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Contents

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Event and Comment.

Reorganisation.

AS already announced by the Minister (Hon. T. L. Williams), the Department of Agriculture and Stock has been reorganised to provide for more extensive advisory and research services and facilities for the land industries in the post-war period. The activities of the Department have been sectionalised by the establishment of five divisions: Administration, Plant Industry, Animal Industry, Dairying, and Marketing.

In the Division of Administration, the Under Secretary has now two Assistant Under Secretaries, one to supervise the activities of the technical divisions (Plant and Animal Industry and Dairying) and the other the work of the Divisions of Administration and Marketing. In addition a Special Administrative Officer with senior status has been attached to the central administration for special and emergency duties.

In designing the structure of the technical divisions, the policy has been to make them as self-contained as practicable, in order to facilitate close and rapid co-operation in investigational work.

The Division of Plant Industry is comprised of five branches—Agriculture (excluding sugar-cane growing), Horticulture, Science, Chemical Laboratory, and the Bureau of Sugar Experiment Stations. In addition, the Director, Division of Plant Industry will have associated with him certain specialist advisers who will be regarded as authorities on problems common to several branches, such as soil conservation, irrigation and biometrics. The Agriculture and Horticulture Branches will carry on both research and extension activities, with provision for effective liaison between them. By virtue of its special constitution, the Bureau of Sugar Experiment Stations

will continue to maintain its own soils, pathology, entomology and applied science laboratories. In the field, each branch of the Division of Plant Industry is organised on a district basis with a senior adviser in charge of each district, the advisers stationed in sub-districts being under his direct control. Included in the Science Branch are three sections—Plant Pathology, Entomology and Botany—the head of one section being also the administrative head of the Branch.

The Division of Animal Industry contains the several branches of animal husbandry, and includes the Veterinary Research Branch and the Biochemical Laboratory. For the whole of Queensland, the boundaries of five divisions have been fixed, each in charge of a divisional veterinary officer who, through his district officers, will control the activities of the field staff—veterinary officers, advisers, and inspectors—within the divisional area. The Veterinary Research Branch will incorporate the Animal Health Stations at Yeerongpilly and Oonoonba. All matters pertaining to animal health, husbandry and breeding will be the responsibility of the Division.

The Division of Dairying will take over at the milking shed, so to speak, and will be responsible for dairy hygiene, grading, herd testing, and all matters relating to transport, manufacture and preservation of dairy products. Within this Division is the Dairy Research Branch with chief and subsidiary laboratories and which will carry out the technical work necessary for the control of the liquid milk supply. As with the other production divisions, the field organisation of the Division of Dairying is on a district basis with senior advisers, in charge of local advisers and dairy officers, all of whom will work in close association with butter and cheese manufacturers and milk distributors.

The organisation of the Division of Marketing comprises the Marketing and Economics Branch and the Standards Branch. The first named is charged with the administration of legislation relating to farmers' co-operative associations and the marketing of primary products, and the development generally of organised marketing. The Standards Branch ensures the maintenance of standards of the requirements of rural industries in relation particularly to pure seeds, fertilizers, pest destroyers, stock foods and veterinary medicines; this Branch also is charged at the present time with the administration of stock food rationing schemes.

All the officers controlling the several Divisions and their Branches have had active and extensive experience of the land industries. No fewer than eighteen hold university degrees, five hold diplomas from technical institutions and sixteen have had the advantage of overseas study and experience.

The scheme of reorganisation is complete, in so far as wartime staff difficulties have permitted. More than 25 per cent. of the departmental officers are still absent on defence or other national service duties while, in common with other institutions, recruitment has been negligible over the past five years. Some considerable time, therefore, must necessarily elapse before all the proposals embodied in the scheme of reorganisation are brought to fruition.

Tropical Legumes in South-Eastern Queensland.

J. L. SCHOFIELD, Agrostologist.

THE chief limiting factor to livestock production in Queensland, apart from lack of available soil moisture, is shortage of protein, and the war years have served to demonstrate how very vulnerable the State is in this respect. One way, of course, to overcome the difficulty is the importation of protein-rich feeding stuffs. But such a policy places the producer at a very serious disadvantage—quite apart from the unjustifiable procedure of the importation of foodstuffs by an agricultural State such as Queensland, where their production would do much to diversify and stabilize agriculture.

It is essential, therefore, to investigate the possibilities of production of various protein-rich feeding stuffs in different parts of Queensland. The chief obstacles to the satisfactory development of such plants are deficiencies of available soil moisture and nutrients, inability to withstand temperature extremes, and proneness to insect attack. The first stage of this work, therefore, involves the observation of the effect of these factors on the species and strains selected. Selection was restricted to *perennial* tropical legumes which had shown promise under coastal conditions in northern Queensland for pasture work, fodder, grassland renovation, green manuring, and soil erosion prevention. There are numerous annual legumes which grow well under coastal conditions, but it was considered that a study of perennial tropical legumes selected for drought resistance, winter-hardiness, aggressiveness and ability to thrive on poor, acid soils without fertilizer addition or irrigation might yield results of some value under conditions in south-eastern Queensland.

Legumes Selected.

The initial trial at Moggill in early 1942 consisted of small plots of calopo (*Calopogonium mucunoides*), centro (*Centrosema pubescens*), puero (*Pueraria phaseoloides*), single rows of strains of centro and pigeon-pea (*Cajanus cajan*), and seedlings from an abnormal plant considered to be a cross between stylo (*Stylosanthes guianensis*) and hairy stylo (*S. guianensis* var. *subviscosus*). The area selected was cleared open forest country which previously carried gum-topped box, oak, Moreton Bay ash and blue gum; the soil was quite acid and very low in nitrogen.

In 1943, strains of centro, stylo, and pigeon-pea were established at Yeerongpilly and seeds of calopo and puero were also planted. Single plant studies were commenced at Moggill in 1944, and small observation plots were planted at Kingaroy, Toowoomba, Greenmount, four locations in the Brisbane Valley, Quilpie, and, through the courtesy of the Forestry Sub-department, a small number of strains of pigeon-pea was established at Beerwah on typical "wallum" country.

Plate 53.
PIGEON-PEA.—An erect, late-ripening, frost-resistant strain. Yeerongpilly, 18th September, 1944.

Pigeon-pea.

The pigeon-pea is a short-lived perennial shrub. There are many types, which differ considerably in seed and foliage yield and in habit and flower colour. Two distinct types are recognized: a short-growing, early-ripening type and a tall, late-ripening type. The foliage is rich in protein and forms an excellent stock food, and the seeds are valuable

for the same purpose. However, stock will not feed readily until they have acquired a "taste" for it, and this is best attained by seeding it lightly with maize. In India it is always grown as a mixed crop with sorghum, millets, maize, or *Paspalum scrobiculatum*. This legume is regarded in the countries in which it is chiefly grown—i.e., India and Hawaii—as being particularly hardy, and even in areas with a rainfall of less than 25 inches has been known to yield satisfactorily

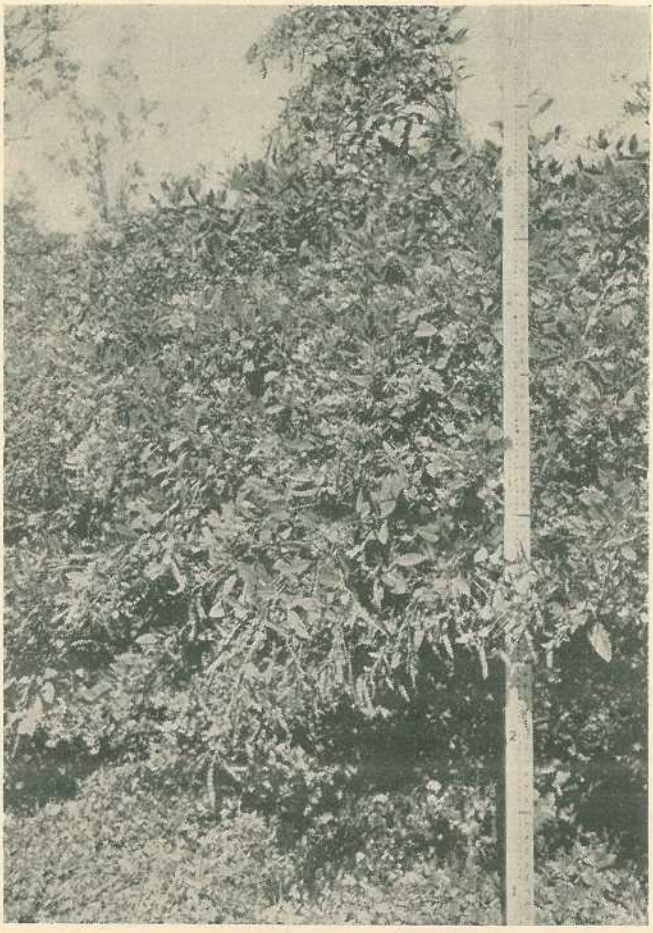

Plate 54.

PIGEON-PEA.—A wide-branching strain, podding freely. Moggill, 29th June, 1945.

when other crops fail. Recorded yields of green matter vary from 18 tons to 35 tons, and of seed from 20-30 bushels per acre. Sown in the months of September-November, it germinates as soon as there is sufficient moisture in the soil and grows rapidly; it flowers towards the end of April or sooner according to the strain, and is in full pod in June-July. Although it responds to cultivation, the plant has been

grown on an experimental scale on poor soils with little preparation and without the addition of fertilizer. Certain types are susceptible to frost and work is in progress to obtain winter-hardy strains.

Plates 53 to 56 illustrate various types of pigeon-pea and phases of the testing work with this legume.

Plate 55.

PIGEON-PEA.—Portion of trial plot at Fairney View, 8th August, 1945.

Centro.

Centro is a summer-growing, perennial, vine-like legume, so aggressive that it produced a close mat of cover within six months from planting (9th October, 1944) on a poor soil in the Brisbane area without fertilizer addition or irrigation. It is very leafy, and does not produce any woody growth even after eighteen months. The tonnage of green matter per acre at Moggill after seven months' growth was estimated to be equal to that of a good annual green manure crop, and the dry matter content in the dry months is usually higher than that of cowpeas and lucerne. The crop may be mown for hay, using a special attachment to the cutter bar. No serious insect damage has been noted on this legume, although aphids attacked the young shoots and leaves from time to time. No fungous diseases have occurred,

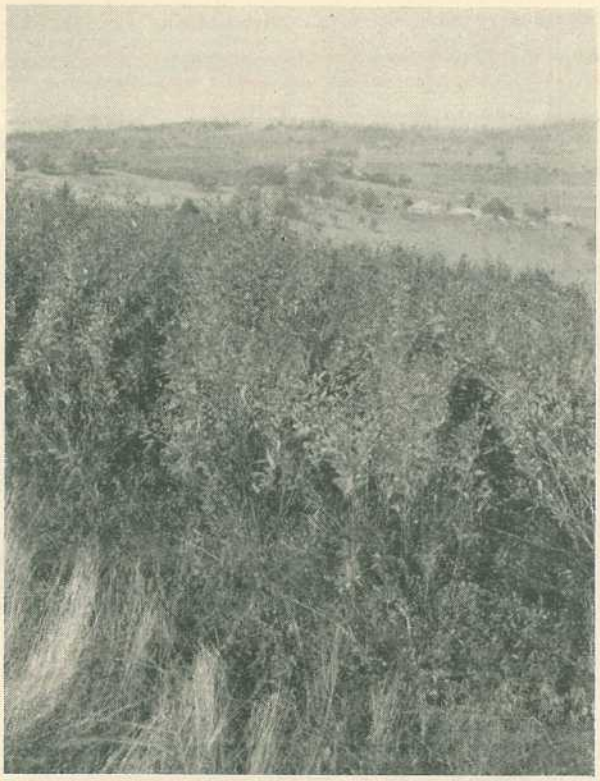

Plate 56.

PIGEON-PEA.—An isolation seed-multiplication plot of a frost-resistant strain at Larkhill, 8th August, 1945.

and, with respect to nematodes, it is of interest that centro has been reported as forming a satisfactory cover in certain areas after the death of stronger covers from nematode infestation.

The young foliage and stems are subject to frost damage but the underlying mature runners are protected by the thick cover of foliage above. Considerable variability in plant type is shown by centro, and Dr. L. G. Miles (formerly Research Officer at the Bureau of Tropical Agriculture) has selected strains of this legume. A number of these strains are now under test in south-eastern Queensland, and differences in vegetative vigour, earliness, winter-hardiness, and seed production are apparent. Plate 57 shows a row of centro plants at Yeerongpilly planted 24th December, 1943, and photographed 17th November, 1944. The first quarter of 1944 was particularly dry, with only 7·23 inches of rain, and in April four points only were recorded—the lowest April rainfall for 97 years. Severe frosts were experienced later in the year. The photograph shows the excellent recovery of this strain from frost; by contrast, Plate 58, representing another strain photographed on the same date, demonstrates that winter-killing has occurred to the extent of almost 100 per cent.

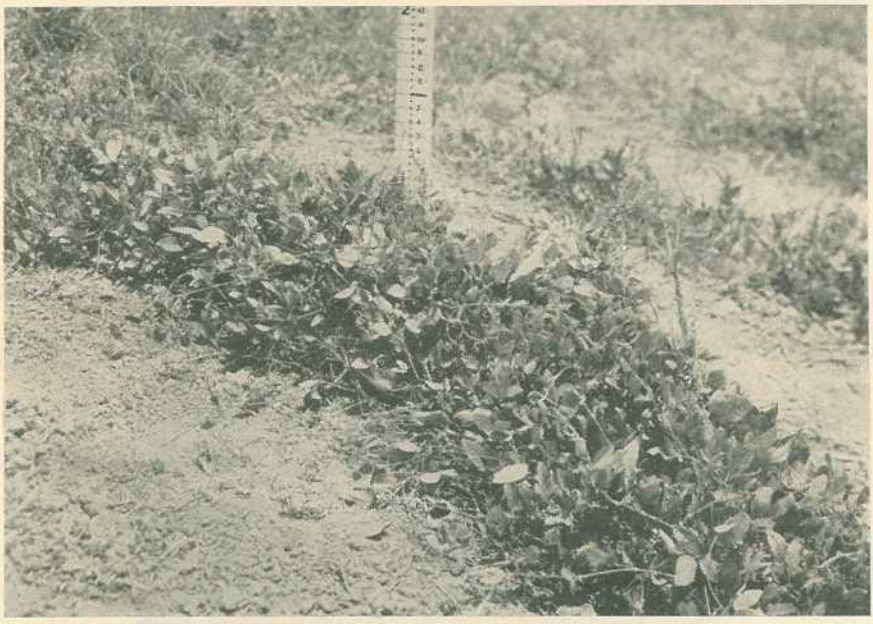

Plate 57.
CENTRO.—An early strain, 11 months old. Yeerongpilly, 17th November, 1944, following severe winter frosts.

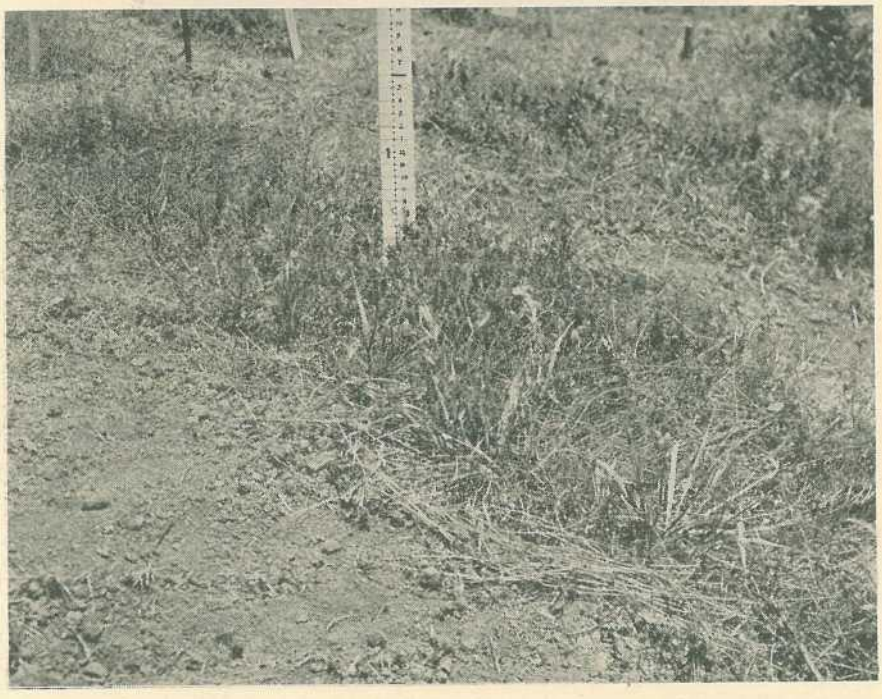

Plate 58.
CENTRO.—Showing almost complete winter-killing suffered by one strain of centro. Yeerongpilly, 17th November, 1944.

