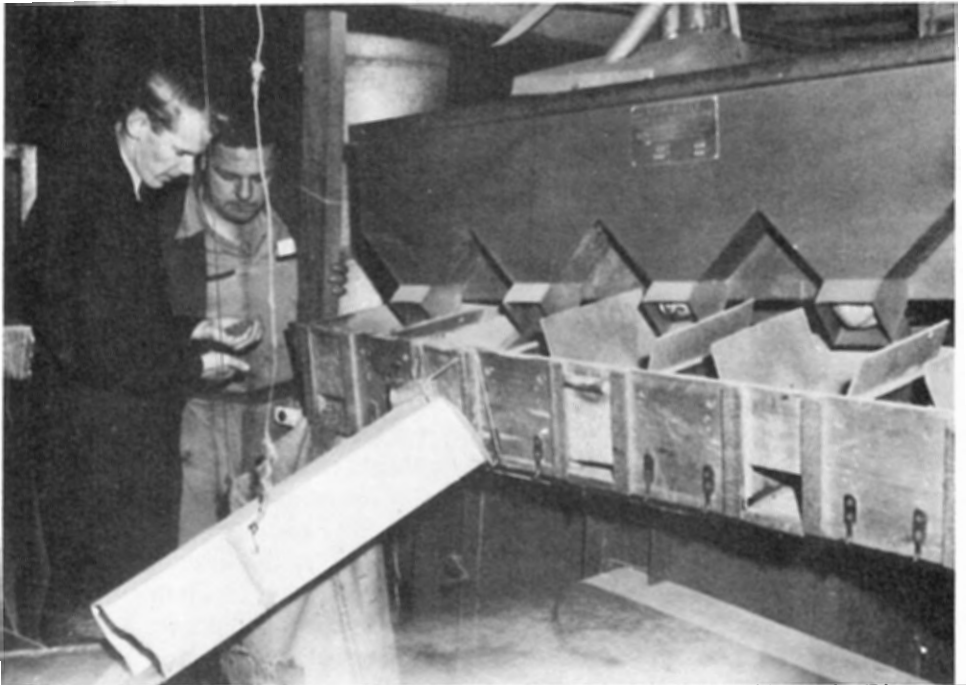
In 1945 the unwieldy title 'Seeds, Stock Foods, Fertilisers, Pest Destroyers and Veterinary Medicines Branch' became, simply, 'Standards Branch'. Fritz Coleman remained officer-in-charge. When he retired in 1957, Alan Ross was appointed standards officer, a title that had been conferred on the branch's senior officer by *The Agricultural Standards Act of 1952*. A. C. (Chris) Peel became standards officer when Ross was promoted to the position of assistant director of the marketing division in 1960.

Before 1952, numerous Acts regulated the sale of seeds, fertilisers, chemicals, lime, pest destroyers, veterinary medicines and stock foods. The Agricultural Standards Act consolidated and amended these Acts and stated that all agricultural requirements, as they were now referred to, were to be registered with the standards branch before being marketed. The registration authority was the Agricultural Requirements Board, a panel of officers from the Department replacing the pest destroyers and stock medicines boards that had been set up before the war. In its first year of operation the board registered 1728 requirements but ten years later the number had more than doubled. Standards branch inspectors visited towns throughout the State, calling on sellers of agricultural requirements to ensure that they complied with the provisions of the Act.

As the Department's seed-testing section, the branch also became involved in seed certification. A seed certification committee had been set up in 1935, but its operations were curtailed during the war. After the war committees were set up to organise the production and certification of seed of specific crop and pasture species. Seed was grown and harvested under the supervision of Departmental officers, and by 1950 certified seed was available for hybrid maize, grain sorghum, Sudan grass, beans, tomatoes and papaws. A seed selection service was also pro-



Ivy Bloxson (left) and Corrie McIntyre, of the standards branch, testing seeds in the William Street building in 1947



Blair Linnett (left), of the standards branch, checking commercial seed-grading operations at Toowoomba (Photo courtesy Blair Linnett)

vided for wheat growers, and cotton, tobacco and peanut seed was selected by Department officers. The seed certification scheme was formalised by the 1952 Act. All seed imported into Queensland was sampled and examined on behalf of the Commonwealth Plant Quarantine Service to ensure its purity and check for potential weed seeds.

By 1962, extra staff were required to cope with the demands for pasture seed testing and to establish new laboratory methods to test subtropical and tropical pasture seeds. From that year all pasture seed used by the Land Administration Board was tested before sowing in the Brigalow Scheme.

The standards branch administered *The Fruit Tree Standards Act of 1946*, which required that all fruit trees or fruit plants, except imported trees, be sold by a registered nurseryman and carry identification labels. All imported trees and plants were inspected, and nurserymen were required to keep records of sales and varieties grown. *The Fruit and Vegetables Act of 1947* set maturity and grade standards and handling procedures for all fruit and vegetables of commercial importance in Queensland. Initially, inspections were carried out by horticulture branch officers, but in 1956 the responsibility was transferred to the standards branch. Administration of *The Farm Produce Agents Acts, 1917 to 1952* was also placed under the branch's control in 1959.

Economics research branch

Although a small section was set up in the marketing branch in 1945-46 to look at farm economics problems, it was not until 1958 that the Department set up its economics research branch. Defries, its first director, had been awarded a scholarship by the United States Government to study farm management and economics in the United States and Canada. There he saw that the trend was towards intensification of production and recognised the need for extension workers to have information on the economics of farm operations. On his return in 1958, Defries gave a series of lectures on farm management to Queensland University staff and students and members of the public.

Because the new branch started with no technical staff other than Defries, projects were undertaken in conjunction with staff from other branches. For example, a wheat industry survey, dairy cattle feeding investigations and soil conservation economics studies were begun in cooperation with staff from the cattle husbandry and agriculture branches. As a result of this early work, the branch expanded and in 1959-60 three agricultural economists, two of them former marketing officers, were appointed.

From the early 1960s the branch became more involved in extension activities. In 1962 the farm management accounting group was set up and worked with the South Burnett Dairy Extension Advisory Committee to promote the use of modern accounting techniques in farm management. In the same year an agricultural economist was stationed in Toowoomba to service farmers on the Darling Downs. Other extension activities included lectures, radio broadcasts, farm tours and a series of short articles entitled 'Profit and Loss', published in the *Queensland Agricultural Journal* in 1962-63.

Conclusion

After World War II the division of marketing responded to the need for better market information and advice on the economics of farming. Its enlarged responsibilities included supplying market information, overseeing product standards and providing farm management advice. As a result, the division took on a relevance to all aspects of Queensland's rural industries, a relevance that had not existed at its establishment in 1945.

Information and extension training

John Reid, editor of publications, headed the publicity branch after the 1945 reorganisation. The branch had responsibility for publications, photography, press and radio news releases, and the central library. When Reid retired in June 1948 the Department consolidated its publicity and information services, merging sections connected with the publication and distribution of journals and other literature, publicity, photography, displays and the central library to form the information branch.

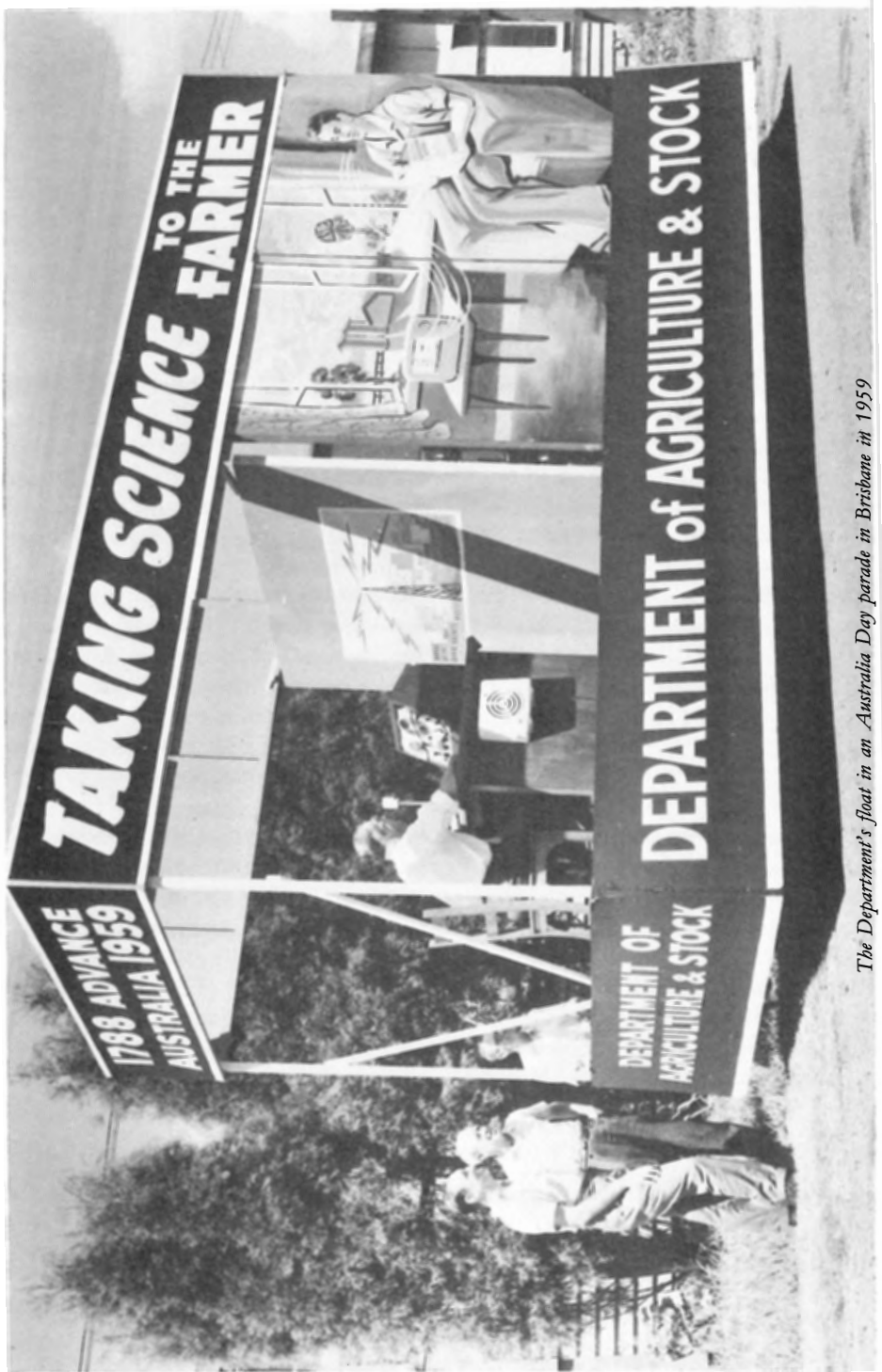
Charles Winders headed the branch, also editing the *Queensland Agricultural Journal (QAJ)*, the *Queensland Journal of Agricultural Science (QJAS)*, the Department's annual report to Parliament and all other publications put through it. After a reorganisation of the branch in 1957, E. J. (Ted) Hockings took over editorship of the *QAJ*, the Department's main extension medium. Winders remained editor of the *QJAS* and all other technical publications as well as the Department's annual report to Parliament, but became more involved in extension training projects with extension coordinator George Moule.

A popular reference publication, *The Queensland Agricultural and Pastoral Handbook*, had been issued in four volumes between 1938 and 1941. However, it was out of print by 1948 and the volumes were revised. Volume III, which dealt with insect pests and diseases of plants, and which urgently required revision because of the development of new chemicals, was reissued in 1951. Revised and enlarged editions of the handbook were then prepared, with Volume II (*Fruit and Vegetables*) issued in 1961 and Volume I (*Farm Crops and Pastures*) a year later. Officers of the publications section also handled several other major reference works, including *The Honey Flora of South-eastern Queensland* and *Tobacco Growing in Queensland*.

News service

Stewart Dick, a journalist, was appointed assistant editor and publicity officer in August 1949. He made special news releases almost daily, and revived the Department's *Weekly News Bulletin*, a series begun in 1936 but discontinued during the war, that was issued to metropolitan newspapers and radio stations.

After Dick's death in 1953 the Department appointed its first agricultural journalist, A. E. (Andy) Fisher. Fisher continued the *Weekly News Bulletin*, issued special news releases from the Minister and Under-Secretary, and prepared fea-



The Department's float in an Australia Day parade in Brisbane in 1959

ture articles for metropolitan and provincial newspapers and rural magazines. In 1959-60 the *Weekly News Bulletin* was renamed *Press Release*.

Radio was also used for extension work, with the information branch arranging for technical officers to give talks on agricultural topics on commercial and ABC radio stations. Radio stations themselves engaged technical and extension officers to give talks, especially in programmes such as the ABC's 'Country Hour'. A radio tape service was introduced in 1949 and tapes were sent to seventeen stations each week.

Photographic services

The photography section, whose members were A. A. (Bert) Salmon and his assistant, William Sanderson, serviced the publication, display and record requirements of field officers. In the 1950s they began providing colour slides of scientific subjects for both reference and lecture purposes. They also started to build up a central film library of 16 mm movie films on various agricultural topics and by 1960 the library had forty-eight films.

In the late 1940s a fire that started in the lift well in the William Street building destroyed much of the Department's photographic collection, dating back to 1897. Any prints that could be found were then copied and are among the pre-1950 photographs that appear in this book.

Library and abstracting services

The central library continued to build up a collection of reference books and journals from all over the world dealing with agricultural and pastoral subjects and related sciences. Charles Schindler was appointed librarian in 1945, but in 1959 the Public Library of Queensland assumed responsibility for the staffing of the library and Schindler was given the position of science abstractor. His first abstracts were issued in 1959 and the service came to be widely used by all branches.

Extension training

The director of the sheep and wool branch, George Moule, obtained a study fellowship under a grant from the United States Government and went to the USA in 1952 to examine extension methods in primary industries. On his return in 1953, with assistance from Winders of the information branch, Moule ran a pilot school in extension methods for selected officers.

A year later, Moule was appointed extension coordinator, also remaining director of the sheep and wool branch. The Department received financial support under the Commonwealth Extension Services Grant to inaugurate an extension consultant service, in which information services, photography and the library were consolidated. Its aims were to assist in coordinating extension activities throughout Queensland; to train staff in extension methods; and to serve as consultant to the divisions and branches in programme planning and all extension activities. One of its first projects was the organisation of schools in extension

methods, run in the 1950s by Moule, Winders and Fisher. John Wolfe, an experienced extension officer, was seconded from the sheep and wool branch in 1956-57. In the following year, he gained the degree of Master of Science after completing a course in extension education at Cornell University in the United States. He returned to the Department to train new officers in extension methods. Officers studying in Australia under the Colombo Plan were also trained in extension methods.

By 1962, most Departmental extension officers had received in-service training and Wolfe was transferred to Toowoomba, where he organised a soil conservation group in the Pittsworth district. New staff joined the information branch in the early 1960s to help with the extension training and evaluation programmes, an expansion made possible by the Commonwealth Dairy Industry Extension Grant. The Department also continued to receive assistance under the Commonwealth Extension Services Grant.

The first Toowoomba Farmers' Festival was organised by Departmental staff in Toowoomba in 1958 and by 1963 it had become an annual event. The Department's extension officers set up displays and information booths to provide up-to-date advice on agricultural matters. The festival was the forerunner of Farmfest, held each year in Toowoomba, at which the Department provides a large contingent.

Conclusion

The large increase in technical and advisory staff that occurred after World War II generated new responsibilities for the Department. One was the organisation and dissemination of technical information, including the latest research findings, to Departmental staff as well as farmers. Another was ensuring that advisory staff were applying extension methods that would allow technical information to reach farmers in the most efficient way. These responsibilities were borne mainly by the information branch.

PART 4

TECHNOLOGY

The early 1960s began a period of unprecedented application of technology in Queensland agriculture, a development guided largely by the Department. Productivity was improved through plant and animal breeding, better husbandry and mechanisation, and advances were made in the control of soil erosion and of pests, diseases and weeds.

By the early 1980s new problems had arisen to threaten the future of Queensland's rural industries: soil and water salinity, chemical resistance in insect pests, chemical residues, and poor market returns. These imposed new demands on the Department, which combined traditional research techniques and advanced information technology to assess and respond to the challenges.

A special feature of the Department in the late twentieth century is its increasing 'internationalisation'. In its first decades, the Department had to look overseas for expertise; today, it leads the world in the technology of subtropical agriculture, and sends its experts to other countries. The Department is also active in promoting Queensland's rural production on world markets.

Administration

The Department of Agriculture and Stock, so named for almost sixty years, was renamed the Department of Primary Industries on 26 September 1963. In some ways the new name was a misnomer as the Department was not given responsibility for mining and forestry, which are generally considered primary industries. Although it was occasionally confused with the Commonwealth Department of Primary Industry, the State Department became known throughout Queensland as 'the DPI'.

Five ministers and six directors-general have headed the Department of Primary Industries in the years since 1963.

J. A. Row

John Alfred Row was born at Ingham in 1905 and educated at Toowoomba Grammar School. In 1924 he bought a cane farm near Ingham, which he worked until his election to Parliament in 1960. After O. O. Madsen retired because of ill health in June 1963 Row became Minister for Agriculture and Forestry and then Minister for Primary Industries in September of that year. Although Row had been a Member of the Legislative Assembly for only three years, he brought a wealth of experience to the office from his long service in sugar industry organisations and local authorities. He was Minister until his retirement in 1972, and was knighted two years later for his distinguished and statesmanlike service to Queensland as a Parliamentarian and Minister of the Crown. As Minister, Row piloted twenty-nine Acts through Parliament.

V. B. Sullivan

Born in Launceston, Tasmania, in 1918, the son of a farmer, Victor Bruce Sullivan was educated at Toowoomba then ran a mixed farm at Jandowae. He was elected MLA for Condamine in 1960 and was appointed Minister for Lands and Forestry in 1968. He succeeded Row as Minister for Primary Industries in 1972.

Fifty-two Acts dealing with primary industries were passed during Sullivan's administration. One of the most significant and controversial was the *Milk Supply Act* 1977, which set up the Queensland Milk Board and the Milk Entitlements Committee to allocate quotas to dairy farmers. Sullivan was appointed to the Mines and Energy portfolio in 1980, and retired from Parliament in 1983.

M. J. Ahern

Born at Maleny in 1942, Michael John Ahern graduated from the University of Queensland as a Bachelor of Agricultural Science in 1964, then took up farming near Maleny. Elected MLA for Landsborough in 1968, he was appointed Minister for Primary Industries in 1980.

Ahern's term as Primary Industries Minister was short — he became Minister for Small Business and Technology in 1983 — but it was a period of considerable legislative activity. He introduced thirty-four Acts into Parliament and cleaned up much outdated legislation relating to primary industries. Ahern took a special interest in the Department's work, as one of the only two of its Ministers with qualifications in agricultural science. With the assistance of industry representatives, he developed the first documented agricultural policy for Queensland.

N. J. Turner

Neil John Turner was born at Charleville in 1934, attended the Queensland Agricultural High School and College at Gatton, and then took up a grazing property at Morven. He entered Parliament as MLA for Warrego in 1974 and became Minister for Primary Industries in 1983.

Turner took a particular interest in the problems of the sugar industry, which was badly affected by a slump in world prices. He initiated and participated in negotiations between the Commonwealth Minister for Primary Industry and representatives of sugar grower and miller organisations over assistance measures and proposals for deregulation and restructuring of the industry. Turner retired from Parliament in 1986.

N. J. Harper

Neville John Harper was born in 1926 at Brisbane, and entered the Royal Australian Navy on completion of his secondary education at the Brisbane Grammar School. He rose to the rank of sub-lieutenant before demobilisation in 1947.

Harper selected land at Wandoan in 1954 and was elected to the Legislative Assembly as Member for Auburn in 1980. He was appointed Minister for Justice and Attorney-General in 1983, becoming Minister for Primary Industries in December 1986. Harper is also a registered rural and urban valuer.

His administration of the Primary Industries portfolio has involved several major issues, including assistance measures for the financially troubled sugar and grain-growing industries, drought aid, the Brucellosis and Tuberculosis Eradication Campaign and problems associated with pesticide residues in meat. In April 1987 Harper visited several research centres in Europe and North America to study the use of irradiation, a technique used as an alternative to chemicals in the disinfestation of fresh produce to prolong the shelf life of various foodstuffs.

Directors-general

After 1963 the Department continued to be led by officers who had both high qualifications and proven ability in agricultural or veterinary science. This was

Left:
J. A. Row,
Minister for Primary
Industries, 1963-72



Right:
V. B. Sullivan,
Minister for Primary
Industries, 1972-80

Left:
M. J. Abern,
Minister for Primary
Industries, 1980-83



Right:
N. J. Turner,
Minister for Primary
Industries, 1983-86



N. J. Harper,
Minister for Primary Industries, 1986-

important as the Department had begun to recruit highly trained graduates, also encouraging its staff to seek higher qualifications. Later, as its administration became larger and more complex, superior administrative and managerial ability was also required from officers who aspired to senior leadership positions.

W. Webster

William Webster was appointed director-general and under-secretary in 1964, when Dr Alan Summerville left to take up his appointment as agent-general for Queensland in London. Webster had come from the New South Wales Department of Agriculture in 1947, to become director of the Department's division of animal industry. He was the first qualified veterinary scientist to hold the position of director-general.

Webster was seconded to the position of general manager of the public abattoir and chairman of the Queensland Meat Industry Board in 1964, and his deputy, W. J. S. Sloan, served as acting director-general. In 1965 Webster took up his appointment on a permanent basis and Sloan replaced him as director-general.

W. J. S. Sloan

William James Stuart Sloan was born at Atherton in 1912 and educated at the Brisbane Grammar School. He graduated as a Bachelor of Science and was later awarded a Master's degree from the University of Queensland. Sloan joined the Department as an entomologist in 1934 and had a successful career in the division of plant industry. His greatest single contribution to Queensland agriculture was his introduction of grain sorghum hybrids from the United States in 1957-58, during his term as director of the agriculture branch. Sloan died in 1965, the year in which he became director-general.

J. M. Harvey

Dr James Meiklejohn Harvey became director-general and under-secretary after Sloan's death, and headed the Department until his retirement in 1976. In his forty-three-year career he made a significant contribution to Queensland's rural industries, first as a scientist and later as an administrator. Harvey joined the Agricultural Chemical Laboratory as a cadet in 1933 and graduated with a Science degree from the University of Queensland in the following year. His study of fluorosis in sheep (a condition caused by high fluoride levels in water) in western Queensland earned him a Doctorate of Science. In 1956 Harvey was appointed head of the biochemical branch of the Animal Research Institute. When the new biochemical laboratory was built there in 1976, it was named the J. M. Harvey Biochemistry Laboratory in his honour. In 1974 Harvey was awarded the Imperial Service Order (I.S.O.) for meritorious service.

A. A. Ross

Alan Alexander Ross, Harvey's deputy since 1965, became director-general in 1976. Born at Charters Towers, Ross attended the Queensland Agricultural High School and College. He later graduated from the University of Queensland with

an Agricultural Science degree and joined the Department as a horticultural adviser. Ross gained a Master's degree in Agricultural Science from the University of Queensland in 1945. After serving at various country centres, he was transferred to Brisbane in 1956 to head the standards branch.

In 1960 Ross was awarded the advanced certificate at the Australian Administrative Staff College at Mt Eliza, Victoria, and two years later was appointed director of marketing. As deputy director-general and chairman of both the Research Stations and Extension Services Boards between 1965 and 1976, he travelled all over Queensland. Ross studied extension organisations in major primary-producing countries during a world tour in 1970, and two years later initiated a regionalisation of the Department's extension services. He retired in 1978 and was awarded the Imperial Service Order (I.S.O.) in the following year.

E. O. Burns

Elton Owen Burns became director-general and under-secretary in 1978. Brisbane-born, he joined the Department in 1933 as a cadet in the despatch section and obtained accountancy qualifications by correspondence. Burns was encouraged by Lorne Cameron, who had visited the USA as private secretary to Minister Frank Bulcock in the 1930s, to concentrate on farm management. He graduated with a Bachelor of Commerce degree from the University of Queensland in 1950.

Burns was a foundation member of the economic services branch, formed in 1958, and four years later became its director. In this capacity, he initiated farm-management projects, appointed agricultural economists to country centres, and set up a farm management accounting service.

G. I. Alexander

Graham Irving Alexander was appointed director-general and under-secretary when Burns retired in 1980. Born at Ayr in 1928, Alexander graduated as a Bachelor of Veterinary Science from the University of Queensland in 1950, and joined the Department. He served as a veterinary officer and cattle husbandry officer at Rockhampton until 1955, when he moved to the cattle husbandry branch in Brisbane.

Alexander studied genetics and physiology at Oregon State College, USA, and was awarded the degrees of Master of Science and Doctor of Philosophy from that institution in 1959. Appointed director of the cattle husbandry branch in 1964, he developed a performance recording programme for beef cattle and expanded the Department's artificial insemination services to include beef cattle. He also accelerated a breeding programme to develop the Australian Friesian-Sahiwal, a tick-resistant tropical dairy breed with high milk output.

As director-general, Alexander has organised the Department to meet increasing demands from national and international committees and agencies involved in agricultural policy and research, as well as its expanding overseas training and consultation roles. He is active in professional associations, serving as president of the Australian Society for Animal Production and the Australian Veterinary Association, and is a Fellow of those bodies and of the Australian College of Vet-



Left:
W. Webster,
Director-General
and Under-Secretary,
Department of
Primary Industries,
1963-64

Right:
W. J. S. Sloan,
Director-General
and Under-Secretary,
Department of
Primary Industries,
1965



Left:
Dr J. M. Harvey,
Director-General
and Under-Secretary,
Department of
Primary Industries,
1965-76

Right:
A. A. Ross,
Director-General
and Under-Secretary,
Department of
Primary Industries,
1976-78



Left:
E. O. Burns,
Director-General
and Under-Secretary,
Department of
Primary Industries,
1978-80

Right:
Dr G. I. Alexander,
Director-General
and Under-Secretary,
Department of
Primary Industries,
1980-

erinary Surgeons and the Royal Australian Institute of Public Administration. Alexander was created an Officer of the Order of Australia (A.O.) in 1986, an honour conferred on him for his service to agriculture, particularly in the field of animal production.

Departmental directorate

Alexander established a Departmental directorate, one of his main organisational changes. The idea of special officers to help in the administration of the Department was not new; the positions of special administration officer and two assistant under-secretaries for technical and administration matters had been created in 1945, because of the increased responsibilities imposed on the under-secretary during the war years. In 1958-59 the position of assistant under-secretary (technical) was abolished and that of deputy director-general was created. In 1965-66 the special administration officer was replaced by a chief advisory officer (administration), whose function was to advise the director-general on finance and other matters, and in the following year the position of assistant under-secretary was abolished.

With the increasing complexity of the Department and its greater involvement in national and international committees and organisations, positions at a similar level were required in other areas, so in 1980-81 the position of chief advisory officer was abolished and a directorate of three assistant directors-general was established. Desmond Lapidge was appointed to planning and development, Brian Oxenham to research and John Ryley to extension. Ken Shea filled a further position, for administration, created in 1983.

Assistance to primary producers

From the mid 1960s the Department became increasingly involved in setting up permanent administrative structures to assist primary producers who were in difficulties because of drought or some other natural disaster or because of falling prices for their products. Assistance to primary producers is administered by the Departmental directorate.

In May 1965, when more than half of Queensland was in the grip of one of the worst droughts on record, Premier Nicklin set up a drought committee, with representatives from the Primary Industries, Transport, Treasury and Railways Departments and the Irrigation and Water Supply Commission. Under the chairmanship of the Department's director of cattle husbandry (Alexander), it reviewed the incidence of drought and strategies that could be adopted by producers. On the committee's recommendation, the Graziers' Drought Relief Scheme was set up to assist producers. In 1968-69 more than 77 per cent of the State was declared drought-stricken and drought-relief committees, with representatives from the Department, were formed in many centres to advise the Agricultural Bank, which administered the scheme, on the merits of applications for assistance.

The Department set up the Drought Secretariat in 1970, under Bill Mawson, to develop a long-term approach to drought problems and their mitigation, and

to provide technical support for the government's drought-relief strategy. The secretariat represented the Department on an Australia-wide study group formed in 1972 to study all aspects of drought, and Queensland was selected for a pilot study to test various drought strategies.

The Agricultural Bank, which had been established within the Department of Agriculture in 1902 and transferred to the Treasury in 1938, was transferred back to the Department of Primary Industries in 1969. The bank administered relief schemes introduced during the severe droughts of the 1960s, as well as making normal loans to farmers. Its manager Frederick Strutton was succeeded by Allan Dellit in 1979. The bank was transferred back to the Treasurer's control on 1 July 1986, to become part of the new Queensland Industry Development Corporation.

The Rural Reconstruction Board was established in 1971, under the chairmanship of J. A. Barton, to administer structural adjustment assistance schemes introduced by the Commonwealth and Queensland Governments. Operating within the Treasury Department, the board acted as 'lender of last resort', its objective being to help farmers remain viable. In 1977 the board was transferred to the Department of Primary Industries. In that year, measures for financial assistance provided by the Rural Reconstruction Scheme, the Beef Cattle Assistance Scheme and the Dairy Adjustment Programme were brought together under the Rural Adjustment Scheme. In 1980 Barton was succeeded by Bill Mawson, former head of the Drought Secretariat. Mawson retired in 1982 and Robert Bygott and Dr Barry White, both Departmental officers, were appointed chairman and deputy chairman of the board until July 1986, when it was absorbed into the Queensland Industry Development Corporation under the control of the Treasury Department.

