ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.

QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Health and Agriculture.

BY raising the level of nutrition and increasing the consumption of foodstuffs it is believed that international trade can be greatly increased and, incidentally, agricultural production promoted. The association of health and agriculture would, if universal, soon put an end to policies of production restriction which have become an important factor—seriously adverse in its effects—in world economy.

As stated in the last report on nutrition from Geneva, "the malnutrition that exists in all countries is at once a challenge and an opportunity—a challenge to men's consciences, and an opportunity to eradicate a social evil by methods which will increase economic prosperity." Some Governments, notably those of Australia and Great Britain, have recognised this, and have formulated policies by which the primary producer, as well as the general community, must benefit considerably.

It has been urged that the solution of nutrition problems may even decide the fate of democracy. In a recent statement by the Queensland Branch of the British Medical Association, published under the imprimatur of the Queensland Nutrition Council, this possibility is stressed, and the Council has strongly urged the commercial world to review its activities in the light of this standpoint.

In the course of the statement referred to, it is pointed out that thirty years or more of medical research have revealed that health is quite as seriously menaced by improperly balanced or defective diets as it is by the bacteria of infectious disease. The danger of an ill-balanced diet is often greater, because the effects may not be noticed until serious damage has been done. Medical practitioners see much of this damage in the course of their daily work, and they feel that they should make it clear that even modern medical science cannot, in many cases, effect repairs. The situation is comparable with a building that has been constructed of insufficiently strong materials. That building, like the individual, is a liability instead of an asset.

As members of a democracy, they view with concern the rapidly growing cost of pensions and necessary sickness services, and their medical training and experience enable them to state definitely that much of this could be avoided by the application of the modern knowledge of nutrition.

A regrettable feature of the present nutrition situation in Queensland, the statement continues, is that foods such as milk, cheese, fruit, and vegetables, meat, and wholemeal cereals, are produced in excess of requirements. In fact, Australia produces more food per head of population than any country in the world except the Argentine. The situation is a challenge to our powers of organisation to make these foods available at a cost within the reach of the majority of the people. The provision of refrigerated fruit and vegetables for the dwellers in North-Western Queensland is regarded as an example of the type of development urgently required in this State. There is a danger that one may think this statement applies merely to others and not to himself, but it must be made clear that there is scarcely one of us who could not effect advantageously an improvement in the food habits of himself and his family.

The Nutrition Movement and the Man on the Land.

DISCUSSING the need of reform in the food habits of the people, the Queensland Nutrition Council quotes the final report of the Commonwealth Advisory Council on Nutrition, in the course of which it is stated that "there exists in Australia a considerable mass of minor departures from normal health describable generally as malnutrition. Some of this is undoubtedly economic in origin, some is due, also (in country districts), to inability to obtain adequate supplies of perishable foodstuffs; but a very large proportion is the result of faulty selection of diets arising through ignorance as to the proper balance of food items."

The Commonwealth Advisory Council on Nutrition was formed in 1936, following the recommendation of the League of Nations that there should be a world-wide inquiry into problems of nutrition.

The Commonwealth report showed that while Australians are on the whole better fed than other people, up to 33 per cent. of children examined were found to be in a state of malnutrition. In the family dietaries studied there was an almost universal deficiency of foundation foods, such as milk, eggs, cheese, fruit, and vegetables, coupled in many cases with too great a consumption of refined carbohydrate foods such as white flour and bread, biscuits, cakes, and sweets. As these deficiencies occur to a surprising extent in well-to-do as well as in poorer

households, misguided selection of food appears as an important causative factor. This being so, there must exist in Australia a home market for primary products, undeveloped and hitherto unsuspected, which is dependent for its expansion chiefly upon efficient education of the public in relative food values.

"From a health point of view," the statement of the Queensland Nutrition Council continues, "Australia has valuable natural resources which many other countries do not possess. But as a result of haphazard development and lack of constructive education, these resources have not been used to the best physical advantage of her people. And a more scientific development of Australia's food habits would be to the definite financial advantage of the producer. The nutrition movement is the best thing that ever happened to the man on the land. Even now, economic experts strive to preserve the London market for Australian butter, when the consumption of whole milk and cheese in this country is only half what is considered desirable, and when it is financially desirable for the dairy farmer to sell his milk as whole milk rather than as butter fat. Likewise, engineering experts have developed a refrigeration technique which enables fruit and other perishable foods to compete on overseas markets while fresh fruit and milk is largely unobtainable in many parts of Australia for lack of refrigerated transport and storage, even although the home market be frequently glutted.