At Moggill in late 1944 seeds of selected strains from Yeerongpilly were inoculated with a culture obtained originally from Malaya, and placed in pots. The pot plants were transplanted to the field in late January, 1945. Variation in the amount of foliage production between strains is illustrated by examination of Plate 59, which shows a heavy-foliage strain, a dwarf strain, and a strain with a free-flowering and heavy-podding character. All strains were grown under the same conditions, without fertilizer, and represent single seedlings only.

Plate 59.

Centro.—Single seedlings of (*a*) a heavy-foliaged strain, (*b*) a dwarf strain, and (*c*) a free-seeding strain; all trained on stakes and 7 months old. Moggill, 29th June, 1945.

Centro is considered to have promise for coastal conditions in Queensland because of its ease of establishment on poor acid soils without fertilizer, rapid growth and aggressive nature, ability to withstand extremes of temperature and heavy rain and severe drought, perennial leafy nature, free-seeding habit, palatability, high nutritive quality combined with ability to grow well under shade, and quick recovery after grazing.

Stylo.

Stylo is a perennial legume of considerable promise in the frost-free areas of coastal Queensland. In a strain trial at South Johnstone an abnormal plant was observed which was quite different from either stylo or hairy stylo and was found to be intermediate in certain characters. This plant was called stylo X and appeared to be a cross between stylo and hairy stylo. Seeds from stylo X were sown in the following year and considerable variation was noted among the resulting seedlings. Selections were made and seedlings were raised at Moggill and Yeerongpilly. In 1944, single plants of selected strains were planted at Moggill.

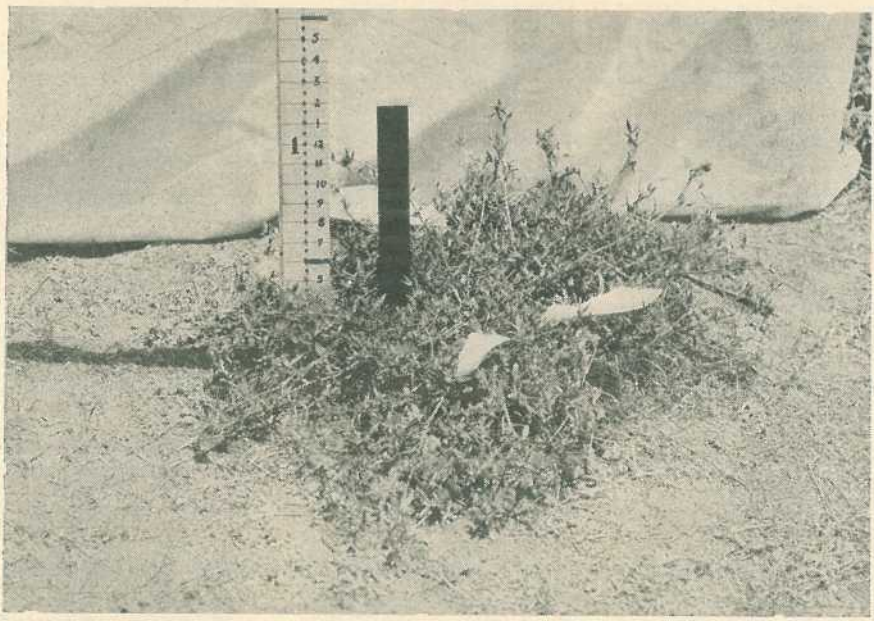

Plate 60.

STYLO.—A selection from stylo X possessing decumbent habit, vegetative vigour and free-flowering character. Moggill, 17th November, 1944.

Plate 60 shows a selection which possesses a decumbent habit, vegetative vigour and free-flowering character—severe frosts were experienced during the winter and the photograph was taken on 17th November, 1944, at Yeerongpilly. Plate 61 shows a row of single plants obtained from seed collected from the plant shown in Plate 60.

These plants were raised in pots and transplanted to the field towards the end of January; the photograph was taken on 29th June,

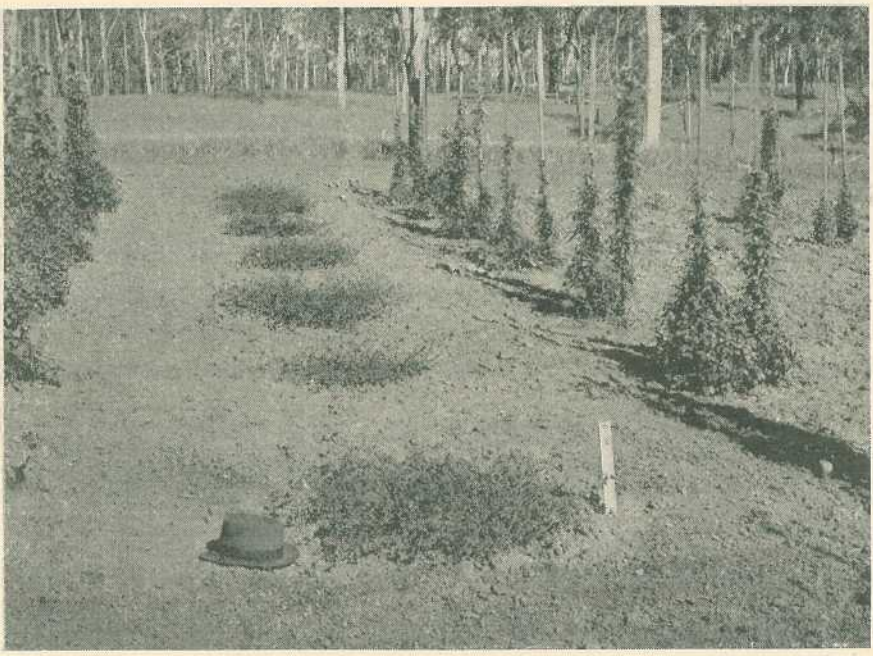

Plate 61.
STYLO.—A row of seedlings grown from seed collected from the selection shown in Plate 60. Moggill, 29th June, 1945.

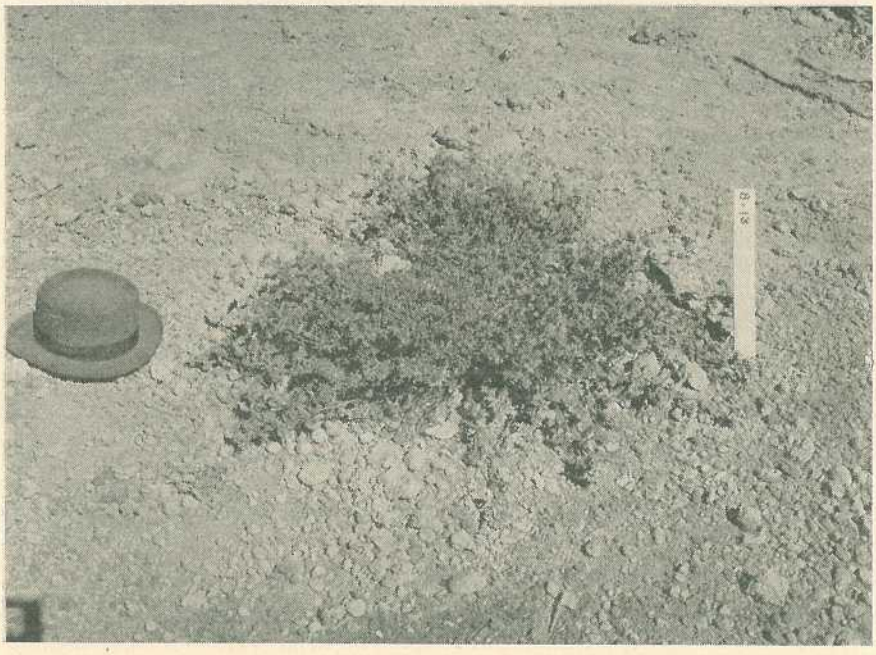

Plate 62.
STYLO.—A selection from stylo X which possesses earliness combined with vegetative vigour and free-flowering character.

1945, at Moggill. Plate 62 shows a plant of another selection photographed on the same date. The earliness, free-flowering, and vegetative vigour characters of this plant are noteworthy. In addition to the selections mentioned, work is also in progress with the various species of *Stylosanthes*.

The early results from these trials indicate that some of the selections show promise under conditions at Moggill and Yeerongpilly, but trials at a number of different centres combined with grazing trials are essential before any definite statement can be made on the possible value of the various species and selections of stylo in south-eastern Queensland.

Calopo.

Calopo is a vigorous, aggressive, summer-growing, creeping plant possessing pronounced hairy stems and leaves. It is inferior to centro in most respects but is sometimes employed as a nurse-crop with this legume. It is not winter-hardy and does not withstand shade. In the far north, calopo is of robust habit and sets seed freely. In the Brisbane area it grows well during the late spring and summer, and on poor soils without fertilizer produces up to 6-8 tons of green matter per acre; very few flowers form and no seeds are set. It is not particularly palatable because of the hairy nature of the stems and leaves.

Puero.

This is a vigorous, aggressive, summer-growing, twining herb with large clover-like, hairy leaves, which grows well in late spring and throughout the summer under good rainfall conditions, but is not winter-hardy. This legume grows to perfection in the high rainfall area of northern Queensland, but conditions in south-eastern Queensland do not appear satisfactory for puero except as a short-term summer crop.

Conclusions.

The results from these trials indicate that three legumes—centro, stylo, and the pigeon-pea—merit further trial under conditions in south-eastern Queensland. Of the three, the pigeon-pea would appear to possess the widest range of soil and climatic tolerance. The fact that one strain selected for winter-hardiness did not suffer any damage from the severe frosts at Quilpie which followed the first rain of the season on 10th July, 1945, is strong evidence of the climatic range of this legume. Another point of importance is the survival of the pigeon-pea on "wallum" country at Beerwah even in a season made difficult by very hot and dry conditions at the end of January and delayed rain. The growth of a deep-rooted, free-seeding, perennial, pioneer legume such as the pigeon-pea may be a first step towards making "wallum" country useful.

The good growth shown by the pigeon-pea in various localities in the Brisbane Valley demonstrates the potential value of this protein-rich legume for stock feeding, both in the field (mixed with other

crops), in the chaffed form, and as seed. In addition, it is valuable as a poultry feed and as a green manure. The development overseas of mechanization of operations connected with the growth of this legume from planting to threshing is of importance under Queensland conditions.

Centro shows promise as a pasture legume, green manure, and soil-erosion preventive crop. However, much work is required on the various species and strains of *Centrosema*, and on the effect of grazing, before a definite statement can be made as to its use in south-eastern Queensland.

Stylo is a legume which deserves close attention, but here again much work is required on the various species and strains of *Stylosanthes* and on their reaction to grazing. Calopo and puero do not possess any characteristics which warrant their use in south-eastern Queensland except as short-term, summer-growing legumes.

In conclusion, it is desired to emphasize that this paper is merely a progress report. Much work requires to be undertaken in the future on the pigeon-pea, centro, and stylo, and, until a more advanced stage has been reached, it will not be possible for this Department to supply seed to any growers.

Acknowledgments.

Acknowledgment is due to the Sub-Department of Forestry and to the farmers and graziers who are co-operating in the testing work.

Plate 63.

A SELECTED SEED PLOT OF WHEATLAND MILO SORGHUM, KINGAROY DISTRICT.

Reorganisation of the Department of Agriculture and Stock.

FOLLOWING the announcement by the Minister for Agriculture and Stock (Hon. T. L. Williams) that plans for the reorganisation of his Department had been approved by the Government, appointments have been made to numerous administrative and technical positions within the Department. Although many officers, including a number selected for senior positions, are still on service with the Forces or seconded to the Commonwealth Government, the reorganisation now is otherwise practically complete.

Plate 64.
HON. T. L. WILLIAMS.

In the reorganised Department, branches with common interests are now grouped within a division controlled by a director responsible for co-ordinating their activities. Some amalgamation of former branches and sections has been made, and there has been a reallocation of responsibilities. The grouping of branches into a limited number of divisions with clearly-defined duties is intended to eliminate overlapping and facilitate efficient handling of the problems associated with the primary industries of the State. The five divisions now established are the Divisions of Administration, Plant Industry, Animal Industry, Dairying, and Marketing.

The officers chosen to administer the reorganised Department and to direct the work of the divisions, branches, and sections have an extensive knowledge of Queensland agriculture, and many have had overseas experience in various branches of crop and livestock production. The technical workers in every division have all been suitably trained, or will receive special training, for the tasks which have been allotted to them.

Plate 65.
MR. R. P. M. SHORT.

GENERAL ADMINISTRATION.

The permanent head of the Department is the Under Secretary, Mr. R. P. M. Short. Joining the Department as a clerk in 1898, Mr. Short later became Chief Clerk, then Acting Under Secretary, and has been Under Secretary since 1939. Throughout the war years the duties of the Under Secretary have been particularly onerous, because of increased responsibilities in connection with food production and food distribution involving close liaison and co-operation with the Commonwealth Government and departments in the other States.

In future, the Under Secretary is to have the assistance of two Assistant Under Secretaries. Mr. A. F. Bell, M.Sc., D.I.C., A.A.C.I., has been appointed Assistant Under Secretary (Technical) and Mr. M. L. Cameron Assistant Under Secretary (Administration).

Plate 66.
MR. A. F. BELL.

Mr. Bell joined the Department in 1916. In 1924, he was awarded a Sugar Research Travelling Scholarship and on his return to Australia in 1928 he was appointed Pathologist in the Bureau of Sugar Experiment Stations. He later became Assistant Director, then Acting Director of the Bureau, and with his new duties will combine those of Director of the Bureau. During recent years Mr. Bell has been particularly closely associated with the organisation and improvement of Queensland agriculture.

Plate 67.
MR. M. L. CAMERON.

Mr. Cameron has been with the Department since 1915, and as Chief Clerk since 1939 has had considerable administrative experience, frequently deputising for the Under Secretary. Prior to his appointment as Chief Clerk, Mr. Cameron visited many countries in the company of the then Minister for Agriculture and Stock (Hon. F. W. Bulcock), and gained first-hand knowledge of rural conditions in South Africa, South America, the United States, and New Zealand.

Plate 68.
MR. H. BARNES.

Mr. H. Barnes, who joined the Department in 1920, and who for more than twelve years was Director of Fruit Culture, has now been appointed Special Administration Officer and State Executive Officer of the District War Agricultural Committees. In the latter capacity he succeeds Mr. Bell.

Mr. W. T. Gettons, A.I.C.A., has been reappointed Accountant. Mr. Gettons joined the Department in 1910 and eventually became Sub-Accountant, a position he filled until 1936, when he was appointed Accountant.

Plate 69.
MR. W. T. GETTONS.

The Publicity Branch of the Administrative Division remains under the control of Mr. J. F. F. Reid, who since entering the Department in 1921 has been, first, Editor of *The Queensland Agricultural Journal* and subsequently Editor of Publications.

Plate 70.
MR. R. VEITCH.

DIVISION OF PLANT INDUSTRY.

Branches of the Department which are concerned with various aspects of crop and pasture production now form the Division of Plant Industry, which is directed by Mr. Robert Veitch, B.Sc.Agr., B.Sc.For., F.R.E.S. Mr. Veitch came to the Department as Chief Entomologist in 1925 from the Colonial Sugar Refining Company, with which he was engaged for eleven years in field scientific work in Fiji, New South Wales, and Queensland. Since 1937 he has been Director of Plant Industry (Research), controlling a large staff engaged in research and much extension work in agriculture, botany, entomology, horticulture, plant pathology, plant physiology, and soils.

Experiment station work will have an important place in the activities of the Division, and Mr. W. G. Wells has been appointed Specialist Adviser, Experiment Stations. Mr. Wells joined the Service in 1922 and was Director of Cotton Culture and Senior Research Officer, controlling the activities of the Biloela Experiment Station. In addition to his new duties he will act as Cotton Specialist.

Plate 71.
MR. W. G. WELLS.

There are five Branches within the Division, namely—Agriculture, Horticulture, Bureau of Sugar Experiment Stations, Science, and the Chemical Laboratory. The Bureau of Sugar Experiment Stations has long been organised as a one-crop section and will continue as a self-contained unit. The Agriculture and Horticulture Branches will have the assistance of the Science Branch on botanical, entomological and plant pathological problems, and of the Chemical Laboratory on matters connected with soils, plant nutrition and poisonous plants, and will correlate fertilizer and other experiments in the field with laboratory studies.

Plate 72.
MR. E. R. BEHNE.

Bureau of Sugar Experiment Stations.

The Bureau has as its director the Technical Assistant Under Secretary (Mr. A. F. Bell) and as Assistant Director and Chief Mill Technologist, Mr. E. R. Behne, B.Sc., M.Sc.App., A.A.C.I. Mr. Behne has been attached to the Mill Technology Section of the Bureau since 1930, and during recent years has held the position of Chief Mill Technologist. As a member of a sugar industry delegation, Mr. Behne will shortly visit America to investigate various aspects of cane culture, harvesting and milling.

The staff of the Bureau includes also entomologists, plant pathologists, chemists, mill technologists, advisory officers, and an agronomist. The entomology and plant pathology section is under the control of Mr. R. W. Mungomery, who has served the Department in the cane-growing areas since 1925.