After the transfer of the Agricultural Bank and the Rural Reconstruction Board out of the Department, the Drought Secretariat remained the main vehicle for Departmental assistance to primary producers affected by seasonal conditions. The secretariat considers applications for assistance and makes recommendations to the Treasury Department for the payment of relief from funds allocated by the Commonwealth and Queensland Governments. From time to time Departmental officers are called on to recommend relief payments or special loans to primary producers affected by other natural disasters, such as floods, cyclones or frosts. The secretariat coordinates these activities as it is centrally placed within the Departmental directorate, reporting to the director-general.

Administrative branches

The administration division comprises branches that service all sections of the Department. Some, such as the research stations, biometry, information and extension training and extension services branches, are connected with the Department's technical work. (These are discussed in Chapters 40, 50 and 51.) Others are concerned with the Department's general administration and are controlled by the director of administration; they include the administrative services, accounts and organisational services branches.

In 1963 the clerical and general division, headed by assistant under-secretary



The Department's William Street offices being fumigated for West Indian termite in 1979. By this time, most branches had moved to offices in Comalco House (now State Law Building) and Mineral House, both in George Street.



The Department's regional office at Mareeba, completed in 1980

H. (Harry) Barnes, with E. C. R. (Cec) Sadler as accountant, was responsible for general administration matters in the Department. Barnes died in 1968 and Sadler retired in the same year, so that Roger Riley became assistant under-secretary, with H. J. (Hammy) Evans as accountant.

When Riley became assistant to the director-general in 1973 Evans replaced him as assistant under-secretary, with John Reardon as accountant. Evans retired in 1979 and Eric White was appointed assistant under-secretary. In the following year White became deputy chairman of the Sugar Board and was replaced by Reardon, who moved to the Treasury Department in 1982. The assistant under-secretary was then redesignated director of administration, and John Gibb was appointed to the position.

In the same year, the organisational services branch was created, under Ray Nimmo, to look after personnel development and administration as well as management services. From 1980 the accounts branch was headed by Phil Griffin, who became the Department's financial controller, a new post, in 1985. In 1986 Nimmo replaced Gibb as director of administration and Jim Gillespie became director of the organisational services branch.

The quarantine services section was established within the administrative services branch in 1986 to take charge of the Quarantine and Export Centre at Eagle Farm, in Brisbane. The centre had been set up in 1974 and by 1986 thirty-five technical officers from the horticulture, veterinary services and standards branches were stationed there to make import and export quarantine inspections at the nearby international airport and shipping terminals. Before 1974 quarantine staff had operated from William Street, while standards branch inspectors overseeing the export of grains had had an office at the Pinkenba Grain Terminal.

Staff training

The Department's main difficulty since the war had been attracting and keeping suitably trained staff, a problem that arose partly out of the slowdown in tertiary training during the Depression and World War II and was exacerbated by the low salaries offered by the government compared with those being offered in private enterprise. In 1961-62, eighty-six scientists and technicians were appointed but forty-five resigned or retired.

Some trained staff were recruited and retrained through the public service cadetship and scholarship schemes introduced in the late 1950s. Officers recruited as cadets after matriculation pursued part-time studies, while scholarship-holders, who were full-time students, were bonded to the Queensland public service after graduation. By the mid 1960s the schemes were starting to bring results, with significant numbers completing their courses and taking up appointments with the Department. As more tertiary graduates became available, the role of the cadetship system changed. The Public Service Board introduced the Study and Research Assistance Scheme (SARAS) in 1982, and since then more than one hundred officers have been awarded assistance for full-time study and research.

The government's policy of no growth in staff numbers in the public service since 1976 has led to a greater emphasis on personnel management, especially on

management training for supervisors. The Department conducted management development courses and also sent officers to the Queensland Institute of Technology to undertake postgraduate diploma courses in business management. The organisational services branch, which takes in personnel administration, development and management services, is used as a model for other government departments.

Conclusion

The Department has grown and changed enormously in the past twenty-five years. The change in name to 'Primary Industries' in 1963 did not confer any added responsibilities in itself, but since then the Department has been given added roles. Since the mid 1960s it has become more visible in country areas, with large numbers of advisory and research staff posted to district centres and research stations. It has also widened its scope of research to include new tasks and technologies and recruited the staff to carry out this work.

The years of growth were not without problems; trained scientists were hard to find, and many experienced officers left because of relatively low rates of pay and poor laboratory facilities. But these problems were addressed and in the late 1980s the Department can boast a professional work force, using the latest equipment in modern offices, research stations and laboratories.

Research stations and laboratories

The Department's network of laboratories and research stations, re-established after World War II, continued to expand after 1963. Centres previously designated 'regional research stations' assumed a wider role, with their emphasis on particular industries, environments or problems. This trend towards specialisation was also evident in the development of specialist laboratories and research institutes from the 1960s.

Research stations branch

Between 1945 and 1960, the Department's six regional experiment stations (Ayr, Biloela, Gatton, Hermitage, Kairi and Millaroo) had been administered by the division of plant industry through its regional experiment stations branch. As an increasing amount of livestock research was being undertaken, the Research Stations Board was established in 1961 to take control of the stations. Its members were the divisional directors of animal industry, dairying and plant industry, with the deputy director-general as chairman. The regional experiment stations branch was abolished and replaced by the research stations section, established in central administration to oversee day-to-day operations. Gordon Allen was its first executive officer. Two research stations, Theodore and Walkamin, were added to the section's responsibilities in 1961.

The section was raised to branch status in 1983, with Bryan Rodda its first director, and a number of facilities previously administered by other branches, including the five horticultural research stations (Kamerunga, Bowen, Maroochy, Redlands and Applethorpe), were transferred to it. In 1981 responsibility for the metropolitan gardening staff, who tend the gardens around government buildings in Brisbane, including Government House and the Queensland Cultural Centre, was transferred from the horticulture branch to the research stations branch. The engineering services section, established in the division of land utilisation in 1974, was transferred to the branch in 1984. The research stations branch administered twenty-seven research stations at the end of 1986.

New facilities on existing research stations

In 1963 some of the Department's twenty-two research stations were old centres that had been reopened after World War II, with outdated office and laboratory

facilities. The easier availability of funds and materials in the 1960s, and industry assistance, allowed a start to be made on a building and refurbishing programme to bring them up to date, and by the mid 1980s all of the older stations, such as Hermitage, Kairi, Kamerunga and Maroochy, had new facilities.

Some centres were enlarged to include specialist facilities. For example, an artificial insemination export centre was built at Redlands in 1972 and the Poultry Research Centre was transferred from Rocklea to new facilities there in 1984; a new freshwater fish research facility was built at Walkamin in 1981; and in early 1987 a genetic germplasm centre for subtropical crops was being built at Biloela, funded by the Commonwealth Government. (This will be one of a network of genetic germplasm centres throughout Australia.)

New research stations

Several new research stations have been established since 1963. The first was the Brigalow Research Station, opened in 1964, in the Dawson River Valley between Theodore and Moura. It serves as a research and demonstration centre for integrated crop and livestock production systems on land typical of the former brigalow country.

Bowen Horticultural Research Station was established in 1964 on a small area of land previously occupied by the Don Delta State School. The Committee of Direction of Fruit Marketing leased a larger adjoining area and made it available to the Department. Station expenses are met partly by contributions from local fruit and vegetable growers.

Southedge Tobacco Research Station was established in the Mareeba Irrigation Area in 1969 to take over the tobacco research previously done at Parada. Other crops, including coffee, cassava and horticultural tree crops, have also been tested there in recent years. The station operates in conjunction with laboratories in the Department's large complex at Mareeba.

The J. Bjelke-Petersen Research Station was opened in 1975 just outside Kingaroy to centralise crop research done in the South Burnett district. The station also accommodates advisory and regulatory staff previously located in the centre of Kingaroy.

The Department had had a small pilot irrigation farm at Emerald since the development of irrigation there in 1972, but needed a larger area for research after expansion in dryland and irrigation cropping. Thus Emerald Research Station was opened in 1976 to service the central highlands district.

The Primary Industries Department controlled fisheries research between 1970 and 1974, when responsibility was transferred back to the Department of Harbours and Marine. The Southern Fisheries Research Centre at Deception Bay was established in 1972 and was operated by the Department, in conjunction with CSIRO. Another saltwater centre was operated at Mourilyan Harbour, and a freshwater research facility at Walkamin Research Station. By the time the Department again assumed responsibility for fisheries research in 1980, CSIRO had moved to a new research centre at Cleveland, the Mourilyan Harbour facility had been closed and a new fisheries research station had been set up at Burnett



Ron Parsons, horticulturist, working in a pineapple trial at Maroochy Horticultural Research Station in 1900



Steer grazing on fertilised pastures at the South Johnstone Research Station, near Innisfail

Heads, near Bundaberg. The Deception Bay and Burnett Heads facilities were transferred to the Department, and in 1980-81 the Northern Fisheries Research Centre was opened at Cairns.

Mutdapilly Research Station, south of Ipswich, was established in 1981 to concentrate on husbandry and nutrition in cattle. Dairy and beef cattle research were transferred there from Ayr and Coolum, and development of the Australian Friesian-Sahiwal, a tropical dairy breed, was continued at Warrill View Field Station established nearby.

In 1985 the Department established three new research stations: one at Bundaberg, to study alternative crops to sugarcane for the coastal Burnett district; another at Roma, set up to research crops and pastures suited to the Maranoa district; and a third, at Leichhardt Downs, near Home Hill, for research into hydrosalinity problems and irrigated crop production in the expanded Burdekin River Irrigation Area. In 1987 the Department acquired 'Batavia Downs', a 200 000 hectare pastoral holding near Weipa, for research aimed at improving the cattle industry on Cape York Peninsula.

Stations closed

At the same time as new research facilities were being set up in response to the changing needs of the State's agricultural industries, some older stations were closed down and facilities on others were reassigned to more appropriate research. The first facility closed since the Depression of the early 1930s was Theodore Irrigation Research Station. It had been acquired from the Bureau of Investigation of Land and Water Resources when that body was abolished in 1957, and staff based at Biloela had done some research there into irrigated pastures and cotton. Theodore was closed in 1970 and the research was transferred to the Biloela and Brigalow stations.

Parada Research Station had been established in the Mareeba-Dimbulah Irrigation Area in 1952, specifically for tobacco research. This work was transferred to Southedge in 1969 but a small area of heavy soils on the station, which was not suited to tobacco, was developed for pasture and pasture-seed production trials. One, a grazing trial, gave the highest cattle weight gains ever recorded in the world from fertilised and irrigated pangola grass pastures. However, Parada was closed in 1976 during the beef slump, when pasture development was not economic.

Coolum Field Station had been established in 1952 to undertake research on pastures and grazing systems for the wallum, a coastal strip of infertile sandy heath country stretching from Coolangatta to Bundaberg. However, by the late 1970s wallum development for cattle grazing had become uneconomic because beef prices had dropped but land values had risen greatly and the station was closed in 1982.

Also established in 1952 was Inglewood Tobacco Experiment Station, set up to research tobacco-growing on lands served by the Macintyre Brook. Tobacco-growing declined and other crops such as cotton, navy beans and fruit were tested on the station, but by 1985 Inglewood had outlived its usefulness and was sold as a farming property.

Research institutes

Over the years the Department has set up administrative entities to undertake or coordinate research for particular industries or purposes. At the end of 1986 it operated the Animal Research Institute (ARI) at Yeerongpilly, the Arid Zone Research Institute (AZRI) at Longreach and the Queensland Wheat Research Institute (QWRI) at Toowoomba.

The Animal Health Station at Yeerongpilly was renamed the Animal Research Institute (ARI) in 1955. Its director (currently Lionel Laws) has deputy divisional director status within the division of animal industry. He administers the pathology and biochemistry branches, both based at Yeerongpilly, as well as the regional veterinary laboratories at Oonoonba and Toowoomba, the Brucellosis and Tuberculosis Testing Laboratory at Rockhampton and similar testing facilities at Roma and Charleville.

The Yeerongpilly complex also includes facilities and branches that are not under the direct administrative control of the director of ARI. These include the Wool Biology Laboratory, the sheep and wool branch, and the Department's QDPINET computer network centre.

Land was acquired at Longreach in 1985 to establish the Arid Zone Research Institute. This was set up to coordinate all of the Department's research efforts in western Queensland, including the work of the Toorak Research Station, at Julia Creek, and the Charleville Pastoral Laboratory.

The Queensland Wheat Research Institute was established at Toowoomba in 1962 on the recommendation of the Queensland Wheat Industry Research Committee. This committee determines policy, although the Institute is staffed and managed by the Department. Its buildings and capital works are financed from the Commonwealth Wheat Research Trust Account, which is funded by a tax and a voluntary levy on wheat growers. Previously operated by the Department's agriculture branch, the Institute became a separate entity within the division of plant industry in 1976. Staff from the agriculture, plant pathology, agricultural chemistry and soil conservation research branches are located there.

Research laboratories

A number of laboratories are administered by branches and operate either singly or as part of larger laboratory-office complexes. In 1962 the Department acquired land at Indooroopilly, a suburb of Brisbane, to establish modern laboratories that would replace inadequate and overcrowded facilities in the old William Street building. New laboratories were built to house entomology, botany, plant pathology, standards, agricultural chemistry, soil conservation and land resources staff. The complex was completed in 1985, and was officially opened in that year by the Minister, Neil Turner, as the Agricultural Research Laboratories.

A laboratory complex was started in 1962 at Wacol, between Brisbane and Ipswich. The artificial insemination centre was built there in that year, the tick fever research station two years later, the herd improvement laboratory in 1974 and the pig research station in the following year. The artificial insemination centre was expanded in 1980.



Brian Cull (right), officer in charge, explaining tissue culture to Primary Industries Minister Mike Abern in the glasshouse at the opening of the Nambour and Maroochy office and laboratory complex in 1983



Toorak Research Station, near Julia Creek, in 1986

The Food Preservation Research Laboratory and the Dairy Research Laboratory were built at Hamilton, a suburb of Brisbane, in 1960 and 1967 respectively. In 1985 both came under the administration of the food research and technology branch. The Tobacco Research Laboratory, established at Northgate in 1957, was closed in 1973.

A number of regional laboratory-office complexes have also been built since 1963 to house staff doing research, analysis and testing work, as well as those in advisory or regulatory positions. Major complexes were built at Toowoomba in 1974 and Mareeba in 1978, with smaller facilities at other centres. A laboratory-office complex was built at Ayr in 1981 to accommodate research and advisory staff, expanded to service the new Burdekin River Irrigation Scheme.

The Charleville Pastoral Laboratory was established in 1962 to study pasture and animal production problems in south-west Queensland. In 1982-83 the Department bought 'Croxdale', a property near Charleville, to carry out commercial-scale experiments in conjunction with the laboratory.

Station advisory committees

When the regional research stations were transferred to the Research Stations Board in 1961, committees were formed to draw up programmes of investigations so the stations would meet both district and industry needs. Their members included local research and extension representatives of the dairying, animal industry and plant industry divisions.

In a 1965 report, Director-General Sloan advocated that research projects be better planned and timed to speed up the practical application of results. The Department sought local industry participation, and by 1986 industry representatives were serving on advisory committees for the 'Swan's Lagoon' and Toorak research stations and on industry consultative committees for the Biloela, Brigalow, Hermitage, Kairi and J. Bjelke-Petersen research stations.

Conclusion

Since the 1960s the Department has recruited more specialist staff to undertake research, apply increasingly complex technology and oversee its new responsibilities in areas such as fisheries and soil conservation research, and has upgraded and expanded its research centres to provide these specialists with the latest facilities. At the end of 1986 the Department had forty-two research establishments at thirty-five centres, as well as many individual laboratories in its major laboratory complexes.

Field crops and pastures

The Department is responsible for agronomic research and extension in all crop and pasture industries except sugar. (The sugar industry is serviced by the Bureau of Sugar Experiment Stations, which became a statutory authority in 1951.) The period 1963–86 was one of enormous expansion in Queensland's crop and pasture plantings: the area of crops doubled, to reach three million hectares, while the area of sown pastures increased from one million to more than four million hectares.

Division of plant industry

Overall administration of the Department's work in crops and pastures is vested in the division of plant industry. In 1963 the division had five branches — agriculture, horticulture, soil conservation, the Agricultural Chemical Laboratory and food preservation research — and responsibility for the botany, entomology and plant pathology sections. Since then many changes have taken place and at the end of 1986 the division had six branches — agriculture, horticulture, entomology, plant pathology, botany and pasture management — and administered the group at the Queensland Wheat Research Institute. It also included the crop protection management unit, created in 1985.

Dr Gordon Miles directed the division from 1964 until his retirement in 1974. Brian Oxenham was then director until 1980, followed by Gordon Purss, who retired in December 1986, to be replaced by Dr John Leslie. Stan Marriott was appointed deputy divisional director, a new position created in 1967. He retired in 1973 and was followed by Norman Fox (who subsequently became chief advisory officer in 1978 and then deputy director-general), Purss until 1981, and then Leslie. Neville Kruger, director of horticulture, filled a second deputy director's position, created in 1984, taking with him the title of chief quarantine officer (plants).

Queensland Wheat Research Institute

The Queensland Wheat Research Institute (QWRI) was established at Toowoomba in 1962, with industry funds. It is not part of but is staffed and managed by the Department, and its director has branch director status in the division of plant industry. Dr Tom McKnight, a plant pathologist with the Department at

Toowoomba, was its first director. He left in 1967 to take up the position of chief lecturer in plant science at the Queensland Agricultural College.

Dr John Leslie, an agrostologist who had joined the staff of the Institute when it opened, then became director. Leslie took leave in 1973 to undertake postdoctoral studies in Western Australia and John Harbison, principal agronomist at Toowoomba, acted as director until the appointment of Dr Alan Clarke in 1975. Clarke had been employed by the Department of Agriculture in South Australia after postdoctoral studies in wheat nutrition in the United States.

Agriculture branch

The agriculture branch was responsible for research and advisory services in field crops, forage crops, heavy vegetables and pastures until July 1986, when the pasture management branch was created. In 1967 the branch was rearranged into three sections, each under an assistant director — agronomy (field crop research), agrostology (later pasture agronomy) and extension (later extension agronomy, or field crop and pasture extension services) — with planning and implementation of research programmes supervised by regional leaders.

Another senior position in the branch was that of the director of tropical agriculture, held by David Atherton. Atherton died in 1963 and was succeeded by John Groom, an agronomist. Groom was appointed assistant director of the information and extension training branch in 1970 and the position of director of tropical agriculture lapsed.

After Marriott's appointment to the division of plant industry in 1967, Oxenham moved from the plant pathology section to become director of agriculture, with Dr L. R. (Ross) Humphreys as his assistant. Humphreys later joined the University of Queensland, where in 1987 he was Reader in Pasture Agronomy and head of the Department of Agriculture.

Oxenham was promoted to the deputy directorship of the division in 1973 and was succeeded by Norman Fox. Fox followed Oxenham as deputy director a year later. Leslie left the QWRI to become director of agriculture in the same year and in 1981 became deputy divisional director. In that year, Don McNee was appointed director of the agriculture branch.

In 1986, the pasture agronomy section of the agriculture branch became the pasture management branch, with Dr Barry Walker as director. Don Cameron was assistant director. The new branch was given responsibility for pasture, fodder crop and woody weed research, while the agriculture branch continued to provide extension services in these areas.

Field-crop research

The Department's field-crop researchers seek to optimise production by defining the best combination of variety, planting date, plant population, spacing, and water use, and by overcoming nutrition, disease, insect pest and weed problems. The agriculture branch's field-crop research covers three broad areas: genetic improvement; crop agronomy (which includes planting time, plant population and nutrition); and cropping systems. Most of this work is done at thirteen

research stations, extending from Southedge, near Mareeba, to Hermitage, near Warwick, and west to Emerald and Roma, as well as at QWRI at Toowoomba.

Cereal grains

The QWRI's major activity is wheat breeding to produce new varieties that are resistant to constantly changing disease pathogens. Its first variety was Oxley, released in 1974, and it has made eight releases since then. The proportion of the State's wheat crop planted to Departmental varieties increased from 10 per cent to 75 per cent in the decade to 1983, the year in which team leader Dr Jim Syme was awarded the Farrer Memorial Medal for his contribution to wheat breeding. QWRI staff also study wheat physiology, nutrition, quality, surface management and the control of pests, diseases and weeds. Agriculture branch officers based there have devised physiology and crop nutrition programmes, which resulted in two important recommendations: for the early planting of wheat, particularly in central Queensland, and the use of nitrogen and phosphorus fertiliser.

A sorghum hybrid breeding programme was started in 1957 at Hermitage Research Station, using seed from the United States. Three hybrids were released in 1962-63: two of the original introductions, and Brolga, which was bred by the Department. In trials, Brolga recorded a significant increase in yield over the open-pollinated variety Alpha then being used. In 1962 a second programme was started at Biloela Research Station, with its major objective the production of hybrids with better standability than Brolga had when grown in drier areas, and the hybrid Q5161 was released in 1971. Since then, the Department has supplied breeding and parental lines to commercial seed companies for their breeding programmes. These lines incorporate genetic resistance to a number of important diseases and to sorghum midge, an insect that costs the industry about \$15 million each year. The sorghum research programme has recently been widened to seek better adaptation of the crop to the semi-arid tropics of central Queensland.

The Department's barley researchers, based at Hermitage, have concentrated on breeding varieties suitable for malting, the most profitable market, as well as working on better yield and disease resistance. Barley types used for manufacturing and feed are also produced. The first release from the Hermitage programme, made in 1969, was of the malting barley Clipper, a variety introduced from South Australia. A locally bred feed barley, Corvette, and Grimmett, the first malting barley bred in Queensland, were released in 1982.

Plant breeder Ian Martin was appointed in 1962 to develop a maize hybrid adapted to the Atherton Tableland. He produced two hybrids that were resistant to tropical rust and by 1970 more than 95 per cent of the Tableland's maize crop was Kairi-bred hybrids. Martin was awarded the Medal of the Order of Australia (O.A.M.) in 1983 for his services to the Queensland maize industry. The development of disease-resistant hybrids was a prerequisite for further work on yield improvement through the application of nitrogen fertiliser, which was important as Tableland soils had declined in fertility since clearing early in the century. Further yield increases have been obtained by increasing plant density of the modern short-statured hybrids bred at Kairi.

Experiments at Millaroo in the 1950s had shown that paddy rice could be



Plant breeder Ian Martin, who succeeded in producing high-yielding maize hybrids for the Atherton Tableland, pollinating maize at Kairi Research Station



Gerry Gibson, agronomist at Hermitage Research Station, operating the Department's 'moon buggy', a mobile soil sampler especially suited to plot and farmer crop trials



Ron Moore (right), with Peter Keys (left) and Brian Duffy, inoculating sorghum seedlings with sugarcane mosaic virus to screen for resistance at the Biloela Research Station in 1974. Moore pioneered hybrid sorghum breeding in Queensland.

grown successfully in north Queensland. When the first commercial crop was grown in 1968, the Department arranged for the grain to be milled locally and for a southern-based marketing organisation to handle the crop. The Rice Marketing Board was established in 1971 and rice production has expanded since then in the Burdekin and Herbert River Valleys and at Mareeba. The industry was based on the tall-growing and long-grained United States variety Bluebonnet and its replacement, Starbonnet. However, Dr Michael Cox started a breeding programme at Ayr in 1981 and five years later released Lemont, the first semi-dwarf rice variety grown commercially in Queensland.

Legumes

In the early 1960s agronomists began a research programme at Hermitage to find the right combination of variety, planting time and plant population for successful soybean production. Their work, complemented by research at the University of Queensland, laid the foundation for further development of the industry. The Department's soybean breeding programme, led by Dr John Rose, began at Hermitage in 1970 and has produced high-yielding varieties with resistance to disease. Research was also done on the phosphorus fertiliser requirements of the crop and the use of irrigation. Queensland's average soybean yields have increased threefold since the late 1960s.

Navy bean production was insignificant until the improved varieties Kerman and Galloway were bred by the Department in the 1960s. The breeding programme continued, aimed at producing varieties with more compact growth, higher yields and disease resistance, and two were released for commercial production in 1977. Plant breeder Dr Robert Redden began work at Hermitage in 1982 and four years later released two varieties of high-yielding navy bean that were resistant to bacterial blight and rust.

Although peanuts had been grown in Queensland for about fifty years, yields had not improved in that time. In the late 1960s Departmental agronomists looked at factors such as time of planting, fertilisers and plant population, but commercial yields still showed no improvement, a problem attributed to reliance on old varieties. In 1977 Dr Ray Shorter was appointed to mount a breeding and improvement programme, and eight years later he released McCubbin, the first Australian-bred peanut variety.

Cotton

Although John Harbison's work at Biloela in the 1940s had proved that much higher yields could be achieved through irrigation, in 1963 most Queensland cotton was still raingrown. The Department, recognising that recent improvements in mechanical harvesting increased production efficiency from irrigated crops, initiated further research. Work at Biloela and on the Darling Downs in the 1960s showed that yields could be more than doubled by correct irrigation management of improved varieties, combined with fertilising and pest control. In the 1970s cotton researchers concentrated on breeding plants with insect pest resistance, high yield, and fibre length and strength.

This large investment in research contributed significantly to cotton once again

becoming a major industry in Queensland. By 1985 the area under the crop had expanded fivefold, to 52 000 hectares — but, more importantly, average yields had increased from 150 kilograms of raw cotton (lint) per hectare in the early 1960s to more than 1000 kilograms per hectare in the 1980s.

Other crops

The Department's priorities in tobacco research in the 1960s were in plant breeding and nutrition. Much research was done on quality problems caused by high chloride levels in irrigation water in the Burdekin Valley, at Bundaberg and at Inglewood, but tobacco production eventually declined in those areas. After CSIRO withdrew from tobacco research in 1975 the Department was the only body researching the crop in the State. Its work is done at Southedge, whence two varieties, ZZ100 and Southedge, have been released.

The State's sunflower crop increased from less than four thousand hectares in 1963 to nearly two hundred thousand in 1985. In the early 1960s the crop was grown for birdseed, but between 1967 and 1970 the Department introduced more than a hundred oilseed varieties, as vegetable oils had become lucrative. Breeders at Hermitage then concentrated on producing sunflowers with disease resistance, higher yields and better oil quality; at the same time agronomists studied 'optimum' planting time, plant populations and variety response to climatic conditions. In 1983-84 the Department released lines derived from crosses between oilseed sunflower and a wild sunflower found in Queensland. These hybrids were resistant to the most important sunflower diseases, including sunflower rust and *Alternaria*.

Tea was another crop guided by the Department into commercial production. The crop had been researched at the Bureau of Tropical Agriculture at South Johnstone since its establishment in 1935. Trials continued after World War II, looking particularly at mechanical harvesting, and in the late 1960s the Department began an agronomic research programme and established an experimental tea-manufacturing laboratory at South Johnstone. Later, a private commercial factory, based on large tea plantations, was built at East Palmerston. By the early 1980s Australia's tea industry was firmly established in north Queensland, and Nerada tea, the brand produced there, is now widely sold.

Agriculture branch staff did trial work on many other crops. Despite research, some, such as linseed and arrowroot, declined because of market forces, but efforts were directed at several new crops, including mung beans, safflower and chick peas, which became commercial successes. From time to time trials were undertaken to assess the commercial potential of crops new to Queensland, for example, cassava, amaranthus and sesame. Other work was directed at improving established crops, such as potatoes, sweet potatoes, onions and pumpkins.

Cropping-systems research

As well as research on individual crops, since the early 1960s the agriculture branch has done cropping-systems research, that is, looking into tillage practices and cropping sequences that maximise returns while conserving the soil resource.

The longest-running tillage experiment was started at Hermitage by Jack Littler and John Marley in 1968 and is still continuing.

Research on weeds of commercial crops became important in the 1960s because of the high purity standards required in export grains and planting seed and the increasing economic cost of weeds in cropping systems. Several agronomists were then appointed to undertake weed research on a regional basis, and have developed mechanical and chemical strategies for the control of most weeds in field crops. However, the problem of controlling weeds on fallow land is a major deterrent to the adoption of conservation cropping systems and this is currently a priority area of research for weeds agronomists in all regions of the State. The crop protection management unit, set up within the division of plant industry in 1985 and headed by Dr Jim Syme, is establishing a computerised database and information management system to sort and provide information on the weed- and insect-control chemicals available.

Pasture research

The Department contributed to the sown-pasture revolution that began in the early 1960s, fuelled by the widespread clearing and pasture developments undertaken in the Brigalow Scheme. Although that scheme was administered by the Department of Lands, officers of the agriculture branch met the demand for pasture research and advisory services.

The major thrust of the Department's pasture research was, however, away from the brigalow lands, towards the speargrass and coastal lands with more favourable rainfall environments. Working with other organisations, including CSIRO and the University of Queensland, the Department obtained overseas species that might suit Queensland conditions. Chief agrostologist Dr Joe Ebersohn visited South America and Africa in 1966 and brought back several hundred pasture species, which were screened at 'Brian Pastures' Pasture Research Station, near Gayndah, and in the pastoral laboratory at Charleville. A year earlier, Dr Bela Grof had collected high-rainfall tropical species in Central and South America for evaluation at South Johnstone Research Station, and in 1970 Ian Staples visited countries around the Indian Ocean seeking wild *Macrotyloma* types, but also collecting other material for the Walkamin Research Station's dry tropics programme.

CSIRO also introduced many species, including large collections of the genus *Stylosanthes*. Several new species and cultivars of this genus were selected by the Department and released in the 1970s. When the fungal disease *Anthracnose* appeared on stylos in 1977 the introduction of further material and selection for resistance was necessary to maintain availability of plants for the vast areas of northern Queensland, where stylos are the major introduced pasture plants.