"In these days of scientific progress it is indeed surprising to find modern man so loath to apply for his own physical benefit the results of scientific investigation. He will use science to improve his crops and his herds, while maintaining an air of tolerant indifference to scientific guidance concerning his own body and health. Good health can be obtained and maintained only in so far as human life is lived in accord with physiological laws, which apply to man and animal alike. If modern man were to apply to any of his domestic animals the dietetic principles to which he himself clings with such determination, he would not be long in realising the appalling results of his action. But however firmly the moving finger may trace words of wisdom and warning on the wall, he comforts himself that they do not apply to him or his children, and he refuses in consequence to modify his old habits. So it is a case of heads we win, tails we can't lose.

"If the people will but apply in their daily lives the modern knowledge of nutrition, they will not only realise a health standard that will make for a new level of national fitness, but they will benefit financially, first by reduced sickness and pension costs, and secondly by helping the primary producer, who is the backbone of the country."

Queenslanders are Becoming Nutrition-conscious.

ACCORDING to the Nutrition Council, Queenslanders are becoming nutrition-conscious. The science that a few years ago was regarded as the prerogative of research workers is now finding its way into the average home and is playing an increasingly important part in our daily life. This development is not peculiar to Queensland. We are merely keeping in line with developments taking place all over the world. Science has shown us that an unbalanced diet is responsible for much of our ill-health, and every country is at present engaged in solving the problem of raising the nutritional standard of its people.

Sheep and Wool.

JAS. CAREW, Senior Instructor in Sheep and Wool.

NOT only is the sheep and wool industry important to those associated with it directly—whether it be on the production, transport, treatment, or manufacturing side—but also to the whole community. Some general notes on sheep and wool should, therefore, be of interest to those who, while not connected primarily with it, share indirectly in the fortunes of an industry which is the chief source of wealth to the State.

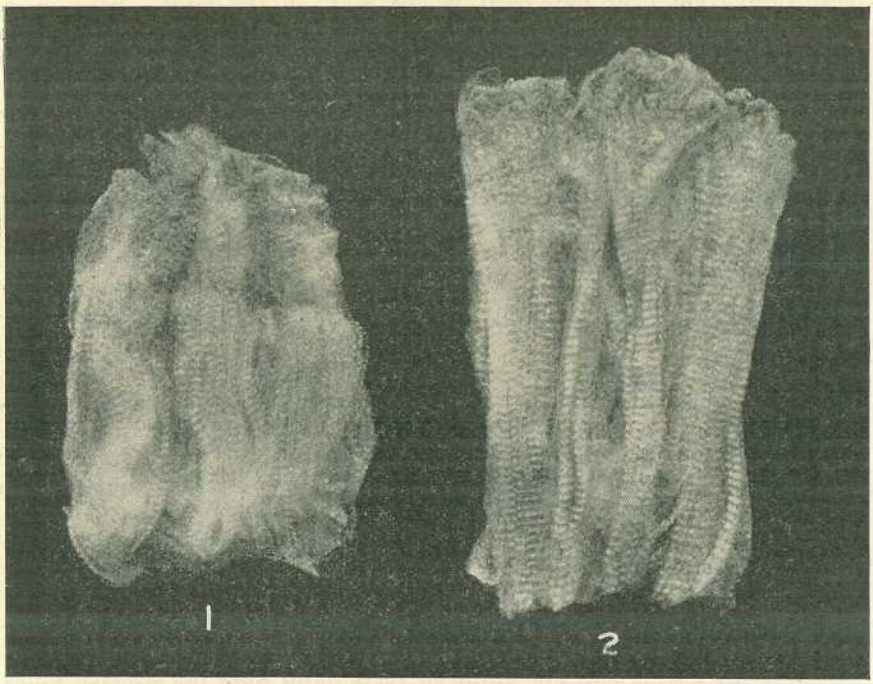


Plate 147.
(1) A sample of wool from the Camden flock. (2) Fine Merino wool.

Over 98 per cent. of the wool produced in Queensland is merino. A fact of great importance in the early pastoral history of Australia was that Macarthur, the founder of our woolgrowing industry, realised the value of fine wool and that the merino was the best breed for its production. Very little progress was made with Australia's first merino flocks, however, until the discovery of richer natural pastures further inland, when an immediate improvement in the constitution of the sheep was observed.

The sheep brought by pioneer squatters northward to the territory afterwards named Queensland were descendants of Macarthur's foundation merino flock. As settlement extended, men imbued with the pioneering spirit went further west and north-west, where they discovered immense tracts of open rolling downs country suitable for

sheep raising and requiring practically no other improvement than the provision of permanent water. Since then, these areas have become the home of the merino in Queensland (Plate 149).