Plate 73.
MR. C. J. MCKEON.

Agriculture Branch.

The Agriculture Branch is directed by Mr. C. J. McKeon, Q.D.A. He entered the Department in 1918 as Instructor in Agriculture. Before his original appointment as Director of Agriculture in 1937, he was Director of the Bureau of Tropical Agriculture at South Johnstone for several years. Lieut.-Colonel D. O. Atherton, Q.D.A., M.Sc.Agr., formerly an entomological research officer in the Department, has been appointed Assistant Director and on his release from the Army will take up his duties, which relate especially to research work in agriculture. The advisory officers of the Agriculture Branch are under the control of Mr. W. H. Bechtel, Chief Adviser in Agriculture formerly State Farms manager and Instructor in Agriculture.

Plate 74.
LT. COL.
D. O. ATHERTON.

The research staff of the Agriculture Branch will include plant breeders, a tobacco specialist, and a soils chemist, and these officers will co-operate with advisers in agriculture, who are stationed in all of the main agricultural districts. Experimental work on various other phases of crop production also will be carried out with the assistance of the advisory officers.

Plate 75.
MR. W. H. BECHTEL.

Horticulture Branch.

The Horticulture Branch will control investigational and advisory services in connection with the production and transport of horticultural crops. Dr. W. A. T. Summerville, formerly officer in charge of horticultural research, has been appointed Director of Horticulture, with Dr. S. A. Trout, who has come to the Department from the Food Preservation Division of the Commonwealth Council for Scientific and Industrial Research, as Assistant Director.

Plate 76.
DR. W. A. T. SUMMERVILLE.

Plate 77.
DR. S. A. TROUT.

Several horticulturists have been appointed to conduct experimental work in the main fruit and vegetable-growing districts. The Branch has a large staff of advisory and inspectional officers stationed in all of the main producing and distributing centres.

Plate 78.
MR. J. H. SMITH.

Science Branch.

The Science Branch comprises three Sections—Botany, Entomology and Plant Pathology. Mr. J. Harold Smith, N.D.A., M.Sc., who has been with the Department since 1926, will act as Senior Entomologist. Major J. H. Simmonds, M.B.E., M.Sc. (at present on military service), who entered the Department in 1923, will act as Senior Plant Pathologist. Mr. C. T. White continues as Government Botanist, a position he has occupied since 1917.

Plate 79.
MR. C. T. WHITE.

The Branch has a staff of entomologists and plant pathologists investigating pest and disease control in agricultural and horticultural centres, and a number of botanists concerned with matters of importance to primary producers, such as the study of plants of economic value, and the identification of weeds and poisonous plants.

Plate 80.
DR. M. WHITE.

Chemical Laboratory.

The Chemical Laboratory remains under the control of Dr. Montgomery White, who first became associated with the Department in 1936, and who has been Agricultural Chemist since 1941. In addition to its activities in matters connected with plant industry, the Chemical Laboratory will be associated with the Division of Animal Industry, and Dr. White is therefore designated also as Biochemist.

Mr. C. R. von Stieglitz, F.A.C.I., who joined the Department in 1914 and was formerly Chemist in the Bureau of Sugar Experiment Stations, has been appointed Officer-in-Charge of the Plant Nutrition Section in the Chemical Laboratory and will investigate and advise the production branches on matters connected with soils, irrigation waters and plant nutrition matters generally.

Plate 81.
MR. C. R. VON STIEGLITZ.

DIVISION OF ANIMAL INDUSTRY.

The Division of Animal Industry embraces former sections concerned with animal health, stock breeding and management and livestock products other than dairy products. The Acting Director of Animal Industry is Dr. J. Legg, who entered the Department in 1914. Since 1943 he has been Acting Director of Veterinary Services. Dr. Legg has had a long connection with animal health problems in Queensland as Officer in Charge of the Animal Health Stations (formerly Stock Experiment Stations) at Yeerongpilly and Oonoonba.

Plate 82.
DR. JOHN LEGG.

Mr. L. D. Carey continues as Chief Inspector of Stock and Chief Inspector of Slaughter-houses and will control the activities of the District Stock Officers, Stock and Slaughtering Inspectors, and brands officers. He joined the Department in 1918.

Field Veterinary Services.

Within the Division are fourteen Veterinary Officers, five of whom are in charge of divisions of the State and will be stationed at Brisbane, Toowoomba, Kingaroy, Rockhampton, and Townsville, respectively. When the veterinary officers at present on military service are released, the livestock industries will be well served with veterinarians.

Plate 83.
DR. F. H. S. ROBERTS

Animal Health Stations.

The Animal Health Stations at Yeerongpilly and Oonoonba, in addition to providing vaccines and other preparations for the treatment of various stock ailments, will continue as the centres of veterinary research work. Dr. F. H. S. Roberts, who has been with the Department since 1930 and was formerly Veterinary Parasitologist, has been appointed Acting Director of Research in the Division.

Plate 84.
MR. J. L. HODGE.

Sheep and Wool Branch.

In the Sheep and Wool Branch the Senior Advisor in Sheep and Wool is Mr. J. L. Hodge, who has been an advisory officer in sheep and wool

Plate 85.
MR. G. R. MOULE.

since 1929. Mr. G. R. Moule, B.V.Sc., who has been with the Department since 1941, is attached to the Branch as Veterinary Officer.

Mr. Moule was one of the first graduates of the Veterinary School within the University of Queensland, and held a Scholarship awarded by the Department of Agriculture and Stock.

Plate 86.
MR. F. BOSTOCK.

Pig Branch.

Mr. F. Bostock, formerly of the New South Wales Department of Agriculture, has been appointed Officer in Charge of the Pig Branch. Mr. Bostock was at one time an Instructor in Pig-raising in Queensland and has since had considerable experience in New South Wales. There are four advisory officers in the Branch, two of whom are on war service.

Plate 87.
MR. P. RUMBALL.

Poultry Branch.

The Officer in Charge of the Poultry Branch is Mr. P. Rumball, R.D.A., who has been Poultry Expert in the Department since 1924. There are several advisory officers and inspectors in the Branch and a comprehensive service to poultry raisers is assured.

In recent years, the staff of the Poultry Branch has been increased to cope with a great expansion in the industry. Advisory officers are stationed in country centres, and also in the metropolitan area.

Plate 88.
MR. E. B. RICE.

DIVISION OF DAIRYING.

The former Dairy Branch of the Department has been raised to the standing of a Division, which is under the direction of Mr. E. B. Rice, Dip.Ind.Chem. Mr. Rice, who has been with the Department since 1922, was a technologist in the Dairy Research Laboratory of the Department before his first appointment as Director of Dairying in 1939.

The Dairy Research Laboratory—the investigational branch of the Division—is under the control of Mr. O. St. J. Kent, B.Sc., A.A.C.I., who entered the Department in 1924 and who has been in charge of the Laboratory since its inception. The staff of dairy technologists stationed at Brisbane and Toowoomba will continue their investigations into problems associated with the attainment and continuance of high standards in dairy production.

Plate 89.
MR. O. ST.J. KENT.

Many of the field officers of the Division have been promoted with the new designations of Senior Adviser and Adviser in Dairying, and the allocation of these officers to the dairying centres will ensure that expert advice on milk and cream production is readily available to farmers. There is a large number of dairy officers concerned to some extent with inspectional work and these men will now have an important role in raising milk and cream quality.

The herd-testing operations of the Division will continue as at present until an improved system is adopted.

Plate 90.
MR. H. S. HUNTER.

DIVISION OF MARKETING.

The Division of Marketing is under the direction of Mr. H. S. Hunter, who, prior to his first appointment as Director of Marketing in 1939, was associated in a secretarial capacity with many of the Department's special activities, such as drought and drought relief investigations. He has been with the Department since 1914. Mr. H. K. Lewcock, B.Sc.Agr., M.Sc., who joined the Department in 1931, and who was formerly closely connected with the production side of the pineapple industry as Senior Research Officer in the Plant Physiology Section of the Department, has been appointed Acting Assistant Director of Marketing and Senior Marketing Officer.

Plate 91.
MR. H. K. LEWCOCK.

The Marketing Branch of the Division has been strengthened by the appointment of a Production Statistics Officer, marketing officers, and inspectors. It will consequently be able to extend the activities of the former Marketing Branch of the Department into a wider field.

The Standards Branch of the Marketing Division is concerned with grade standards for such agricultural requirements as fertilizers, seeds, pest destroyers, veterinary medicines, and stock foods. Mr. F. B. Coleman, who entered the Department in 1919, and who for many years was Officer in Charge of the branch responsible for maintaining the desired standards for such materials, is now Officer-in-Charge of the Standards Branch.

Plate 92.
MR. F. B. COLEMAN.

PLANT PROTECTION

Diseases of Root Crops.

T. McKNIGHT, Assistant Plant Pathologist.

DURING the last few years, there has been a considerable increase in the acreage sown to root crops in Queensland. Substantial reductions in yield may occur in these crops in the field as the result of fungous attack, and heavy losses may follow subsequently due to transport and storage rots. While experimental work in Queensland on control measures is in a preliminary stage, the information given here will aid in the identification and control of the more important diseases of root crops.

MACROSPORIUM LEAF BLIGHT OF CARROT.

Macrosporium leaf blight or "rust," as it is called in some districts, is the disease of the carrot which is most frequently encountered in the field. When the causal fungus* attacks the foliage early in the life of the crop, a partial or complete loss of leaves and leaf stalks may occur with the result that the development of the root is markedly retarded. However, the disease is most prevalent when the crop is approaching maturity and at the harvesting stage, particularly during cool, wet weather in autumn and winter.

The initial stages of infection are not conspicuous and the disease is generally first observed on the older leaves, the colour of which changes from green to an unhealthy yellow and then to brown. In wet weather, the disease spreads rapidly, younger leaves and leaf stalks being attacked in succession until the tops have a blighted appearance (Plate 93). The slightly sunken spots which are characteristic of this disease are more prominent on the leaf stalks than on the leaves. They are dark-brown with a yellowish centre, and though usually small in size, they may be up to one-third of an inch in length. The unsightly appearance of blighted tops considerably reduces the value of roots sold in the bunch. The tops must therefore be trimmed—a task which is both laborious and time consuming. The reduced yields obtained from crops attacked by Macrosporium leaf blight are, however, more important to the farmer than the loss of time involved in trimming.

Control.

Copper sprays such as a 4-4-40 Bordeaux mixture, 1-10 home-made cuprous oxide, or their commercial equivalents, should be applied when the disease is first seen in a crop. The exact times of application have not yet been determined but, in general, if the disease has appeared in a

* *Macrosporium carotæ.*

crop and wet weather is encountered, a rapid extension of the damage may be anticipated and treatment at ten to fourteen day intervals accordingly may be worthwhile. During dry periods of the year, fungicidal control measures are not normally warranted. As the spores of the fungus live in the soil on diseased leaf material and provide a source of infection for a later crop, discarded tops should be burned when the

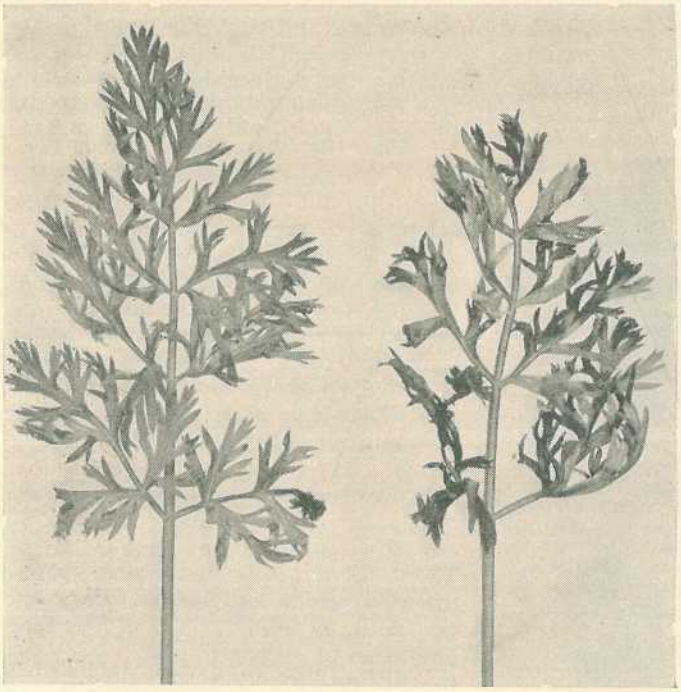

Plate 93.
Macrosporium Leaf Blight of Carrot.—Lightly and severely blighted leaves.

disease has appeared in a severe form. Deep ploughing should also be carried out to bury infected material. Crop rotations in which three years elapse before carrots are again planted on the same land should be adopted.

CERCOSPORA LEAF SPOT OF CARROT.

Cercospora leaf spot of carrot* may be distinguished in the early stages of infection from Macrosporium leaf blight by the more conspicuous nature of the leaf spots occurring on the leaves in the former disease. The leaf spots caused by the Cercospora leaf spot fungus are at first grey but quickly become brown to dark-brown in colour. The majority of the spots are situated near the margin of the leaflets and are irregular in shape. The leaflets curl and are later destroyed when the spots expand and merge into each other. A blighted "burned" appearance not unlike that of Macrosporium leaf blight is the result of Cercospora leaf spot infection.

Control.

Measures for the control of Cercospora leaf spot on carrot crops in respect to both spraying and field sanitation are identical with those discussed in connection with Macrosporium leaf blight.

* *Cercospora apii carotæ.*

CROWN ROTS OF CARROT AND BEETROOT.

Crown rots of carrot and beetroot, which are caused by several soil-inhabiting fungi, may be encountered at any time during the growing period from the seedling stage onwards, until the roots are mature, both diseases being most prevalent when irrigation water is applied at frequent intervals.

Plants are attacked on the crown and root, the causal fungus often binding the surrounding soil to the root (Plate 94). In wet weather, a white weft of fungous strands may be noticeable on the lower parts of the leaf stalks, and when these rot at the base the leaves wilt and die.

Plate 94.
CROWN ROT OF CARROT.

The two commoner crown rot diseases may be readily distinguished from each other in the field when the fungi form sclerotia or resting bodies. Sclerotia are very compact bodies, composed of fungous threads, and have a resistant coat which enables them to survive adverse conditions. In the more important crown rot fungus*, these sclerotia are spherical or roughly spherical in shape and are approximately the size of cabbage seed; at first they are white in colour, but they eventually change to dark-brown. A second crown rot fungus† forms dark-brown to black sclerotia which are irregular in shape and generally larger in size than in the other important crown rot. They occur in considerable numbers on diseased plants and may be distributed over the field by cultivation or by the careless handling of diseased plants and thus serve to initiate infection at other points. The distribution of these crown rot fungi throughout the field must be avoided as they are capable of attacking most vegetable crops. Very favourable conditions for the spread of the crown rot fungi occur on badly drained soils in wet weather, particularly in the later stages of growth when the plants are touching each other.

Control.

Measures for the control of crown rots are wholly dependent on the early detection of the diseases at the point or points of origin in the field. Affected plants should be removed and burned, care being taken to avoid spreading the sclerotia. If the area affected is small, a blue-stone solution prepared by dissolving one pound of copper sulphate in seven gallons of water should be applied to the soil at the rate of two gallons per square yard or until the soil is wet to a depth of six inches. This solution destroys any sclerotia which may be present in the soil.

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* *Sclerotium rolfsii.* † *Rhizoctonia* sp.

Cultural methods aimed at the prevention of the spread of the diseases are important, particularly if it is suspected that the soil is harbouring sclerotia from a previous crop. The top soil should be kept loose and open once the seedlings are established, and overwatering should be avoided. The eradication of weeds and shallow cultivation tend to reduce the surface moisture and thereby minimise the risk of infection by crown rots.

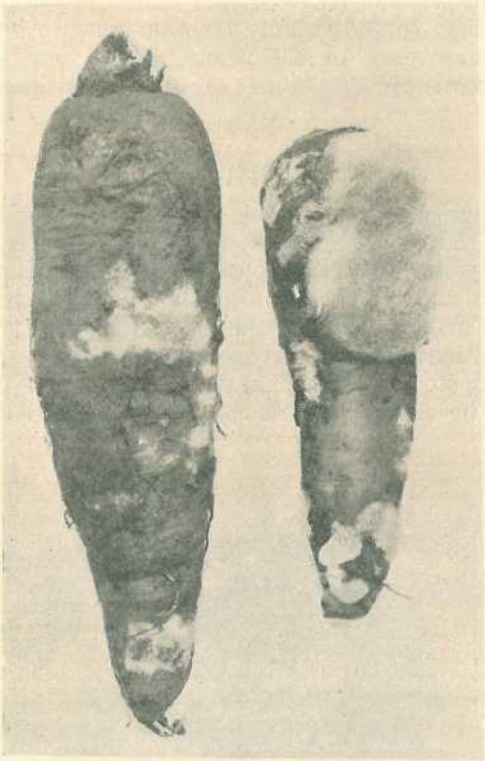


Plate 95.
Transport and Storage Rots of Carrot.