Pasture researchers also selected species and pasture mixtures suited to the better-rainfall areas of the State and set up grazing trials to assess their value. Irrigated pasture trials, using white clover and other temperate species, were done at the Gatton and Theodore Irrigation Research Stations and at Biloela, where irrigation of lucerne was also studied. At 'Brian Pastures', pasture grazing systems

involving varying mixes of native and introduced species, including the introduced browse shrub *Leucaena leucocephala*, were tested and recommendations were provided for local graziers.

Fast and effective research was required to overcome the problem of aphids on lucerne when they appeared in 1977. Entomologists and agrostologists worked together to identify natural enemies, assess critical infestation levels, determine spraying programmes and select for resistance in established and new varieties. The problem of woody weeds in the native pasture grazing lands in higher-rainfall areas is also the subject of recent Departmental pasture research; chemical control measures and the ecology of the major problem species are under study.

Although the development of sown pastures for Queensland's high-rainfall areas took up most of the agrostologists' time, the Department did not neglect the large native pasture resource in the west of the State. Agrostologists were stationed at Blackall and on Toorak Sheep Field Research Station in 1961 to work on Mitchell grass pastures, mainly for the sheep industry, and the Charleville Pastoral Laboratory was established in 1962 to provide a centre for pasture research in western Queensland. This work has mainly addressed the management of native pastures, the potential for sown pastures such as buffel grass, the use of fodder trees and degradation of the pasture resource through the incursion of woody weeds. Another centre, the Arid Zone Research Institute at Longreach, has recently been set up to provide facilities for a broader and more coordinated approach to the problems of western Queensland's pastoral industries, including research work on native pastures.

Release of new pasture cultivars

The State Pasture Improvement Committee had been established in 1952 as a forum for discussing pasture research and related matters. Its members represented CSIRO, the University of Queensland, the Department and commercial seedsmen. Its most important function was to consider effective procedures for obtaining agreement on new pasture cultivars (varieties) and for making promising new material available to the pastoral industries.

The committee was replaced in 1961 by the Queensland Plant Liaison Committee (QPLC), which established a formal mechanism for releasing new cultivars and in two years released twenty-one cultivars. In 1965 the Australian Herbage Plant Registration Authority was set up within CSIRO's division of plant industry, on the recommendation of the Standing Committee of Agriculture, a federal body, to establish and maintain a register of Australian herbage plant cultivars. Herbage plant liaison committees were then established in each State to release new cultivars and submit recommendations on registration. The Queensland Herbage Plant Liaison Committee (QHPLC) was formed from members of the QPLC, the Seed Industry Association of Australia and the Queensland Seed Producers' Association. The inclusion of members of the seed industry enabled the establishment of seed increase committees, whose function was to arrange supplies of seed for commercial purposes. The Queensland Agricultural College later joined the QHPLC. The QPLC continued to operate separately until 1984.

Extension agronomist David Hamilton inspects a high-yielding cotton crop in the Emerald Irrigation Area. Hamilton gained a Master's degree for his work in irrigated cotton agronomy from the Texas A & M University in 1982. On his return he introduced better crop-management techniques, which contributed to significant yield improvements.



Dr Bill Burrows, a pasture agronomist based at Rockhampton, discusses liveweight gains on improved pasture with local graziers at a field day at the Brigalow Research Station in 1986.



Seed production

As pasture seed is difficult and costly to produce, the Department has undertaken a great deal of research in this area. Work on tropical pasture seed production is done at Walkamin Research Station, while research on subtropical species is done at Gympie, where a special seed research facility was established in 1973. Seed production physiology, including defoliation management, harvest times and harvesting machinery, is studied at both centres. Between 1964 and 1978 a unit at Beerburrum produced seed of experimental lines for use in pasture trials. Since its closure, facilities at Walkamin have been expanded and some Departmental seed-production work is done at CSIRO's Samford research station.

The Department is acclaimed worldwide for its work in tropical pasture and fodder-crop seed production. Since the early 1980s its findings have been passed on to countries with environments similar to Queensland's. Seed-production courses organised by the Department have attracted trainees from overseas, and officers from the Department conduct courses on pasture development and seed production in other countries.

Field crop and pasture extension

While agronomists and plant breeders are based mainly at the Department's research stations and regional research centres, the agriculture branch's extension agronomy staff are stationed throughout Queensland's cropping districts. In 1965 the branch had advisers at twenty-seven locations. Although the number of centres serviced had only increased to twenty-nine by 1987, several had been closed and new ones opened as the pattern of agriculture and emphasis of advisory work changed. In the early 1960s much of the branch's work concerned the sowing of pastures and fodder crops for improved dairy production. Advisers were stationed in dairying areas, such as Boonah, Cooroy, Theodore and Toogoolawah, but when dairying declined they were transferred to centres where crop or pasture development was expanding.

The establishment in 1962 of a lectureship in agricultural extension at the University of Queensland provided extension training to agricultural scientists, and the Department then began appointing graduates. At that time, most extension staff in the agriculture branch were diplomates from the Queensland Agricultural College or similar colleges, who had been appointed as advisers. The last diplomate was appointed in 1967, and since then all appointees to agricultural extension positions have been graduates. Several advisers who have since obtained degrees through part-time study have been appointed as extension officers.

In 1963 the Department held the first of its in-service training schools in farm management for extension staff. Treating the farm as a complete management unit was seen as the best way to help farmers adjust to change in the rural sector. Extension planning was introduced in the early 1970s as part of a move to formalise and coordinate the Department's extension services.

The higher profitability of field crops led to a dramatic expansion of cropping into the pastoral areas of the brigalow belt, the central highlands and south-west

Queensland in the late 1970s. Combined with the expansion of irrigated crops, especially cotton, in areas such as Emerald, St George and the central Darling Downs, this put pressure on the branch's extension team. At the same time, better roads, more reliable vehicles, faster communications and better office facilities provided an improved operating environment for extension staff. Subsequent advances in information technology enabled management of the rapidly expanding body of information available to them and by the mid 1980s extension agronomists (the name was changed in 1983) were using microcomputers in their work. For example, WHEATMAN, a computer package to help farmers decide on the most appropriate wheat variety to plant, was written by agriculture branch research and extension staff.

A major extension programme in recent years is aimed at the adoption of cropping practices that conserve soil without adversely affecting farm income. Extension agronomists, representatives of commercial organisations and innovative farmers have combined forces to turn research results into practical and commercially viable cropping systems for tropical and subtropical environments. Extension agronomy officers also advise on pasture technology. Those in beef cattle areas have established pasture trials in cooperation with graziers to adopt pasture technology for commercial use.

Conclusion

The Department's assistance to the field-crop and pasture industries in the years 1963-86 produced significant improvements through the introduction, breeding and testing of better plant varieties. This, together with research in crop and pasture agronomy, irrigation, and pest, disease and weed control, led to increased crop yields and contributed to higher productivity in the pastoral industries. These advances followed the appointment of highly trained researchers, whose findings were transmitted to farmers by skilled extension workers.

Horticulture

The contribution of Queensland's horticultural industries to the State's agricultural economy rose from 5 per cent by value in 1963 to 10 per cent in 1986. Expansion in the subtropical fruit industries, particularly bananas and pineapples, came mainly from increased yields, while in other areas new crops such as avocados, capsicums and zucchinis aided industry growth. Over the same period, improvements in handling and transport systems allowed the marketing of a wide range of fruits and vegetables, enabling Queensland to become the major producer of winter vegetables for eastern Australia.

Horticulture branch

The Department's horticulture branch services the State's fruit, salad vegetable and ornamentals industries, while the agriculture branch services the heavy vegetable industries, which include potatoes, pumpkins and onions. The horticulture branch operates within the division of plant industry, assisted by other branches in that division and in the divisions of marketing and land utilisation, as well as the food research and technology branch, part of the division of dairying and fisheries.

Since the early 1960s the horticulture branch has been responsible for work on the production, post-harvest handling and processing of crops, and has provided extension services in all horticultural districts. It oversees interstate plant quarantine procedures and conducts the import and export plant quarantine service on behalf of the Commonwealth Government.

J. Harold Smith, branch director from 1963, retired in 1968 to be succeeded by Royce Cannon. In 1969 three assistant director positions were created in the branch; appointees were Hubert Groszmann (research), Frank Berrill (extension) and Rowland Leverington (food preservation). When Cannon retired in 1974, he was succeeded by Groszmann, who retired in 1978. Neville Kruger took over as director, but in 1984 he was promoted and was succeeded by Dr Geoff Behncken, who had been assistant director of the plant pathology branch.

The horticultural research stations at Applethorpe, Redlands, Maroochy, Bowen and Kamerunga (near Cairns) were operated by the branch until 1982. Since then they have been managed by the research stations branch, with senior horticulture branch personnel appointed as officers in charge.

The horticulture branch administers the Diseases in Plants Act, which was drafted by Henry Tryon in 1893 and passed by Parliament in 1896. The Act was redrafted in 1916 and again in 1929; at the time of writing, it is undergoing another revision.

Food preservation research

The food preservation research branch was created in August 1960, with its headquarters at its laboratory at Hamilton and Dr Sandy Trout its first director. After his death in 1968 the branch was absorbed into the horticulture branch. John Blake was placed in charge of the laboratory, which was renamed in honour of Trout.

Until 1985 the laboratory had four main sections: physiology, food technology, microbiology and chemical. The physiology section developed methods of storing and handling fruit and vegetables to eliminate wastage; the food technology section studied the canning, freezing and dehydration of foods; the microbiology section identified spoilage organisms; and the chemical section dealt with changes in stored and processed foods, and evaluated fruit quality.

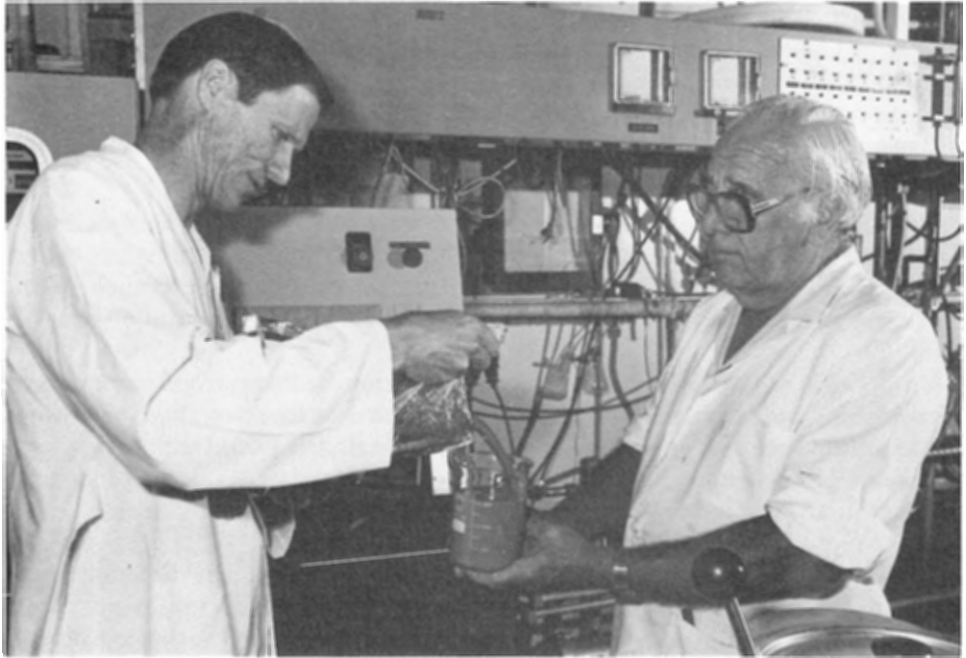
Many of the laboratory's research findings have been applied to commercial operations. These include forced-air cooling of produce and improved apple storage and packaging. The laboratory has evaluated new crop varieties for processing quality, defined quality standards for fresh fruits, and developed new products, such as frozen avocado spread, mango puree and canned mango.

In 1985 fruit and vegetable processing research was transferred to the food research and technology branch. The physiology and transport groups were then combined with the horticulture branch's marketing extension group to form the horticulture post-harvest group.

Pineapples

Maroochy Horticultural Research Station had been the main centre for pineapple research since its establishment in 1946, and a new laboratory was built there in 1962 to provide improved facilities. Much of the Department's research has been directed towards meeting the needs of the Golden Circle Cannery, which processes more than 80 per cent of Queensland's pineapple crop. This work includes the use of flower inductants to enable block harvesting and the development of a wide range of cultural methods to produce high-quality fruit of uniform shape and size. Other pineapple research has been done in weed control, fertiliser application, clonal selection and pest and disease control, especially of top and root rot disease caused by the fungus *Phytophthora*.

The clonal selection programme, started in the late 1930s but interrupted by World War II, was revived and intensified in 1950. It culminated in the release eighteen years later of high-yielding and high-quality Queensland Cayenne selections. Since the mid 1970s, a growth regulator has been used to accelerate production of clonal material, and plant improvement was widened in 1980 to include a breeding programme designed to produce superior varieties with pest and disease resistance.



Food technologists Ray Bowden (left) and Bernie Bradley with the first mango puree produced in sterile flexible packages in Queensland, at the Department's Sandy Trout Food Preservation Research Laboratory, Hamilton, in 1985



Bevan Zischke, a Departmental experimentalist at Bundaberg, demonstrates a machine that lays plastic mulch and trickle-irrigation hose for vegetable crops at the 1984 Horticultural Expo, held at Queensland Agricultural College.

Bananas

The Department's studies in crop management, plant density, irrigation and nutrition management brought improved banana yields and higher fruit quality, while further quality improvements have resulted from its research into ripening, packaging and transport systems. In the 1970s the main centre of banana production moved from the south back to north Queensland, necessitating special packaging and transport studies.

Developments in pest- and disease-control technology have also improved productivity. Tissue-culture techniques developed by the Department in the early 1980s have produced diverse plant material for field evaluation of resistance to Panama disease and rapid commercial multiplication of disease-free plants.

Black sigatoka disease appeared in the Torres Strait and on Cape York in 1981. Its presence, so close to commercial plantations in north Queensland, necessitated an eradication programme, and led to a search for resistant commercial varieties. One of these varieties is being released for planting in the affected area.

The horticulture branch is responsible for the administration of *The Banana Industry Protection Act*, 1929 to 1932. The Banana Industry Protection Board was established under the Act; its policies are implemented by branch inspectors. Their work is focused on the containment of bunchy top, the virus disease transmitted by the banana aphid that had devastated the industry in the 1920s.

Citrus

By 1963 citrus stock-scion trials had been in progress for three years. The citrus budwood and seed distribution scheme continued to expand and by 1978 the Department was supplying nurserymen and orchardists with about 150 000 citrus buds and 100 kilograms of seed for rootstocks annually. In that year, special 'mother' budwood isolation blocks were established to provide material that was virus-free and true-to-type, and in the following year trials were begun at Beerwah and Gayndah to test new rootstocks.

In the mid 1970s a collection of Queensland's native citrus species was made by Departmental officers to provide material for a rootstock breeding programme being established in Florida by the United States Department of Agriculture. Such work has not been attempted by the Queensland Department of Primary Industries because of the length of time involved and the special facilities required.

Crop management researchers developed thinning sprays for mandarins to prevent biennial bearing and overcropping, which produces small fruit, as well as a spray treatment to maintain the quality of export mandarins. By research into leaf and soil analysis criteria, they established crop nutrition management guidelines, leading to improved yields and better-quality fruit. They also developed integrated pest management systems for commercial use.

The first commercial shipments of Australian citrus to Japan left Queensland in 1983. The fruit was favourably received, opening a lucrative market. This market was pioneered by the Queensland industry, using Department-developed techniques to improve packaging, containerisation, refrigeration, insect fumigation and aeration to meet the strict Japanese requirements.

Deciduous fruit

Most of the Department's deciduous fruit research is done at the Granite Belt Horticultural Research Station at Applethorpe, a facility established by CSIRO in 1933 and transferred to the Department, with its staff, thirty years later. Researchers there have introduced improved peach and nectarine varieties, selected rootstocks adapted to the local environment, and developed high-density tree management systems and improved pruning systems. They have also worked on breeding better varieties, weed, pest and disease control, post-harvest handling and irrigation techniques. The station has contributed significantly to the development of the local wine industry. Researchers in other parts of the State have identified the suitability of low-chill varieties of peaches and nectarines to extend the production of early stone fruit to coastal and subcoastal areas.

Other fruit and nut crops

The Department's papaw breeding and selection programmes produced seed of numerous improved lines for distribution to growers, but further development was impeded by the lack of effective vegetative propagation methods. Departmental researchers attained a world first in 1986 by propagating papaws by tissue culture, and are doing further work to perfect the technology for commercial application. This will make it possible to produce large numbers of superior clones from both Departmental breeding programmes and field selection.

Queensland's avocado production has increased sixfold in the last decade but root rot, caused by the pathogen *Phytophthora cinnamomi*, still causes devastating tree losses and yield declines after long periods of rain. Horticulture branch researchers have developed successful control strategies by combining semi-tolerant rootstocks, management of soil biology, chemical soil drenches and foliar sprays, and, more recently, tree injection with chemicals.

Strawberry virus diseases have been virtually eliminated from Queensland through the strawberry runner approval scheme, under which growers are provided with virus-free planting material produced commercially from mother stock provided by the Department. The scheme was jointly administered by the Department and the Committee of Direction of Fruit Marketing (COD) until 1980, when it was taken over by COD. Departmental officers continue to give advice and conduct research to select superior strawberry varieties.

Although it had expanded in the 1970s, Queensland's mango industry was still based on one variety, Kensington Pride, which gave variable yields and had a limited harvesting season. The Department introduced overseas varieties for evaluation and has released more than a dozen of these to widen the cropping season and increase the environmental range of the crop in Queensland.

In recent years the Department has played a key role in the emergence of other crops. By 1978 its trial plantings of kiwi fruit (Chinese gooseberry) had shown that, in Queensland, sufficient winter chilling could be achieved in elevated areas of the south-east, a breakthrough that led to the establishment of a promising new industry. Most macadamia research had been directed towards cultural aspects and pest control, but in the early 1980s nearly 1500 selected open-pollinated seed

lines were planted for evaluation and selection. The Department has also examined a wide range of tropical fruits, such as rambutan, pulasan, sapodilla, carambola, longan, langsat, durian and mangosteen, most new to Queensland or previously grown only as curiosities. Many of these are being tested at Kamerunga and Maroochy, and are expected to provide the basis of viable industries.

The wine industry

Since the late 1960s the Department has played a part in the revitalisation of Queensland's wine industry. Its work has included the evaluation of wine grape varieties introduced under quarantine to the Granite Belt Horticultural Research Station; its investigations of wine-making techniques (done at the Food Preservation Research Laboratory) uncovered the need for more modern equipment and methods. Such work has resulted in wider market acceptance of Queensland wines, and about fifty modern wineries now operate in the State.

Vegetables

Most of the Department's vegetable research is done at the Redlands, Gatton and Bowen research stations and at a new facility opened at Bundaberg in 1986. Much of this research is directed at tomatoes, Queensland's most valuable horticultural crop. With little change in the area planted, the Department has helped the tomato industry to double yields since the early 1960s. Its breeding work and evaluation of imported lines have provided varieties resistant to a wide range of fungal, bacterial and virus diseases. Breeders are developing varieties with resistance to new races of fusarium wilt (identified at Bowen in 1979) and verticillium wilt (identified in southern Queensland in 1980), while the Department's seed certification scheme provides the industry with disease-free seed.

Hubert Groszmann developed the world's first stringless French beans, released in 1963-64. Further breeding and evaluation of introduced lines have produced superior varieties suited to both the fresh and processing industries. The Department's French bean research has also provided improvements in nutrition, disease control, mechanical harvesting and seed quality, and since the late 1940s it has provided the industry with seed that is free from serious diseases.

A pea variety evaluation programme, started in 1980, resulted in increased yields and an extended production season, so that by 1983 Queensland produced one-third of Australia's pea crop. Improved varieties of many other vegetables have also been selected, enabling those industries to extend their markets.

Other horticultural industries

The north Queensland coffee industry, which was important at the turn of the century, has recently been revitalised through the development of mechanical harvesting. The Department has introduced modern varieties of Arabica coffee for evaluation at Southedge and Kamerunga, and its researchers are studying the latest crop management, harvesting and processing techniques.

The Department's research has contributed in particular to the successful

development of the ginger industry, which now markets high-quality products around the world. Subjects studied have included 'seed' (rhizome) size and plant spacing, weed control, time of harvest, mineral nutrition, pest and disease control and processing requirements.

The last twenty-five years have seen a great expansion in Queensland's plant nurseries and cut flower and turf industries. The Department's first floriculturist, Margaret McKay, was appointed in 1972 and the specialist ornamentals group at Redlands Horticultural Research Station was subsequently expanded to service the industries on a statewide basis.

Post-harvest handling

The long transport hauls necessary to service Queensland's expanding interstate markets require that greater attention be paid to packaging and handling of fruits and vegetables to ensure their arrival in marketable condition. Richard Schoorl of the horticulture branch, in association with a member of the University of Queensland's Engineering Department, has improved post-harvest packaging and handling systems, and in 1984 he was awarded the degree of Doctor of Agricultural Science from the University of Queensland for this work.

Other research has led to improvements in the on-farm handling of produce. A portable tight-fill vibration packing system designed by the Department reduced labour and container costs for citrus growers. John Watkins, a horticulture branch officer, developed a forced-air cooling technique to remove field heat from produce, which allows better control of the ripening process. Better packaging and handling systems are promoted to growers, transport operators and agents by officers of the marketing extension service in the horticulture branch.

Fruit Variety Foundation

In 1971 the Commonwealth and State Governments established the Fruit Variety Foundation (FVF) to produce virus-tested planting material of superior varieties of fruit, such as apples, pears, stone fruit, grapes, citrus and avocados. The FVF has no repository in Queensland, but the State has contributed virus-tested material to the Foundation and receives material from it. Material received from the Foundation was multiplied by the Granite Belt Horticultural Research Station, in association with the Queensland Deciduous Fruit Budwood Committee, and distributed to accredited nurserymen. Virus-free planting material has also been provided to pome, stone fruit and grape growers in the Granite Belt.

Conclusion

The Department's guidance of the State's horticultural industries has helped them attain a premier position — Queensland's vegetable industry is the largest in Australia — and allowed them to expand into world markets. Its research and extension staff have contributed to both the continued growth of established industries and the development of new crops, through improvements in pest and disease control, cultural techniques, processing methods and marketing systems.



Margaret McKay, who was appointed the Department's first floriculturist in 1972, working in the glasshouse at Redlands Research Station



Primary Industries Minister Sullivan (far right) sampling sweet corn at a horticultural field day on Bert Granshaw's property near Gympie in 1977. Also pictured are (from left) Peter Deuter, extension horticulturist, Premier Bjelke-Petersen and Mr Granshaw.

Plant industry sciences

The science branches in the division of plant industry (botany, entomology, plant pathology and, until 1983, agricultural chemistry) were called on by other branches for identifications and analyses, and for contributions to the research techniques used by those branches in their projects. These branches also carried out research on their own account and serviced direct requests from farmers, agribusiness, authorities and householders.

In 1963 the botany, entomology and plant pathology sections operated independently, although they were grouped under the banner 'science branch' within the division of plant industry. In 1966 the term 'science branch' was dropped and five years later all three sections were raised to branch status. The agricultural chemical laboratory branch was renamed the agricultural chemistry branch in 1983 and transferred to the division of land utilisation.

Botany branch

When the botany section became a branch Selwyn Everist, government botanist, was appointed its first director. He retired in 1976 and was replaced by Dr Robert Johnson, who still holds the position. The government botanist is responsible for the Queensland Herbarium, which was housed in a wooden building in the Botanic (now City Botanic) Gardens until 1968, when the section's headquarters and the Herbarium were moved to a modern, air-conditioned building at Indooroopilly.

In 1970 the botany section was reorganised into three groups: taxonomy, ecology and general services. The taxonomy group investigates plant specimens sent in by DPI field staff, farmers, plant collectors, other government departments and various organisations; issues certificates of identification required under the Health Act for prohibited species, such as marijuana, submitted by police and customs officers; investigates both poisonous plants and promising new economic plants; and does research to review the taxonomy of known plants and establish the relationships of new species. The ecology group is concerned with vegetation mapping and surveys, and environmental impact assessment and ecological studies, also contributing to survey and evaluation studies done by the land resources branch. The general services group maintains the Herbarium and provides assistance to the other groups.

The Department's botanists have always been involved in taxonomic research — that is, the classification and description of plants — with studies of grasses and sedges being of particular importance. Dr Stan Blake gained international recognition for his studies of economically important grasses. Bryan Simon has continued this study and in 1978 published a checklist of Australian grass species and a key to Queensland grasses. Blake also clarified the taxonomy of tea trees, work continued by Norm Byrnes, who revised information on tea tree species of northern and eastern Australia. Les Pedley's revision of the taxonomy of Queensland acacias was a major contribution to Australian botany. Rainforest plants have been a major concern for the Department's botanists as Queensland has the largest rainforest area in Australia. One of the branch's most notable achievements was the identification in 1971 of a completely new family of plants, the Idiospermaceae, represented by a single tree species from north Queensland's rainforests.

The Queensland Herbarium is one of the most important in the world as it includes unique material representing the tropics and subtropics of the Australian continent. The Queensland Herbarium Records Storage Project (HERBRECS) was started in 1970; this project, aimed at computerising the labels on herbarium specimens, is part of the Australian Biological Resources Survey and the Inventory of Plants and Plant Communities, which is funded by the National Estate Programme. In 1986 the Herbarium held 450 000 specimens, all of which had been entered on the HERBRECS masterfile. The same year saw the completion of a three-year project, the mounting of all specimens of Australian species held in the Herbarium, funded by the Commonwealth Wage Pause Programme and the National Employment Strategy for Aboriginals (NESA) Scheme.

A botanist was based at Mareeba in 1979 to undertake a systematic collection programme on Cape York Peninsula, long recognised as one of the most botanically interesting but least known areas of Australia. Technical assistance is funded by the Australian Biological Resources Survey. The Mareeba botanist also provides routine identification and advisory services, maintains a small reference collection, and liaises with CSIRO's division of plant industry, which holds a herbarium at its regional station at Atherton.

The botany branch is one of the few sections of the Department that have little direct contact with farmers, but it contributes to a range of services provided to them, particularly through its work on poisonous plants. From the Department's earliest days, its botanists and stock officers have collaborated in poisonous plant studies and taxonomists have been asked to identify suspect plants sent in by field officers and farmers. In 1974 the results of this work were brought together in *Poisonous Plants of Australia*, a major publication that collated all information on poisonous plants collected by botanists and other researchers in Australia since the arrival of the First Fleet. This book was not published by the Department, although its author, Selwyn Everist, was government botanist from 1954 to 1976. Everist was awarded an honorary doctorate from the University of Queensland in 1977 for his work on poisonous plants. His book has proved very popular and went into a second edition in 1981.

The botany branch advises on the re-establishment of native plant communi-

ties after sandmining, the selection of areas for national parks and scientific reserves, and the management of plant communities, and generally monitors the effects of industry on plant communities. It has worked with the authority building the new Brisbane airport, advising on the revegetation of soil and on the use of salt-tolerant mangroves to stabilise the banks of drainage canals.

The Vegetation Survey of Queensland, an inventory, in map form, of the State's plant communities, is a major activity of the botany branch. The survey, sponsored by grants from the Australian Biological Resources Survey and the Commission for the National Estate, began in 1974, and has resulted in two publications to date. The botany branch has published a number of other studies. *Weeds of Queensland*, issued in 1979, is used as a reference by advisers, researchers, and weed control officers working for local authorities throughout the State. Other publications include *Wildflowers of South-eastern Queensland*, published in two volumes in 1977 and 1981, *Flora of South-eastern Queensland*, also in two volumes (1981 and 1984), and *The Flora of Lamington National Park*, published in 1985.

Entomology branch

Dr William McDougall was senior officer of the entomology section from 1949 to 1971, when he retired. The section was then raised to branch status, with Dr Alfred Brimblecombe its first director. Brimblecombe retired two years later and was replaced by Tom Passlow, who is still branch director.

Entomology was the first branch represented at Indooroopilly. Its research facilities in the overcrowded headquarters at William Street were inadequate, so a nematology laboratory and a stored products laboratory, with insect breeding facilities, were built at Indooroopilly in 1962. Fourteen years later, a major laboratory with the controlled environment facilities, shadehouses and glasshouses necessary for successful insect rearing and study was added. The branch's work today includes insect identification and control, plant protection, product development, and responsibility for beekeeping. The entomology section was also responsible for flora and fauna conservation and nematology before their transfer to the fauna conservation branch and the plant pathology branch, respectively, in 1971.

The entomology branch is decentralised; its staff are based at eleven country centres as well as in Brisbane, a system that allows close association with other field staff and primary producers. The entomology building at Indooroopilly houses a reference collection of more than three hundred thousand insect specimens. The collection is visited regularly by Australian and overseas specialists, and specimens are lent. The branch's identification section assists the quarantine entomologist with identifications, work that is given priority because of the need to quickly identify potentially important pests. In 1985 a Philips 505 scanning electron microscope was installed to enable prompt and accurate identifications; it is also used by the botany and plant pathology branches.

Entomologists develop and assess control strategies for insect pests already present in Queensland and advise field staff on control methods. They monitor pest levels, test plants for resistance, develop chemical application strategies and



Don Gowanlock using the Philips 505 Scanning Electron Microscope, which was installed in the entomology laboratory at Indooroopilly in 1985 for plant and animal disease identification



Dr Neil Gough (second from left), entomologist at the Agricultural Research Laboratories at Indooroopilly, discusses biological control with a Chinese delegation, as part of an information exchange programme with China.

identify biological control measures. A notable success has been their control of the *Heliothis* caterpillar, an important plant pest, which developed resistance in the 1970s to a range of insecticides, including organochlorines, organophosphates and pyrethroids. This caused problems in susceptible crops such as cotton, until Departmental officers, in conjunction with industry groups, CSIRO and the New South Wales Department of Agriculture, developed programmes to reduce the build-up of resistance in pest populations.