In the early days, the pioneer pastoralists travelled their flocks to where they had selected their holdings. Drovers who accompanied them remained to shepherd the flocks in the newly-settled country within reasonable distance of what was judged to be permanent water (Plate 150). Later, fences were erected, boundary riders were employed, and the day of the shepherd soon passed. Because of lack of lasting surface water, however, the advance of settlement was slow. The subsequent discovery of artesian water altered completely the conditions of occupation of the western pastoral lands. As the number of flowing bores

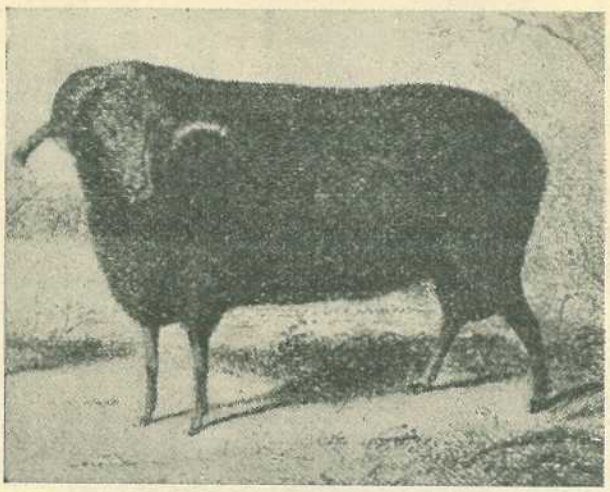


Plate 148.
Early Type of Merino Ram in Macarthur's Camden Park Flock.

increased, the water problem was progressively solved. Some of these bores gave a supply of over 1,000,000 gallons of water a day. By delving contour drains water was directed from the bore heads to different parts of the runs. Some of these bores have kept a flow going along 50 to 100 miles of drains for fifty years and more (Plate 151).

The early settlers held leases over immense holdings (thousands of square miles) on which large flocks were run. Later, many holdings were subdivided. Many large holdings still remain, carrying flocks as large as 100,000 sheep.

STATION MANAGEMENT.

From a wool point of view shearing is the pastoralists' harvest, but a considerable amount of work and planning is necessary before his sheep can be shorn. Careful management is an essential factor in the maintenance of flock numbers and in the yield and quality of fleeces. On large holdings many people are employed, including station hands, boundary riders, cowboy, cook, head stockman, and overseer; while horses and well-trained sheep dogs are of importance in the general working of the flocks.