TRANSPORT AND STORAGE ROTS OF CARROT AND BEETROOT.

Considerable wastage in both bunched and topped carrots and beetroot follows the entrance and activity of rot-producing fungi* after the crops are harvested. Bacteria almost invariably accompany these fungi and assist in producing a soft rot. At first the diseased areas on the root have a water-soaked appearance and are soft and watery to the touch. They may occur anywhere, but most frequently are located at the crown with the decay extending deep into the centre of the root. The greater portion or the whole of the root is affected in the later stages of decay and the surface becomes covered with a conspicuous mould growth which is white, greyish-white or dark in colour (Plate 95). At this stage the carrot or beetroot disintegrates when gentle pressure is applied to the surface; in the case of beetroot, the decomposing tissues may have a most unpleasant smell.

* Principally *Rhizopus nigricans, Botrytis* sp., and *Fusarium* spp.

Storage rots of this nature are rarely of any significance in the field, and are not usually encountered in a packing shed though they may occur there if carrots or beetroots are held for a few days when temperatures are moderately high. The organisms causing soft rots are universally present as spores in the soil and in the air and they enter the roots through wounds, bruises, and cracks, the presence of surface moisture greatly facilitating the germination of the spores and the penetration of the fungi. Hence, under humid conditions during transport, the fungi may spread rapidly from one or two infected roots and involve the greater part, or the whole, of the contents of a bag of carrots. A similar rapid spread may occur in a consignment of beetroot.

Control.

While storage rots are seldom evident on the farm, precautions taken there determine to a great extent the degree of infection and thus the amount of wastage in the roots occurring during transit to the market. Carrots and beetroots showing any signs of injury should not be marketed. Furthermore the roots should not be packed while wet; otherwise, conditions will be favourable for the development of rot organisms during storage and transport. Finally, delays in transporting root crops to the market should be avoided, particularly in warm weather.

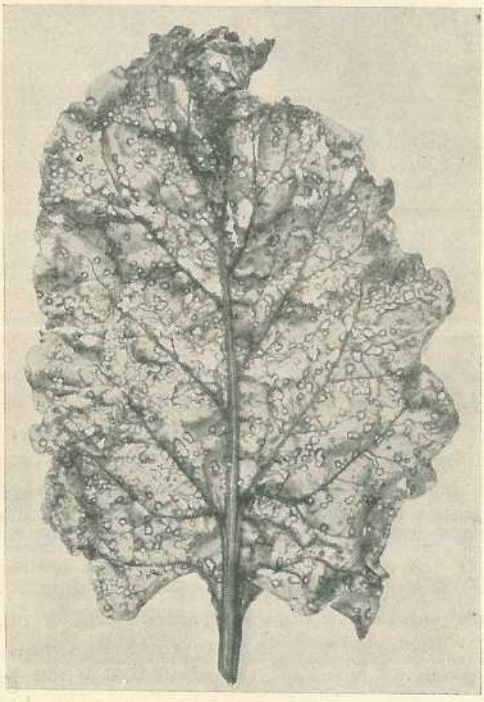


Plate 96.

CERCOSPORA LEAF SPOT OF BEETROOT.—Severely infected leaf.

CERCOSPORA LEAF SPOT OF BEETROOT.

The commonest disease of beetroot in Queensland is Cercospora leaf spot which, on occasions, may cause very heavy losses in locally-grown crops. The fungus* responsible for the disease produces spots, which, while variable in size, are generally about one-eighth of an inch in diameter; these spots have a purple border and an ash-grey centre, and may occur in great numbers on the leaves. Occasionally, larger spots—up to seven-sixteenths of an inch at their greatest diameter—are present; the purple border round such spots is less distinct than in the smaller ones. Clumps of spores are produced by the fungus on the diseased tissue and these are dispersed by wind, rain, and insects. A ragged "shot hole" effect may be produced at a later stage when the centres of the spots drop away and leave irregular holes in the foliage (Plate 96). Entire leaves may be killed, and, as with all leaf diseases of root crops, the development of the root is adversely affected. Disfigurement of the foliage may cause a reduction in the market value of beetroot which is not topped before sale. Cercospora leaf spot may appear at any time from the seedling stage onwards, but it is generally most severe when the plants are approaching maturity.

Control.

If the disease is distributed throughout a crop, spraying with a copper fungicide such as 4-4-40 Bordeaux mixture, 1-10 home-made cuprous oxide, or their commercial equivalents, is recommended. Applications should be made at ten to fourteen day intervals, particularly during wet, humid weather. As the disease may be carried over to a subsequent crop on diseased leaf material, field sanitation is important and discarded tops should be burned and the land ploughed deeply in order to bury infected material. When the disease has appeared in a severe form, it may be necessary to grow other crops for three years before planting beetroot again.

BLACK LEG OF TURNIP.

Black leg of turnip is caused by a fungus† which infects the plant at any stage of growth, the attack occurring in the region of the crown where a dark, sunken canker is formed. On the surface of this depressed area numerous black dots, which contain the spores of the fungus, may be observed. This disease ultimately destroys the root.

Control.

The fungus causing black leg is closely allied to the black leg fungus of cabbage and cauliflower and control measures are similar for both diseases. If seed has not been saved from a previous disease-free crop, or if the origin of the seed is unknown, disinfection of the seed by hot-water treatment should be employed. The treatment requires that the seed be tied loosely in a cheese-cloth bag and immersed for 15 minutes in water held at 122 deg. Fahr. It is then removed and dipped in cool water, dried in the shade, and sown as soon as possible. When turnips, cabbages, and cauliflowers are grown they should be included in a crop rotation in which at least three years elapse between plantings of the same or related crops. All plant debris remaining in the field after a diseased crop has been harvested should be collected and burned.

* *Cercospora beticola.* † *Phoma* sp.

WHITE RUST OF TURNIP.

The white rust fungus* attacks turnip, radish, and other plants, forming numerous prominent, blister-like, white pustules on the leaf and stem. When these pustules rupture, a whitish dust composed of spores of the fungus is liberated. These spores may be scattered by rain or during irrigation, or they may be carried by insects to neighbouring plants where, in the presence of moisture, they germinate and enter the breathing pores of the leaf to cause further infection. This disease is only of minor importance in Queensland.

Control.

Measures for the control of white rust of turnip are not required unless considerable infection has occurred in previous crops on the same land. Under such circumstances a worthwhile precaution is to apply a copper spray such as 4-4-40 Bordeaux mixture, 1-10 home-made cuprous oxide mixture, or their commercial equivalents, at ten to fourteen day intervals. As an additional precaution against infection, old diseased tops should be collected and burned in order to reduce the amount of spore material remaining in the field when the crop has been harvested.

* *Albugo candida.*

Plate 97.

A PEANUT CROP, KINGAROY DISTRICT.

Correct Methods in Lamb Marking.

G. R. MOULE, Veterinary Officer, Sheep and Wool Branch.

CRITICAL examination of marking methods and investigations into mortalities of lambs associated with the marking operation have shown that many graziers do not realise the great importance of using correct methods in this necessary procedure. This article deals mainly with the all-important docking of the tail. In a later article the prevention of the disease most commonly associated with lamb marking will be discussed.

General Notes on Marking.

The actual application of the earmarks does not call for very much comment and consequently the following remarks refer to the docking of the lamb's tail and to the castration of males.

Choice of Yards.—With the establishment of smaller properties, marking is usually carried out in permanent yards. Often the shearing shed yards are used for the drafting and holding of the sheep. Some managers insist on using temporary sheep yards erected as the occasion demands.

Sterilization of the Instruments.—Unfortunately, this very important phase of the work is often neglected under station conditions. All instruments used for the marking procedure should be carefully sterilized by immersing them in boiling water for about half an hour before the commencement of each day's work. As the work proceeds the instruments should be dipped frequently in a reliable disinfectant.

Docking.

The site at which to dock the tail.—Most practical men like to think they cut the tail through a joint rather than sever one of the small bones of the tail. Observations made in many lamb marking camps indicate that very few operators "strike the joint" in more than about 30 per cent. of tails. Recent research work carried out in Queensland by the Council for Scientific and Industrial Research has shown that, although cutting through a joint makes the operation easier, it is unimportant from the point of view of the rapidity with which the tailing wounds heal.

Covering the stump of the docked tail.—One of the most important practical points is to cut the skin on the underside of the tail longer than that on the upper or woolly surface. Such a practice draws the skin from the under surface round over the end of the stump, and the scar develops towards the back of the tail (Plate 98). In this way the bare unwoolled skin from the underside of the tail grows over the cut end and the woolly surface is not brought opposite the anus and vulva, where it could come in contact with moisture, which would eventually lead to tail strike.

Plate 98.
SHOWING THE BARE, UNWOOLLED SKIN FROM THE UNDERSIDE OF THE TAIL HEALED TO COVER THE STUMP.

The length of the tail.—Recent investigations carried out by Council for Scientific and Industrial Research have shown that the length at which the lamb's tail is cut is of paramount importance for two reasons:—

(i.) The rapidity with which the wounds heal.

(ii.) The subsequent protection of the sheep against crutch strike.

If the tail of the average lamb is cut so that it is just long enough to come down to cover the wool-less skin around the vulva and anus, i.e., to cover the "bare area," it will be cut at the optimum length from both points of view.

The docking wounds on tail stumps cut shorter than this (Plate 99) are readily soiled with excreta and healing is delayed as the result of the consequent infection, while tails cut at the recommended length heal most rapidly and they also give the maximum protection from fly strike, especially if combined with the Mules operation, for the rest of the sheep's life. Tails cut longer than is recommended will be a definite source of danger from both "dagginess" and tail strike.

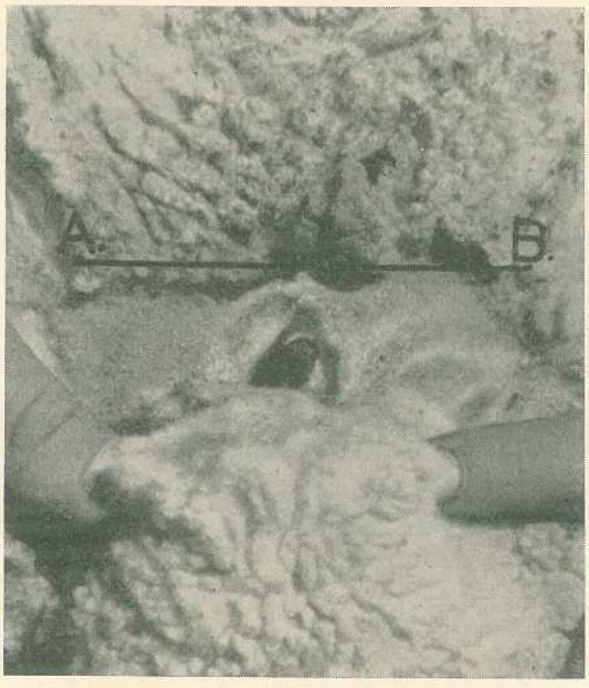


Plate 99.

SHOWING A TAIL CUT TOO SHORT.—The correct length is indicated by the line AB. (Note the stretched bare area resulting from the Mules operation. Length of AB, 4 inches).

The operation of docking (Plate 100).—One easy way to get the end result described above is to perform the operation as follows:—

(1) Hold the tail in the left hand and decide on the correct length at which it should be cut. Place the knife blade flat on the under surface of the tail and a little further down towards the tip.

(2) Press the knife on to the tail and move it up towards the lamb's body until the point where the tail is to be severed is reached. In this way the skin is puckered behind the knife.

(3) Bend the tail over the knife blade by moving the left hand in towards the scrotum.

(4) Cut the tail, directing the knife towards the operator's abdomen.

Take care to pivot the right elbow on the right hip-bone during the cutting operation. This will remove any possibility of the operator stabbing himself.

Plate 100.

SHOWING THE METHOD OF PERFORMING THE DOCKING OPERATION.—Note the tail held in the left hand, which is pressed down into the scrotum, and the right elbow pivoted on the right hip. (The tail of this sheep has been cut too long).

Castration.

The castration of wether lambs is a well-known procedure, and calls for little comment. Greatest care is necessary with regard to the sterilization of the instruments, as the scrotum forms an ideal place for the entrance of germs which can cause heavy mortality after marking.

Many graziers like to cut the tip only of the scrotum or purse when they are castrating lambs as they consider a better "cod fat" develops and this is a useful indication when selling fat sheep. However, it should be borne in mind that the bleeding associated with the drawing of the testicles is often considerable and the incision in the scrotum should be large enough to allow complete drainage from the purse.

BENDING A PIPE.

It is known that to bend a pipe successfully is not as easy to do as to bend a solid rod. It has a tendency to cave in or bend flat, even if it is hot. To prevent this, fill and block the pipe hard with sand and heat red hot. Then the pipe will bend nicely and round in the place, and to the shape required. When cool shake out the sand from the pipe.

Merino Flock Management in Western Queensland.

C. J. F. SWINBURNE, Adviser in Sheep and Wool.

IT is difficult to generalize about merino flock management in Western Queensland, as there are several different environments; for instance, the Central Highlands of the Clermont, Emerald, Springsure belt differ markedly from the so-called "desert" country of the Jericho, Alpha type, which is different again from the "open downs" which extend from the Nive River north to Cloncurry. In the course of the past six years, information has been collected from pastoralists in the West and the data have been reviewed and the methods which have proved successful in actual practice over a period of years are outlined in this short paper.

Joining.

Lamb marking percentages are not good when the average of all breeding flocks is considered. Wartime shortage of station labour for the maintenance and extension of improvements and the increase of predatory birds and animals—eagle hawks, foxes, and dingoes—probably have a bearing on the figures obtained at present, but the actual management of the sheep at joining time is of paramount importance. About six weeks before joining, the rams should be put on a "green pick" if this is available, and it is advisable to crutch, ring and wig the animals at this time. It is important to keep rams free of fly strike prior to joining, as the fever associated with strike is quite sufficient to cause temporary infertility of the sires.

It has been shown recently that arsenic can be absorbed from unbroken skin and that when this happens temporary infertility of rams may result. Accordingly, it is not advisable to jet or dip rams in arsenical preparations for at least two months prior to joining. Before the rams are put with the ewes they should be examined carefully for any signs of organic disorders or injury, and it is advisable to "trim up" any of the sheep's feet which require attention. Particular care should be exercised in examining the old rams.

On the Central Highlands, where intestinal parasites are prevalent, it is advisable to drench the rams when they are put on the green pick before mating. Phenothiazine is undoubtedly the most efficient drug to use against the three common species of worms in Queensland.

The usual practice is to join 2½ per cent. of rams and it is advisable to put 1½ per cent. for the first month, and then add the remainder, keeping the older rams till last. If the distances to be travelled are great, it is preferable not to drive the rams to the paddock containing the ewes, but, if practicable, carry them by motor truck.

Most ewes are fertile, but recent studies indicate that the period of the year when maximum fertility might be expected varies a little under the different Queensland conditions. Naturally, the joining time should be governed to a great extent by the seasonal conditions, but it is strongly advised to endeavour to lamb "in season," whenever possible. By "in season" is meant the natural lambing season of the ewes if the same were allowed to run with them all the year round. Observant stock men have noted it is difficult to keep rams in their paddock during

late April, May, and early June, and this usually corresponds with the optimum time to mate from the point of view of the frequency of heat among the ewe flock. This means a spring lambing, and where seasonal conditions are suitable it is a practice well worth considering. Factors peculiar to certain localities should, however, be considered before a decision is reached. For example, in the North-West the wet season, which is usually assured, commences early in the calendar year and April, May, or June joining means that the lambs are dropped on dry feed, and with the approaching summer heat in an area where there is little shade, and long distances to be travelled to water, their chance of survival is jeopardised.

On the Central Highlands consideration has to be given to the incidence of the white spear grass, and obviously lambing should be planned for a time when the seed is not falling. Another complication in this district is the occurrence of grasshopper plagues. These usually occur after the first storms, and as the insects cause great damage to the pastures it is possible to have a virtual drought after good grass-growing rain.

A useful wrinkle to remember during the joining period is to make sure the rams and ewes are constantly brought into close contact with one another. When riding through a mating paddock it is easy to gather up a mob of ewes and drive then along quietly to another mob, and then leave them. If this is repeated with every mob picked up in the paddock the practice has more or less the same effect as yarding of the ewes and rams at night, with the added advantage that the wool is not damaged by dust.

Care of the Pregnant Ewe.

Care should be exercised at all times in the handling of the ewes after joining, and before lambing. Unnecessary yarding and drafting of the ewes should be avoided, but if the feed is "going off" towards lambing time it is advisable to change the ewes over to a fresh paddock, if practicable, about a month before they commence lambing. Although the fresh paddock may not appear to be better off for feed, provided it has been spelled for a while, the ewes will find fresh food, and in this way "twin lamb disease" (pregnancy toxaemia) may be prevented. It is necessary to protect the ewe against fly strike during the lambing period. The basis of all fly prevention work should be the Mules operation and the correct tail length, but, in addition, it may be thought wise to crutch the ewes before lambing or they may be treated with one of the usual arsenical preparations by jetting, "spretter" jetting, or tip dipping.