Successful pest-management strategies require close cooperation between relevant sections of the Department as well as industry organisations and farmers. In the early 1980s, entomology, plant pathology and agriculture branch officers in central Queensland developed SORPACK, a sorghum pest management package consisting of a suite of computer programs. Growers can enter information on pest infestation and crop development and receive advice on the expected impact of the pest and control measures required. This package won the *Australian* newspaper's 1985 rural software competition.

Because of pests' increasing resistance to chemicals as well as environmental considerations, entomologists also consider control through biological means. Biological control of plant pests involves a range of non-chemical methods: natural control measures such as viruses, bacteria or predators are identified and applied to the pest; alternatively, plants may be bred with increased tolerance or resistance to particular pests. The most spectacular development in biological control has been in the citrus industry, where a pest-management system involving native parasites and predators, introduced parasites and minimum use of pesticides has brought marked savings. Biological measures were also applied to lucerne in the late 1970s: when two new aphid pests appeared, native predators and introduced wasp parasites gave a more cost-effective control than insecticides. Several aphid-resistant lucerne varieties were then introduced from the United States, and two with aphid and added disease resistance were produced in association with CSIRO.

In the late 1960s the branch did intensive research on the efficiency of grain protectants after insect pests of stored grain developed resistance to the insecticide then used. By the mid 1970s, in conjunction with CSIRO and the Australian Wheat Board, it had produced a series of improved chemicals.

Fumigation with ethylene dibromide (EDB) was used on fruits and vegetables to prevent the spread of the Queensland fruit fly to other Australian States, but this treatment was discontinued in the 1980s after EDB was deregistered in the United States. Entomology branch officers then developed other protective measures, and are currently examining ionising irradiation as a means of non-chemical disinfestation. Such measures are necessary because overseas market countries, fearing pesticide residues, have banned the use of many chemicals in food protection or storage.

Another project, supported by the Australian Centre for International Agricultural Research (ACIAR), is a study of grain-protectant insecticides for use on stored maize and rice. The Department is collaborating with the National Post Harvest Institute for Research and Extension in the Philippines and the Malaysian Agricultural Research and Development Institute in this work.

The entomology branch's major publications include *Insect Pests of Field Crops in Colour*, produced in 1983, and a companion volume covering pests of fruit and vegetables, issued in 1985. It has also produced guides for the easier identification of insect pests of crops, products, gardens and houses, such as the booklets *Resistant Grain Insects* and *Major Insect Pests of Stored Grain*, published in 1974, and another booklet, *Insect Pests in the Home*, published ten years later.

The entomology branch assists the Queensland beekeeping industry, in which protection from diseases, particularly American and European brood diseases, is a major concern. Because of the spread of disease from southern States, the Stock Act was amended in 1978 to control the entry of bees into Queensland, and beekeeping legislation was completely revised in the *Apiaries Act* 1982, which repealed and replaced the 1947 Act. The new Act regulated the movement of apiaries to minimise disease and pest outbreaks and to prevent overcrowding and starvation of bees; continued to require Queensland beekeepers to register annually with the Department; dealt with the purity of strains of bees, disease notification and the powers of inspectors; and required that bees introduced into Queensland be certified free of disease in their State of origin.

The entomology branch also administered *The Fauna Conservation Act* of 1952, with Charles Roff nominated as fauna conservation officer. Sanctuaries were declared and advertised in the *Queensland Agricultural Journal*, field stations were set up at Oonoonba in 1958 and Hermitage in 1960 to undertake controlled wildlife experiments, fauna surveys were begun, shooters were licensed, and statistics were kept of the numbers of each species taken. However, in 1971 responsibility for fauna conservation was transferred to the new fauna conservation branch in the administration division, under Dr Graham Saunders. That branch was abolished three years later, when responsibility for fauna conservation was transferred to the National Parks and Wildlife Service (NPWS). Just before the transfer the Department had established the North Queensland Fauna Centre at Cape Pallarenda, Townsville; this centre and the fauna research facility at Hermitage were handed over to NPWS. Roff and other officers of the branch transferred to NPWS, which is still headed by Dr Saunders.

Plant pathology branch

Brian Oxenham, government plant pathologist, headed the plant pathology section until 1967, when he became director of the agriculture branch. He was replaced by Gordon Purss, who became director of the plant pathology branch in 1971. Purss was succeeded in 1978 by Dr Robert Colbran, who had held the newly created assistant director's position in the branch for four years. Colbran had made an outstanding contribution to the identification and control of nematodes, work for which he was awarded a Doctorate of Philosophy from the University of Queensland and the Australian Institute of Agricultural Science Medal. He retired in 1986 and was replaced by Dr Ian Muirhead.

Nematologists and virologists had been stationed at Indooroopilly since the early 1960s. In 1962 plant pathologists worked at the research stations at Applethorpe, Kingaroy, Nambour and Kamerunga; their numbers were increased in the following year by staff at laboratories at the new Queensland Wheat

Research Institute at Toowoomba and at Mareeba. The Toowoomba laboratory was set up primarily to research root and crown diseases and stem rust of wheat, while the Mareeba laboratory's main function was research into diseases of tobacco and other crops grown in north Queensland. In 1971 the branch's head office was moved to a new laboratory at Indooroopilly.

Plant pathologists diagnose plant diseases for Departmental advisory staff, primary producers, agribusiness and home gardeners. Their diagnoses, combined with plant disease surveys, allow monitoring of the incidence of a wide range of diseases in Queensland. In addition, the branch's specialists identify the specific fungi, bacteria, nematodes and viruses involved in new or unusual disease outbreaks. Virus identification is made by inoculation or by using electron microscope technology. A Siemens 101 transmission electron microscope, installed in the plant pathology laboratory at Indooroopilly in 1971, and a Philips 505 scanning electron microscope, installed in the entomology laboratory at Indooroopilly in 1985, are used for the latter purpose. A new method, using genetic engineering, has recently been used to isolate banana bunchy top virus genes and to provide the basis for rapid and sensitive detection techniques.

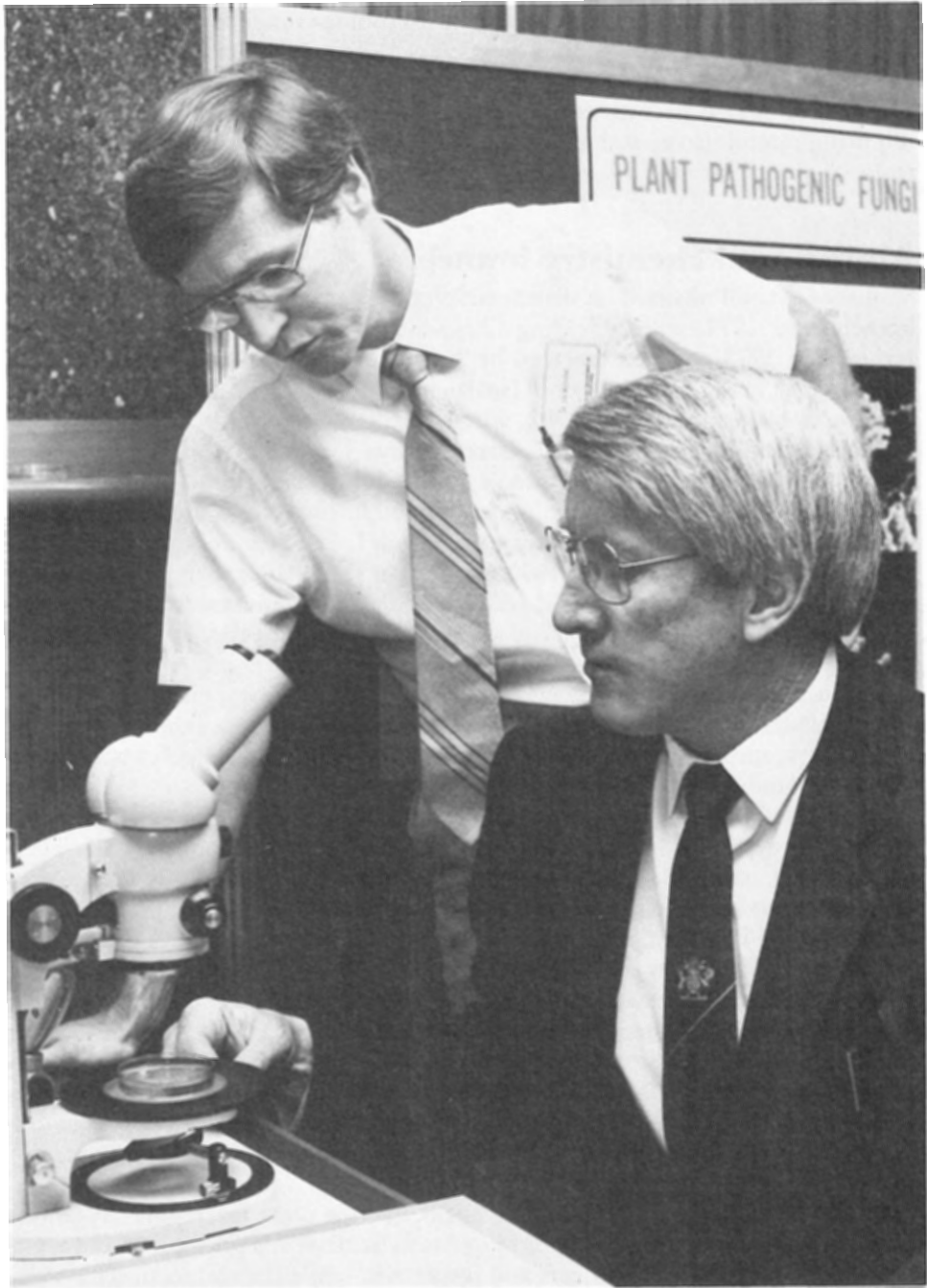
The branch's records of plant disease occurrence in Queensland date from 1926, when John Simmonds was appointed the first full-time plant pathologist. Each record lists the plant host and disease identified, with the date and place of occurrence and other relevant information. Simmonds published the first index of the records in 1966 and ten years later Dr John Alcorn prepared a supplement to it. In 1986 the previous twenty years' records were entered on PATHOGEN, the branch's plant disease record database.

In 1977 Dr David Jones, a plant pathologist, was appointed to work solely on plant quarantine problems. His position was funded by the Commonwealth Government, under whose legislation all restricted seeds and plants introduced into Australia must be grown in special quarantine facilities for inspection before release. Jones oversees such facilities in Queensland, operated by the Department, CSIRO and commercial firms.

The first disease-warning service to operate in this State was started on the Granite Belt in 1973 to help orchardists control black spot, a fungal disease. Run by senior plant pathologist John Heaton, who is based at the Granite Belt Horticultural Research Station, the Black Spot Warning Service operates from mid-September to the end of November and uses temperature and rainfall to predict disease risk levels. The service also advises on fungicides. Most growers follow the warning service closely and spray their crops accordingly.

To enable easier field diagnosis of plant disease a series of colour illustrations of plant diseases was published regularly in the *Queensland Agricultural Journal* from 1973. These illustrations were compiled and released in 1978 as the *Handbook of Plant Diseases in Colour*, two volumes covering fruit and vegetables and field crops. Second editions were published in 1982 and 1986. Several thousand copies have been sold, many to interstate and overseas buyers.

The plant pathology branch's staff also research methods of disease control using chemicals and beneficial organisms, breeding for resistance, or developing better cultural practices. Many important advances have been made since the



Dr Ian Muirhead (left), assistant director of the pathology branch, shows Primary Industries Minister Neil Turner how to use a microscope to examine fungal spores at the opening of the Agricultural Research Laboratories at Indooroopilly in September 1986.

1960s, such as the use of chemicals to control root rot fungi in avocados and blue mould in tobacco, and the implementation of clean-seed schemes to reduce losses from seed-borne diseases. However, despite these many successes, new diseases and new forms of diseases continue to threaten Queensland's crop industries, requiring careful survey and identification, the setting-up of quarantine areas, and research into their control.

Agricultural chemistry branch

William Cartmill retained his directorship of the agricultural chemical laboratory branch until 1971, when Fielding Chippendale became director. Chippendale resigned in 1973 and was replaced by Trevor Beckmann, who became government analyst in the Department of Health in 1979. Brian Crack was director from then until his promotion in 1982, when Robin Bruce took over.

The Agricultural Chemistry Laboratory was located in the William Street building from 1900 until 1972, when a new building at Indooroopilly became the head office, and main laboratory, of the branch. In 1963 the branch had six country laboratories, as well as the Tobacco Research Laboratory at Northgate in Brisbane. Northgate was closed in 1973 and staff at the smaller country laboratories were transferred to new regional office-laboratory complexes. In 1986 regional laboratories were located at Toowoomba (QWRI), Mareeba, Ayr and Biloela. Tobacco research and extension, funded by the tobacco industry, is done at Mareeba, and research into the nutrition of peanuts, potatoes, maize and pastures on the Atherton Tableland is also based there. The branch does cereal chemistry, soil fertility, and analytical chemistry work at QWRI, funded largely by the wheat and barley industries.

Although the branch had lost its two sections dealing with livestock (toxicology and pathology) in 1957, it assumed a number of additional responsibilities. These were mainly associated with irrigation developments and the crop and pasture expansion that began in the late 1950s and accelerated through the 1960s and subsequent years. In 1961 the branch was organised into three sections: general analytical, plant nutrition and cereal chemistry. The general analytical section analysed plant, fertiliser and agricultural chemical samples submitted by farmers, field staff and inspectors. The plant nutrition section analysed soil and plant samples from Departmental surveys and investigations, and soil and water samples submitted by farmers and field officers. The cereal chemistry section, which was later transferred to QWRI, analysed wheat and barley samples mainly arising from the Department's plant breeding varietal trials and cereal nutrition work.

In 1977 the branch was reorganised again, into the plant and regulatory section and the soil section. The plant and regulatory section analysed plant and water samples for farmers, field officers and inspectors, while the soil section provided soil analyses for field staff, conducted investigations in soil chemistry and soil physics, and did the branch's soil survey work. The soil survey group was transferred to the new land resources branch in 1982, and the soil physics group was transferred to the new soil conservation research branch a year later. Today, the

branch supports the Department's extension, research and regulatory functions through its soil, plant, water, stockfeed, veterinary medicine, vitamin and pesticide analysis service, and also conducts research in the fields of analytical chemistry, soil chemistry, plant nutrition, pesticide chemistry and plant organic chemistry.

Conclusion

Since the early 1960s the Department's plant science sections have been raised to branch status and provided with specialist staff, new laboratories and up-to-date equipment to meet the needs of Queensland's expanding rural industries. Producers in these industries have demanded greater protection from pests and diseases, better information on the State's soil and plant resources, and more frequent and more detailed analyses of water, soil, plant material and agricultural inputs. At the same time, stricter regulations on the use of chemicals in agriculture have imposed a much greater responsibility on the Department's scientists in the plant industry branches, in serving both the agriculture sector and the community at large.

Dairying

Queensland's dairy industry changed dramatically after the early 1960s. By the mid 1980s the number of dairy farms had dropped to a sixth and the number of dairy factories had halved, and dairying had moved away from its dependence on butter production towards market milk and manufactured products, such as table cream, yoghurt, fancy cheeses and flavoured milks. The main causes of this change in the industry were the loss of preferential trade in dairy products after the United Kingdom joined the European Economic Community in 1972, the end of the Commonwealth Dairy Products Equalisation Scheme in 1978 and increasing competition from margarine. Farmers wishing to move out of dairying were helped by the Marginal Dairy Farm Reconstruction Scheme established by the Commonwealth and State Governments in 1970 and administered, in Queensland, by the Agricultural Bank and the Rural Reconstruction Board. This financial assistance was complemented at the farm level by the Department's local advisory teams.

Division of dairying

The division of dairying, which had been created in the 1945 reorganisation, was reconstructed in 1969-70 to strengthen and integrate Departmental extension and research services to both dairy farmers and dairy factories. In that year, the dairy research and dairy field services branches were merged to form the dairy cattle husbandry branch, and the position of deputy divisional director was created. Other major changes were made in 1980, when the Queensland Fisheries Service was transferred from the Department of Harbours and Marine and incorporated in the division, which was then renamed the division of dairying and fisheries. (The Department's work in fisheries is covered in Chapter 45.) A further deputy's position was created in 1983, with one deputy divisional director responsible for dairy research and the other for dairy extension.

In 1985 part of the field services branch and the food preservation section within the horticulture branch were combined with the dairy research branch, which was renamed the food research and technology branch. The balance of the field services branch was joined with dairy cattle husbandry to form the dairy husbandry and animal breeding branch. At the end of 1986 the division comprised these two dairying branches and the two fisheries branches (fisheries research and

Ailsa Gillies, the Department's first female branch director, headed the dairy research branch from 1978 to 1984. She then became deputy director of the division of dairying and fisheries, in charge of dairy research.



Ian Wood (right), district adviser in the agriculture branch, Brisbane, and executive officer of the Dairy Pasture Subsidy Scheme, hands application forms to dairy farmer Sid Bradshaw of Mt Samson, the first applicant under the scheme, at William Street, Brisbane, in September 1967.

fisheries management). Brooke Rice headed the division of dairying in 1963. He retired in 1972 and was replaced by Dr Graham Alexander, with Russ Smythe as his deputy. Four years later Alexander was promoted to the position of chief advisory officer and Smythe became director, followed by Dave Mitchell in 1979, Jim Miller in 1983 and Robert Bygott in 1986. At the end of 1986, the division's three deputy directors were Geoff Crittall (dairy extension), Ailsa Gillies (dairy research) and Noel Haysom (fisheries).

Industry assistance

The Dairy Industry Advisory Committee was set up by Premier Nicklin in 1964 to advise the government on matters relating to dairy farm production. It presented its report two years later and the government accepted two of its recommendations: that farmers be paid a subsidy to encourage pasture improvement, and that farm advisory teams be set up in the main dairying areas. The Dairy Pasture Subsidy Scheme was introduced in September of the same year, granting farmers a subsidy on a dollar-for-dollar basis to plant improved permanent pastures. The scheme was administered by a central committee, on which the Department and the Queensland Dairymen's Organisation were represented. As well as increasing the area of dairy pasture, the scheme greatly increased dairy farmers' knowledge and skill in pasture establishment and management.

Dairy extension advisory committees (DEACs) were set up as formal farm advisory teams in all major dairying districts in the mid 1960s to provide an organised forum for closer cooperation between industry and Departmental representatives. Some DEACs established dairy development committees (DDCs), based on local dairy factories. The driving force behind such committees was usually the local dairy adviser. Both the DEACs and the DDCs played a part in improving the quality of dairy produce through merit systems and quality competitions as well as addressing local problems such as weed taint.

Dairy advisory teams were located at centres where butter factories or other major dairy factories operated. They usually comprised two officers: one visited factories to advise on processing matters and quality problems while the other visited farms to advise on dairy cattle nutrition, breeding and milk production and quality. In 1965 dairy field services branch advisers were located at thirty-nine centres, but the dairy industry began to contract in the 1970s and by 1987 advisers and husbandry officers were present at only nineteen centres.

Dairy research branch

Leslie Nichols, director of the dairy research branch, resigned in 1965 and was replaced by Russ Smythe. Smythe was promoted in 1972 and William Major became director. Ailsa Gillies replaced him in 1978, the first female branch director in the Department. In 1985 it was renamed the food research and technology branch with Dr Harley Juffs as director; by this time Ailsa Gillies had been appointed deputy director of the division to coordinate and oversee dairy research.

The aim of the dairy research branch was to increase the efficiency of processing methods and improve the quality of dairy products, thereby bringing them

wider market acceptance. In 1963 the Otto Madsen Dairy Research Laboratory at Hamilton was the main centre of dairy research in Brisbane, and smaller laboratories operated at Malanda, Murgon and Toowoomba. The Murgon and Toowoomba laboratories closed in 1979 and 1983, respectively.

The Hamilton laboratory includes a pilot plant capable of manufacturing a wide range of dairy products on a semi-commercial scale, as well as extensive microbiological, chemical and biochemical laboratories. In the 1960s researchers at the laboratory developed a process to remove weed taint from butter oil. Another major achievement was their discovery that off-flavours in milk were caused by contamination with copper where the tinning had been worn off pipes and fittings. This led to a successful campaign to install stainless steel equipment in both farms and factories. Intensive dairy research at the laboratory resulted in its workers achieving international recognition and contributing to a textbook on dairy chemistry. When the dairying industry changed its orientation — from export butter production to market milk and manufactured milk products — the branch was called on for research into a wider range of processing methods and problems in dairy products. The Australian Dairy Produce Board funded the branch's research in ultra-high temperature (UHT) pasteurisation of cream. A breakthrough came with William Major's development of a non-vacuum cream pasteuriser, which pasteurised cream at lower capital, installation and processing costs. The first commercial 'Major' UHT pasteuriser was installed at Malanda, and others followed in other dairying States. Although the equipment was designed specifically to process cream for butter manufacture, it can be readily adapted for a wide range of liquid milk and other food products.

In the 1970s considerable effort was put into meeting consumer demands for locally produced non-cheddar cheeses, such as blue vein, edam, gouda, romano, stirred curd (colby), cheshire and camembert. As a result of the Department's pioneering research work, most of these cheeses are now being made by Queensland cooperative dairy associations. The Department's scientists, working in collaboration with Commonwealth Industrial Gases Ltd, also developed a device for dispensing whipped cream. The prototype for this machine was tested at the Sunshine Plantation, near Nambour, in the mid 1970s, and it is now used worldwide.

The testing of market milk was an important part of the branch's work until it was phased out in 1986. Testing is now done by factories, following procedures laid down by regulation, and the results are forwarded to the Department.

The branch's work was expanded in 1983 to include research into the post-harvest handling of fish and post-slaughter meat research. Two years later the branch was renamed the food research and technology branch and assumed responsibility for fruit and vegetable preservation.

Field services branch

Russ Smythe, director of field services, transferred to dairy research in 1965 and Dave Mitchell was appointed director of field services. He was followed by Geoff Crittall (1977-79), Jim Miller (1979-82) and Dr Harley Juffs from 1983 to 1985, when the branch was abolished.

In the 1960s, the field services branch administered the Dairy Pasture Subsidy Scheme and the herd recording service, and carried out farm and factory inspections to maintain and improve the quality of farm milk, pasteurised milk, butter and cheese. The branch also looked at the problem of providing adequate feed in the winter-spring and summer-autumn periods when pastures were generally poor. Herd recording, bull proving and artificial breeding services were transferred in 1970 to the new dairy cattle husbandry branch, leaving the field services branch to concentrate on the farm side of those activities, along with other extension projects and legislative responsibilities.

In the mid 1960s field services staff were involved in the conversion programme under which farmers changed over from supplying cream in cans to bulk milk, which was collected by tanker. Many farmers also took the opportunity to update their milking sheds and equipment. The branch collaborated with industry groups to advise on improved milking systems and dairy buildings, and organised discussion groups and farm meetings. In the early 1980s it organised two major seminars for dairy farmers at Toowoomba and Gympie, to deal with the problems of milk production from larger herds and improvement in productivity, and since then branch staff have developed two computer software packages, HERMAN and FARMACC, to help dairy farmers manage their herd records.

The branch also became involved in herd health programmes. A survey in 1969-71 showed that widespread mastitis infection caused severe losses to the dairy industry, so the Department introduced the Mastitis Cell Count Service to test milk on arrival at the factory. The programme led to an increased awareness and understanding of the disease among farmers, who then requested advice from the Department on its control, and by 1981-82 somatic cell count levels indicated that the disease was in decline. The Herd Management Scheme was introduced in 1983 to provide reports on the reproductive performance of cows and the mastitis status of individual animals. A complementary scheme, the Dairy Practitioners' Information Service, was introduced from July 1985 for use by veterinarians.

The swansong of the branch was a complete review of the Australian Code of Practice for Dairy Products, which was undertaken during a five-day national workshop in Brisbane in 1985 under the auspices of the Standing Committee on Agriculture. Juffs was chairman of the organising committee set up to review the code. The branch was abolished in that year; its factory product services were transferred to the food research and technology branch and its farm responsibilities were transferred to the dairy husbandry and animal breeding branch.

Dairy cattle husbandry branch

The dairy cattle husbandry branch was created in 1970, taking in the dairy component of the cattle husbandry branch, the artificial insemination (AI) centre at Wacol, previously run by the division of animal industry, and the herd recording section of the dairy field services branch. Greg Young, the branch's first director, died in 1971. He was succeeded by veterinarian Charlie Barr, who retired three years later, to be followed by Ivan Rayner.



Laboratory attendant Tom Salisbury operating a Milkoscan 203 at the Wacol Herd Improvement Laboratory in 1984. The machine, used to determine the composition of milk samples, also detects the presence of mastitis cells.



Bill Hornbuckle (sixth from left), district experimentalist in the dairy cattle husbandry branch, supervising an AI training course for local dairy farmers and Etna Creek prison officers at Dalma, near Rockhampton, in the mid 1970s (Etna Creek Prison Farm has a dairy herd.)

A major part of the branch's work was dairy cattle nutrition research. The establishment of the Herd Improvement Laboratory at Wacol in 1975 provided better facilities for controlled research through the testing of milk samples from trials. Since then, all testing for the Department's herd recording services has also been done at Wacol instead of on farms, and milk samples have been collected by contractors rather than by Departmental herd recorders.

In 1985 the branch was combined with part of the field services branch to form the dairy husbandry and animal breeding branch, under Pat Thurbon. It is responsible for the control of dairy cattle diseases, nutrition, performance recording, bull proving, artificial breeding of dairy cattle, the development of a tropical dairy breed, and the husbandry of goats kept for milk production.

Animal breeding

The Department began bull proving in 1955 when a Jersey team was put under test and procedures for bull proving in Queensland were developed (see Chapter 34). By the late 1970s the scheme had been extended to the Australian Illawarra Shorthorn (AIS), Holstein-Friesian, Australian Milking Zebu, Australian Friesian-Sahiwal and Sahiwal breeds.

Bull proving had originally involved artificial insemination (AI) and this work expanded from the 1960s. Artificial breeding services were based at the Wacol AI Centre after its establishment in 1962. Embryo transfers were made and embryo-freezing technology was developed to expand the export trade and in 1972 the AI Export Centre was built on Redlands Research Station at Cleveland to complement this work. The Wacol AI Centre is also used to train both 'commercial' and 'herdsman' inseminators. Through the Australian Dairy Herd Improvement Scheme, lists of sires and their breeding values were supplied to all dairy farmers to help them select superior genetic material.

In 1960 the Department had begun experiments at Ayr, Kairi and Biloela Research Stations in breeding a tropical dairy animal, and ten years later the Australian Friesian-Sahiwal (AFS) had been developed. Selection was continued within the new breed for improved tick resistance and milk production, and in 1982 the AFS herd at Ayr was transferred to a new research station at Mutdapilly.

Queensland's development of a highly sophisticated tropical dairy industry has aroused overseas interest. The Department has collaborated with the Australian Development Assistance Bureau to make tropical dairying technology available to countries with similar climates, by conducting courses in Queensland for overseas students and sending consultants to other countries.

Dairy industry legislation

The Department administers many Acts dealing with the dairy industry in Queensland. The State's first Dairy Produce Act was passed in 1904, amended and consolidated several times, and again consolidated in the *Dairy Produce Act* 1978. Under that Act, the licensing of producers was transferred from the Department to the Queensland Milk Board and grading and testing were required of all dairy produce imported for sale.

A major reorganisation in milk marketing in Queensland accompanied the establishment in 1977 of the Queensland Milk Board, which replaced the Brisbane Milk Board and has statewide powers. It began operating in June 1978 under the *Milk Supply Act* 1977. The Milk Entitlements Committee was established to allocate market milk quotas. The Department is represented on both bodies.

The Margarine Act was introduced in 1910, both to protect the Queensland dairy industry from competition and to ensure that margarine met the high standards required. However, Queensland was not producing enough butter for its own requirements by the mid 1970s, so restrictions on margarine additives and production quotas were relaxed, although restrictions on labelling, packaging, and advertising remained in force.

Conclusion

Despite the decline in dairying, the Department's commitments to the industry have not decreased since the early 1960s. The industry's increasing emphasis on product diversification and quality, added to the need for efficiency on the farm and in the factory, have brought new responsibilities. The Department's research work in tropical dairying has changed the face of the industry and has also benefited other nations in the tropics, where dairying is being introduced to improve nutrition.

Fisheries

The Department tried to acclimatise trout in streams on the Atherton Tableland in 1910-11, probably its earliest involvement in fisheries. A Mr Morris, who had managed a trout hatchery at Killarney for the Acclimatisation Society of Southern Queensland, took charge of the project. A hatchery was set up on the Wild River near Herberton and temperature measurements were taken to assess the suitability of surrounding streams. Rainbow trout ova from New Zealand and Killarney were released, but the trout did not survive, because of problems in transporting the ova and high summer temperatures in the north. The project was abandoned and the Department did not again become involved in fisheries for almost sixty years.

Fisheries branch

Queensland's fishing industry was administered by the Department of Harbours and Marine until 1969, when control of both the Fish Board and the fisheries section of Harbours and Marine were transferred to the Department of Primary Industries. Only three months later the fisheries section was removed from Primary Industries, but it was brought back again in 1970 and given branch status in the following year, with Geoffrey Harrison its first director. The Boating and Fisheries Patrol remained with the Department of Harbours and Marine.

The fisheries branch operated several small laboratories, such as the one at Mourilyan Harbour, near Innisfail, where research was done on the crown-of-thorns starfish from 1971 until the facility was closed in 1975. In 1971 the Department established a research facility at Deception Bay, near Redcliffe, to undertake work in the east-coast prawn project in cooperation with the CSIRO division of fisheries and oceanography. It established a base at Cairns two years later for survey work on prawns, lobsters and mackerel in the Torres Strait, and in the same year built a freshwater fish biology facility at its Walkamin Research Station.