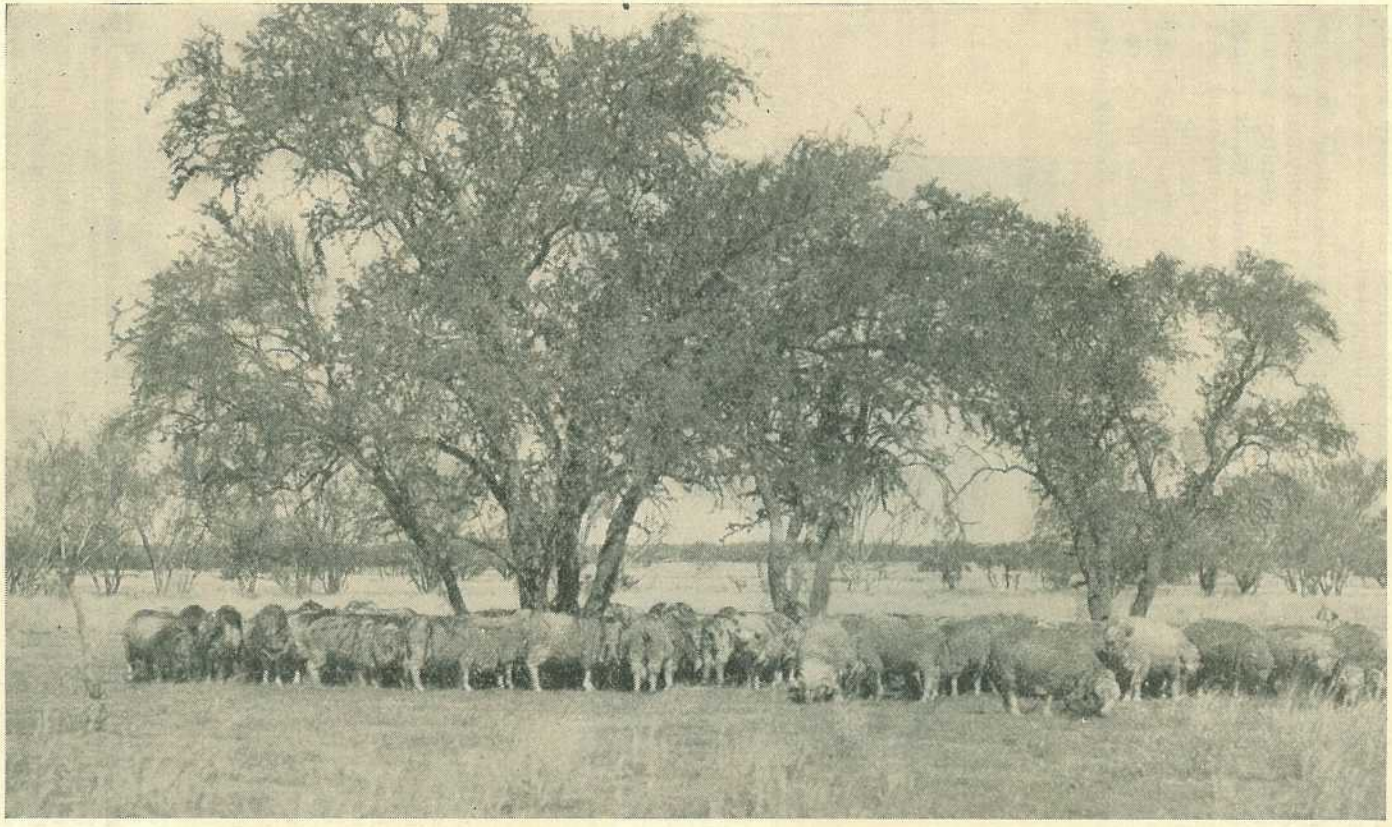


Plate 149.

SHEEP COUNTRY IN CENTRAL-WESTERN QUEENSLAND.—A contented mob of young rams in the shade of the Bauhinia—a beautiful native flowering tree.