Properties located in worm infested areas would be well advised to drench their ewes prior to lambing, and, where possible, the ewes should be moved into a "clean" paddock—i.e., one which has been spelled for a month or so—immediately after drenching for lambing. This practice minimizes the infestation with worms of the very young lambs immediately they commence to pick grass.

Lambing.

Observations made in the Central-West have indicated that there are heavy and fairly constant losses between lambing and marking, and the management of the flock at lambing time should aim at keeping these losses down to a minimum. It is important whenever possible to

lamb the ewes in small well-watered, shaded paddocks. This reduces the distance the lambs have to walk with the ewes to water, decreases un-mothering, and minimizes losses from actual heat prostration.

Dingoes, foxes, and eagle hawks increased considerably during the war years, but some measure of protection can be obtained by the regular poisoning of all carcases which are seen, and by an active policy of bait distribution. The Maltese Cross trap built on a dog-netting fence is excellent for catching dingoes and foxes, while rabbit traps, baited and set on top of posts or stumps near a carcase, may catch a few eagles.

Lamb Marking.

Lamb marking is an important operation and should be done carefully. In order to minimize blow fly strike, both at marking time and in the sheep's later life, it is necessary to pay considerable attention to the length at which the lamb's tail is cut. The most effective tail length is that which leaves sufficient stump to come down and cover the bare unwoolled skin surrounding the urino-genital opening. The wounds on tails cut at this length are not so subject to soiling from the droppings and subsequent infection, and accordingly heal quicker, and are not attractive to blow flies. In addition, this slightly longer tail confers on the sheep a well-established degree of protection from fly strike for the rest of its life.

Temporary yards, or alternatively established yards, which are not used very often, should be used for handling the sheep at marking time, and the greatest care should be taken to keep the instruments clean. Often it is quite unnecessary to use any lamb marking dressing, but if marking has to be done when the flies are bad a 10 per cent. citronella dressing is a suitable repellant. In applying the dressing it is important that it should be applied only to the wool around the wounds. No useful purpose can come from applying the dressing to the wounds.

When performing the marking operation, it is important not to un-mother the lambs. It is preferable to handle the ewes in small lots, and in this way the lambs are out with their mothers in ample time for mothering before nightfall. The un-mothering of lambs can be an important source of loss, particularly when seasonal conditions are difficult, and the country is open. It is advisable when marking the lambs from the two youngest age groups among the breeding ewes to "wet and dry draft" the ewes. All ewes which have lambed should receive a special earmark, and any ewe which fails to reproduce at least on one of two successive years should be culled.

Weaning.

The time for weaning depends much on the season. If the weaners cannot be run in the paddock in which they were weaned, it is advisable to put them on to the water when they are taken to their new pasture. Should the paddock be a scrubby one, it is often advisable to run a few old ewes and wethers with them.

Shearing is often done at weaning time, and if not done then it is often advisable to crutch the young sheep while they are "in hand." This is a suitable period in the sheep's life to perform the Mules operation, as the animals are light to lift into the cradles at that age, and the earlier they are treated the earlier they are protected against fly strike.

Buttermaking.

J. D. W. OGILVIE and E. B. RICE, Division of Dairying.

BUTTERMAKING is a scientific operation and buttermakers are required to possess skill and ability, as well as practical and scientific knowledge of the buttermaking process. In Queensland, every person in charge of buttermaking is required to qualify by examination, both theoretical and practical, before a certificate of competency is issued.

Standardizing the Cream.

In Queensland, cream containing 34 per cent. butter-fat is usually desirable for churning, as cream of this richness gives maximum concussion in the churn. The average test of the mixed supplies is from 38 per cent. to 40 per cent. During the neutralization* of the cream, the quantity of neutralizing solution required reduces the test and, if necessary, additional water may be added to bring it to the desired fat percentage. However, in any factory using a vacreator, allowance should be made for the dilution of the cream by condensation of steam.

To ascertain the amount of water required, it is necessary to test a sample from the holding vat, for which the following formula may be useful:—

> Difference between the actual test and the test required multiplied by amount of cream in the vat and divided by the test required.

Example.

> Standardize 450 gallons of cream from a 40-per cent. test to a 34-per cent. test:—

$$\frac{(40 - 34) \times 450}{34} = \frac{6 \times 450}{34}$$

$= 79\frac{7}{17}$ gallons ($79\frac{1}{2}$ gallons for practical purposes).

* Separate bulletins on testing, grading, neutralizing and pasteurizing of cream at a butter factory preliminary to the actual buttermaking process are obtainable from the Department of Agriculture and Stock, Brisbane.

Standardizing of cream assists in controlling and obtaining uniformity in butter composition. By maintaining a standard fat test of cream from day to day, accurate neutralization, efficient pasteurization and correct churning, breakwater and washwater temperatures, the moisture and salt content of butter is more easily controlled; thus the manufacture of butter of uniform composition and good body and texture is facilitated.

Straining of Cream.

The cream should be strained into the churn. This is best done by inserting in the churn door opening a strainer with fine perforations. These strainers may be obtained from any factory supply house. The straining breaks up and keeps out of the churn particles of curd which might otherwise be incorporated in the butter and give rise to white specks and other irregularities in colour. The proper straining of the cream also eliminates the possibility of churning into the butter insoluble foreign matter which may have accidentally gained access to the cream.

Preparing the Churn.

The churn is prepared by cleansing and near sterilizing with boiling water and then cooling with very cold water. This process cleanses the churn and prevents the butter from adhering to the inside. Modern churns are so arranged as to permit churning, washing, salting, and working without removing the butter from the churn. This style of churn, because of its economic worth, is now being operated in practically all factories in Queensland. It keeps flies and dust away from the butter, and eliminates the handling of butter during the salting and working process.

Churnability of Cream.

By churning is meant the agitation of cream to such an extent as to bring the fat globules together into masses of butter of such size as to enable the maker to separate them from the butter milk.

For churning, cream is conditioned by a number of factors, such as—

1. Churning temperature.
2. Richness of cream.
3. Acidity of cream.
4. Amount of cream in churn.
5. Nature of agitation.
6. Time cream is held at churning temperature.
7. Breed of cows.
8. Season of year.
9. Stage of lactation of cows.

Churning Temperature.

This is one of the most influential factors determining churnability. The melting point of the fats is the governing factor in deciding the correct churning temperature. With softer fats, a lower temperature is called for, and *vice versa*.

The melting point of the fats depend on:—

(*a*) *Season of Year.*—In the spring, fresh, lush pastures cause milk fat to contain a larger proportion of the softer (lower melting point) fats. As the pastures dry off in autumn and winter, the harder (higher melting point) fats predominate.

(*b*) *Stage of Lactation.*—Cows early in their lactation period give milk which contains a higher proportion of soft fats and the globules also are larger. As the lactation period advances, the fats become harder and the fat globules smaller.

(*c*) *Kind of Food Fed to the Cows.*—The influence of the change in succulence of pasture grasses is referred to in (*a*). Dry, hard foods, such as hay and chaff, will produce hard fats. Succulent foods and most concentrates, such as bran and linseed meal, tend to produce soft fats. Cottonseed meal, on the other hand, causes the milk fats to have a higher percentage of hard fats.

(*d*) *Breed of Cow.*—Breeds of dairy cattle, the milk of which normally contains large fat globules, such as Jerseys and Guernseys, produce milk which also contains a higher proportion of softer fats. Conversely, breeds which yield milk containing chiefly small fat globules are noted for a higher proportion of harder fats. Cream which contains large fat globules also churns more rapidly.

(*e*) *Air Temperature.*—Air temperature in the making room also influences the churning temperature. In summer, a lower churning temperature is required so that the cream does not warm too much in the churn, resulting in the butter becoming greasy during working and causing difficulty in packing and finishing. With small churnings in hot weather, it is desirable to churn at a slightly lower temperature than normal.

In Queensland, churning temperatures range from 42-50 degrees Fahr. during spring and summer and 46-52 degrees Fahr. during winter. Too high a temperature is disastrous and should be avoided. It causes the cream to churn too quickly and in soft lumps (instead of in granular form), in which condition it refuses to drain sufficiently and there is risk of high moisture in the finished butter. It causes a greasy texture, incorporation of too much buttermilk, and is detrimental to the quality of the butter generally. Buttermilk contains sugar, curd, and water, which when present together in butter are likely to sour and in other ways deteriorate the butter. Curd and sugar should be excluded from the butter as much as possible, in order to eliminate food for bacteria which may be present. An excess of curd also is favourable for the formation of mottle. Too high a churning temperature also causes serious loss of fat in the buttermilk.

Too low a temperature also is undesirable, although it is better to have the temperature a little low rather than too high. Difficult churning is likely to occur with too low a temperature, as cream at a low temperature becomes too viscous or sticky. On revolving the churn such cream, if it is very thick, will adhere to the inside of the churn and rotate with it without agitating. Consequently, the churning is incomplete, causing loss of butterfat in the buttermilk. Too low a

temperature also brings the butter in such a firm condition that it takes the salt slowly, it is difficult to work, too much water is lost during working (which decreases the over-run), and it does not improve the quality of the butter.

Richness of Cream.

Rich cream churns more readily than thin cream, providing it is not rich enough to be so viscous as to cause it to adhere to the inside of the churn and thus escape being agitated. Rich cream produces less buttermilk, consequently less butterfat is lost in the buttermilk and the over-run tends to increase. Cream excessively low in butterfat prolongs the churning process. If churned at too low a temperature, the butter granules when the butter breaks are very small and much additional churning is required to cause them to unite to the desired size. This prolonged concussion yields very compact, round granules with smooth surfaces and tends to produce butter with a low moisture content. For best results cream should be standardized as described to about 34 per cent. butterfat before churning.

Acidity of Cream.

In Australia, and particularly in Queensland, where farm separation is universal, almost every individual supply of cream to the factory is at different stages of ripeness and the average acidity is too high for churning butter intended for storage. It thus becomes necessary to reduce the acidity to a low point, usually from ·05 to ·12 per cent. This process is termed neutralization and is carried out with the use of commercial neutralizers—sodium bicarbonate, cream acidity standardizer, Crescent cream neutralizer, and calcium hydrate—the most general in use being bicarbonate of soda and cream acidity standardizer.

The Australian buttermaker cannot afford to take the risk of producing butter with a high lactic acid flavour, as such butter deteriorates if held for long periods in cold storage. In Great Britain and on the Continent, where butter is used when comparatively fresh, a noticeable lactic acid flavour may be permitted and is appreciated by many consumers. Cream, the viscosity of which has been reduced by the formation of lactic acid, churns more readily than sweet cream. Within the range of acidity to which cream is neutralized in Australia—·05 to ·12 per cent.—there is no appreciable influence on the churnability of the cream.

Amount of Cream in Churn.

When the churn is about one-third full, the greatest degree of agitation is obtained and consequently a quicker churning. If the churn is too full (more than two-thirds of its capacity) maximum agitation is not attained and the churning time may be prolonged. Similarly, if only a small quantity of cream is placed in a large churn there is a tendency for it to escape proper agitation. It is safe to say if it were possible to maintain all conditions alike, especially as to temperature and degree of churning, there would be little difference in the moisture content of butter made from churnings of different sizes.

Nature of Agitation.

The agitation of the cream in the churn is governed by—

(*a*) Size and type of churn;

(*b*) Number of revolutions of churn per minute;

(*c*) Amount of cream in churn.

The large modern factory churns give more efficient control of body, texture, and composition, reduce fat losses in the buttermilk, churn more rapidly and involve less work than the small churns fitted with an internal agitator which were used in the days of farm butter making. Every churn should be driven at the prescribed number of revolutions per minute for which it was designed. If the churn revolves too slowly, maximum concussion is not obtained and the churning is prolonged; while a churn driven at too high a speed causes the cream to rotate with the churn instead of being subjected to proper agitation.

Time the Cream is Held at Churning Temperature.

Cream is a poor conductor and so should be left overnight after pasteurization to allow complete cooling and firming. If churned too soon after pasteurization, the butter will be soft and the body and texture will suffer. If it is necessary to churn the same day as the cream is pasteurized, it should be cooled to a temperature some degrees below the normal churning temperature and held for at least three hours before churning. It also is advisable to use lower temperatures for break and wash waters.

Breed of Cow, Season of Year, and Stage of Lactation.

These three factors may be considered together, for they each influence the size of the fat globules which, in turn, affect the churnability of cream. Cream in which large fat globules predominate churns more readily than cream in which small fat globules are the more numerous. The effect of each of these factors on the size of the fat globules has already been mentioned.

Churning.

When the cream is in the churn it should be revolved in top gear. After a few revolutions, the vent holes are opened to allow the escape of gasses formed in the churn, but in the more modern types of churns provision is made for any gasses to escape by means of a simple device which automatically releases the gas while the churn is revolving.

The churn is revolved until a "break" shows on the glass, which occurs about 30 to 40 minutes after starting. The time of the "break" is taken when a clean "break" has shown on the glass for at least three consecutive revolutions. The churn is then stopped and about 5 per cent. of break-water 5 to 8 degrees below churning temperature is added. The use of break-water serves the following purposes:—

(*a*) It retards the development of the larger fat globules, and gives the smaller fat globules a chance to coalesce.

(*b*) It assists to keep the temperature down in order to obtain a firm grain.

(*c*) It reduces the viscosity of the cream.

If the cream was standardized in the way described previously there may not be any necessity for adding break-water. The churn is then revolved again until the buttermilk is separated from the fat and the size of the grain thus formed is about the size of or slightly smaller than wheat grain.

The churning of the grain to the correct size is most important. By means of a small grain of correct firmness and well-regulated temperature, the moisture content and body and texture of the butter can be controlled. Under-churning causes excessive loss of fat in the buttermilk, through the escape of unchurned fat globules. If the temperature was too low it may also have caused a short, crumbly textured butter. Over-churning results in the retention of an excessive quantity of buttermilk in the butter, thus jeopardising keeping quality, the butter may have a weak body and texture and, if the churning temperature was high, contain excessive moisture.

Why Butter Breaks.

As the fat globules aggregate in the thickened cream and become larger in size, a point is reached where their surfaces become so small in proportion to their cubic contents that the fat-in-skim milk emulsion can no longer be sustained. The skim milk (now called buttermilk) in excess of the portion that is incorporated in or adheres to the surface of the butter granules, recedes and "wheys off," the butter granules separate out, the emulsion "breaks" and butter "comes." This point is reached after most of the butter granules have outgrown their original microscopic size and have become large enough to be visible to the naked eye. With the "coming" of the butter, the emulsion changes from fat-in-skim milk emulsion, as represented by the cream, to a buttermilk-in-fat emulsion, as represented by the butter.

When to Stop Churning.

Under normal conditions, the churning is completed and the churn is stopped when the butter has gathered in globules the size of wheat grains. While the size of the granules is only one of the indications of the completeness of the churning process and while it is not necessarily an infallibly sure sign, it furnishes the most practical index for the buttermaker to tell when to stop the churn. When the butter first breaks, the butter granules formed are very small and the buttermilk has a rich creamy opaque appearance. From this point onwards, under normal conditions, the formation of additional butter granules, the coalescence of the small granules into larger ones and the completion of the churning take place rapidly. When the churning is complete, the buttermilk should have lost its creamy consistency, and should have a thin, bluish, watery appearance, be free from butter, and the butter should be raised above the buttermilk a considerable distance. The buttermilk is then drawn off through a fine strainer which catches any butter granules which escape from the churns.

Wash Water and Washing the Butter.

The objects of adding wash water are:—

(*a*) To wash the remnants of buttermilk away and thus improve the keeping quality;

(*b*) To firm the grain to ensure an even incorporation of the moisture and salt during working.

An ample supply of pure water, at the correct temperature, free from excessive organic and mineral matter and undesirable micro-organisms, should be available for washing butter after the buttermilk has been drawn off. An impure water and water at too high a temperature are detrimental to the keeping quality of the butter. Impure water should be treated according to recommendations of the Dairy Research Laboratory. As soon as the buttermilk is all drawn off, the butter is washed by water at about 8 degrees below churning temperature. Only a small amount is used for the first washing and this is sprayed over the surface of the butter and allowed to pass away with the buttermilk. As soon as the buttermilk and water show clearly from the tap, the tap is turned off and enough wash water is added to float the butter well up in the churn. The churn is then turned for about half a dozen revolutions to ensure the even chilling of the grain. If the grain is soft, it is allowed to firm in the wash water for from 10 to 15 minutes. The churn could be revolved in low gear during this time, which should ensure an even firming of the grain.

Salting of Butter.

The functions of salting are:—

(*a*) It imparts a desirable flavour to butter;

(*b*) It assists in the expulsion of moisture from the butter granules;

(*c*) It improves the keeping quality;

(*d*) It increases the over-run; and

(*e*) It slightly deepens the colour.