Environmental and biological studies were done at Deception Bay as part of the east-coast prawn research programme begun in 1967 and completed in 1975. Researchers made water chemistry and sediment studies; mapped seagrass nurseries for prawns; investigated the transplanting of seagrass; and studied the abundance, movements and growth of postlarval and juvenile prawns and the growth, migration patterns and catches of commercially harvested king prawns in both

Moreton Bay and offshore areas. They then made recommendations on ways of maximising catches.

The branch's other research projects included market sampling of mullet at Tewantin, studies of the productivity of wetlands in the Southport Broadwater and an investigation into the cause of death of oysters in Pumicestone Passage and Deception Bay. The Department also administered the Fisheries Act, which placed controls on the harvesting of fish, crustaceans, coral and shellgrit, required the licensing of commercial fishermen, and provided for the conservation of the State's fishery resources through the declaration and management of fish habitat reserves.

Queensland Fisheries Service

Fisheries administration was again removed from the Department in 1974, but returned in 1980. The fisheries branch (then named the Queensland Fisheries Service) was absorbed into the division of dairying, which was renamed the division of dairying and fisheries. A new position was created, that of deputy divisional director to oversee the division's fisheries responsibilities, and filled by Noel Haysom, who retained his title of director of the Queensland Fisheries Service.

The service comprised a fisheries research branch, an estuarine and foreshore management section and a marine parks section. The Queensland Boating and Fisheries Patrol, which remained in the Department of Harbours and Marine, was responsible for field services and enforcement duties connected with the fishing industry. Dr Burke Hill was director of the fisheries research branch; Frank Olsen headed the estuarine and foreshore management section; and A. (Joe) Winterton, deputy director of the service, administered the marine parks section. Hill joined CSIRO in 1982 and Bob Pearson became director of the fisheries research branch. Winterton transferred to the National Parks and Wildlife Service in the same year, taking with him the responsibility for established marine parks. The fisheries management branch was created in 1984, with Gordon McCormack its first director.

Fisheries research branch

Many research projects undertaken by the Department's fisheries branch between 1970 and 1974 and the Queensland Fisheries Service between 1974 and 1980 were continued when fisheries administration was returned to the Department. These included the freshwater fisheries programme at Walkamin, the prawn and reef fish programmes at Cairns, and further studies of east-coast prawns at Deception Bay. Fisheries research in Queensland is coordinated by the Queensland Fishing Industry Research Advisory Committee, which was established in 1985 to improve liaison between all sections of the industry. Its members include representatives of the Department, the Queensland Fish Management Authority and the fishing industry.

Prawning is Queensland's most important fishing industry. But the industry, which is based in the Gulf of Carpentaria, is plagued by variable catches that can



The Fisheries Laboratory at Deception Bay in 1972. After the Department regained responsibility for fisheries in 1980, this facility was upgraded and renamed the Southern Fisheries Research Centre.



The Department's fisheries research vessel, the Gwendoline May. It was named by Andrea Abern, the Minister's wife, after his late mother.

leave boats and processing factories idle. Thus in 1980 the Department, in conjunction with CSIRO and the Northern Territory Government, set up the Gulf Prawn Project to enable rational management of prawn stocks. When landings of tiger prawns from the Gulf declined two years later, the Department bought the trawler *Gwendoline May* to undertake more intensive studies. Tiger-prawn sampling around Mornington Island, completed in 1984, identified marked seasonal movement of juvenile prawns from inshore seagrass nurseries in winter to fishing grounds in summer, and the nurseries were then mapped.

Recent prawn research has included studies to assess the benefits of closing prawn grounds between Cairns and Princess Charlotte Bay, studies of the life and population dynamics of king prawns near Townsville, and assessment of the impact of trawling on habitats and fauna of the Great Barrier Reef Marine Park. Surveys in 1984 and 1986 revealed valuable resources of king prawns on the Swain Reefs off Burnett Heads, and a potentially commercial resource of a little-known giant prawn species in deeper water.

The Department began a major study of the Torres Strait's commercial fishing resources in 1985. Under the terms of the Torres Strait Treaty, this fishery is jointly managed by Australia and Papua New Guinea, with a catch quota set annually. Researchers identify important prawn nursery grounds, determine seasonal changes in abundance and movements of prawns through a tagging programme, and monitor fishermen's catches via log books. A fibreglass boat, the *Lumaigul* (Torres Strait Islander for 'investigator ship'), was commissioned in 1985 to work out of Thursday Island, carrying fisheries research branch officers who study commercial prawn species in the Torres Strait.

The fisheries branch started breeding tropical freshwater fish at Walkamin Research Station near Mareeba in the early 1970s, and the Queensland Fisheries Service continued this work through the subsequent administrative changes. The programme was set up to investigate the introduction of Nile perch, but while approval was being sought researchers carried out general improvement of Queensland's freshwater recreational fisheries by stocking some of the large dams and weirs built since the late 1950s. Fingerlings of several angling species, including sooty grunter, sleepy cod and silver perch, were supplied from Walkamin, and by the early 1980s about 250 000 fingerlings were produced annually.

A special quarantine facility, where tests on Nile perch could be performed under secure conditions, was built at Walkamin in 1984. But before any fish were imported further ecological studies revealed that their introduction could adversely affect our native species, and the Queensland Government terminated the project in the following year. Researchers at Walkamin have continued to work on the hatchery production and grow-out of barramundi and other native species, with considerable success. Nearby Lake Tinaroo was stocked with more than 50 000 fingerlings in 1986 and 1987, and anglers have reported good catches.

The fisheries research, fisheries management and food research and technology branches are helping the Queensland industry to supply the lucrative Japanese sashimi market. These branches examine different methods of catching and handling tuna and other high-value fish, and study other processing methods for fish of lower quality.

The fisheries research branch has undertaken a number of other important projects, including studies of ciguatera fish poisoning and of reef fish, scallops and crabs. Researchers who studied the biology of the saucer scallop at the Burnett Heads Fisheries Laboratory between 1978 and 1982 found that harvests varied considerably from year to year and that temperature affects spawning activities; they also identified the algae on which the scallop feeds. In the same period researchers at Deception Bay studied the biology of the mud crab, examining the proportion of the females being fertilised by the diminishing male population, the effect of harvesting males only and of the current size restrictions, and made population estimates. They also began a study of the biology of the sand crab in Moreton Bay, and the effect on it of harvesting by pole fishermen, trawlers and recreational fishermen. Going further afield, in August 1985 the Department and the University of Queensland began a study of coconut crabs in Vanuatu, in a project funded by the Australian Centre for International Agricultural Research (ACIAR).

The fisheries research branch has its head office in Brisbane and operates research stations at Cairns, Walkamin, Burnett Heads and Deception Bay. It also has four research vessels, presently based at Thursday Island, Cairns and Deception Bay. The fisheries research unit built at Cairns in 1973 to survey the prawn, lobster and mackerel resources of the Torres Strait was greatly expanded and opened as the Northern Fisheries Research Centre in 1981. A smaller installation on Green Island, just off Cairns, allows on-site research on the Barrier Reef.

In 1984-85 the Department began establishing an aquaculture centre on Bribie Island to undertake aquaculture research on a semi-commercial scale in conjunction with experimental facilities built at the Southern Fisheries Research Centre, Deception Bay, in the previous year. The Bribie Island facility is expected to be complete by the end of 1988.

Fisheries management branch

The fisheries management branch has three groups of officers directly servicing the fishing industry. The environmental group looks into fish habitat protection, the biological elements of fisheries management, and recreational fishing; the management group carries out economic studies and statistical reporting and reviews commercial and recreational fishing policy; and the extension liaison group is responsible for freshwater fisheries, communication with industry groups and enforcement duties.

The environmental group is responsible for habitat reserves previously managed by the marine parks section of the division. Management of the two marine parks, Heron Island, off Gladstone, and Green Island, off Cairns, was transferred to the National Parks and Wildlife Service in 1982. Three types of fisheries reserves were declared under the *Fisheries Act* 1976-1984: fish habitat reserves, wetland reserves, and fish sanctuaries (where no fishing is permitted). The branch undertakes environmental impact studies to determine the effect of developments on water quality and fish and their habitats, including studies of seagrass growth and mangrove rehabilitation. It is involved in the expanding aquaculture

industry in southern Queensland, especially in breeding marron, a West Australian freshwater crayfish. The branch introduced a marron industry management programme in 1986, and in the same year, in conjunction with the *Queensland Country Life* newspaper, held a two-day conference, 'Aquafarm 86', in Brisbane. Recreational fishing is an important aspect of its work, as a survey by the Australian Bureau of Statistics in 1985 revealed that about 30 per cent of Queensland's adult population fish at least once a year. This work includes estimates of catch rates, and a sportfish tagging programme, started in 1980 in cooperation with the Queensland branch of the Australian National Sportfish Association and other groups of recreational anglers.

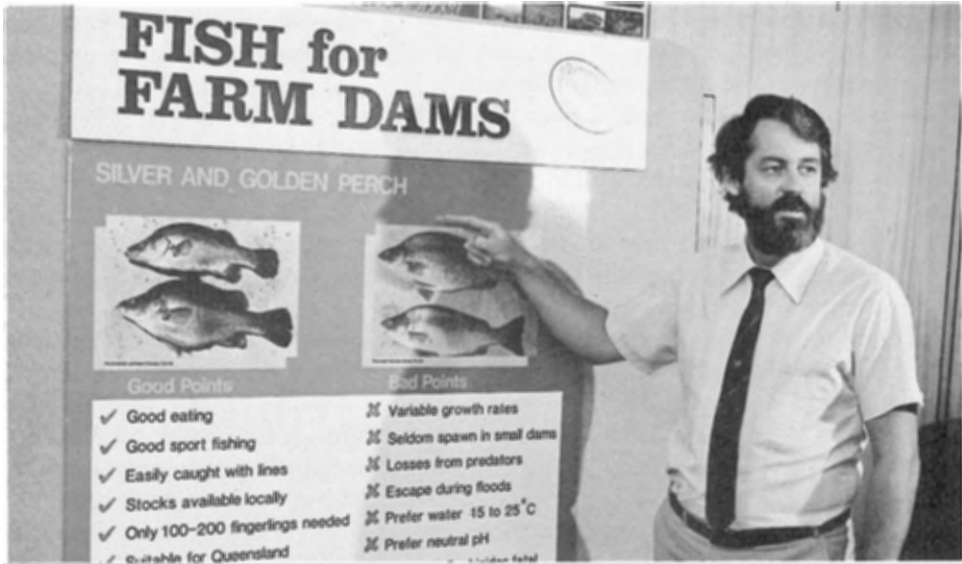
The fisheries management branch provides information to fishermen and consumers through field days, displays and publications describing various aspects of Queensland's marine and freshwater fisheries, and works closely with industry committees and groups. In 1984 the Minister for Primary Industries, Neil Turner, established the Recreational Fishing Advisory Committee to provide a forum for the discussion of matters affecting both recreational and commercial fishing. The branch is represented on this committee and performs the secretarial duties. In the same year, the QFMA Fishing Sector Advisory Committee, a subcommittee of the Queensland Fish Management Authority (QFMA), was established to review fishing sector issues submitted to the authority. The fisheries management branch provides Departmental representation on this committee, performs the secretarial duties, provides technical input and undertakes investigations for the committee.

Fishing legislation

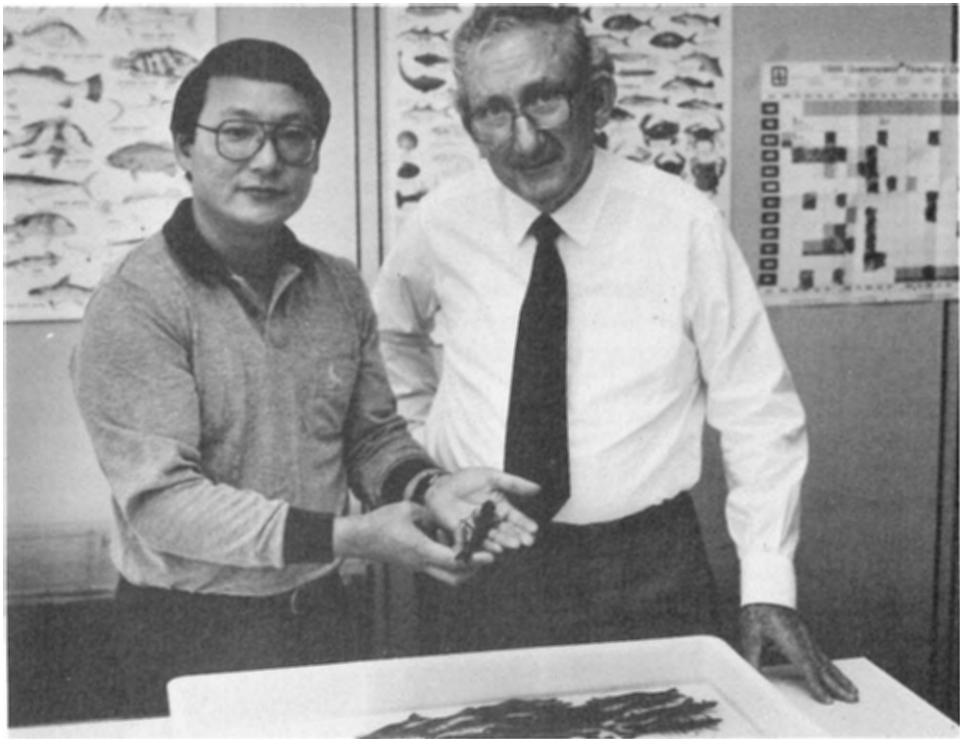
The Department administers the *Fisheries Act* 1976-1984, which provides for the protection, conservation and management of the State's fishery resources. It controls fish processing by the licensing of processing establishments, and imposes bag limits on certain species vulnerable to overfishing. The Act sets out areas of State or Commonwealth jurisdiction over seas and submerged lands. Fisheries responsibilities in offshore areas were returned to the States under the Offshore Constitutional Settlement of 1987.

The *Fishing Industry Organisation and Marketing Act* 1982 set up the Queensland Fish Management Authority (QFMA) to oversee the catching, processing and marketing of seafoods. The authority, which is mainly concerned with the management of food-producing fisheries, replaced the Queensland Fish Board. Its seven members include a chairman, a member nominated by the Minister, and the Director-General (or his nominee). (Dave Mitchell, formerly director of the division of dairying and fisheries, was appointed chairman.) The other members represent processors, wholesalers, fishermen and fishermen's organisations.

In 1984-85 the Department established a small fisheries inspection group, which operates in the fisheries management branch, to support the QFMA licensing activities not serviced by the Boating and Fisheries Patrol in the Department of Harbours and Marine. This group is particularly concerned with the licensing of commercial seafood premises.



Fisheries economist Noel Moore discussing fish farming with aquaculturists at a 1985 meeting to assess the potential for aquaculture in Queensland



Fisheries biologist Todayoshi Hoshino shows the director-general, Dr Graham Alexander, some of the first batch of tiger prawns reared at the Southern Fisheries Research Centre in 1986.

When the QFMA was set up, the Fisheries Act was amended to transfer licensing powers to the authority, except in relation to oyster products or pearl farming. Under the *Fisheries Act Amendment Act* 1982, the Chief Inspector of Fisheries was nominated as the responsible authority, a title held by the director of the division of dairying and fisheries.

The *Torres Strait Fisheries Act* 1984 was designed to promote the management, development and welfare of the fishing industry in the Torres Strait. It implements the provisions of the Torres Strait Treaty between Australia and Papua New Guinea concerning maritime boundaries and oversees a fishing management programme. The Protected Zone Joint Authority, a Commonwealth and Queensland Government body, was set up in 1985 to manage the area and three committees were established to advise it. Bob Pearson, director of the fisheries research branch, represents the Department on the Torres Strait Fish Scientific Advisory Committee, while Dave Mitchell, chairman of QFMA, represents the Queensland Government on the Torres Strait Fish Management Committee and the Torres Strait Industry and Islanders Consultative Committee.

Conclusion

In 1969 the Department assumed responsibility for the fishing industry in Queensland. The difficulties associated with this quite different work are reflected in its subsequent seesawing between various departments until December 1980, when the Queensland Fisheries Service was transferred to the Department of Primary Industries. Later, when the Queensland Fish Management Authority was created to oversee the orderly marketing of fish products, the Department assumed wider responsibilities. Since 1980 it has assisted the authority and the industry through its fisheries research, fisheries management, and food processing and technology work, and by protecting fisheries resources. This work has helped to guide the fishing industry through years of great change and has presented the Department with new challenges in addition to its traditional crop and livestock responsibilities.

Animal industries

Like dairying, Queensland's other animal industries underwent considerable changes from the early 1960s, caused mainly by fluctuating product prices in the extensive pastoral industries and specialisation in the pig and poultry industries, which resulted in fewer, but larger, commercial units. Great adjustment occurred in the wool and beef-producing industries and many beef producers in higher-rainfall areas switched to cash and fodder crop production and planted improved pastures.

Division of animal industry

Queensland's animal industries other than dairying are serviced by the Department's division of animal industry. The most significant organisational changes made in the division after 1963 were the split of the cattle husbandry branch into its dairy and beef components in 1970, and the disbandment in 1981 of the husbandry research branch, whose staff and responsibilities were shared among the animal husbandry branches. At the end of 1986 the division had seven branches — beef cattle husbandry, sheep and wool, pig and poultry, veterinary public health, veterinary services, biochemistry and pathology. The last three are discussed in Chapter 47.

In 1963 the division of animal industry was directed by Arthur Clay, with C. R. (Rod) Mulhearn his deputy. After Mulhearn's retirement in 1969, an additional deputy divisional director's position was created. Les Newton, former director of veterinary services, became deputy director responsible for regulatory and other field activities, while John Ryley, former director of veterinary research, took charge of the division's research work. Clay retired in 1976 and was followed by Newton, who was succeeded by Brian Woolcock in 1980, with deputy directors Stan Knott in charge of field services and Lionel Laws in charge of research.

In 1986 Knott retired and was replaced by Ian Wells, previously director of veterinary services. In the same year Laws became director of animal laboratories at the Animal Research Institute at Yeerongpilly and was replaced by Dr Peter Hopkins, who had been director of the beef cattle husbandry branch. Woolcock became assistant director-general and was replaced by John Gibb, former director of the administration division.

Beef cattle husbandry branch

The beef cattle husbandry branch does applied research in husbandry and management and extends its findings to producers. It conducts trials at Swan's Lagoon, Kairi, Brigalow, Brian Pastures and Mutdapilly research stations, and has field officers based at twenty-three centres throughout Queensland. The branch was created in 1970 from the beef cattle husbandry component of the cattle husbandry branch, with Brian Woolcock its first director. He was followed in 1976 by Marcus Durand. Dr Peter Hopkins took over in 1985 but was promoted a year later and Lyle Winks became acting director.

The breeding performance of herds was the subject of the Department's major beef cattle research programme in the 1960s. Many producers went into debt to increase stock because of the strong beef market but it slumped in 1973, largely because of a curtailment of beef imports by Japan and the United States. Four years later the State's beef herd was the largest ever recorded, and producers then had to reduce the size of the breeding herd. As spaying — the removal of both ovaries — was the only effective way to prevent pregnancies in surplus cows while they were being fattened for slaughter, the Department held field days and organised schools to demonstrate the process. John Biggers, a stock inspector at Toogoolawah, worked with a steel fabricator and a grazier to develop a new technique for spaying cattle, and shared first prize as Australian Rural Inventor of the Year in 1978 for the technique, which was widely adopted.

Although the beef slump lasted until 1978, the branch continued its research into nutrition and breeding throughout the downturn in the industry. It developed molasses-urea supplementation for survival feeding and for weaners, and developed drum lick feeders, which have attracted worldwide interest.

A major feature of the beef industry since 1963 has been the changeover from predominantly British breed stock to predominantly Indian, or Zebu, breeds in Queensland's beef cattle herds. The Department assessed the qualities of the various breeds and advised on those that would best meet graziers' needs. The change to Indian breeds was made to develop an animal more tolerant to heat and less susceptible to tick fevers and debilitation from high tick loads, an important consideration when ticks developed resistance to organophosphate acaricides in the early 1960s. The branch became involved in studies of paddock spelling, using rotation systems to decrease tick numbers and strategic dipping to decrease the level of tick exposure to chemicals.

The extension component of the beef cattle husbandry branch increased in the late 1960s and early 1970s as farmers in the declining dairy and sheep industries changed to beef, and its involvement with graziers became even greater during the beef slump of 1973-78. Although prices rose again in the early 1980s, they did not match their earlier heights in real terms and branch officers devised extension programmes to improve production and marketing systems to help cut costs.

The Department held beef production seminars for the managers of pastoral companies in 1980-81, and, in association with the Queensland Agricultural College and the Livestock and Meat Authority of Queensland, animal appraisal and marketing courses for stock and station agents. The aim was to show that a lower



Beef cattle husbandry officer Tom Rudder checks a grain ration feeder with central Queensland grazier Keith McCamley of 'Memooloo', Comet, in 1974.



Dr Linda Murphy, the Department's first officer trained in animal welfare husbandry, and Ray Byrnes, director of the pig and poultry branch, at the opening of the Redlands Poultry Research Centre in 1986

slaughter age would improve the market acceptance of beef. Carcass classification and sale by description were promoted and schools were held to increase the live-animal assessment skills of producers. Branch officers also advocated a change to better breeds, and the adoption of objective selection criteria, pasture improvement and management practices that would reduce labour costs.

Electronic marketing of cattle has recently become available to Queensland producers, and beef cattle husbandry officers have mounted programmes to explain its operation and benefits. Perhaps the greatest advantage is that handling and transport of animals are reduced to a minimum. In recent years the branch has investigated the most efficient methods of marketing cattle to improve production while taking account of animal welfare. Its director, Marcus Durand, was co-convenor of a national workshop on cattle handling and transport facilities, held at Cowra in 1985.

The beef cattle husbandry branch also has responsibility for research into and adoption of artificial insemination technology for beef herds. This programme was started by performance-testing bulls at the Animal Husbandry Research Farm (Rocklea) and then transferring the best bulls to the Wacol Artificial Insemination (AI) Centre. The AI Export Centre was established at Redlands Research Station in 1972 specifically to process semen for the American market. The Department's AI facilities demonstrated a wider usefulness to the industry in 1982, when the first consignment of cattle from the Cocos Island Quarantine Station arrived in Queensland. Seven bulls were sent immediately to Redlands by their owners to ensure that supplies of semen were placed in storage before the animals were moved to their properties or other locations.

Sheep and wool branch

The sheep and wool branch provides research and extension services to the sheep and wool and the mohair and cashmere goat industries. Its advisers are based at twelve centres in wool-producing districts and its researchers conduct trials at 'Toorak', near Julia Creek, and 'Croxdale', near Charleville. The branch also operates the Wool Biology Laboratory at Yeerongpilly, although in 1981 the sheep and wool fleece measurement service, previously offered by the laboratory, was subcontracted to the Australian Wool Testing Authority. Alan Bell was director of the branch from 1963 until his retirement in 1978, when he was followed by Dr Peter Hopkins. Hopkins moved to the beef cattle husbandry branch in 1985 and was replaced by Lyle Winks.

Studies continued throughout the 1960s at Toorak Sheep Field Research Station to find reasons for heavy lamb deaths after marking, a problem that brought great difficulty in maintaining flock size in Queensland's north-west. Heat stress during the first week after mating was found to be the reason for low lamb births and low survival rates in that environment. On the recommendation of the Animal Production Committee of the Standing Committee on Agriculture, the Department began a survey of the vital statistics of breeding flocks in 1964-65. Long-term studies on the management of mulga scrub and Mitchell grass pastures and cropping in the north-west were also begun in that year.

Wool prices slumped in the late 1960s and sheep field officers then advised on alternative enterprises, as well as on financial management, wool marketing, clip preparation and labour-saving devices. Researchers at Charleville and Roma studied decision-making in the wool industry and developed a computer simulation model to guide farmers in flock management. The branch also educated graziers in using the wool futures market once it was established.

In 1980 the Australian Wool Corporation, with assistance from State departments of agriculture, published *Australian Wool Harvesting Notes*, describing sheepyards, shearing sheds and sheep-handling devices. In 1982 the sheep and wool branch set up a shearing shed design service to promote the use of more efficient wool-handling facilities, using these notes as a reference.

Chemical defleecing trials began in the early 1970s, as did trials with sheep rugs supplied by CSIRO, necessary in Queensland because of the problem of sunburn. As shearing costs continued to be the most expensive factor in wool production, studies on chemical defleecing were again undertaken in the 1980s, with many new chemicals tested.

When selling by objective measurement (using random bale-core samples) was introduced branch officers gave demonstrations on clip preparation and a system of classing that complemented sale by sample. The Department organised wool-classing courses for graziers and shearers, with practical training courses at Cunnamulla and Tambo.

With the decline in wool prices, some growers turned to producing mohair from Angora goats, advised by sheep and wool branch officers, and others mustered and marketed feral goats for meat. By the late 1970s the demand for advisory services was so great that it was necessary to allocate a sheep and wool adviser to specialise in goat husbandry and provide training to other officers in the branch. Departmental field days, seminars and meetings were held for goat owners and the sheep and wool branch published a booklet, *The Angora Goat in Queensland*.

Pig and poultry branch

The pig and poultry branch provides research and extension services to the pig and poultry industries, and regulates the latter. Fred Bostock was in charge of the pig section until his retirement in 1969, when he was followed by Arnold Todd. F. N. J. (Noel) Milne headed the poultry section. Overall administration of the branch was in the hands of divisional director Arthur Clay until 1971, when Milne was appointed branch director. He retired in 1981 and was succeeded by Ray Byrnes.

Queensland's pig industry has changed enormously since the 1960s, when the decline in the dairy industry and the change from farm-separated cream to market milk broke the close relationship between dairying and pig raising. Specialist pig producers, with assistance from branch advisers, adopted more sophisticated production methods, using special housing and prepared feeds based on milled feedgrains. To provide more appropriate information to this group, the pig progeny test at the Rocklea Pig Testing Station was replaced by a performance test based on measurements of growth rate, food conversion and carcass character-

istics. Most of the testing facilities at Rocklea were allotted to commercial herds, with genetic progress in the tests measured by comparison with a control herd at Biloela Research Station. The Pig Research Centre was established at Wacol in 1972-73 and after much research and refinement of procedures an AI service for the pig industry was launched in 1985-86. Sires are drawn from boars tested at Rocklea, and users of the service are taught AI procedures by Departmental officers.

The poultry industries also became highly specialised in the 1960s, and by the mid 1970s the poultry section had grown from a general advisory service, with its emphasis on disease control, to include special project work in nutrition and housing and studies on egg quality. It also gave advice on farm accounting and conducted surveys on the industry's needs, as well as applying the regulations of the Poultry Industry Act. Companies and other organisations involved in the poultry industry sought more technical advice from the Department and extra specialists were appointed. Dr T. M. Grimes rejoined the Department after studying poultry disease at the University of Georgia for three years; Dr Linda Murphy, an animal behaviour specialist, and a veterinary officer were also appointed.

Poultry industry legislation

The poultry section administers the Poultry Industry Act, which regulates the industry and which set up the Poultry Industry Fund to collect levies to fund the Department's research, advisory and diagnostic services. The Poultry Advisory Board, reconstituted under a 1965 amendment to the Act, organised a symposium in 1973 on poultry needs for the future. This was the forerunner of the Poultry Industry Information Exchange (PIX), which is now held annually.

By June 1964, more than two-thirds of the broilers (meat chickens) produced in Queensland were being grown on contract to processing firms. Broiler production increased rapidly in the 1970s, and the *Chicken Meat Industry Committee Act* 1976 was passed to regulate the industry. This Act, applying only to broiler chickens, set up the Chicken Meat Industry Committee to allow growers and processors to negotiate contracts. The committee, which is serviced by the poultry section, checks all agreements between processors and growers, and mediates in disputes over prices.

Veterinary public health branch

As its name implies, the veterinary public health branch is charged with protecting the health of the public as well as overseeing the meat processing industries. It administers the Meat Industry Acts, which provide for inspection of domestic meat from slaughter to retail. As well as reporting on the incidence and origin of disease in slaughter stock, the branch explains meat quality to consumers. Formed in 1964 as the meat control branch, it was renamed the slaughtering and meat inspection branch to avoid confusion with the Queensland Meat Industry Authority, which was set up in 1965. The branch was renamed veterinary public health branch in 1980, in recognition of its wider areas of responsibility. Boyd Parkinson was director from 1964 until his retirement in 1987.

Primary Industries Minister Neil Turner signed an agreement in April 1985 under which responsibility for the inspection of meat slaughtered in export abattoirs for domestic consumption was transferred to the Commonwealth. This removed the need for dual meat inspection fees and resulted in substantial savings to producers. Twenty-three Departmental inspectors were transferred to the Commonwealth, although the branch continued to provide inspection services at domestic abattoirs, slaughterhouses, knackeries, smallgoods processing plants and retail meat outlets. The Department also remained responsible for monitoring domestic meat marketing, and some State officers were authorised under Commonwealth regulations to help control game meat exports.

Because of the need to reduce costs and losses in marketing and to consider animal welfare, the branch also became involved in studies on bruising, stockcrate construction, and the watering and feeding of travelling stock. These culminated in the Australian Carcass Bruise Scoring System, developed by branch officer B. (Jock) Anderson and J. C. Horder of the Australian Meat Board, and adopted by the industry. The Department then prepared a film on bruising, funded by the Australian Meat and Livestock Corporation.

The studies suggested that the time cattle travelled without rest, water and feed should be minimised, and that on arrival at meatworks, beasts should be rested for two days before slaughter instead of one. Trials done by the Queensland Meat Industry Organisation and Marketing Authority and the Department's beef cattle husbandry branch validated this theory and the 'wet curfew' system of liveweight cattle selling was then adopted.

In conjunction with the Saleyards Boards Association of Queensland, the Department conducted workshops for meat processors, buyers and stockmen to improve cattle handling and transport procedures. The Queensland Saleyards Livestock Committee was formed in 1986 to promote better handling procedures and facilities at saleyards. The veterinary public health branch's meat quality section also convened a working group from the pig industry to develop a similar code of practice.

In response to a declining preference for red meats, the beef industry has called on the Department for help in improving the quality of red meats to increase their attractiveness to the consumer. The veterinary public health branch and the Livestock and Meat Authority of Queensland have promoted meat as a nutritious food, and changes have been made in retail meat trading regulations to improve meat sales.

The Department conducts a chemical residue monitoring programme to ensure that levels of pesticide residues in meat do not exceed permissible limits. Property registration and tail tagging of slaughter cattle, measures that had proved invaluable in the Brucellosis and Tuberculosis Eradication Campaign, are also used to trace the origin of contaminated meat.

In the mid 1970s the branch developed methods of tenderising meat that could be applied to both beef and mutton. It prepared a series of slides illustrating how to break up tenderstretched beef hindquarters and mutton carcasses. Electrical stimulation of freshly slaughtered carcasses was another tenderising treatment developed by the branch. The Queensland Meat Industry Organisation and Mar-



John Lapworth (left), district adviser in the beef cattle husbandry branch and specialist in stock transportation, discusses ways of building better stock crates with a manufacturer at the Brisbane Truck Show in 1983.



Rob Thomson (centre), meat inspector in the slaughtering and meat inspection branch (now veterinary public health branch), inspecting meat at the Ipswich District Abattoir in the early 1970s

keting Authority introduced a voluntary system of colour branding of young beef and lamb to indicate tenderness, and in 1982–83 all States agreed to implement the system.

Meat industry legislation

In 1964 the Queensland Government appointed a committee of inquiry to examine the livestock and meat industry, with C. L. (Lloyd) Harris, chief advisory officer in the Department, a member. On the committee's recommendation, *The Meat Industry Act of 1965* was introduced, consolidating *The Slaughtering Acts, 1951 to 1958*, *The Abattoirs Acts, 1930 to 1955* and the slaughtering provisions of *The Poultry Industry Acts, 1948 to 1959*. The 1965 Act set up a meat inspection account at the Treasury, and provided for the establishment of the Queensland Meat Industry Authority, on which the Department was represented. William Webster, the Department's director-general, was seconded to the authority as chairman in June 1964 and took up the appointment on a permanent basis in January 1965. The Queensland Meat Industry Board was renamed the Metropolitan Public Abattoir Board to prevent confusion with the authority.

The Act was amended in 1977 to establish the Queensland Meat Industry Organisation and Marketing Authority, which replaced the Queensland Meat Industry Authority. This change had been recommended by the Queensland Beef Industry Committee, set up in 1975 to find ways of overcoming the effects of depressed markets on the beef industry. The new authority, whose ten members included a senior representative of the Department, was empowered to improve marketing arrangements and develop a carcass classification system. It was renamed the Livestock and Meat Authority of Queensland under a further amendment to the Act in 1983.

Deer farming became a growth industry in Queensland in the early 1980s, thanks to expanding sales of locally produced venison to the restaurant trade and high prices for velvet (the soft covering on the deer's antler, used to make aphrodisiacs and in great demand in Asian countries). In 1980–81 deer were declared 'stock' under the Meat Industry Act and the Deer Farming Act, passed in 1985, permitted their farming.

Conclusion

Since the early 1960s specialisation and intensification in the livestock industries have necessitated changes in husbandry methods and techniques and animal housing. At the same time, economic pressures on individual industries have led to a review of production, handling and marketing methods to bring greater efficiency. The Department has responded to the livestock industries' demands for husbandry and marketing advice by appointing and training specialist officers and setting up appropriate administrative structures in which these officers can operate effectively.

Animal health and quarantine

The staff of the Animal Research Institute (ARI), headquartered at Yeerongpilly, together with field staff of the veterinary services branch, contribute to the maintenance of animal health in Queensland. Laboratory services are centred at Yeerongpilly, with a smaller complex at Oonoonba servicing north Queensland. Laboratories at Rockhampton and Toowoomba, facilities at Roma and Charleville, and the Tick Fever Research Station at Wacol are also part of this network.

Animal Research Institute (ARI)

In 1964 John Ryley, director of husbandry research, was appointed to the new position of director of veterinary research to oversee operations at the Animal Research Institute. He was promoted four years later and the position lapsed. In 1981 Rolph Gartner, who had headed the disbanded husbandry research branch, was appointed director of animal laboratories at Yeerongpilly. He retired in 1986 and was succeeded by Lionel Laws, who brought with him the title 'Chief Quarantine Officer (Animals)'. The director of animal laboratories administers the ARI complex and the pathology and biochemistry branches, liaises with directors of other branches based there, and is also responsible for the laboratories at Oonoonba, Toowoomba and Rockhampton.

Some of the Department's other animal industry services have been based at Yeerongpilly recently. In 1983 the sheep and wool branch moved there from Mineral House in the city, to join the Wool Biology Laboratory, and staff from the biometry branch were stationed there in 1987 to manage the Department's computer network (QDPINET).

Pathology branch

Les Newton directed the pathology branch until 1965, when he was succeeded by W. T. K. (Sam) Hall, who retired in 1980. Geoff Simmons was then acting director until the appointment of Dr L. L. (Bill) Callow in 1982.

The pathology branch provides veterinary diagnostic services to field staff, veterinarians and primary producers, does applied research in animal diseases, prepares and distributes vaccines, and operates the Tick Fever Research Centre, which was established at Wacol in 1962. Its laboratories at Yeerongpilly,

Oonoonba, Rockhampton and Toowoomba provide support in the control and eradication of exotic diseases.

An epidemiology and statistics section was formed in the branch in 1966-67 to record and analyse diagnostic data. A computerised on-line recording and retrieval system for veterinary diagnostic information was completed in 1986, using QDPINET's computer facilities, and regular reports are issued to research and field staff.

Biochemistry branch

Dr Jim Harvey was director of the biochemical branch until 1965, when he became deputy director-general and was replaced by C. W. R. (Bill) McCray. On McCray's retirement in 1981, Dr Tom McEwan became director of the branch, which was renamed the biochemistry branch in the following year.

The biochemistry branch serves the division of animal industry in clinical and nutritional biochemistry and toxicology, and does research in these fields. It also provides chemical analyses to the division of dairying, and monitors feedstuffs, animal products and the environment to detect chemical residues.

Husbandry research branch

John Ryley was director of the husbandry research branch from its formation in 1959 until 1964, when he became director of veterinary research. The branch was then headed by Jim Morris (1964-70), Lionel Laws (1970-80) and Rolph Gartner, before its disbandment in 1981.

A unit of ARI, the branch ran the Animal Husbandry Research Farm at Rocklea and the pig section's testing unit, which was transferred to the branch in 1969-70. It also operated the Toorak Sheep Field Research Station, and had research units at Hermitage, Biloela and Charleville. When the branch was disbanded these responsibilities were returned to the appropriate branches or sections.

Veterinary services branch

Rod Mulhearn was director of the veterinary services branch (and also deputy director of the division of animal industry); he was followed by Les Newton (1965-68), Keith Grant (1968-78), Stan Knott (1978-80), Ian Wells (1981-86), and Roly Nieper. (In 1968 the directorship of veterinary services had become a separate position.) The branch is responsible for investigation into and control of animal disease, extension, and disease prevention. It administers the Stock Acts and the Brands Acts and carries out animal quarantine inspection services on behalf of the Commonwealth Government.

The Brands Acts require all cattle, sheep and pigs to be branded and thereby registered with the Department, allowing stock to be traced to their property of origin. The Computer Operated Brands Recording and Acquisition (COBRA) project began in 1980 and was almost complete by 1986. Microfilming of brands records from when they started, in 1872, to the present day is also under way.

Veterinary services is the largest branch in the Department and is represented at more centres than any other. In 1986 stock inspectors and veterinarians were based at eighty-one country centres. At twenty-four of these, including such outposts as Thursday Island, Normanton and Windorah, the stock inspector was the Department's sole representative. Stock inspectors are the first line of defence against animal disease: they report outbreaks, which are then tackled by the branch's veterinarians. They also spearhead campaigns to rid the State's flocks and herds of endemic diseases that affect production and the marketability of meat products.

Pleuropneumonia eradication

Contagious bovine pleuropneumonia, or 'pleuro', which became the most serious problem of the Queensland cattle industry other than drought and the cattle tick, was introduced into Victoria in 1858, through an infected cow imported from England, and spread rapidly over the Australian mainland. In 1864 the Queensland Government set up a Select Committee to examine ways to control the disease, but little was done until 1888, when visiting scientists developed a vaccine to provide temporary immunity.

By 1936, the Council for Scientific and Industrial Research (CSIR) had developed an improved vaccine and better vaccination methods, and a reliable blood test for detecting 'carrier' animals. Queensland achieved marked success in controlling pleuro under the guidance of veterinary services branch staff. By 1944 a quarter of a million doses of vaccine were being administered annually and the incidence of the disease declined markedly. However, close surveillance of cattle herds could not be maintained during World War II and pleuro again became established. An investigation was launched at the 1953 Biennial Conference of Commonwealth and State Veterinary Officers, and funding from the Commonwealth Extension Services Grant permitted the employment of more staff for a pleuropneumonia eradication project.

An amendment to the Stock Act compelling owners to vaccinate their stock led to a decline in the disease, but in 1958 the Standing Committee on Agriculture appointed a pleuropneumonia subcommittee and the mainland States agreed to contribute funds for an eradication project. The Commonwealth Government set up a trust fund, the National Pleuropneumonia Fund, and the States' chief veterinary officers joined a subcommittee formed to control and eradicate the disease. The scheme took effect in 1961, with vaccination the basis of the campaign. In 1964 a specially trained Departmental team equipped with a mobile laboratory tested animals on properties and reactor cattle were removed. Queensland's last outbreak was in 1960 but the eradication campaign continued until 1970, and two years later the whole of the State was declared free of pleuropneumonia.

Tuberculosis and brucellosis eradication

Following the success of the national pleuro campaign, a similar project, the Brucellosis and Tuberculosis Eradication Campaign (BTEC), was launched in 1970. In that year, four areas where substantial eradication of tuberculosis had

already been achieved through the Department's testing programme were declared 'protected' and tuberculosis testing was extended into adjacent areas over the next two years.

The Department's pathology branch supported the scheme through its laboratories at Yeerongpilly, Oonoonba and Rockhampton and facilities at Roma and Charleville. Veterinary services and veterinary public health officers collected blood samples and tissue lesions, which were tested, respectively, for brucellosis and tuberculosis. The laboratories also tested milk samples, provided by the division of dairying, for brucellosis. Private veterinarians have made an important contribution to the campaign by taking blood samples for brucellosis testing.

The most complex animal health programme ever undertaken in Australia, BTEC should result in complete freedom from the diseases by the target date of 1992. Work started in 1985-86 on the 200 kilometre Nicholson River Fence, the first of a series of strategic fences the Department is building in the Gulf of Carpentaria and on Cape York Peninsula to prevent clean areas being reinfected by feral animals. Graziers in remote areas are also assisted through subsidised testing, freight rebates on cattle bought for restocking, and help in financing capital improvements for disease eradication.

Other disease eradication schemes

The Department's Brucellosis-free Tested Herd Scheme for pigs and the Pulorum Control Programme for poultry both continued to operate after 1963. Voluntary schemes have been introduced in the 1980s to control ovine brucellosis in stud sheep, enzootic bovine leucosis (EBL) in dairy cattle, and caprine retrovirus (CRV) infection in goats. Such disease-control schemes also facilitate animal movement and trade. Veterinarians undertake the field aspects of the schemes, while testing is done in the Department's laboratories; direct charges are made for both services.

Ticks and tick fever

In the 1960s the problem of cattle ticks and tick fever was worsened by the emergence of cattle ticks that were resistant to chemicals. A strain of cattle tick resistant to all organophosphorus chemicals appeared in the Esk district in 1965-66 and other resistant strains have since appeared throughout Queensland.

From the mid 1950s, Departmental trials on commercial properties had produced higher growth rates and indicated better tick resistance in Zebu x British cattle than in straight British breeds. CSIRO research at 'Belmont', near Rockhampton, had confirmed this by the mid 1960s, and also showed that chemical tick control was usually unnecessary in Zebu x British cattle. The Department then promoted the use of Zebu breeds in the State's beef herds, also promoting minimal dipping to reduce the exposure of ticks to chemicals and extend the effective life of the chemicals. These strategies reduced costs while maintaining production, and resulted in an increase from 13 to 65 per cent of Zebu x British cattle in Queensland between 1965 and 1982 and the widespread adoption by producers of minimal dipping since the mid 1970s.

The Department continued to enforce dipping regulations where cattle were being moved, to prevent the infestation of the non-ticky area of the State. A Government-owned dip was built at Helidon in 1985 to replace the old facility, which had been leased. In the same year, the railway line and road between Hughenden and Cloncurry were double-fenced to prevent tick-infested cattle crossing to the tick-free areas south of the line.

After the Tick Fever Research Laboratory was established at Wacol in 1962 research on the production, storage and handling of tick-fever vaccine was intensified and has received worldwide recognition. The vaccine is used to prevent tick fever in cattle that have not had the chance to acquire natural immunity.

Disease outbreaks

Serious livestock diseases appear from time to time and Departmental officers are called on for rapid diagnosis, cure and prevention. One of these is ephemeral fever (three-day sickness) of cattle, a disease that occurs at irregular intervals, starting in north Queensland and gradually spreading to the south-eastern States of Australia. After a major outbreak of ephemeral fever in 1981, in which about one per cent of affected cattle died, the epidemiology of the disease seemed to change, with it occurring in some area of Queensland in most years. Work done by researchers at the University of Queensland in association with the Department and the CSIRO led to the production of an effective vaccine, which was released in 1985.

Stock poisoning

The value of cattle dying each year from plant poisoning alone in Queensland has been estimated at about \$15 million on 1986 values. This does not include the cost of reduced production from cattle that survive poisoning, the reduced grazing potential resulting from the presence of poisonous plants, or the cost of treatment and control measures.

Cattle are also poisoned by sawfly larvae, which contain a toxin that damages the liver. The problem is estimated to cost \$150 000 in cattle deaths annually and an additional \$1 million in the cost of reduced land usage.

Accidental chemical poisonings occur from time to time. For example, in 1983 more than a hundred head of cattle died after the application of arsenic trioxide, which was in a wrongly labelled container bought at a sale. The Department used this unfortunate incident to highlight, through the *Queensland Agricultural Journal* and newsletters, the risks of re-using old containers.

Contaminated feed also causes problems in the livestock industries. The first positive field isolation in Australia of vomitoxin, a mycotoxin that is toxic to pigs, was obtained at Beaudesert in 1983-84 after the harvest of weather-damaged cereals. Departmental officers established that a fungus produces the toxin. A year later aflatoxin, produced by a different fungus, caused losses in cattle, pigs and ducklings that ate infested grain.

In 1985-86 the Department developed a treatment for cattle poisoned by mother-of-millions, a plant containing a cardiac glycoside that decreases heart

function and causes scouring. The successful treatment regimen counteracts the effects of poisoning and prevents the death of affected animals.

Blowfly control

Sheep blowflies are the most serious health problem in Queensland's sheep and wool industries. As a countermeasure, sheep and wool branch officers continued to promote the mules operation, which had been developed in the 1940s. It was widely adopted by graziers after Departmental studies at Longreach showed that mulesing lessened the incidence of blowfly strike. The Department's researchers next tried crossing Merinos with Wiltshire Horns to develop a 'mini-care' sheep in which blowfly strike was minimised. In the mid 1980s a test was developed to show the level of immunity to fly strike in sheep, and after validation in field trials this test will be used to select animals for breeding experiments.

The Department's studies of the ecology of the blowfly enable prediction of outbreaks and the implementation of improved prevention techniques. Researchers have also developed better methods of applying chemicals to the fleece and skin, and have sought to develop a vaccine to immunise sheep against fly strike.

The Stock Act

Legislation dealing with animal health is enacted mainly in the Stock Act. The Act has been amended several times since the early 1960s to introduce more effective disease-control measures. An amendment in 1965 listed notifiable diseases, placed levies on milk and cream to contribute to tuberculosis eradication, changed stock-movement regulations and provided for the licensing of pet shops.

A 1973 amendment repealed the Buffalo Fly Control Act, transferring the money in the Buffalo Fly Control Fund to the Stock Fund. It dealt with stock movements, quarantine, the health of sale stock, and cattle dips. The amendment also repealed the Pig Industry Act and brought the disease-control provisions of the Poultry Industry Act under the Stock Act. A further amendment in 1976 banned the feeding of swill to pigs to prevent the spread of disease.

A major source of the Department's funds for stock services and compensation was removed in 1977, when stock assessments levied by the Department were declared invalid by the High Court. As a result, the State Government had to provide money for this purpose from Consolidated Revenue, and amended the Stock Act in 1978. That amendment also required the registration of veterinary laboratories and surveillance over the introduction of vaccines; provided for the destocking of areas contaminated with chemicals that might leave residues in animal products and empowered inspectors to take soil samples from those areas; introduced compulsory disease testing; and allowed the Minister to declare infected areas by notification in the *Queensland Government Gazette*.

The 1979 and 1986 amendments to the Stock Act both concerned the eradication of brucellosis and tuberculosis. They enforced the inspection, testing and treatment of stock, and gave the Minister greater authority to order that eradication programmes be carried out on infected properties.

Other legislation

Veterinary surgeons in Queensland were first registered under *The Veterinary Surgeons Act of 1936*. The Act set up the Veterinary Surgeons' Board, with the Dean of the Faculty of Veterinary Science as president. The faculty was closed during World War II and doubts about its future led to an amendment in 1946 giving presidency to the Under-Secretary of the Department of Agriculture and Stock. But in 1964 the Act was amended to return the presidency to the Dean of the re-established faculty. In 1973 the Act was again amended, allowing a senior officer of the Department (who must also be a veterinary surgeon) to be president. The Department maintains the register of veterinary surgeons, with the administration officer of the division of animal industry as registrar.

The Swine Compensation Fund was established by *The Swine Compensation Fund Act of 1962*, but the disease it was aimed against, swine fever, had been excluded from Queensland by bans on the entry of pigs and pigmeats. By 1969 the fund had reached a figure that was considered adequate and no further fees were collected. An amendment in 1975 allowed the fund to be used to improve the Queensland pig industry, after the Australian Agricultural Council had decided that funding for disease compensation would be provided jointly by Commonwealth and State Governments.

Disease control strategies

In 1965 the Department took prompt action against the threat of bluetongue when it was discovered that cows in the Mt Crosby area, close to Brisbane, had been inseminated with semen smuggled in from Canada. The Commonwealth Veterinary Consultative Committee ordered the slaughter of all animals inseminated and of animals in contact with them. All cattle within a 2.4 kilometre radius of the point where the semen was used were removed for slaughter and the area was fogged by an army detachment, supervised by scientists from CSIRO and the Queensland Medical Research Institute. Although material submitted to South African laboratories revealed no evidence of bluetongue, the disease could have been introduced: this incident proved the need for continued vigilance by the Department's quarantine and veterinary services, as the consequences to the livestock industries could have been disastrous. *The Stock (Prevention of Bluetongue) Act of 1965* ratified the action taken by the Minister and provided compensation for the cattle destroyed, except those of the smuggler.

The *Exotic Diseases in Animals Act 1981* provides for the rapid implementation of measures to control and eradicate outbreaks of exotic diseases in animals and provides compensation for animals that have to be destroyed. This Act repealed *The Foot and Mouth Disease Expenses and Compensation Fund Acts, 1958 to 1969* and *The Stock (Prevention of Bluetongue) Act of 1965*. The Department regularly mounts simulation exercises to test the effectiveness of the provisions of the Act and regulations as well as the strategic and communications arrangements set up to deal quickly with real disease outbreaks. Such exercises also test logistical problems in more remote areas and lines of communication between field headquarters and the Exotic Diseases Operations Centre in the State Law Building in Brisbane.

Animal quarantine

The division of animal industry provides animal quarantine services within Queensland on behalf of the Commonwealth Government. The Commonwealth Quarantine Act is administered by the veterinary services branch under the supervision of an officer of the executive of the division of animal industry, who is designated the chief quarantine officer (animals) for Queensland. Increased powers of search provided by amendments to the Act in 1979 helped in the detection of illegal imports.

Faster transport and a marked increase in the number of people entering Australia have greatly increased the risk of exotic disease entering the country. Staff were increased in 1975-76 to meet the demands imposed by the introduction of larger aircraft and tighter supervision of parcel post, passengers' luggage and other quarantine services. As the number of travellers continued to increase, further staff were appointed. Between 1979 and 1981 a veterinary officer was stationed at Cairns for quarantine work and extra port quarantine officers were appointed, three at Brisbane and one each at Mackay and Townsville.

Cape York Peninsula and the Gulf of Carpentaria pose a high risk for the introduction of exotic animal diseases, by travellers in Torres Strait or by fishermen or illegal immigrants landing on the mainland. The signing of the Torres Strait Treaty in 1978 created new problems: the risk of prohibited products coming into Australia through the Protected Zone brought a need for stronger enforcement of existing quarantine measures, and the Department set up a livestock-free buffer zone near the top of Cape York Peninsula.

In recent years, great efforts have been made to prevent the entry of screw-worm fly from the northern islands. The fly, which is endemic to New Guinea, attacks wounds in an animal's skin and eventually causes death. The main work of the veterinary officer at Cairns is the surveillance and monitoring of the presence of screw-worm fly. Trappings are made monthly in the islands of Torres Strait, and every three months on the outer islands. A sentinel herd at Bamaga is inspected regularly for evidence of screw-worm fly attack.

Conclusion

Despite the Department's spectacular success in eradicating several endemic livestock diseases from the State, animal health remains a serious problem in Queensland's livestock industries. Since the 1960s the Department has established a surveillance, reporting and diagnostic network that ensures the rapid detection, isolation and eradication of livestock diseases, complemented by extension programmes that educate owners in disease prevention. However, the threat of introduced pests and diseases is ever-present and is contained by the Department's quarantine officers stationed throughout the State.



Ian Wells (left), veterinary services branch director, discussing exotic disease control strategies with branch officers John Walthall and Roly Nieper (right) in 1985



Condemned reactor cattle being destroyed in an exotic disease exercise at Emerald in the mid 1980s. Part of the exercise was designed to test ways to safely dispose of large numbers of carcasses.

Land use and conservation

Since the early 1960s the Department has become increasingly involved in matters related to land resource evaluation, land use and the conservation of natural resources in Queensland, and from about this time locally trained specialists became available for such work. Dr P. J. Skerman, who had compiled the first comprehensive land resource survey and the first land use map of Queensland in the 1940s, introduced land use 'projects' into his agricultural science course at the University of Queensland in 1965. Two of Skerman's early students, Ed Turner and John Mullins, joined the Department, and specialised in land resource and land use investigation and mapping.

Division of land utilisation

After the Bureau of Investigation of Land and Water Resources was disbanded in 1957, resource evaluation was done mainly by the Commonwealth Government through CSIRO's land use and soils division and the Bureau of Agricultural Economics, with some work done by the Department. By the mid 1970s, however, the Commonwealth organisations had ceased these activities in Queensland and the Department then became the major organisation undertaking resource evaluation in the State. Its work in land resource evaluation, land use and conservation is done mainly by the division of land utilisation, with technical input from other divisions.

The division of land utilisation had its origins in the creation of the soil conservation branch in the division of plant industry in 1961 and the creation of the development planning section in central administration in the following year. The two branches were brought together in 1965 to form the division of development planning and soil conservation, which provided research, technical facilities and extension services for soil conservation and the planning of agricultural developments.

The new division set out to catalogue Queensland's resources and to determine their limitations and suitability for various uses. The development planning branch had livestock resources development and agricultural resources development sections, while the soil conservation branch had sections covering both research and field services. The responsibilities of the division continued to increase and in 1969 it was renamed the division of land utilisation.

The division was completely reorganised in 1983. The development planning branch was renamed 'land resources branch'; the soil conservation branch became the soil conservation services branch; a new branch, soil conservation research, was created to include the soil physics section of the agricultural chemistry branch; and the agricultural chemistry branch was transferred from the division of plant industry, giving the division of land utilisation four branches. The division's main function is to identify Queensland's land resources and land use capabilities, and to develop and promote the implementation of practices that will maintain the productivity and stability of land resources. It also provides specialist technical services to other branches, departments and primary industry in the fields of land and soil resource evaluation and agricultural chemistry.

Don Sutherland, director of the beef cattle husbandry branch, was appointed the first director of the division of development planning in 1964. In the same year he was appointed deputy director-general but resigned soon afterwards. The division was then led by Jasper Ladewig, who had been director of the soil conservation branch. The position of deputy director of the division was created in 1967, to be filled by A. (Jack) Hegarty, who was also chief development planning officer. Ladewig retired in 1977 and was replaced by Hegarty, with Harry Pauli as deputy director. In 1980 Hegarty became assistant director-general and was replaced by Pauli, who retired because of illness in the following year. Brian Crack, who had been director of the agricultural chemistry branch, became director of the division, with Keith Trudgian as deputy director. Crack died in early 1987 and was replaced by Bryan Rodda, who had been appointed to the extra deputy divisional director's position created in 1984.

Soil conservation branch

When Jasper Ladewig was promoted to the directorship of the division in 1965 he was replaced by John Rosser as director of the soil conservation branch. Rosser resigned in 1973 and Harry Pauli was then director, becoming deputy divisional director in 1977. H. S. (Stan) Pink replaced Pauli, and when Pink retired in 1979 he was replaced by Howard Briggs. In 1984 Briggs transferred to the land resources branch and was replaced by Ross Berndt.

The soil conservation branch had been established in 1961 within the division of plant industry. Its first field staff were agriculture branch advisers who worked under *The Soil Conservation Act of 1951* and gave farmers technical assistance in soil conservation. By 1964, thirty-five soil conservation officers were stationed in twenty districts.

The Soil Conservation Act of 1965 repealed and replaced the earlier Act and provided the statutory facilities for landholders to undertake joint soil conservation activity, either under government guidance or through local sponsorship. The Act permitted cooperation with statutory authorities and approval of plans for soil conservation schemes. Once a plan was approved, its implementation could not be threatened by any uncooperative minority in the area. These provisions overcame deficiencies of the 1951 Act.

The 1965 Act required the reorganisation of the Department's services and

resulted in the establishment of the division of development planning and soil conservation. It constituted the director-general as the Soil Conservation Authority. But amendments to the Act in 1980 reconstituted the Soil Conservation Authority to comprise the director-general, the director of the division of land utilisation, the director of soil conservation and the commissioner of water resources.

The implementation of contour layouts was the most important method of soil conservation used until the late 1960s, when the Department started placing increased emphasis on stubble mulching. A machinery evaluation programme then developed a range of stubble-mulching equipment for local conditions. Soil conservation officers also tested grasses for use in waterways, tested the erodibility of soils and moisture accumulation under fallow, and conducted water spreading trials.

After severe erosion, siltation and flood damage on the Darling Downs in the spring of 1972, the State Government declared eleven Downs shires areas of soil erosion hazard under the Act and agreed to subsidise approved soil conservation works. The subsidy encouraged more farmers to seek advice from the Department and new staff were appointed to meet this demand, so that in 1973 fifty-five soil conservation extension officers were located at twenty-eight centres in Queensland. The Darling Downs Regional Soil Conservation Committee was set up in that year to coordinate soil conservation activities in the region. Its members represented shires, river improvement trusts, industry organisations and all government departments likely to be involved in the programme. Once the programme was established the committee was disbanded and replaced by four local advisory group committees, which coordinated activities at the local level. Parts of the Isis and Kolan Shires, near Bundaberg, were also declared areas of soil erosion hazard in 1973 and 1974 to facilitate the implementation of the Isis and Gin Gin land use schemes. Local advisory group committees were also established in these areas.

The Commonwealth-State Collaborative Soil Conservation Study, tabled in both the State and Federal Parliaments in 1978-79, showed that 42 per cent of Queensland's agricultural land required treatment for land degradation and three-quarters of the cropping land required treatment to control erosion. Soil erosion had thus emerged as one of the greatest threats to the continued productivity of Queensland's farmlands.

Minister Ahern convened a soil conservation planning committee in 1981-82, consisting of representatives of the sugar industry, local authorities, advisory committee groups and the Department. The committee recommended the introduction of a restyled soil conservation authority and a new statewide planning system. It also recommended the removal of some subsidies for owner works but the wider use of lower-interest loans through the Agricultural Bank and assistance to local authorities. The committee's report resulted in the *Soil Conservation Act* 1986, which repealed the 1965 Act. The new Act made landholders more responsible for soil conservation, with the Department providing technical advice and legislative support for coordination between affected parties. The Soil Conservation Authority was abolished and its powers were invested in the director-

general of the Department of Primary Industries. The Act also provided for changes brought about by the creation on 1 July 1986 of the Queensland Industry Development Corporation, which absorbed the functions of the Agricultural Bank from the Department, including loans for soil conservation projects.

Although the Department is not directly responsible for the sugar industry, it provides soil conservation advice to sugar growers in cooperation with the Bureau of Sugar Experiment Stations (BSES). To counter severe soil losses in the canelands, the Department and the BSES began a cane-residue-management programme in 1982 on selected cane farms from Childers to Innisfail. The results were startling: an almost tenfold reduction in soil loss was recorded at Innisfail when a system using zero tillage with chemical weed control replaced conventional tillage practice, and a further tenfold reduction in erosion was measured when green cane was harvested and the residue was left on the soil surface. After the downturn in sugar prices in 1983 many growers turned to conservation cropping to help reduce production costs and increase yields.