The proper amount of salt to use depends on the market requirements. For export to the United Kingdom, the Commonwealth Department of Commerce and Agriculture desires a salt content of 1·25 per cent.; while for home consumption the Queensland Butter Board desires a salt content of 1·5 per cent. The salt should be well distributed over the surface of the butter granules, at the rate of approximately one pound (the actual weight depending on the particular market for which the butter is intended) to each box of butter contained in the churn; a little water may be sprayed on top of this to assist in dissolving the salt. To get the butter salted uniformly from day to day is very important. A variation in salt content can be detected very easily by the consumer, while a variation in any one of the other constituents cannot be so readily noticed. It is essential to know the approximate weight of butter in the churn and to weigh the salt before adding it. The approximate weight of butter in the churn may be ascertained by having taken previously a sample of the cream from the vats for testing for butter-fat, and by measuring the cream in the churn by graduated rod. By this means, the number of gallons of cream let into the churn is known to the operator.

Working the Butter.

The objects of working the butter are:—

(*a*) To incorporate the salt evenly in the butter. (The number of revolutions necessary for this will be dependent on the condition of the butter. No fixed time can be laid down for the satisfactory working of butter; it must be left to the care, skill and intellect of the buttermaker);

(*b*) To disperse the moisture as minute droplets and expel any free moisture;

(*c*) To bring the butter granules into a compact form having the desired body and texture.

After adding and damping down the salt as explained previously, the doors and taps of the churn are tightly closed and the churn revolved in low gear with the rollers in operation for approximately four and a-half minutes, by which time the butter will be in a fairly compact form. The churn is then stopped and the doors loosened or taps opened, as the case may be, in order to drain off surplus brine. Enough (one or two buckets) brine is saved for addition to the churn, if necessary, later. After draining, the churn is again revolved and the working continued (with doors still loosened or taps open) for approximately eight minutes and again stopped, by which time there should be very little free moisture left in the churn. A sample is then taken from different parts of the churn for a trial test to determine the percentage of moisture in the butter. Care should be taken in drawing the sample, as free moisture adhering to the sample would give an incorrect reading. If the result of the trial test reveals a moisture test of 15·6 per cent. the working should be continued for about five minutes and the butter withdrawn from the churn; but if the trial test reveals a moisture content less than 15·6 per cent. it would be necessary to add some water, or preferably the brine solution (saved during the early draining). The following formula will be useful in determining the amount of water or brine solution to add to the butter to bring it up to the percentage aimed at. (In this formula an allowance should be made for any free moisture which may be adhering to the inside of the churn, which usually runs about ·2 per cent.)

Should the trial test reveal a reading of, say, 15 per cent. and it is desired to increase this to 15.8 per cent. the difference ·8 per cent. less ·2 per cent. is multiplied by the number of pounds of butter in the churn and divided by 100.

For example:—

1,120 lb. of butter in churn—

$$\text{lb. of water or brine to add to churn} = \frac{1120 \times \cdot 6}{100} = 6{\cdot}72$$

Before adding the water, the taps should be closed. The churn lid should be closed down tightly and the butter worked for three to five minutes. The butter will then have incorporated all the added water, and will have reached the desired moisture content, body, texture, and condition. The churn should then be stopped and the butter withdrawn into a barrow. The butter should have a firm waxy body and close texture.

Moisture Content.

The maximum percentage of moisture permitted for Australian and British markets is 16 per cent. To be on the safe side, butter-makers are advised to work the butter so that it contains no more than 15·8 per cent. moisture. Working the butter too dry is not economical and lessens the over-run.

Packing and Packages.

Butter boxes should be made from clean well-seasoned timber, free from taint, sap, mould and knots. The boxes should be properly lined with the best parchment paper procurable and in such a way as to prevent any part of the butter coming into contact with the wood. The

butter should be firmly packed in boxes, avoiding open spaces, for when it arrives at the grading depots it is stripped from the wood and if not firmly packed the sides and bottom of the cubes will show holes and present an unattractive appearance. Besides this, if there are any holes in the butter, the moisture and air will gather there. This gathered brine at times causes a change in colour on the surface of the butter to which the brine has been exposed. The top surface should be neatly levelled and rolled with a honeycombed roller with the brand "Australia" for choice grade butter and with a honeycombed roller, bearing no brand, for butter below choice grade.

For export beyond the Commonwealth, 56 lb. 2 oz. butter must be packed in the box; for domestic use 56 lb. must be packed.

The nailing or wiring down of the boxes should be neatly done, taking care no sharp points are protruding which might cause injury to persons handling the boxes in transit, and that the marking is distinct, uniform, and neatly put on. The boxes should be branded on the left-hand top corner of the branded end of the box with the date number of the vat, number of churning, and the number of boxes in that particular churn—Thus: 2-3-19 over 10-6-5—shows that the butter was made on the 10th June, 1945, and the cream from vat 2 was used for the third churning which comprised 19 boxes.

After nailing down or wiring and marking the full boxes, they should be removed to the cold storage room.

Butter is usually marketed through agents who arrange for grading, fees, harbour dues, and other charges. Export butter boxes of choice grade are stamped with a "Kangaroo," and if below that grade "Approved for Export" stamp, by Commonwealth officers.

Accompanying each consignment an advice card must be sent showing the amount of butter consigned and all churn marks.

Records of the amount of butter made and other particulars must be sent each month to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Standard of Butter.

The Dairy Produce Acts, 1920 *to* 1944, prescribe the following standards for butter:—

Butter-fat—not less than 82 per cent.

Water—not more than 16 per cent.

Salt—not more than 2·5 per cent.

Milk solids-not-fat (curd)—not more than 2·0 per cent.

Quality Characteristics.

Flavour and Aroma.—Choicest Australian butter is characterised by a full, sweet, and nutty flavour, and pronounced butter aroma. Butter of clean, neutral fat flavour is classed as choice grade; any weed, bacterial, chemical or other taint will cause the butter to be lowered in grade, the extent of such de-grading being dependent upon the nature and intensity of the defect.

Body and Texture.—A firm, solid body and waxy closely-knit texture is desirable. These characteristics cannot be accurately defined, hence the use of a scoring system for assessing the quality of butter:—

Points for Determining Grades.

Flavour and aroma	50 points
Texture (including body, grain, and moisture) ..	30 points
Condition (including colour, finish, salting, packing, and package)	20 points

Grades of Butter.

Choice grade	93-100 points
First grade	90-92 points
Second grade	86-89 points
Pastry grade	83-85 points

Butter scoring below 83 points is prohibited from export.

ELECTRICITY ON THE FARM.

The movement for the wider availability of electric light and power in farming districts is growing in Queensland, and it is expected that there will be a considerable extension of rural electrical services after the war.

Queensland, because of its great size and relatively small population, and also because it is so largely a primary producing State, has, of course, special problems in electricity development. A big extension of electrical services is mooted, so that farmers and other country people will be supplied at reasonable rates. The extent to which this development is practicable will depend, no doubt, on how projected schemes for regional planning will work out. There seems to be no real difficulty, apart from the present war limitations, why existing electrical services cannot be combined and carried on under a unified regional control.

Over in the United States, where things can be done in a big way with a big population, there is the Rural Electrification Administration which had its tenth birthday recently. At the usual celebration it was said that in the ten years 2,000,000 farms had been linked up with this national electric service, and this has led to more efficient food production during the war and has drawn a pattern for a better balanced and more prosperous country life when the war is over. Before 1935, the total number of electrified farms in the States was 750,000, so the 2,000,000 increase since is not bad going. More than half of the farm services from the rural electric systems were financed by loans by the administration on a sort of co-operative basis. In addition to farmers, loans are made to public bodies and private utilities.

Because these co-operative rural electric systems are run primarily by and for farmers, they have been able to provide effective local leadership in a nation-wide campaign to foster the use of electricity in farming operations. The results in terms of labour saved and increased production alone make it an economic proposition. A five-year programme for extension of rural electrification after the war has already been outlined. It is estimated that this plan will bring electric light and power to over 3,500,000 more country establishments now unserved and so stimulate a total market for goods and services, including, obviously, domestic electrical equipment, such as refrigerators, cooking appliances, amounting to five and a-half billion dollars.

The Harvesting, Packing and Marketing of Tomatoes.

S. A. TROUT, Assistant Director of Horticulture.

THE artificial values for fruit and vegetables brought about by high prices and availability of markets have resulted in decreased marketing standards, as inferior grades have been able to compete on equal terms with a high class article. However, with the return of normal conditions, greater attention will have to be given to harvesting and packing methods if a grower is to obtain a satisfactory return for his produce. The market value of fruit or vegetables depends on condition as judged by freedom from disease and blemish, colour and flavour, uniformity of the material, method of packing and attractiveness of the pack. Sound fruit may lose some of its value by faulty packing methods and a well-packed box of fruit of mixed colours will not find a ready sale in competition with fruit of uniform size and maturity.

Picking Maturity.

The correct stage of maturity at which tomatoes should be picked depends on the distance from the available market; thus fruit harvested in Bowen for sale in Melbourne would have to be picked in a much less mature condition than that harvested in the Redland Bay area for the Brisbane market. However, fruit picked in a very immature condition will not develop full colour or flavour on ripening, while over-mature fruit deteriorates rapidly in eating quality and is subject to mould and other forms of wastage during transport and marketing.

The tomato should not be harvested until it is fully grown, its skin is glossy, the colour is pale green, and the flesh surrounding the seed is deep amber or a deep amber tinged with pink. Care in harvesting is essential to avoid injuries and resultant wastage.

Colour Grading.

In order to obtain packs of uniform maturity the fruit should be graded for colour into green, coloured, and ripe. Fruit of mixed colours is not acceptable to the retailer and must return a lower

price than uniform material. Colour grading in the shed is tedious, but can be largely avoided by harvesting at more frequent intervals. The green class should contain only fruit showing no sign of pink colouration. The coloured class will contain fruit ranging in colour from slight pink to 50 per cent. coloured. The ripe class will contain fruit more than half coloured. Fully coloured fruit should be firm, as soft fruit will not stand the handling inseparable from transport and marketing.

Size Grading.

Good packing depends on accurate grading, but because of their irregular shape it is more difficult to grade tomatoes than other fruits.

The size of a tomato is the length of its diameter from cheek to cheek and not from stem to calyx. An expert packer can readily gauge the size of fruit by eye, but for checking purposes grading rings or a board with holes of various diameter can be used. Grading of round tomatoes can be carried out mechanically with revolving rollers used for grading other fruits, but flat varieties are difficult to grade in this way because the diameter from cheek to cheek is different from that measured from stem to calyx. The operation of grading for colour and size and packing is tedious if carried out on an ordinary single bench, but can be simplified by designing a bench in which the upper portion is divided into a number of compartments for sorting and the lower portion is used for packing.

Packing.

The packing of tomatoes presents difficulties because of the variation in shape, and this has been accentuated by the number of different cases which have been used in the past. Charts have been designed for the long bushel, the long half-bushel, the half standard, the half dump made on the wide system, and the half dump made on the narrow system. For transport and inspection, a standard case is essential, and the half dump made on the narrow system with internal measurements of 18 inches long, $7\frac{1}{8}$ inches wide and $8\frac{3}{8}$ inches deep is recommended.

The tomato is packed on its edge and not on the stem or calyx end. Two kinds of packs are used, viz., square packs with open pockets (Plate 102), and angled packs with closed pockets (Plate 101). The pocket is the space between the fruits and the size of the pocket governs the height of the fruit in the case. The type of pack depends on the size and shape of the fruit, but the angled pack in which the fruit is placed diagonally across the case is generally used. The round type of tomato of $2\frac{1}{4}$ inches, $2\frac{3}{4}$ inches, and 3 inches diameter and some flat types of $2\frac{1}{2}$ inches, $2\frac{3}{4}$ inches, and $3\frac{1}{4}$ inches diameter have to be packed with open pockets; that is, at right angles to the cases. The cases should be lined with white paper to protect the fruit from injuries which are likely to occur if the fruit is in direct contact with the case.

Correct Height.

The upper layer of fruit should be about $\frac{1}{2}$-1 inch above the top of the case to allow for shrinkage which occurs during transport and marketing.

Grade Standards.

The stalks of tomatoes should be removed before packing to avoid injuries through punctures which might otherwise occur when fruits are in contact. Sound and blemished fruit should not be packed in the same case, as this lowers the grade standard. The grade standards for tomatoes under "*The Fruit and Vegetable Acts,* 1927 *to* 1939," are as follows:—

"A" grade shall consist of sound, clean, firm, well-formed, mature fruit, free from blemish, and not sunburnt.

"B" grade shall consist of sound, clean, firm, mature fruit, but subject to skin blemishes as prescribed.

Definition of "Blemishes."

(1) A ring crack which is more than skin deep or extends more than 15 per cent. down the surface of the tomato from the stem.

(2) A radial crack which is more than skin deep or extends more than ½ inch from the stem.

(3) Punctures from insects or other causes which are more than skin deep or affect more than 5 per cent. of the surface of the fruit.

(4) "Cat-face" covering more than 10 per cent. of the surface of the fruit, or not having an unbroken surface, except in the case of tomatoes under 2½ inches, in which case "Cat-face" in any extent is a blemish.

(5) Skin marks other than disease blemishes covering more than 10 per cent. of the surface of the fruit.

(6) Sunburn to the extent of 2½ per cent. of the surface of the fruit.

Stencilling of the Cases.

The cases should be clearly marked with the agent's name and address on one end and the grower's name and address, grade, colour if not green, and size on the other end. The size of a tomato from 2-3 inches should be accurately specified, but sizes below 2 inches should be branded small, and those of 3¼ inches and above, large. The marketing of small and large tomatoes should be avoided if possible, as they are not acceptable to the trade and tend to depress the market. Small tomatoes are usually lacking in flavour and take longer to grade and pack.

EXAMPLES OF STENCILLING CASE ENDS.

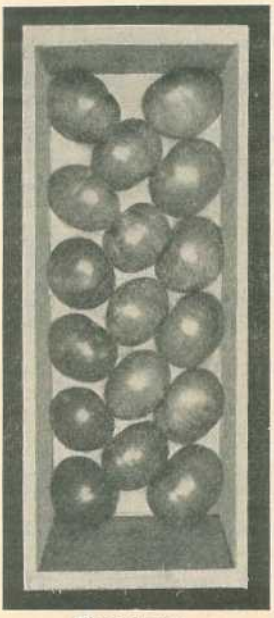
C.O.D.
BRISBANE.

W. SMITH,
REDLAND BAY, Q.
TOMATOES.
A
2¼

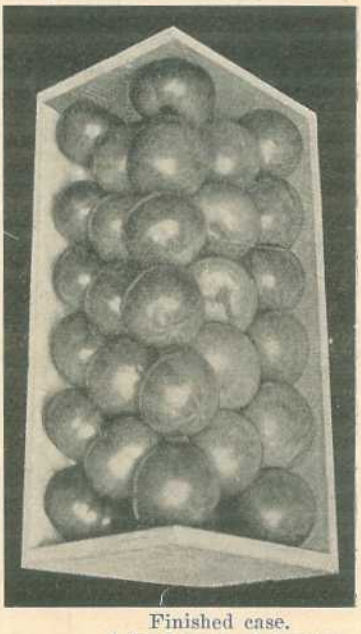
A for choice green;
COL. for coloured;

B for blemished;
RIPE for ripe.

Top. Side.



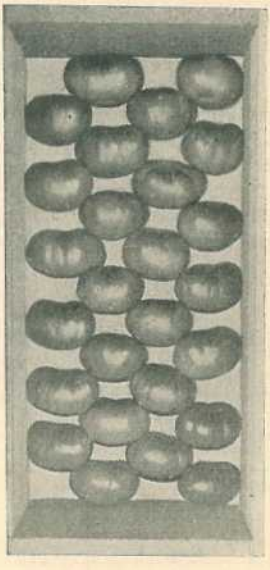
First layer.



Finished case.
6 by 5 layer, 3 layers
count 50.

Plate 101.
Closed Pocket Packing. 2-1 Pack.

Side. Top.



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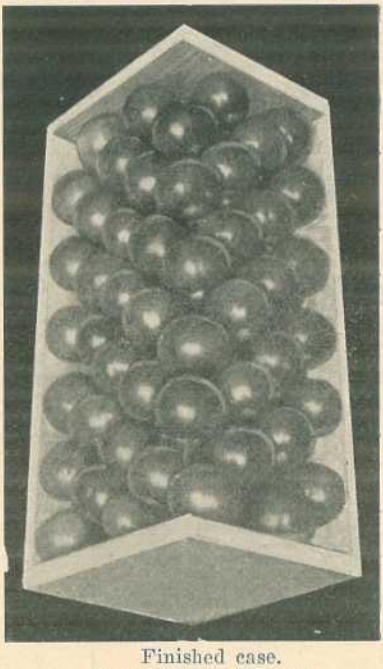


Finished case.
6 by 6 layer, 5 layers
count 120.

Plate 102.
Open Pocket Packing. 2-2 Pack.

TOMATO PACKING CHARTS.