In 1983 the soil conservation branch was renamed soil conservation services branch. Its officers recommend land management practices to maintain productivity on various land types, prepare farm plans and guide their implementation. In 1986 the Branch had ninety-six officers located at thirty-three centres; at Childers and Gin Gin, both in sugar districts, the soil conservation officer is the Department's only representative.

Soil conservation research

In 1983, the Department's soil conservation research activities were consolidated in the soil conservation research branch. Its first director, Dr Kep Coughlan, was appointed in 1984. The soil conservation research group, which had operated within the development planning branch, was enlarged and given soil physics expertise from the agricultural chemistry branch and conservation cropping management expertise from the soil conservation services branch. Four agronomists from the agriculture branch were added. The charter of the new branch was to define the processes involved in land degradation and to develop and extend practical management systems and techniques that would ensure continued land productivity and stability.

In 1985 the Departmental Salinity Coordinating Committee organised a series of regional workshops on salinity, which has become a serious problem in Queensland's cropping lands. Salinity degradation was investigated in both irrigation and dryland situations, and more than 20 per cent of the groundwater used for irrigation was found to be saline enough to reduce crop yields. The branch then undertook studies to develop a model of irrigation water quality assessment and to study the long-term effects of irrigation and the clearing of up-slope areas on levels of salinity, especially in the aquifers and streams of the Lockyer Valley. It also investigated the development of salting following the removal of native vegetation.

The branch assesses the effects of land management on soil erosion in intensive and extensive cropping and grazing systems. Its major work in this area has been



Brian Venz, an officer in the division of land utilisation, taking soil core samples at Brigalow Research Station in the early 1970s



Farmers at a Departmental stubble-handling machinery field day at Jimbour, near Dalby, in 1973

the study of runoff and sediment transport and infiltration with rainfall simulators at Toowoomba. Other important research includes studies on the physical state of soils, especially in the cracking clays of south-east Queensland, in which seed establishment and moisture penetration to the subsoil are problems.

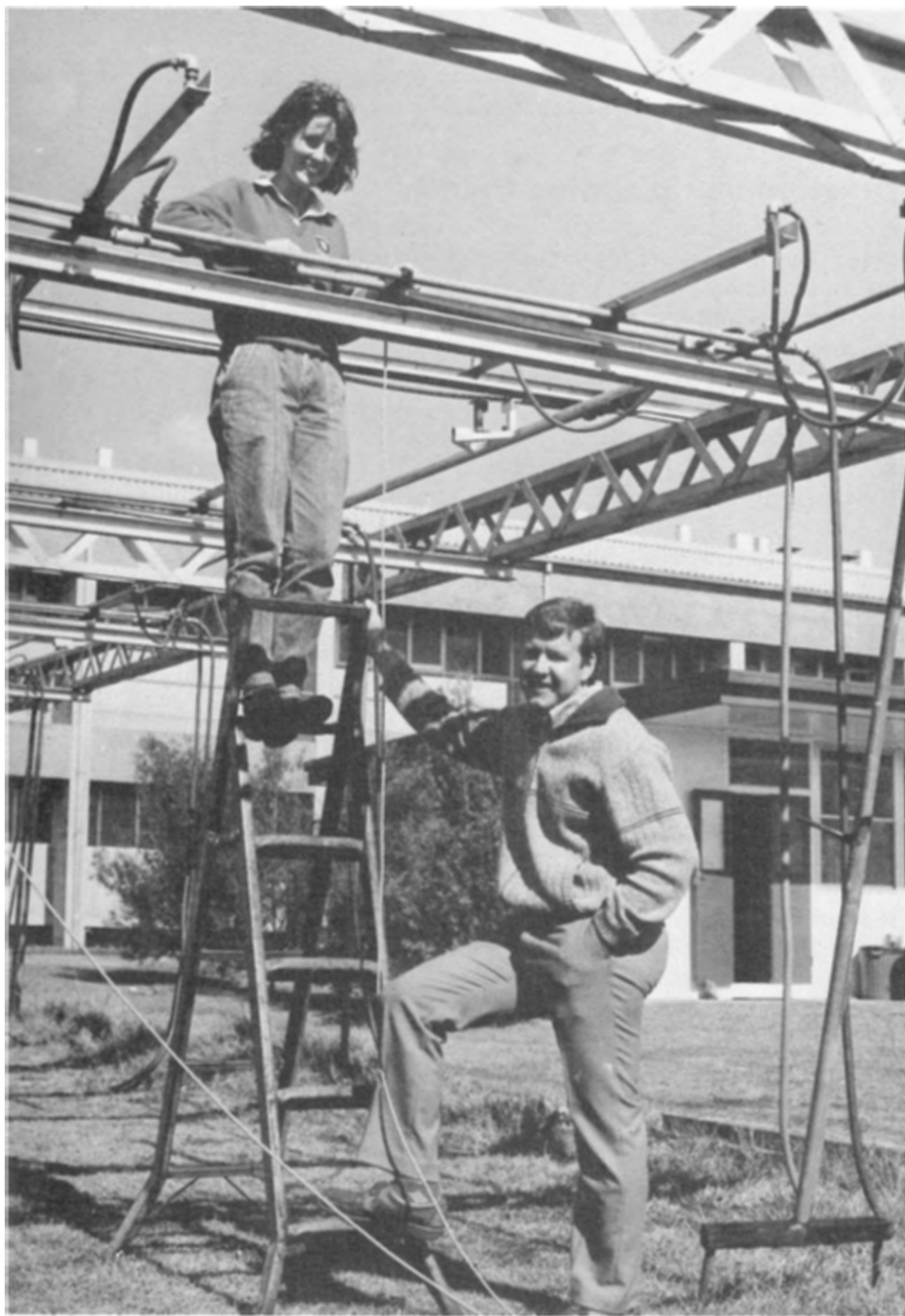
Development planning branch

A development planning section was set up in central administration to create an organisational structure for the Department's role in the Fitzroy Basin (Brigalow) Development Scheme in 1962. Its main work was to provide technical advice on land classification and ensure pasture seed supplies. When Don Sutherland left to become director of the beef cattle husbandry branch in 1963 the section was joined with the soil conservation branch to create the division of development planning and soil conservation. A. (Jack) Hegarty replaced Sutherland as chief development planning officer, and became the branch's first director in 1970. Subsequent directors were Bill Mawson (1977-78), Noel Dawson (1979-84) and Howard Briggs.

Although the Brigalow Scheme was administered by the Land Administration Commission, technical advice on land classification and recommended land use was supplied by the development planning branch. Ed Turner, development planning officer, prepared physical inventories and property development plans and branch officers also compiled development budgets for new settlers, and sampled, tested and submitted recommendations on the purchase of pasture seed. The botany, agriculture and cattle husbandry branches also provided advisory services to brigalow settlers.

In 1964 the Department established the Brigalow Research Station near Theodore to undertake research on livestock and cropping systems suitable for the newly developed brigalow lands. Because of the isolation of the brigalow areas, Departmental officers were assigned to groups of settlers to ensure the availability of the whole range of technical services and these contact officers met regularly with development planning officers. By the end of 1974 the role of the development and planning branch in the Brigalow Scheme was completed and extension staff from other branches took over property planning and advisory work. When the scheme was wound up two years later the brigalow lands had been divided into 360 new leases, all of them occupied.

The branch was also active in other areas. In the late 1960s and early 1970s, in conjunction with the Irrigation and Water Supply Commission, it coordinated Departmental surveys and reports on a number of irrigation projects. It initiated a major project in 1967, the Western Arid Region Land Use Survey, conducted in association with the Bureau of Agricultural Economics, the Department of National Development, CSIRO's division of rangeland research and the Land Administration Commission. The aim was to formulate principles for the management of soils, vegetation and livestock that would maintain the long-term pastoral productivity of western Queensland. The mapping programme was completed in 1982. Other major surveys in which the branch was involved included the Moreton Regional Survey, conducted by the Queensland



Senior soil conservationist Rob Loch and assistant Jenny Foley adjusting the rainfall simulator at the Queensland Wheat Research Institute, Toowoomba, in 1986

Co-ordinator General's Department, and the joint Commonwealth-State Burdekin Basin study.

State Cabinet directed in 1970-71 that reports on environmental studies be made for all developmental undertakings, including private and company developmental projects and proposals by State, semi-governmental and local authorities. These reports involved officers from many of the Department's branches, including fisheries, fauna conservation, botany, soil conservation, economic services, beef cattle husbandry and development planning. The Irrigation and Water Supply Commission, in particular, required advice on such aspects with its many water-storage projects. Although the statutory requirement for environmental impact statements in Queensland was discontinued in 1977, the organisers of many Commonwealth-funded projects and even private projects still seek assistance from the Department in preparing environmental impact assessments.

Land resources branch

The soil survey section of the agricultural chemistry branch was transferred to the development planning branch in 1982, placing all Departmental land evaluation work in the one branch. Renamed land resources branch, it provides land resources information to landholders, industry, local authorities and the State Government. Its head office is at the Agricultural Research Laboratories at Indooroopilly, and in 1986 it had staff stationed at eleven country centres.

Land resource mapping is done throughout the State and includes the recording of soils, land systems, vegetation, land suitability and capability, geology and geomorphology, land degradation and groundwater. Work also includes agricultural development studies in areas where crop production is expanding. In April 1986 the branch published a land resource mapping catalogue, which lists all resources studies undertaken by the Department.

Drafting section

The Department's cartographic unit, established as a section of the soil conservation branch in the early 1970s, is now a separate section within the division of land utilisation. Located in the Agricultural Research Laboratories complex at Indooroopilly since 1978, the unit provides drafting and cartographic services, mainly to branches of the division of land utilisation but also to other branches. The unit's maps accompany various Departmental publications used by extension officers, farmers, industry organisations and planners in government agencies. A series of vegetation maps of Queensland is being prepared for the botany branch.

Regional drafting units have also been established at Toowoomba, Bundaberg and Rockhampton. The unit at Toowoomba has been operating since the 1950s, while drafting staff were appointed to Bundaberg in 1983.

Engineering services section

In 1973-74 engineers were transferred from other branches of the Department to form an agricultural engineering services section within the division of land utilisation. The new section was called on by any branch requiring advice on machin-

ery, equipment and buildings used in rural production or in the storage, transport and processing of produce. It was also responsible for the engineering input into drainage, irrigation and soil conservation.

The section also provides advice to the Agricultural Equipment Advisory Committee, which was formed in October 1979 to provide a forum for producers, manufacturers and dealers to discuss disputes over farm equipment performance. The section's main centre is at Toowoomba, where a new workshop was occupied in 1977. In 1984 the section was transferred to the research stations branch; Vince Hay, its executive engineer, became assistant branch director.

Conclusion

Since the early 1960s the Department has taken on additional responsibilities in soil conservation, farm development planning, and land resource survey and assessment. Such new tasks required the creation of administrative structures and the appointment of suitable staff. Thanks to the contributions of these people, the Department's expertise in the area of land resource assessment and utilisation grew. Today, its staff are highly respected and their advice is valued by other departments and authorities, shire councils, developers and farmers.

Marketing, economics and standards

Farm profitability, efficient marketing systems and better-quality farm materials and products became essential to the continued development of modern agriculture in Queensland in the postwar era. Since the 1960s huge adjustments have taken place in the dairying, beef and wool industries owing to price changes; the grain, horticulture and intensive livestock industries have expanded; and large irrigation developments have been established. All have demanded greater attention to the economics of alternative enterprises and the profitability of farming systems. The expansion in the grain and seed industries, in particular, has brought a need for economic studies into improved infrastructure and more efficient marketing methods. Standards have also had to be revised to meet farmers' and consumers' demands for higher-quality materials and farm produce. Work in marketing, economics and standards was done by the division of marketing, in close consultation with other divisions.

Division of marketing

In 1963, Alan Ross was director of the marketing division and was in charge of the marketing branch. Des Lapidge was assistant director of the division. In 1965 Ross became deputy director-general and was replaced by Lapidge, with Elton Burns as assistant. Burns also retained his position as director of economic services, but in 1974 became chief advisory officer, heading the administration division, and later director-general. A. C. (Chris) Peel (director of standards) replaced him as assistant director of marketing. Peel retired in 1978 and was replaced by Robert Densley, who had been director of marketing services.

When Lapidge was promoted in 1980 Densley replaced him, with Bob Bygott, previously director of economic services, as deputy divisional director. Peter Hamilton, former director of biometry branch, filled an additional deputy director's position created in 1982. Hamilton was immediately seconded to the Sugar Cane Prices Board and was replaced by Bill Kidston, who had been director of marketing services. A year later Bygott became chairman of the Rural Reconstruction Board and was replaced by Jim Barnes, previously executive officer in the administration division. In the following year Kidston became assistant to the director-general and Hamilton returned to the division.

The division operates three branches: marketing services, economic services



Standards branch inspector Bill Jennings checking the quality of fresh beans at the Brisbane Market



Standards branch inspector Tom Campbell does a final inspection at the Brisbane airport of broccoli.



Senior market reporter Trevor Brewer (left) checks on price and quantity movements in citrus after early morning trading at the Brisbane wholesale market.

and standards. Officers from the marketing services and economic services branches regularly advise committees on agricultural policy and planning. For example, they helped a planning committee set up by State Cabinet in September 1980 to identify the needs of the State's grain and oilseeds industries to the year 2000. This work resulted in significant improvements in statutory arrangements and facilities for handling and storage of grain and oilseeds in Queensland.

In 1981 Minister Mike Ahern set up the Queensland Agricultural Policy Working Committee to prepare an agricultural policy for the State. Officers from the division of marketing served on the committee in a secretarial and advisory capacity. Its report, *An Agricultural Policy for Queensland*, was released in 1983. In the same year marketing division officers, helped by officers from other divisions, prepared Queensland's submission to a working group set up by the Australian Standing Committee on Agriculture and headed by Sir James Balderstone. The report, entitled *Agricultural Policy — Issues and Options for the 1980s*, made an important contribution to national planning in agriculture.

Marketing services branch

The marketing branch was renamed 'marketing services branch' in 1966 and became a separate entity within the division of marketing under its first director, Dan Lewis. He retired in 1978 and was followed by Bob Densley, Bill Kidston (1979-82), John van Haeringen (1982-84) and Dr Barry White. The branch provides specialist marketing, economic and other advisory services to statutory authorities established under the Primary Producers' Organisation and Marketing Act and other related legislation. It is also represented on quota committees established under specific marketing stabilisation schemes. Through its finance and management services section, the branch advises primary producer cooperatives and other industry bodies, and analyses and comments on capital works programmes undertaken by statutory authorities such as the Brisbane Market Trust and the Queensland Grain Handling Authority. The section is also responsible for the registration of cooperatives under the Primary Producers' Co-operative Associations Act, farm produce commercial sellers under the Farm Produce Marketing Act, and vigneron/vintners under the Wine Industry Act.

The branch's marketing extension work includes crop forecasting, fruit and vegetable market reporting and the publication of marketing information. The crop forecasting service was started in 1947. The reports of selected cooperating farmers on seasonal conditions and the progress of crops in their districts are collated, analysed and published each season in *Agricultural Trends*. The market reporting service, started in the same year, is provided by a team of reporters working at the Brisbane Markets at Rocklea.

Over the years, the marketing services branch has undertaken a wide range of activities, such as consumer preference surveys, feasibility studies for the establishment of processing facilities, financial studies for the amalgamation of cooperatives, market reviews and submissions to the Industries Assistance Commission. A research group was set up in 1986 to develop marketing strategies for particular commodities. An important project initiated recently is the development of an export-orientated horticulture industry in Queensland.

The trade section formed within the marketing services branch in 1984 has played an important part in the planning and functioning of Queensland's involvement in a number of international exhibitions. When the section was formed an officer was seconded to trade promotion and development duties in Queensland's Agent-General office in London.

Marketing legislation

The centrepiece of orderly marketing legislation in Queensland is the Primary Producers' Organisation and Marketing Act, first passed in 1926 and subsequently amended several times. Recent amendments have increased the accountability of statutory authorities and taken account of changes in crop financing and general deregulation of the financial sector.

Other marketing legislation includes the Fruit Marketing Organisation Act, the Fishing Industry Organisation and Marketing Act, the Wheat Pool Act and the Wheat Marketing Act. Further legislation, such as the Hen Quotas Act, the Rice Industry Stabilisation Act, the Tobacco Industry Stabilisation Act and the Wheat Delivery Quotas Act, has been enacted to allow for the implementation of quota schemes for specific industries.

The marketing branch also administers the Primary Producers' Co-operative Associations Act, which dates back to 1923, with many subsequent amendments. Under this Act, primary producers' cooperatives must be registered and are required to submit financial statements and other returns to the registrar.

Economic services branch

The economic services branch advises primary producers on farm business management and provides economic information for use in the extension activities of other branches. Its research economists conduct industry surveys and efficiency studies for primary producers, industry organisations, agribusiness and government.

Elton Burns was branch director from 1958 to 1973, when Norm Hall took over. When Hall left to become director of the Queensland Fisheries Service and chairman of the Fish Board he was succeeded as branch director by Robert Bygott (1975-82), Dr Barry White (1982-84) and Ian Robinson.

In the mid 1960s the branch was geared to help individual producers apply farm business management principles to their enterprises, and economists were sent to country centres. The branch was renamed 'economic services branch' in 1966 to reflect its wider role in farm management advisory services. By 1986 fifteen country centres were staffed by agricultural economists, with temporary farm financial counsellors appointed to several centres to help primary producers who are experiencing financial difficulties. The branch has also provided farm business management training for other extension and advisory staff of the Department since 1963.

The Department has made a major contribution to the development of farm management theory and practice in Australia. It launched Australia's first mail-in farm management accounting service in the South Burnett in 1963 and the ser-

vice quickly spread to other areas. The project's three aims were to provide a continuous source of farm management data; to improve management at the farm level; and to demonstrate, to accountants particularly, the value of farm accounting as a management tool. The branch played a leading role on a farm management accounting committee, which included representatives from the University of Queensland and the accountancy profession. Its report, entitled *Accounting and Planning for Farm Management*, and commonly known as the 'Blue Book', was published by the Department in 1966, with a second edition issued in 1971.

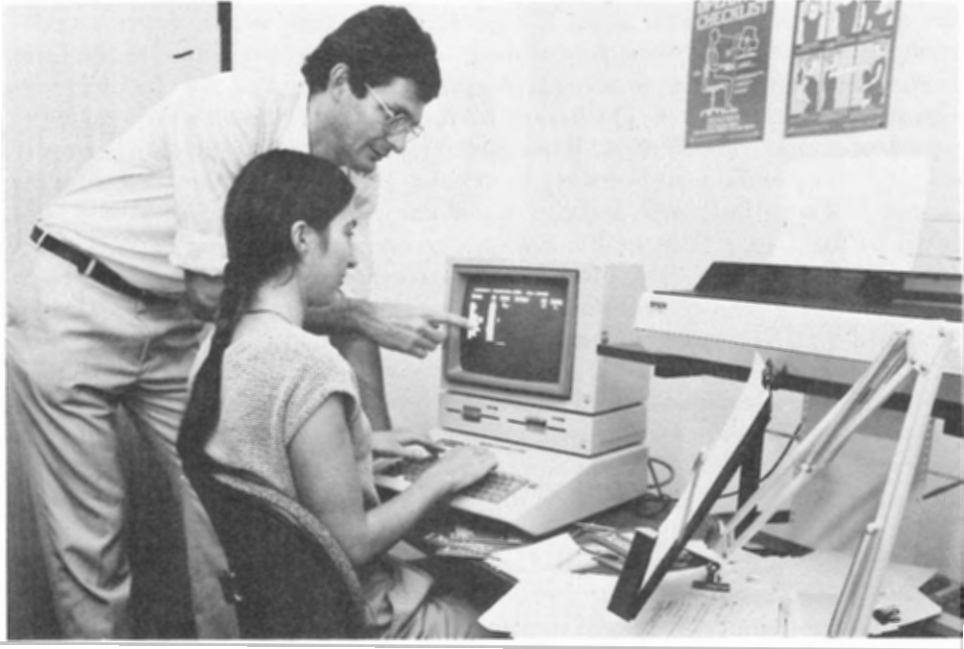
A major branch publication is the *Farm Management Handbook*, first produced in 1964. The latest edition, published in 1983, was a complete revision, produced in two parts; Part A (general technical information) is updated as required, and Part B (economic and financial information) is updated annually. Another annual publication is *Farm Taxation*, revised after each Federal Budget to summarise the taxation provisions that affect primary producers. Other publications include guides to purchasing property and machinery, explanations of futures contracts and interest rates, and cost-and-return data on crop and livestock operations.

The economic services branch was a leader in the application of computer technology to agriculture. Computers had been used since the 1960s in the Farm Management Accounting Service, and when microcomputers became available in the late 1970s economists developed packages to computerise economic survey data for farm business management. *A Primary Producer's Guide to Microcomputing*, a book published by the branch in 1984, has proved popular throughout Australia.

The branch conducts surveys to provide economic data on Queensland's rural industries to various inquiries and committees set up by the State and Commonwealth Governments. Its analytical work includes cost/benefit studies of development proposals, particularly irrigation developments. The branch undertook its first major overseas consultancy project in 1983-84, when the Department, in collaboration with the Papua New Guinea Department of Primary Industry, began an agro-economic survey of Papua New Guinea's major tree crops to improve that country's crop-monitoring capability and provide technical and economic information about its coffee, cocoa and coconut industries. The project is funded by the Australian Centre for International Agricultural Research (ACIAR).

Standards branch

The standards branch ensures that seeds, agricultural chemicals, stockfeed and veterinary medicines conform to standards set out in regulations and are true to label, and that agricultural products comply with market requirements, are acceptable to consumers and are packed, handled and transported properly and economically. The Agricultural Standards Act nominates a 'standards officer' to execute the regulations. In 1963 this officer was A. C. (Chris) Peel; he was redesignated director of agricultural standards in 1966. When Peel was promoted to the deputy-directorship of the division of marketing in 1975 Bill Mungomery became director of standards branch and standards officer (he still holds the position).



Agricultural economist Les Clarke discussing the use of a computer spreadsheet program for pig herd management with Alison Spencer, pig husbandry officer, in 1985



Col Rosenberger (right), agricultural economist at Ipswich, discusses the economics of growing leucaena with a local farmer.

Regulations under the Acts administered by the branch are enforced by inspectors stationed at Brisbane and major regional centres, who make inspections of fruit and vegetables at wholesale markets to ensure that standards set by the Fruit and Vegetables Act are met. Special inspectors at the Brisbane Markets and at the Quarantine and Export Centre work closely with quarantine officers to maintain export standards set by Commonwealth legislation, and export inspection is also done by country-based officers of the branch.

Seed-testing laboratories are located at the branch headquarters at Indooroopilly and at Toowoomba and Mareeba, with seed samples supplied by inspectors, merchants and farmers. The seed-research section provides support for the seed-testing service. Standards branch officers are recognised worldwide for their expertise and knowledge of seed technology, and in recent years the Department has run many courses for overseas students in seed production and testing. The branch hosted the 1986 International Seed Testing Association Congress and Symposium in Brisbane. In the same year it helped establish an external training course for seed analysts at the Queensland Agricultural College.

The main Act under which the standards branch operates is *The Agricultural Standards Act of 1952*, which replaced a number of Acts dating back to 1919 that related to seeds, fertilisers, pest destroyers, stockfeed and veterinary chemicals. The Act sets out standards for agricultural requirements and lays down inspection and testing procedures. It combined the Pest Destroyers Board and the Stock Medicines Board into the Agricultural Requirements Board (ARB), which considers the efficacy claims made for pest destroyers in the application for registration and makes recommendations to the standards officer. The board's members are appointed by the Governor-in-Council on the nomination of the Minister and need not be public service officers, although currently they are all Departmental staff.

Since aerial spraying became common in the early 1960s Departmental researchers, advisers and inspectors have had to deal with the problem of herbicide spray drift affecting nearby crops. Legislation to regulate the application of weedicides, especially by aerial spraying, was introduced in *The Agricultural Chemicals Distribution Control Act of 1966*, which required that commercial spray operators be licensed. Several amendments to the Act have clarified procedures and strengthened regulations to ensure that operators are competent, that they are insured and that they maintain suitable records.

Conclusion

With modern research and technology solving most production problems, the development of Queensland's rural sector in the last twenty-five years has depended largely on its ability to establish lucrative markets and meet the high standards set by those markets, while remaining economically viable. Through its division of marketing, the Department has contributed to this development by providing market information, promoting trade, advising farmers on business management, and setting high product standards.

Biometry and computers

Modern agricultural research requires that experiments be designed so that reliable conclusions can be reached. The science of biometrics — which is partly applied mathematics, partly applied biological research — relates to the design and analysis of agricultural research experiments. Biometry involves advice on the layout of crop experiments or the stocking of paddocks with animals to set up statistically designed experiments and analysis of such experiments.

Origins of biometry in Queensland

In 1921, as the holder of a sugar industry scholarship, Dr H. W. Kerr, from the Bureau of Sugar Experiment Stations, worked at Rothamsted Experiment Station in England studying soils and field experiment techniques. In 1927 he started the first field experimental techniques in Australia on a sugarcane field at Bundaberg. At the same time J. R. A. McMillan was giving lectures in experimental techniques at the Queensland Agricultural High School and College, Gatton, and at the University of Queensland. His course included the design and statistical analysis of field experiments. One of the students attending McMillan's lectures was Gordon Miles. Miles joined the Department and, on an overseas scholarship in plant breeding from 1931 to 1934, furthered his studies in field experimentation by attending lectures in statistical methods given by the English mathematician Sir Roland Fisher and other leaders in the field. When Miles returned to Queensland the Minister (Bulcock) told him he was going to appoint a 'biomathematician' and asked him to define his functions. Miles suggested that the person selected should first tour the Department's field stations to determine the nature of the experiments being undertaken at them and then go to Canberra to consult Betty Allen, who was handling biometrics for the Council of Scientific and Industrial Research. Patrick McGovern was appointed as he had worked in the Bureau of Research (studying weather forecasting for agriculture) and had degrees in Arts (with honours in mathematics) and Science. In 1936 McGovern studied biometrics under Betty Allen but then resumed work as clerk in the records branch as the post of biometrician had not yet been created.

The first published use in Queensland of the statistical method of analysis of field experimental results had appeared in the *Queensland Agricultural Journal* for

August 1930 when Walton Wells, the cotton specialist, published the results of his experiments at the Callide Cotton Research Station, Biloela. Elaine Smith, of the cotton section, had planned and analysed those experiments. On her resignation in 1937, Elvie Goward joined the section as clerk-typist and continued Smith's work as she had received high marks in mathematics at school.

In his recommendations to the Department the science coordinating officer, Professor E. J. Goddard, had suggested that a division of plant industry (research) be established, with biometrics as one of its responsibilities. The division was established in 1937 and Barbara Shield, who held a Master's degree in Arts with honours in mathematics, was appointed assistant research officer. She inaugurated the Department's biometrical services by helping to design experiments and analysing the data obtained. Biometrics was applied first to sugarcane and cotton, then to other agricultural and horticultural crops, pasture experiments at the Bureau of Tropical Agriculture, and some livestock studies. In his 1938 report, Goddard noted that the inclusion of biometrical services had increased the efficiency of the Department's experiments.

Barbara Shield married and left Australia in 1939 and McGovern replaced her, joined in 1940 by biometrician Henry Finucan. Between 1942 and 1946 both men served in the armed forces and the Department's biometrical work was carried on by Elvie Goward, who by 1946 had completed a part-time Arts degree at the University, majoring in mathematics. McGovern returned to the Department after the war but Finucan joined the staff of Queensland University.

Most biometrical work was connected with crop experiments on research stations — although livestock work was also done when required — until 1946, when a separate biometrical unit was set up in the sheep and wool branch. The research stations established in the late 1940s and early 1950s resulted in extra experimental work and a subsequent increase in biometry staff numbers. By 1959 the division of plant industry had six biometricians, while another three serviced the animal industries.

Biometry branch

Pat McGovern, whose knowledge of advanced statistical methodology ensured a high standard of experimental design and analysis within the Department, was appointed chief biometrician in 1960. He was in charge of a separate branch, which brought together biometricians from the division of plant industry and the sheep and wool branch. McGovern died suddenly in 1966 and the branch's work was supervised by Elvie Goward and Jocelyn Tommerup until 1974, when Peter Hamilton was appointed chief biometrician. Hamilton became director of the branch in 1979 and was succeeded by Dr Barry White in 1981. Dr Patricia Pepper — the Department's second female branch director — followed White in 1983.

The biometry branch's three groups — biometrical consulting, software applications development, and computer systems support — advise on the planning and analysis of experiments and run the Department's computer services. Although the branch is based in Brisbane, it has had officers at Toowoomba, Townsville and Rockhampton since the late 1970s.



Barbara Shield, the Department's first biometrician



Pat McGovern, chief biometrician from 1960



Dr Pat Pepper, director of biometry branch (the Department's second female branch director), discusses the use of a microcomputer with Peter Johnson, the branch's administration officer, in 1986.

Biometrical consulting

The biometrical consulting group works with Departmental researchers to define problems, design experiments and analyse and interpret data. When access to the University of Queensland's computer became available in 1962, biometricians developed computer programs to analyse data from standard experimental designs. Such programs enabled more thorough analyses of the Department's research data than had previously been possible on electric calculators.

Biometricians also investigate techniques of direct relevance to Departmental experimental programmes and evaluate and develop new statistical methodology. Their work has resulted in advances such as improved methods of selecting varieties in the Department's barley-breeding programme and guidelines to help researchers to design large grazing trials. Biometricians help to develop simulation models of agricultural systems to generate hypotheses for field testing.