For fruit packed in the half-bushel dump case made on the narrow system. Internal dimensions:—18 inches long by 7⅛ inches wide by 8⅜ inches deep.

CHART 1.—For round-type tomatoes. Closed pocket packing.

Size.	Pack.	Layer.	No. of Layers.	Count.
2 ins.	2 – 2	8 x 8	5	160
	2 – 2	8 x 7	5	150
	2 – 2	7 x 7	5	140
	2 – 2	7 x 6	5	130
2¼ ins.	2 – 1	9 x 8	4	102
2½ ins.	2 – 1	8 x 8	4	96
	2 – 1	8 x 7	4	90
	2 – 1	7 x 7	4	84
4 ins.	2 – 1	6 x 5	3	50
	2 – 1	5 x 5	3	45

CHART 2.—For flat-type tomatoes. Closed pocket packing.

Size.	Pack.	Layer.	No. of Layers.	Count.
2 ins.	3 – 2	9 x 9	4	180
	3 – 2	9 x 8	4	170
2¼ ins.	3 – 2	8 x 8	4	160
	3 – 2	8 x 7	4	150
2½ ins.	3 – 2	7 x 7	4	140
	3 – 2	7 x 6	4	130
2¾ ins.	2 – 2	8 x 8	3	96
	2 – 2	8 x 7	3	90
	2 – 2	7 x 7	3	84
3 ins.	2 – 2	7 x 6	3	78
	2 – 2	6 x 6	3	72
	2 – 1	8 x 7	3	68

CHART 3.—For round-type tomatoes. Open pocket packing.

Size.	Pack.	Layer.	No. of Layers.	Count.
2¼ ins.	2 – 2	6 x 6	5	120
	2 – 2	6 x 5	5	110
2¾ ins.	2 – 1	7 x 6	4	78
	2 – 1	6 x 6	4	72
3 ins.	2 – 1	6 x 5	4	66
	2 – 1	5 x 5	4	60

CHART 4.—For flat-type tomatoes. Open pocket packing.

Size.	Pack.	Layer.	No. of Layers.	Count.
2½ ins.	2 – 2	7 x 7	4	112
	2 – 2	7 x 6	4	104
2¾ ins.	2 – 2	6 x 6	4	96
3¼ ins.	2 – 1	7 x 7	3	63

Plate 103.

The Homestead on Mr. C. Rackemann's Farm, near Crawford, Kingaroy District.

Plate 104.

At Memerambi, looking over Wooroolin, Kingaroy District.

Plate 105.
A NAVY BEAN CROP AT KUMBIA, NEAR KINGAROY.

Plate 106.
A PEANUT PLANTATION (BROWN SPANISH), NEAR KINGAROY.

ANSWERS.

(Selected from the outgoing mail of the Government Botanist.)

Lancewood. Quinine Derry. Red Ash.

W.D.S. (Drillham, Western Line)—

1. Lancewood (*Acacia Shirleyi* or *A. Burrowi*, probably the former, though rather difficult to tell from leaves only). This should be quite a good fodder; as a matter of fact, cattle eat most acacias more or less. They vary a good deal in fibre content, but there is no definite information as to how this tree compares with mulga in that respect.
2. Quinine Berry (*Petalostigma quadriloculare*). This is sometimes known as Crab Apple. Your remark that stock eat it freely is interesting.
3. Red Ash (*Alphitonia excelsa*). Commonly known as Silver-leaf or White-leaf. Stock are particularly fond of this tree or bush. Your remark as to stock leaving it after a short period is also interesting. It is widely spread throughout Queensland from the coast to the interior, and in most places is regarded as an excellent fodder. An experienced Brisbane Valley grazier, however, has informed us that stock eat it when grass is available and seasons are fairly good, but refuse to eat it, at least to any extent, when it is most required—that is, when seasons are dry and grass is very short.

Native Dodder.

T.J.F. (Innisfail)—

The specimen is the Native Dodder (*Cuscuta australis*). This plant is indigenous to Queensland and attacks a number of wild weeds and shrubs. It is frequently found on garden plants and causes considerable destruction. It starts life in the ground, but soon loses all attachment with the soil and lives entirely as a parasite on the host plant. The only means of eradication is to cut the bushes back to where they are free of all dodder, dry and carefully burn the dodder-infested branches. Care should be taken to see that the pest is not allowed to spread. A species of dodder is a very common weed of lucerne fields in Queensland and the Southern States.

Bind Weed.

H.R.Q. (Clarendon)—

The specimen is Bind Weed (*Convolvulus arvensis*). This weed is a very serious pest in the Southern States and some years ago made its appearance on the Darling Downs. Since then it has spread rather slowly in Queensland. It is a most serious weed pest to introduce into cultivation and should be eradicated as far as possible. Forking over the ground and exposing the white roots to the sun, then raking up and burning is helpful, but every little piece left in the ground starts to form a fresh plant. The white underground runners are dependent for food partly on the soil and partly on the green leaves above ground. If the green leaves above ground are destroyed periodically the white underground runners must eventually become exhausted and the plants die. If there is only a small patch, several sprayings of a weak arsenical solution would probably be the best method of eradicating it.

A Clover.

C.A.P. (Mount Morgan)—

The clover specimen bore no flowers or seed pods, but there is little doubt it is the Small Burr Trefoil or Burr Clover (*Medicago minima*). This is the common trefoil on the Darling Downs. In the coastal belt it is mostly replaced by the common trefoil or Burr Clover (*Medicago denticulata*). Both species are very useful winter and spring fodders. They have small yellow flowers succeeded by round burr-like pods, and when dying off pods and stalks are eaten by cattle and sheep and are quite nutritious. Seed should preferably be sown about May.

Rural Topics

Taking the Tickle out of Wool.

During the war, science men in Britain's textile industry have been busy developing new synthetic fibres, possible competitors with wool in textile manufacture. However, a well-known British scientist has said that far from driving the older fibres from the market, they will in many instances be used in combination with the old. And stating a case for wool, this authority says that new knowledge of the structure of fibres is making it possible to eliminate some of the disadvantages of wool in textile manufacture. For example, "tickle" can be taken out of woollen underwear. Softening of the fibres, without any loss of warmth or strength, may well mean that wool will return to feminine favour. Experiments have resulted in many new attractive fashions. Other new processes for the use of wool also are the results of recent research.

Another new material is the result of the deliberate mixture of shrinkable and non-shrinkable wool. Complete control over shrinking has been obtained at last. The same applies to a method for making wool moth-proof. The proceeds depends on the incorporation in wool of a chemical which is a poison to the moth grubs which emerge from eggs in the wool and which have always done so much damage. The chemical does not harm the wool in any way, and it may be that before long moth-balls will become as rare as new golf balls are to-day. A mixture of fibres have produced other interesting new textiles; for example, by mixing wool with new synthetic fibres a material is produced with the appearance and warmth of wool, but costing very much less.

One of the new synthetic fibres, made from peanuts, has proved very effective in a combination with wool and cotton, reducing the cost of woollen garments and making cotton almost as warm as wool.

To the woolgrower these textile developments are very interesting, and they certainly support the case for scientific research in every branch of the sheep-pastoral industry and so assist in the improvement of quality and in the maintenance of wool in its top place in our national economy.

A New Deal for the West.

The movement for a new deal for the West is growing stronger. New proposals for regional organisation in Queensland are under consideration, and that is all to the good. It is recognised that policies cannot be framed for regional planning and for the reorganisation of rural education, health and other services without giving thought to the effect of such policies on local government as a whole. Constructive thought about the principles and whole relation of local administration to the central government is required. It is not enough to recognise that certain public services—electrification, for instance—require for their effective operation administrative areas substantially larger than those of many of the existing local authorities. It is necessary to distinguish clearly the contribution which local support and interest can make to the effectiveness of those services, and to see that proposals for regional organisation are duly co-ordinated and harmonised with one another and with the needs of the situation as a whole. The call is for clear and constructive thinking about the facts as they are, and for the formulation of principles and policy of any "New Deal." More than that, courage is required to make necessary decisions to apply a reasoned policy, whether or not such a policy conflicts with traditional or vested interests. The effectiveness of local government, whether regional or within the boundaries of existing local authorities, clearly depends on the extent to which it can attract the men and women who can give able and unselfish service to the community for the common good of the community. It would be wise, it is suggested, to seek to achieve the proper balance between town and country, secondary industry and agriculture, and between central and local control.

Courage and vision are the first requirements: courage to grapple with whatever private and vested interests obstruct progress; and vision to see the possibilities of progressive local government and regional planning. But with courage should go a readiness to shed old shibboleths and prejudices and all the narrow notions in the

way of effective application of scientific knowledge and technique to the betterment of rural conditions and of the conditions of human life generally. "To be timid, no less than to be weak, is to be miserable."

It may be that the present trend towards effective regional organisation in Australia is because people are concerned about the trend towards over-centralisation of administration. Perhaps, a condition precedent to administrative decentralisation is "mental decentralisation"—that is the getting over of the accepted idea (or superstition) that the modern trend is inevitably towards centralisation, and that the nature of modern industry demands centralisation. Actual facts, however, are against that idea.

A case for decentralisation might be based on these and other points: To ensure a better distribution of population from the national point of view, and especially to retain rural population; the establishment of new industries in country districts as a considered and consistent national policy. Transport facilities—ports, roads, railways, and airways—to be provided in the future might be planned with a view to decentralisation. A rural housing policy to be instituted which would provide for the equipment of farm homes and other country dwellings with all the conveniences of the city—electricity, modern sanitation, water supply, refrigeration, and other amenities, as well as more educational and suitable employment opportunities for the country youngsters coming on.

The Soldier and the Soil.

This is how it is done in America, according to a recent statement from the United States Office of War Information, Sydney (New South Wales).

Soil conservation districts—democratically organised for the administration and maintenance of soil and water conservation measures—are expected to have a strong bearing on the future of returned soldiers who intend to go back to the land.

Under local farmer control, these districts have developed dynamic long-term programmes for conserving soil and water resources. At the same time, district programmes are making it possible for farmers and graziers to obtain bigger yields under conditions compatible with the physical land resources and economic opportunities. District governing bodies pool their practical knowledge and experience with the technical and research information of well-trained soil conservationists.

Since about one-half of the farms and pastoral holdings of the United States are already within soil conservation districts and more districts are steadily being established, many returning soldiers who go directly into farming will find their land within an existing district or one that is soon to be organised. Other ex-servicemen who go into industries will be affected indirectly. For example, many returned soldiers will help to manufacture tractors, graders, and dirt-moving equipment to be needed on an increasing scale, because of expanding soil conservation activities.

Soil conservation district workers will be able to provide information to ex-servicemen on the use and capabilities of all land in the district, including details on soil types, degree of erosion, slopes, and other physical characteristics. District governing bodies have delineated the land into various sub-areas, and will give guidance and advice to returned soldier settlers.

Among other things, the district supervisors will furnish a returned soldier who buys or rents a farm a map showing the land capabilities of each acre, and will make recommendations on its general layout and on its soil and water problems. Technically trained men will also give guidance and help when needed.

Best Site for a Pit Silo.

A high spot should be selected for a pit silo and the pit, if possible, made on the crest of a rise, though this is not essential. What is necessary is good drainage, so that water will not run into the pit. Care should also be exercised to ensure that the site will not be subject to floods. Any red soil is suitable, and sites should be selected on such soil if possible in preference to black soil, which is generally low-lying and likely to crack in dry weather and to admit water after heavy rain.

It is, of course, an advantage to have the pits as near as possible to the crop that is to be made into silage. Consideration should be given to the question of convenience in feeding, but as a rule the nearer the pit is to the crop the better, as it saves expense in filling.

The Future of Wool.

In past years it was the custom in Australia to concentrate on growing wool, not bothering about the manufacturing and selling sides of the wool industry, which was left largely in the hands of interested trades overseas.

Woolgrowers have now decided, very logically, to take a more positive and dynamic interest in all aspects of the wool industry and build up research organisations capable of handling the problems of manufacture as well as of raw wool production. The menace of substitutes for wool has, no doubt, hastened this decision. There are now in Australia two of the world's leading authorities on wool research, and a third is to come. The purpose of the visits of these three authorities is to advise the Australian Government and the Council for Scientific and Industrial Research on the best means of filling the gap in our wool-producing business between woolgrowing and woolweaving.

The success of synthetic wool substitutes in the commercial field is changing the general outlook of the wool industry, especially in respect of the need for scientific research. Research would have the widest aims—to raise wool yield and quality; to improve wool for its present uses; to find new uses for wool; and to develop the profitable use of by-products.

A story of what can be done with wool by-products comes from Bradford—actually from the city corporations' sewage department, of all places. Many wool-scouring plants discharge their suds into Bradford sewers, and the recovery of wool fat from this waste gave spectacular aid to Britain's war effort.

It is said that crude wool grease has qualities as yet unmatched by any other grease or fat combination. From the waste from the Bradford woolscours—actually recovered from the city's sewers—a special lubricating grease was developed from wool grease which proved a remarkable rust preventive. Distillation of wool grease produces stearine, which is combined with lime to form a new lubricant. Wool grease is the basis on which new types of paint are made, and thousands of tons of this paint were used for camouflage. Three thousand tons of axle grease from Bradford's waste helped to keep Britain's trains moving. In 1942-43, Bradford's City Council sold grease and by-products from the former waste woolscour suds to the tune of nearly £250,000. A big proportion of that recovered grease went with the wool from Australian sheep, and which was not scoured before shipment.

That gives some idea of what scientific research can do for the wool industry, and gives point to its change of policy, a change of policy which will be particularly advantageous to Australian sheep men.

Maintaining Fertility of Dairy Land.

Dairy farmers will agree that successful dairying involves not only the proper feeding of the herd, but also the proper feeding of the soil—the regular repayment to the land of the substance taken out of it. The use of animal manure is obviously a cheap method of restoring soil fertility. To treat this manure as a waste product is, of course, contrary to sound farming practice. A New South Wales dairy adviser with a flair for figures has estimated that plant foods to the value of nearly a million pounds a year are taken from the soils of the coastal districts below the Border in the form of meat and milk. In other words, these plant foods pass out of circulation like destroyed pound notes. To replace these lost plant foods, chemical fertilizers worth many thousands of pounds a year are applied. Farmyard manure to the value of £3¼ million, it is estimated, is voided by coastal cattle in New South Wales every year. Relatively, the same thing occurs in the dairy lands of Queensland. And as this manure is not generally utilised systematically it does little to counterbalance the loss of plant foods used up in the production of fodder crops and pastures.

Farmyard manure is not used as much as it should be to restore the soil organic matter, a job which cannot be done directly by chemical fertilizers no matter how liberally applied. The most valuable soil fertility maintaining material on the dairy farm is unquestionably farmyard manure.

ELECTRIC FUSES.

Whether the house is just being wired for the first time or has had an electric system for years, it is well for every adult member of the family to understand what the fuse-box is for and what to do if a fuse blows out. Fuses, or circuit breakers, are the safety valves in the electrical system. Extra fuses of the proper type should be kept on hand in case one blows out.

When a fuse blows out it is usually an indication that there is a short circuit or an overload. Perhaps too many appliances have been connected to one circuit.

Common causes of blown fuses include worn cords, or worn or damaged plugs or appliances. If appliance cords and plugs are always kept in good repair, and appliances are disconnected by pulling on the outleg plug rather than on the cord, blown fuses will rarely occur.

MISTAKES IN MAKING CONCRETE.

Following are some the mistakes often made in the making and in the use of concrete:—

Using ice cold or dirty water.

Disturbing concrete after it has commenced to set.

Allowing mixed batches to remain unused more than half an hour.

Washing with pure cement; always use a portion of clean sand.

Failing to protect new work from too rapid drying.

Failing to tamp thoroughly.

Neglecting to soak old concrete with water before trying to join it to new work.

Failure to keep moulds and forms well oiled to prevent concrete sticking to moulds and wooden forms from swelling.

Trowelling the work too much.

Using a trowel to even the surface; use a float or striker and then allow the water on top to evaporate before finishing with a trowel.

Neglecting to put in joints and divisions to take care of expansion and contraction.

Making the mixture too rich, causing cracks.

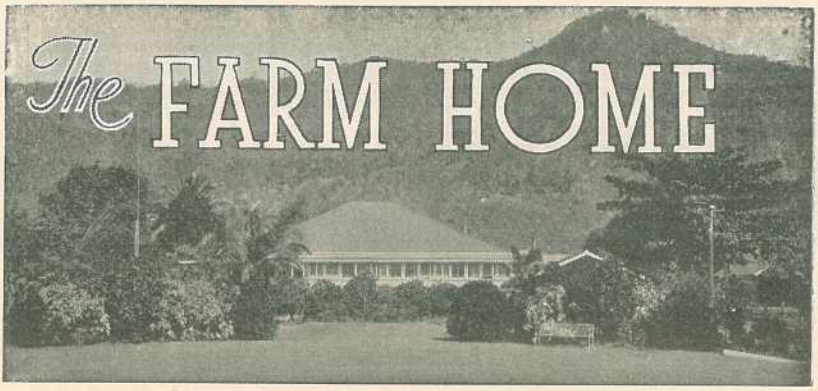
Failure to wet sand, gravel, or stone; this makes the cement stick better.

Neglecting to inspect the ingredients carefully before using them.

Guessing at proportions of materials. They should be measured carefully.

DURABLE WHITEWASH.

Whitewash may be made durable, hard, glossy, and practically waterproof by the addition of salt, alum, and sulphite of zinc. Such a mixture is good for both interior and exterior use. To make it: One bushel (62 lb.) of quicklime is slaked in 12 gallons of hot water. Before using strain this paste through a fine screen. Then another solution is made up of the following:—1 lb. of sulphite of zinc, 1 lb. of alum, 2 lb. of salt, dissolved in 2 gallons of boiling water. These two solutions are then mixed together, and 2 gallons of skimmed milk are added. Also molasses will give the whitewash more penetrating power. Use 1 pint of molasses to 5 gallons of whitewash. Keep the mixture thoroughly stirred while applying.



Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

PARENTS—PLEASE BE GENTLE!

NORMALLY, the tiny child only disobeys through forgetfulness or lack of concentration, or perhaps failure to understand—not wilfully. He loves his parents with the same fidelity as a dog loves his master. Why then must the "big stick" come so prominently into the picture? Or, on the other hand, why are so many children out of control and spoilt?

May it not be that parents unknowingly set a child on the wrong path, firstly by teaching him that nothing they say has any real meaning, as, for instance, when the mother automatically murmurs, "Don't," every few minutes, or the father makes this or that injunction, promise or threat without seeing that they are performed, or alternatively by using force to ensure discipline?

"But what else are you to do?"—the parents enquire. It is granted that forcible methods of coercion are time-saving. A child is told to put on his shoes—he wants to go on playing with his engine and so ignores the direction. To reason with him will take time; to use superior strength will cut the battle of wills short. Nevertheless, to have to resort to force is a confession of failure on the parent's part and the child knows it.

Of course, children will experiment with all sorts of behaviour, some of which may need checking, but if parents are reasonable and try to understand a child's need for movement, adventure and exploration, unpleasant scenes can usually be avoided.

The "Over-mothered" Child.

Much can be done to train a child's intelligence along reasoning and understanding lines. The child who is never allowed to think for himself cannot develop to the full. Don't make all the decisions for the children. Don't constantly plan all their activities over their heads, giving them no choice or option. It adds to the child's sense of powerlessness and helplessness to find that he has no say in what happens to him, and he will sooner or later show behaviour problems as a result. The "over-mothered" child does not develop into a normal balanced adult.

What Should Take Place of Force?

What then must take the place of force? Surely consistency, quiet determination and imagination on the part of the parents. The child must be given a measure of freedom, but, if it is abused, a definite stand must be taken, and the child told where he is at fault, and made to understand that he must not offend again. Direct

disobedience is much less frequent when a child understands why a rule has to be made. After all, it may be regarded as an adventure to break a rule you object to, but if you are consulted before the rule is made at all, and shown why it is a good one, there is no thrill attached to going against it.

Medical authorities say that for the most part the child delinquent and the anti-social or neurotic adult are the result of faulty management in the first few years of life. How important is it then for parents to "learn" their children, and strive to manage them so that threats and force alike are unnecessary. The titles of easy-to-read books on child management, and any other advice on this or any other subject concerning maternal and child welfare will be answered by communicating personally with the *Maternal and Child Welfare Information Bureau*, 184 *St. Paul's Terrace, Brisbane*, or by addressing letters "*Baby Clinic, Brisbane.*" These letters need not be stamped.

IN THE FARM KITCHEN.

SOME VEGETABLE DISHES.

Tomatoes with Onion Sauce.

4 medium sized tomatoes.
1 small onion.
½-oz. butter.
1 tablespoon water.
½-pint milk.
1 rounded tablespoon flour.
Salt, pepper.

Wash and dry the tomatoes. Place stalk end down and cut off a small piece from the other end of each. Replace these tops and put the tomatoes in a dry, fireproof dish. Bake in a moderate oven till the tomatoes are just soft, about twenty minutes. Don't overcook them or they won't bear up under the weight of the sauce later. Keep hot until the sauce is ready.

While they are cooking prepare the sauce. Peel and slice the onion finely beforehand. Put the butter in a small saucepan. Add the onion, then a seasoning of salt and pepper and the water. Cover the pan with a tight-fitting lid. Bring to the boil and then allow to cook very quietly, shaking the pan now and then, for about twenty to thirty minutes. Don't raise the lid unless necessary and use an asbestos mat with gas.

Remove from the fire and add the flour. Blend thoroughly with a wooden spoon. Then gradually stir in the milk. Return to the fire and stir till the sauce boils. Taste and add salt and pepper if necessary.

Remove the tops from the tomatoes and scoop out a little of the centres. Don't discard this altogether, use it for soup or stew or sauce. Fill each tomato to overflowing with the sauce. Replace the tops and serve garnished with tiny sprigs of parsley.

Parsnip Pie.

Bunch of parsnips.
1 oz. butter.
1 oz. flour.
2 to 3 oz. finely grated cheese.
Salt, pepper.
Milk, water.
Dried breadcrumbs.

Scrub the parsnips and remove blemishes, but do not peel or scrape unless necessary. Cut them up small and put in a saucepan. Barerly cover with a mixture half-milk and half-water. Season with salt and pepper. Cover the pan and bring to the boil. Simmer gently till the parsnips are soft, about twenty minutes. Have ready a battered pie dish. Sprinkle this with breadcrumbs. Drain off and reserve the liquid from the parnsips. A cupful will be required; make up the quantity with extra milk if necessary.

Turn the parsnips into the piedish. Melt the butter in a saucepan. Remove and stir in the flour with a wooden spoon. Blend smoothly, then gradually stir in the liquid. Return to the fire and stir till boiling. Boil and stir for three minutes. Stir in most of the cheese. Taste and add additional salt and pepper if necessary. Pour over the parsnips. Sprinkle with a few breadcrumbs and the remaining cheese. Bake in a moderate oven till browned, about half an hour.

Parsnips and Bacon.

Steam or boil some parsnips cut across in slices. Allow to drain and dry off a little. Fry some fat bacon in a dry pan and keep hot in the oven. Then fry the parsnips in the fat in the pan, turning them frequently till browned on both sides.

ASTRONOMICAL DATA FOR QUEENSLAND.

OCTOBER.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	5.29	5.47	Cairns	37	20	Longreach	39	31
6	5.23	5.49	Charleville	28	26	Quilpie	34	36
11	5.18	5.52	Cloncurry	55	44	Rockhampton ..	14	7
16	5.13	5.55	Cunnamulla ..	29	30	Roma	18	16
21	5.07	5.58	Dirranbandi ..	18	20	Townsville	31	18
26	5.03	6.01	Emerald	23	15	Winton	44	35
31	5.00	6.04	Hughenden ..	40	29	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	2.28	1.17
2	3.12	2.14
3	3.52	3.10
4	4.27	4.04
5	5.00	4.57
6	5.31	5.49
7	6.02	6.41
8	6.33	7.33
9	7.05	8.26
10	7.39	9.19
11	8.17	10.13
12	8.59	11.06
13	9.46	11.59
14	10.38	..
		a.m.
15	11.33	12.50
	p.m.	
16	12.33	1.39
17	1.36	2.24
18	2.40	3.07
19	3.46	3.48
20	4.52	4.28
21	6.00	5.08
22	7.10	5.50
23	8.19	6.34
24	9.27	7.23
25	10.32	8.15
26	11.32	9.11
27	..	10.10
	a.m.	
28	12.25	11.10
		p.m.
29	1.12	12.09
30	1.53	1.05
31	2.30	2.00

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS)

Charleville 27 ; Cunnamulla 29 ; Dirranbandi 19 ;
Quilpie 35 ; Roma 17 ; Warwick 4 .

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	12	27	27	43	1	18	29	51
6	19	19	35	35	10	10	39	41
11	27	12	43	27	18	2	50	30
16	27	12	43	27	18	2	50	30
21	16	20	32	37	8	11	36	42
26	11	29	26	44	0	19	28	52
31	14	23	30	39	5	14	34	45

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	8	48	37	62	21	48	8	40
3	14	41	41	58	26	43	14	34
5	23	33	46	53	31	38	21	28
7	31	23	52	46	36	31	26	21
9	40	14	57	41	42	26	33	14
11	48	8	63	36	47	22	39	9
13	51	6	65	35	49	21	42	8
15	51	6	65	35	49	21	42	8
17	44	11	60	38	45	24	36	12
19	34	21	54	45	38	30	29	19
21	22	33	46	53	30	38	20	28
23	12	42	39	59	24	44	12	36
25	7	49	36	63	21	49	8	41
27	6	50	36	63	20	49	7	42
29	10	46	38	61	23	47	10	38
31	16	39	42	57	27	42	16	33

PHASES OF THE MOON.

New Moon October 6th, 3.22 p.m.; First Quarter October 14th, 7.38 p.m.; Full Moon October 21st, 3.32 p.m.; Last Quarter October 28th, 8.30 a.m.

On October 16th the Sun will rise 10 degrees south of true east and set 10 degrees south of true west.

On October 6th and 20th the Moon will rise and set approximately true east and true west respectively.

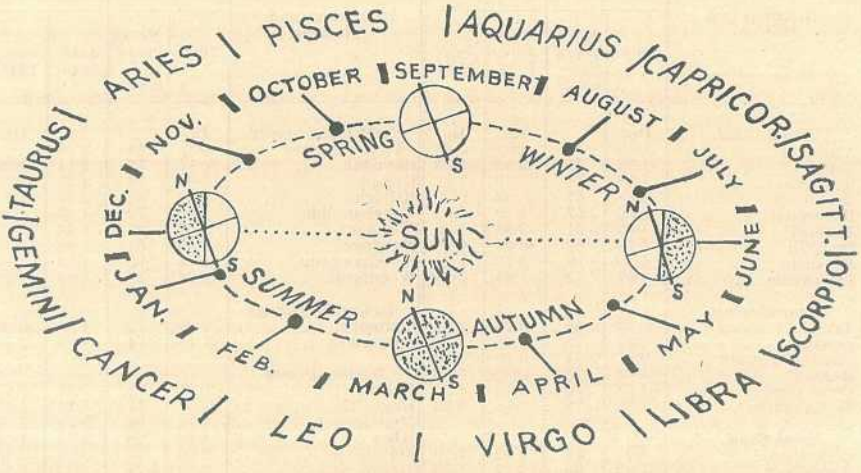
Venus.—During this month Venus will be visible low in the east during morning twilight, rising, in Queensland generally, between 4 a.m. and 4.45 a.m. On October 30th it passes close to Jupiter.

Mars.—At the beginning of the month Mars, in the constellation of Gemini, will rise, between 1 a.m. and 1.30 a.m., about 25 degrees north of true east. At the end of the month it will rise about midnight and on the 26th will be very close to Saturn.

Jupiter.—Too close in line with the Sun for observation at the beginning of the month but at the end of the month this planet will rise between 4 a.m. and 4.45 a.m. about 5 degrees south of true east and may be seen low in the east during morning twilight.

Saturn.—In the constellation of Gemini, this planet, at the beginning of the month, will rise, in Queensland generally, between 1.30 a.m. and 2.0 a.m., about 23 degrees north of true east. At the end of the month it will rise about midnight.

The diagram shows the constellations in which the Sun now appears at each season of the year. At the March equinox the Sun appears in Pisces and at the September equinox in Virgo, when it shines directly over the equator. At the June solstice it appears in Gemini and shines directly over the Tropic of Cancer, while at the December solstice it appears in Sagittarius and shines directly over the Tropic of Capricorn. At these four positions the Earth is shown by a circle on which the shaded portion represents the part of the Earth having night. Dots represent the position of the Earth in its orbit about the middle of the other months of the year.



QUEENSLAND WEATHER IN AUGUST.

Most of the Maranoa and Darling Downs received over-average rains, and also parts of the Warrego and South Coast districts, chiefly Moreton. These districts received most of the rain during the last two days and the already mainly fair to good pastoral and farming conditions should be maintained. Cool weather and absence of storms before harvest would be appreciated in the wheat crop areas. Over the rest of the State, however, rains were well below the usual normally dry conditions of August. Many central districts as well as the tropical interior reported no rain and early storms during October and November would be needed to maintain carrying capacity of pastures. In the dry west general relief was still awaited.

Temperature.—Temperatures were in general well above normal. Average maximum readings ranged from 0.8 deg. above at Mitchell, 4.6 deg. at Boulia to 7.8 deg. at Georgetown. Minimum readings at Mitchell were 4.5 deg. above normal and Longreach 5.7 deg.

The rain position is summarised below:—

Division.	Normal Mean.	Mean August, 1945.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	20	20	..
Peninsula South	7	Nil	100 below
Lower Carpentaria	10	Nil	100 ,,
Upper Carpentaria	25	Nil	100 ,,
North Coast, Barron	114	39	66 ,,
North Coast, Herbert	167	41	75 ,,
Central Coast, East	77	10	88 ,,
Central Coast, West	50	Nil	100 ,,
Central Highlands	84	16	81 ,,
Central Lowlands	48	7	85 ,,
Upper Western	16	2	88 ,,
Lower Western	32	9	72 ,,
South Coast, Port Curtis	118	15	87 ,,
South Coast, Moreton	169	61	64 ,,
Darling Downs East	131	200	53 above
Darling Downs West	88	93	6 ,,
Maranoa	91	134	47 ,,
Warrego	75	85	13 ,,
Far South-West	49	37	24 below

Commonwealth of Australia, Meteorological Bureau, Brisbane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JULY RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of years' records.	July, 1944.	July, 1945.		July.	No. of years' records.	July, 1944.	July, 1945.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	1·12	42	2·38	2·62	Gatton College ..	1·37	44	3·70	..
Cairns	1·53	61	2·54	3·03	Gayndah	1·47	72	2·14	3·23
Cardwell	1·38	71	3·19	1·81	Gympie	2·07	73	4·31	2·83
Cooktown	0·98	67	2·92	0·89	Kilkivan	1·50	62	2·90	3·35
Herberton	0·89	57	1·79	1·61	Maryborough ..	1·93	72	4·36	4·38
Ingham	1·69	51	3·25	1·49	Nambour	2·67	47	6·40	4·81
Innisfail	4·75	62	6·58	6·91	Nanango	1·65	61	1·82	1·55
Mossman	1·19	19	5·73	1·94	Rockhampton ..	1·73	72	2·23	3·93
Townsville	0·67	72	1·25	0·45	Woodford	2·28	55	5·48	2·01
Central Coast.					*Central Highlands.*				
Ayr	0·73	56	0·28	2·22	Clermont	1·06	72	1·31	2·66
Bowen	0·93	72	0·28	3·08	Springsure	1·18	74	1·05	2·24
Charters Towers ..	0·67	61	0·99	0·78					
Mackay	1·64	72	0·57	4·68	*Darling Downs.*				
Proserpine	1·58	40	0,84	4·30	Dalby	1·71	73	2·44	1·57
St. Lawrence ..	1·36	72	1·55	3·72	Emu Vale	1·57	47	2·21	2·05
					Jimbour	1·48	64	3·29	1·54
South Coast.					Miles	1·62	58	1·54	1·12
Biggenden	1·41	44	2·02	3·19	Stanthorpe	2·00	70	3·04	2·48
Bundaberg	1·83	60	2·77	4·58	Toowoomba	2·06	71	3·43	3.01
Brisbane Bureau ..	2·17	93	4·65	3·57	Warwick	1·80	78	2·81	1·64
Caboolture	2·37	67	5·89	4·05					
Childers	1·70	48	2·90	3·16	*Maranoa.*				
Crohamhurst	2·90	50	8·14	3·29	Roma	1·43	69	2·12	2·13
Esk	1·90	56	3·48	2·17	St. George	1·21	62	2·13	1·90

CLIMATOLOGICAL TABLE FOR JULY.

(Compiled from Teleyraphic Reports.)

Divisions and Stations.	Atmospheric Pressure.—Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Pts.	
Cairns	..	77	63	81	11, 12	47	18	303	14
Herberton	..	67	51	78	12	27	17	161	14
Townsville	..	76	59	80	7	47	22	45	6
Brisbane	30·21	68	49	74	6	44	22	357	6
Darling Downs.									
Dalby	..	64	39	72	31	28	22	157	3
Stanthorpe	..	58	33	66	31	23	7	248	9
Toowoomba	..	61	38	68	31	28	22	220	6
Mid-Interior.									
Georgetown	30·06	81	55	85	6, 26, 27 31	31	17	Nil	..
Longreach	30·21	74	47	75	27, 31	27	17, 23	263	2
Mitchell	30·12	63	38	72	31	25	22	215	2
Western.									
Burketown		81	54	88	29, 30	40	12, 17	9	3
Boulia	30·10	70	46	85	27	37	17	104	3
Thargomindah	30·19	65	44	80	31	36	17, 22, 23, 24	126	3

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Commonwealth of Australia,
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