Software applications

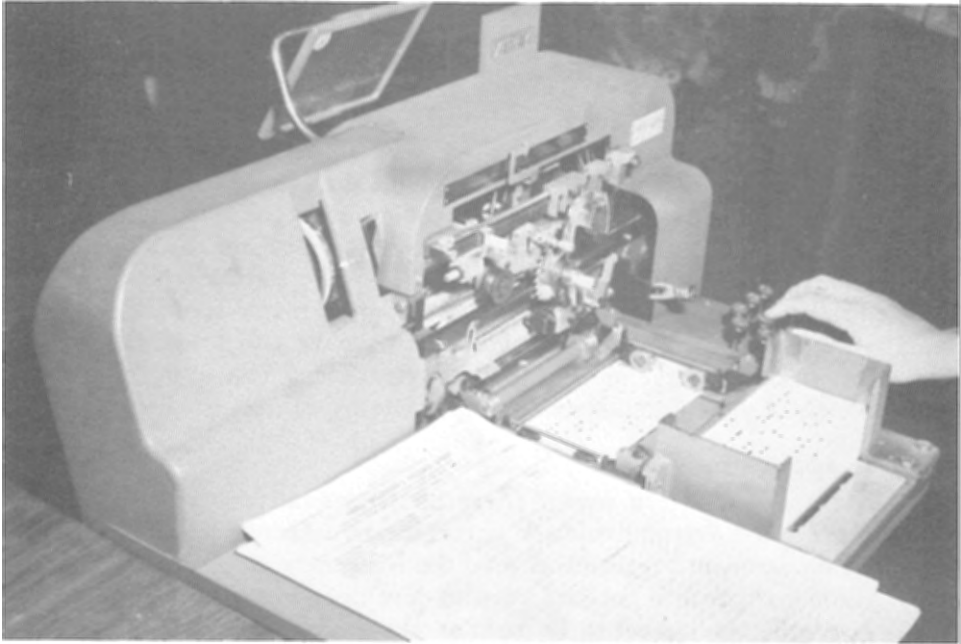
'Software' is the general term used to cover the systems and programs that operate computers, while the term 'hardware' covers the actual computer and its accessories. The Department's researchers used the University of Queensland's computer mainly for statistical analyses but also developed some software programs that had specific application to Departmental research projects. Access to the Treasury Department's computer in 1965 enabled the computerisation of other Departmental functions, such as the Farm Management Accounting Service and the Herd Recording Service. The Department later acquired its own computers, which could be dedicated to specific applications such as the automatic recording and collation of data from the auto-analyser in the Agricultural Chemical Laboratory. When CSIRONET (CSIRO computer network) facilities became available in 1974, more extensive software applications were developed.

Three programmers were appointed to the biometry branch in 1979 to investigate those Departmental operations that could be computerised, such as its inventory recording system. Since then software applications staff have worked with staff from other branches to computerise many of the Department's operations, including the recording and retrieval of veterinary diagnostic information, plant diseases, and registration of beekeepers. The recent acquisition of super-minicomputers with powerful database capacity has accelerated this work.

Computer systems support

Once the Department became self-sufficient in computer facilities it needed specialist officers to support its network of super-minicomputers and microcomputers. These officers evaluate hardware and software and advise and train staff in using the system.

The biometry branch coordinates the development and use of the Department's computing facilities. It reviews current applications in research, extension, regulatory and administrative areas, examines plans for the future, maintains registers for hardware and software, and coordinates the purchase of computers. Between 1973 and 1979 the branch conducted training courses in biometrics, research design and statistical analyses by computer. Since the intro-



Keying herd recording data on data cards in February 1958, before this service was computerised. A semi-automatic card-sorting machine in the Government Statistician's office was used to process the data.



Christine Howitt (left), biometrician, and Tricia Martin, a technical assistant in the land resources branch, using a portable computer in pasture degradation studies on Croxdale Field Station, near Charleville, in 1985

duction of the Department's own super-minicomputers and the installation of microcomputers, the branch has conducted numerous workshops to train staff in the use of this technology.

Computers

The biometry branch's work lent itself to computerisation. The Department had first used computers when it gained access to the computer at the University of Queensland in 1962. From 1965 some branches also used the Queensland Treasury Department's computer. When the University computer was taken out of service in 1974 the Department joined the CSIRO computer network system, CSIRONET, using facilities at the Cunningham Laboratories at St Lucia. CSIRONET access facilities were installed in William Street in 1975 and at Toowoomba in 1976 and lines were leased to nodes in CSIRO laboratories at Townsville and Rockhampton. In the late 1970s dial-up access to CSIRONET was installed, the Charleville Pastoral Laboratory having one of the first terminals of this type. These computers were used mainly by research officers to analyse experimental results.

The first stand-alone minicomputer in the Department was installed in the Agricultural Chemical Laboratory in 1969, followed by a second machine in 1977. In 1978 the Commonwealth Bureau of Animal Health provided three minicomputers to help process data from the Brucellosis and Tuberculosis Eradication Campaign. These were located at the animal health laboratories at Yeerongpilly, Oonoonba and Rockhampton. In the 1980s minicomputers were used to record livestock brands. A further minicomputer was installed at Indooroopilly in 1981; this absorbed the AEHIS database (previously on CSIRONET) and also enabled the Herbarium records database, HERBRECS, to be transferred from the State Government Computer Centre's system to the Department's own facilities. This computer also enabled initial work on computer-aided mapping to begin.

The division of dairying was an early user of computers in its Herd Recording Scheme, first using the Treasury computer and then facilities at the State Government Computer Centre. To meet the changing needs of the division, a minicomputer was installed at Wacol in 1982 and was linked to laboratory equipment for analysis of milk samples and generating reports for each cow on individual dairy farms. The Wacol facilities were upgraded in 1985 and the older minicomputer there was transferred to Newstead to process the quality-control data of the food research and technology branch as well as to record factory registrations and results.

In 1981 the biometry branch bought three microcomputers to evaluate their suitability for Departmental research and extension applications in country centres and surveyed staff to assess the major applications for such equipment. Sixty microcomputers were installed in country centres and city offices in the next three years and were used widely, especially by agricultural economists. Since then, more microcomputers have been bought to satisfy the expanding computer needs of research and extension staff as well as internal administrative services.

A super-minicomputer was installed in Mineral House in 1984 as a major connection to the CSIRONET system. The UNIX operating system was selected for this machine and in 1985 another two UNIX-based super-minicomputers were installed at Indooroopilly and Yeerongpilly to provide facilities for database applications, text processing, statistical data processing and modelling. In 1985 the nucleus of the Department's network, QDPINET, was established with these three computers as hosts and an AUSTPAC link was installed in 1986 to allow officers using microcomputers at country centres to gain access to the network.

Conclusion

The Department of Primary Industries was the first organisation involved in the statistical analysis of field experiments in Queensland, and gradually built up its expertise in experimental design and analysis through the appointment of specialists and by encouraging its staff to obtain higher qualifications and further skills. The acquisition of the latest computer technology has enabled the Department's biometricians to stay leaders in their field, at the same time enabling the Department to provide a better and faster service to its clients.

Information and extension services

The Department's main role is to create a better decision-making environment for Queensland's agricultural industries. It does this by providing agricultural information to farmers and agribusinesses, through publications or media services and through its network of extension staff. The Department's media and publicity services are coordinated by its information and extension training branch, and its extension services by the extension services branch.

Information and extension training branch

In 1963 a small section headed by Charles Winders was responsible for the Department's information, publicity and publishing services. The section published the *Queensland Agricultural Journal (QAJ)*, the *Queensland Journal of Agricultural Science (QJAS)* and occasional monographs, and provided library, photographic and science-abstracting services. A small extension training group was led by Paul Allan. Winders edited the *QJAS* — later renamed the *Queensland Journal of Agricultural and Animal Sciences (QJAAS)* — and prepared the Department's annual report to Parliament. He also wrote speeches for the Minister (the position of ministerial press secretary had not yet been created). Ted Hockings edited the *QAJ* and Departmental monographs, while agricultural journalist Andy Fisher was responsible for the weekly news service, ministerial publicity and special articles for the agricultural, provincial and metropolitan media. Charles Schindler, who had been librarian, now provided the science-abstracting service. Schindler retired in 1973 and Maree McIntyre became science abstractor, but she moved to the agriculture branch three years later, whereupon the position was abolished. The section was also responsible for the Department's exhibit at the Royal National Association Exhibition held in Brisbane each August. The photography group, under A. A. (Bert) Salmon, provided still and movie photography services and supplied material for publication, displays and presentations.

In 1966 the section was enlarged and reorganised after the granting of Commonwealth support for agricultural extension, and was raised to branch status, with Winders as director. Hockings filled the new position of senior information officer, Fisher became editor of the *QAJ*, and Allan continued as senior officer in the branch's extension training section. The branch was also decentralised, with

regional information officers appointed at Mareeba, Rockhampton and Toowoomba, and more journalists and extension training staff in Brisbane.

In 1967 the branch was made responsible for the Department's duplicating service and an art section was created. In the same year, a ministerial press secretary was appointed so the branch no longer had to produce speech notes and publicity, although its senior information officer continued to provide briefing notes and background material for ministerial and viceregal tours and speeches. The weekly news release to the media was discontinued, but the weekly radio tape of interviews continued to be released to stations.

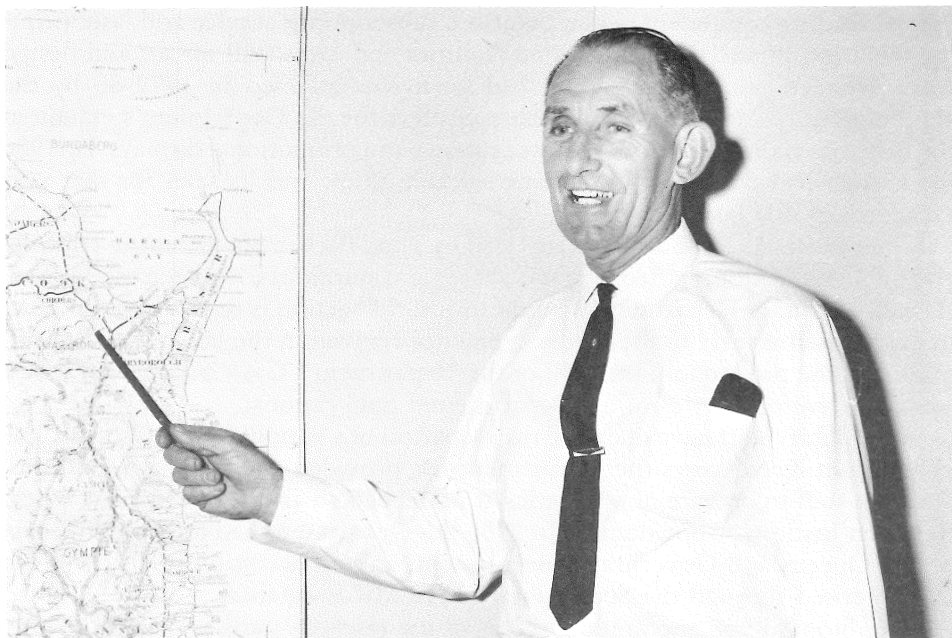
John Groom, who had been director of tropical agriculture in the agriculture branch, was appointed assistant director in 1970. Winders retired three years later and was replaced by Groom, with A. (Joe) Winterton as assistant director. Winterton was appointed assistant to the director-general in 1974 and was replaced by Merv Littmann, a plant physiologist from the Food Preservation Research Laboratory. Groom retired in 1978 and Littmann became branch director, with Peter Stonard, who was regional extension leader at Rockhampton, as assistant director. Littmann concentrated on extension training activities and Stonard on publications.

Fisher became senior information officer when Hockings retired in 1975. He edited the Department's annual report to Parliament, prepared speech notes for the Governor, wrote articles for newspapers and magazines, and supervised the publications section. The *QAJ* was edited by David Wheatley until 1977, then by Peter Lee until 1981. Its present editor, Ken Robinson, was appointed in 1982.

Since the late 1970s the information branch has been responsible for the Department's numerous publication series. Previously, much material had been published by individual branches or divisions. In 1977 the Farmnote series was introduced as the main vehicle for the Department's advisory articles and several monographic series were later introduced for other technical material. Supervision of the duplicating service was transferred in 1978 to the Government Printer, who took over the service completely six years later, although the branch retained photocopying facilities for in-house publications.

After Bert Salmon's retirement in 1964 the branch's photography section was supervised, in turn, by senior photographers Ron Cartledge, Arnold Woodgate and Eric Donnelly, but in 1984 it was absorbed into the photographic section of the Premier's Department. That section now holds the Department's collection of negatives, prints and slides, supplemented in the centenary year by a fine historical collection compiled by Peter Lloyd of the agriculture branch (one of the authors of this book) and Lionel Coxen of the soil conservation branch, Toowoomba.

The Department had produced saleable publications on an *ad hoc* basis since the late 1930s, when the *Agricultural and Pastoral Handbook* was first published. The handbook was revised in the 1950s, and the farm management guides *Accounting and Planning for Farm Management* and *Farm Management Handbook* were published in the following decade. By 1980 the branch had a number of Departmental publications for sale. It was allocated funds to expand its publishing activities and appointed its first book editor in 1981. The branch then installed word processors,



Charles Winders, director of the information and extension training branch, giving a lecture to extension trainees in 1967



Behind-the-scenes action as photographers capture their subject at a DPI extension methods school at Redcliffe in 1971

optical reading equipment, a computerised subscriptions service and laser printing facilities, as well as sophisticated facilities and extra staff for art and design work. The art and display group had been strengthened in 1979-80 by the appointment of Mel Aldous to prepare displays for the Department's exhibit at the Brisbane Exhibition as well as other shows and promotional displays. By 1986 the branch had published ninety-one saleable titles, and its sales for that year exceeded 24 000 books.

Fisher retired in 1982 and was replaced by Tony Barker. Since then an editorial and publicity section, staffed by book editors and journalists, has been established. As well as editing Departmental publications, the section is responsible for news items released weekly to the media, a practice revived in the late 1970s. A landmark was the production, in 1984, of the Department's *Guide to Publishing*, which sets out a uniform style for all Departmental publications.

State Library staff have operated the Department's various libraries since 1959, although in recent years the Department has provided ancillary staff, and professional staff to operate new libraries at Mareeba and at the Queensland Wheat Research Institute, Toowoomba. In 1986 the Department had the largest library of any Queensland Government department, and all accessions are now being computerised through the State Library's ORACLE database.

Peter Stonard was appointed director of the research stations branch in 1984 and Trevor Honour replaced him as deputy branch director. Littmann was appointed acting director of extension services branch in the following year and Marcus Durand, who had been director of the beef cattle husbandry branch, replaced him. Durand had had considerable experience in scientific publications with the CSIRO. Alan Ernst, also from beef cattle husbandry branch, was appointed editor of *QJAAS* in 1985. Durand resigned early in 1987 and Trevor Honour became acting director of the branch.

Extension services branch

The Department's science coordinator had suggested in 1937 that a division of extension services and agricultural education be established, but his recommendation was not followed in the 1945 reorganisation, and advisory staff remained attached to independent branches. The subsequent creation of more branches with advisory responsibilities increased the number of branches providing local advisory services to farmers. By the early 1960s advisory staff in country offices included agriculture, horticulture, soil conservation, beef cattle, dairy, pig and poultry advisers and husbandry officers and agricultural economists. These officers were responsible to their separate branches, headquartered in Brisbane, a situation that led to some problems in organising complementary district extension programmes. In 1965 officers of various branches working in the region formed the Far North Queensland Extension Committee to coordinate their advisory work. At the same time, Denis Purcell, extension officer at Roma, was charged with coordinating extension work in his region.

In 1972 the Extension Services Board and an extension services section were established to coordinate the Department's advisory work. Thirteen regions, each

with its own leader, were formed, and local extension programmes were drawn up by district committees. Among the guidelines for regional extension programming was the requirement to adopt a 'whole farm' approach. All divisions were represented on the Extension Services Board, of which the deputy director-general was chairman and the executive officer of the extension services section was secretary. The extension services section examined ways of making extension programmes more effective and more relevant to producers. The organisation of extension services on a geographical basis proved unsatisfactory, so in 1976 the regional extension committee for the Capricornia region began organising its programmes on an industry basis. By 1982 seven regions had been organised on an industry basis and four years later district extension committees were defunct.

A major objective of the programmed extension introduced in 1972 was the more critical appraisal by field staff of extension needs in their districts, with appropriate planning of work and evaluation of results. The extension research and evaluation unit was established in 1979 to guide field staff in these activities. The unit's work covers such areas as project selection, survey design, questionnaire design, statistical analysis of survey data and report presentation. Surveys are used to assess the effectiveness of extension programmes and to reveal changes needed to make them more effective.

Since the early 1960s the Department has placed greater emphasis on post-graduate extension training, and many officers have received specialist training in Australia and overseas. In-house training was also provided by staff from the extension training section of the information and extension training branch and from the extension services section.

In 1983 the extension services section was raised to branch status, with John Gibb its first director. Soon after, Howard Briggs became acting director, followed by Dr Peter Hopkins and then by Merv Littmann. The branch comprises regional extension leaders, the extension research and evaluation unit and the overseas development section, which was set up in 1981.

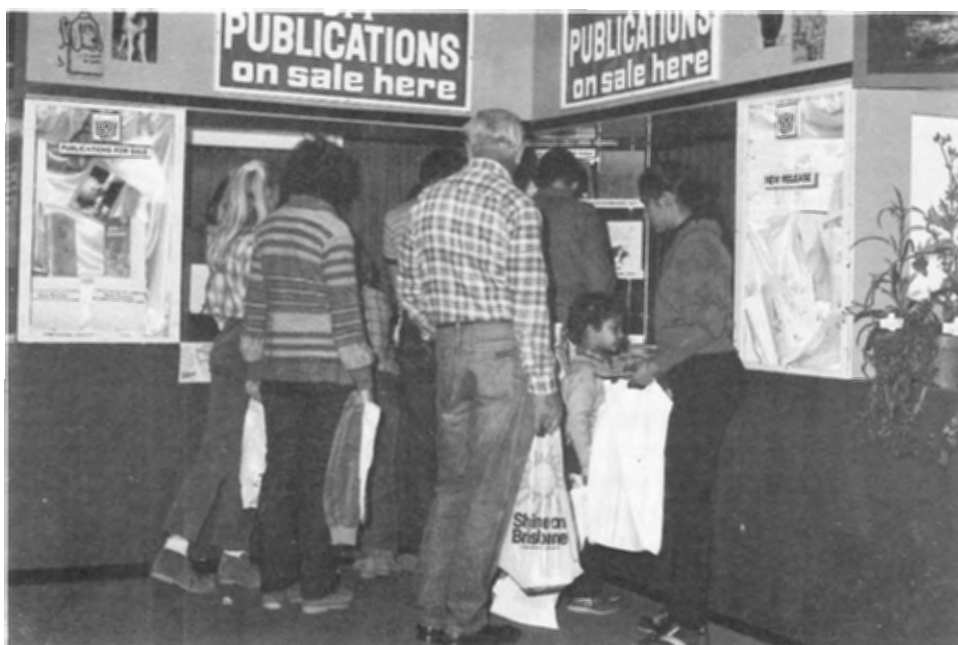
Since the mid 1960s the Department's expertise in agricultural and pastoral research for the tropics and subtropics has aroused interest in many developing countries. The Department has trained technical officers from such countries and sent specialists overseas on consultancy projects in fields such as artificial insemination, dairy farming and marketing, beef cattle management, food preservation, the agronomy of tropical crops, poultry production and pig raising. In 1981 the overseas development unit was set up in the extension services section to co-ordinate and administer these activities. The demand for specialist advice was boosted by the establishment in 1982 of the Australian Centre for International Agricultural Research (ACIAR) in Canberra. The director-general, Dr Alexander, is a member of its council.

District and industry newsletters

The Department maintains contact with farmers, graziers, fishermen and food processors through newsletters produced by extension staff in Brisbane and country centres. Most of these newsletters started with the installation of duplication



Launching the first single-topic issue of the Queensland Agricultural Journal — the topic was agroforestry — are (from left) technical editors Tim Anderson, of the Department of Forestry, Peter Johnston, senior land resources officer, and Ken Robinson, editor of the QAJ.



The Department's display at the Brisbane Exhibition has always proved popular. This photograph was taken in 1983.

facilities at country centres in the 1960s, and the provision of offset printing facilities at key regional centres has further increased their numbers.

The newsletters reach a large number of farmers and lessen the need for individual advisory services, a more costly procedure. They include seasonal advice and trial results, and information on the availability of Departmental services (including officers to contact), new regulations, industry and market trends and new products. They are usually either district- or industry-orientated. A 1983 survey revealed that thirty-nine newsletters, with circulations varying from 200 to 1200, were produced by the Department.

Conclusion

Since the 1960s the Department's library, publications and extension training work have grown to meet the increased need for agricultural information. The challenges of the 'information revolution' have been met by the appointment of skilled journalistic, editorial and design staff, the acquisition of information-processing equipment and the organisation of the Department's information services. Extension training and coordination have also been addressed to improve the flow of information to farmers.

After a hundred years

The Department of Agriculture was founded with a staff of three men, to help thousands of new settlers in Queensland. Several name changes and a century later, the Department of Primary Industries, with its staff of almost three thousand men and women, plays a vital role in the State, by guiding and assisting our rural industries. The need for a department of agriculture was questioned before its founding, but today that department has proved its worth.

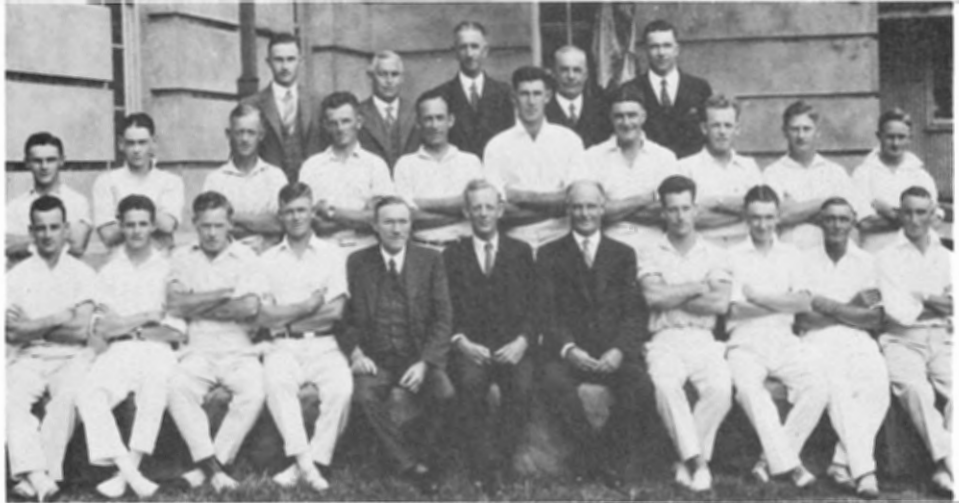
Sporting and social life

One quickly realises from a study of this kind that the history of any organisation is essentially a story of its staff and their achievements. This department is no exception. Many of its officers recall milestones in agriculture, as well as the cultural and social interaction — within the Department and with the wider community — that was a feature of Departmental life, and the strong camaraderie that resulted.

The Department of Agriculture and Stock Sports and Social Club began in the early 1930s, after extensions were made to the William Street building and many new staff members were appointed. Elvie Goward, who provided much information about the Social Club, remembers that it was very active when she joined the Department in 1937. Its members directed their energies towards the war effort in the years 1939–45 but then resumed their sporting and social activities with renewed vigour. The Club's magazine, *Ag-Rag*, was published monthly from July 1945 until the mid 1960s; its subscriptions rose from one shilling per year to sixpence per fortnight in that period.

The Club was active for more than thirty years. Its members organised cricket matches, tennis fixtures, swimming carnivals, table-tennis tournaments, football games and camping weekends, and held dances, balls and Christmas parties. The Club ran a reading and lending library in the William Street building and held slide nights at which members gave talks on holidays or travel.

In the mid 1960s many staff members were transferred away from William Street to new laboratories, such as those at Hamilton, Indooroopilly and Wacol. This decentralisation — and the advent of television, the trend towards multi-car families, and the decline in popularity of dances and balls — contributed to the



Department of Agriculture and Stock Cricket Club, 1935. Back row (left to right): E. Keefer, S. S. Hooper, R. P. M. Sbordt, J. Orr, H. Barnes. Middle row: S. Davis, E. Burns, F. Bell, J. A. Kerr, H. S. Hunter, M. Muller, C. N. Morgan, W. Hamley, R. Pritchard, J. C. J. Maunder. Front row: E. Taylor, C. Peel, C. J. McKeon, S. E. Pegg, A. E. Graham (Under-Secretary), F. W. Bulcock (Minister), R. Wilson (Assistant Under-Secretary), R. Taylor, T. McKnight, —, S. Burchill.



Department of Agriculture and Stock Sports and Social Club football team at Davies Park, West End, in 1954, at a game against the State Works Department team. Back row (left to right): John Bennett, Eric White, —, John Blake, Owen Sturgess, Brian O'Brien, Bruce Champ. Front row: —, Bruce Nelson, Ray Roofayel, Garth McCarthy, Bob Talbot, John Watkins, Dave Wilson. (Photo courtesy John Blake, Horticulture Branch)



A. (Jack) Hegarty, who joined the Department in 1941 and has been Deputy Director-General since 1981. His enthusiasm and commitment ensured the success of the Department's centenary programme.



DPI officers Don McCorkindale, Julie Hughes and Peter White helped cook 3000 breakfasts in Brisbane's King George Square on 17 June 1987, to celebrate the Department's centenary.



A still from The Farm Behind the Beach

Club's decline. But its fate was sealed by the total break-up of the William Street offices in the 1970s.

Today, the Club is inactive, apart from supporting smaller social clubs that have been formed at major new Departmental complexes, for example at Indooroopilly and Yeerongpilly. In the centenary year clubs at these two centres organised open days and the Centenary Fun Run, proceeds from which went to the Bush Children's Health Scheme. Social clubs also operate at some of the major regional centres, such as Toowoomba and Mareeba.

Centenary programme

In January 1979 Peter Lloyd, an extension officer in the agriculture branch, suggested the Department initiate a programme to mark its forthcoming centenary. Andy Fisher, senior information officer in the information and extension training branch, supported the idea. The Centenary Committee — with Norm Fox, chief advisory officer, as chairman and with representatives of the Department's six divisions and the Bureau of Sugar Experiment Stations — was formed in August that year. Peter Lloyd, who represented the division of plant industry, was appointed secretary.

The committee received suggestions for projects from all branches. As a result of one of the proposals, Dr Percy Skerman, retired Reader in Agriculture at the University of Queensland, was asked to research and compile a history of the Department. His research provided material for this book and for several other centenary publications.

In 1985 a small working group was formed to look more closely at other proposals and prepare a detailed centenary programme; A. (Jack) Hegarty, deputy director-general, was chairman and Peter Lloyd was secretary. Other members of the group were Ron Powell, departmental information officer, Tony Barker, senior information officer, Marcus Durand, director of information and extension training branch, and John van Haeringen, executive officer (special projects).

The group recommended that various publications tracing the history of the Department and of Queensland agriculture be produced. Major publications included *Guiding Queensland Agriculture* and *Harvests and Heartaches*, a book in which text and photographs were combined to show some highs and lows of the past hundred years. Other centenary material included a set of colour brochures describing the State's main agricultural industries and the Department's services to them, a short illustrated booklet for staff, a chapter in the 1988 *Queensland Year Book*, journal articles, newspaper supplements, and posters.

A major centenary project was the making of a short film, *The Farm Behind the Beach*, which premiered in March 1987 and has been screened in theatres throughout Queensland. The film shows the many faces of agriculture in this State and the part it plays in the lives of all Queenslanders, even those who live in cities or towns.

Staff at country offices and research stations hosted open days and organised displays at local shows to mark the Department's hundredth year of operation. During the year closer ties were forged among branches and centres as all worked



Some of the centenary promotion and publications team (left to right): Tony Barker, Julie Freeman, Andy Fisher, Peter Lloyd, Dr Percy Skerman and Lindy Brennan.



The Minister for Primary Industries, Mr Neville Harper (far right), fired the starter's pistol at the DPI Centenary Charity Fun Run at the Agricultural Research Laboratories on 19 July 1987.

together to make the year a memorable one. Brisbane centenary celebrations included a breakfast in King George Square and a dinner at the Sheraton Hotel, both on 17 June, a fun run in July, and open days at several of the Department's Brisbane laboratories. On display at many of these events was the Johanson Collection, a set of superb photographs taken by the late Charles ('Plum') Johanson in the Swan Creek Valley, near Warwick, at the turn of the century. The photographs were reproduced by Lionel Coxen from glass plates supplied to the Department by Mrs Free, the photographer's sister.

Looking ahead

This book has been structured around four themes — foundation, organisation, development and technology — which epitomise phases of the Department's development. As the Department passes its hundredth year, there is increasing evidence of a new phase in its development, one that future historians might term the 'management' phase.

The management phase reflects the Department's greater care in the management of its internal resources, necessitated by limited public funding and constraints in the growth of the public service. Such limitations will demand greater efficiency if the Department is to maintain and improve its services to agricultural industries and the general community.

The historical themes and phases chosen also relate to some extent to the parallel and overlapping development of Queensland's agricultural industries. Here again, the management theme seems appropriate to describe the Department's current focus on better management at the farm level and in rural authorities such as marketing boards. The financial and environmental limitations facing the State's agricultural industries have forced farmers to seek greater efficiency through better farm management. As it has done throughout its history, the Department has responded to this need with the appropriate guidance and advisory and counselling services.

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