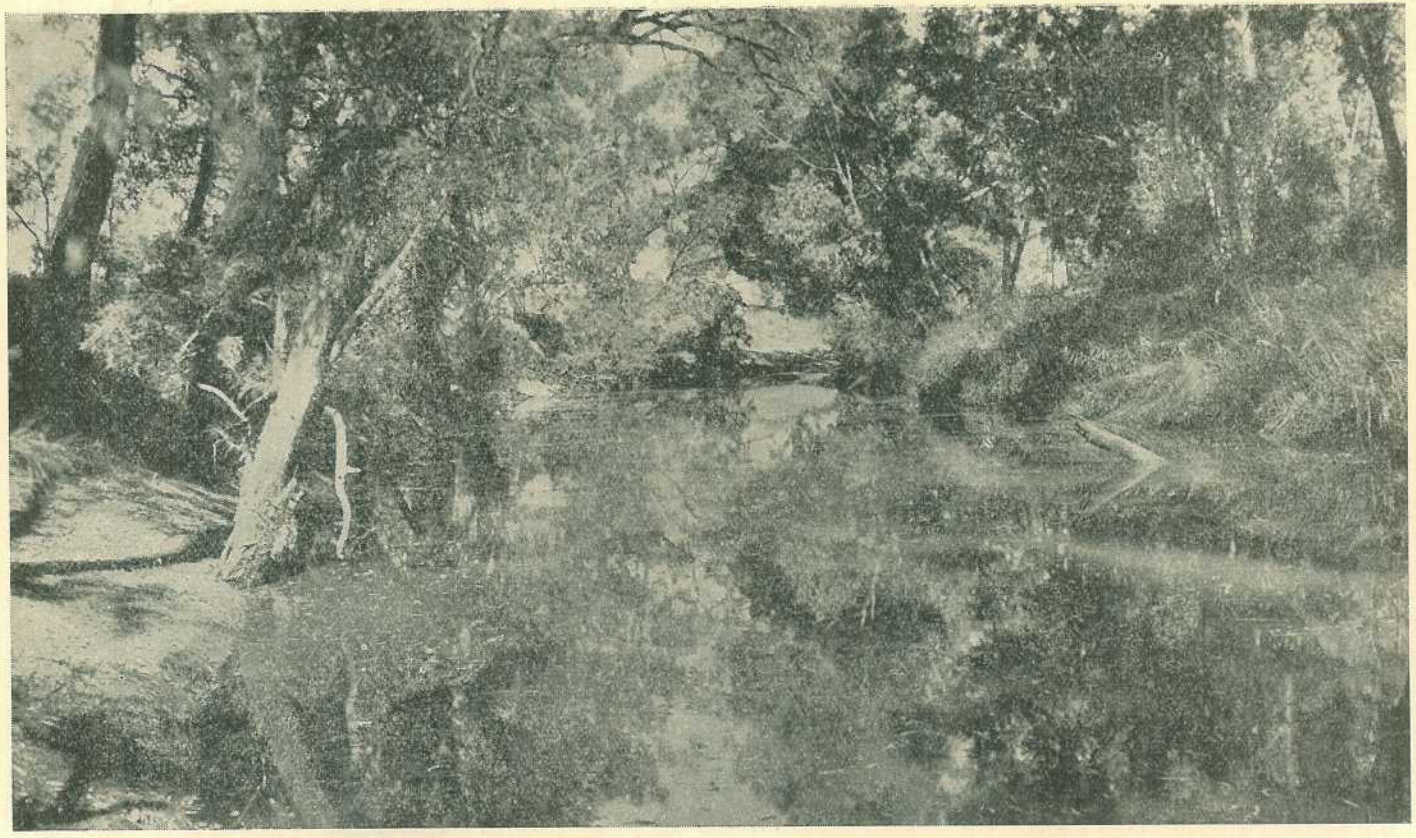


Plate 150.

A River in Central-Western Queensland.—On water frontages like this, pioneer settlers built their homesteads.

Plate 151.

AN ARTESIAN BORE AT NOONDOO, SOUTH-WESTERN QUEENSLAND.—This bore is 3,000 feet in depth and has a capacity of 580,000 gallons a day and has been flowing for forty years.

Plate 152.

Lamb Marking on a Western Queensland Station.—The lambs are held in a "Shannon" cradle, the invention of a Queensland pastoralist.

When a property—particularly a merino breeding station—is stocked with sheep to its normal carrying capacity, the selection of suitable paddocks is necessary for the different ages and sexes, each of which should have an adequate water supply. For breeding ewes, the paddock should be the best available with water within easy access at convenient distances and well shaded, especially with edible shrubs and trees. Careful attention at lambing time is necessary, and while the lambs are young the paddock should, as far as possible, be kept free from disturbing invasions of vermin—eagle hawks, foxes, and other predatory animals—and even from inexperienced or careless people, who may unknowingly cause confusion and separate ewes from lambs, leaving many lambs motherless.

While the lambs are still young, between three and six weeks old, they should be marked, which necessitates the mustering of all sheep in the paddock. On large holdings this is a big job, for which mustering camps are formed at suitable places where yards fitted with drafting race and catching pens have been erected. Most holdings have registered earmarks and brands, and as the lambs are being desexed and tail-docked, the station earmark is inserted—on the right ear of males and left ear of females (Plate 152).

In some districts dipping is necessary to protect the sheep against lice and ticks, while crutching and jetting is practised to minimise blowfly attack. In regions of light rainfall, scrub-cutting to supplement the pasture has often to be resorted to, while in districts of heavier rainfall drenching to control internal parasites should be done at regular intervals.

Fencing and buildings should be kept in repair, while the water supply calls for constant thought and attention.

SHEARING AND SHED MANAGEMENT.

Assuming that the shearing shed is fully equipped and the plant is in good order, much additional planning is necessary before shearing commences. Paddocks have to be mustered and the sheep held in readiness for delivery to the shed yards as required. Some of the sheep may have to travel 20 miles or more to the shearing shed and, perhaps, the same distance back to pasture after shearing. If thirty shearers are engaged (and many stations are still operating more than that number of stands), it means that they shear 4,000 or more sheep daily, which obviously necessitates a big movement of sheep to and from the shearing shed (Plate 153). In mustering sheep much depends on the knowledge of the overseer and the musterers. They should know the country intimately, observe weather conditions closely, have a thorough knowledge of the habits of sheep, and possess patience and endurance.

Sheep in sufficient numbers have to be kept up to the shearers, and this entails yarding, drafting, penning in a shelter shed, if necessary, then in the holding pens, and lastly into the catching pens in the shearing shed. Two shearers catch their sheep, from the one pen. An overseer, usually called the boss of the board, supervises the shearing and keeps tally of the number of sheep shorn by each shearer. Besides station hands, shearers, wool classers, and shed hands, there is another very important section—cooks and their assistants or offsiders (Plate 154). The position of shearers' cook requires a high degree of culinary and catering skill and sound domestic management. Dietetic variety, wholesomeness, and sufficiency to suit different tastes and satisfy

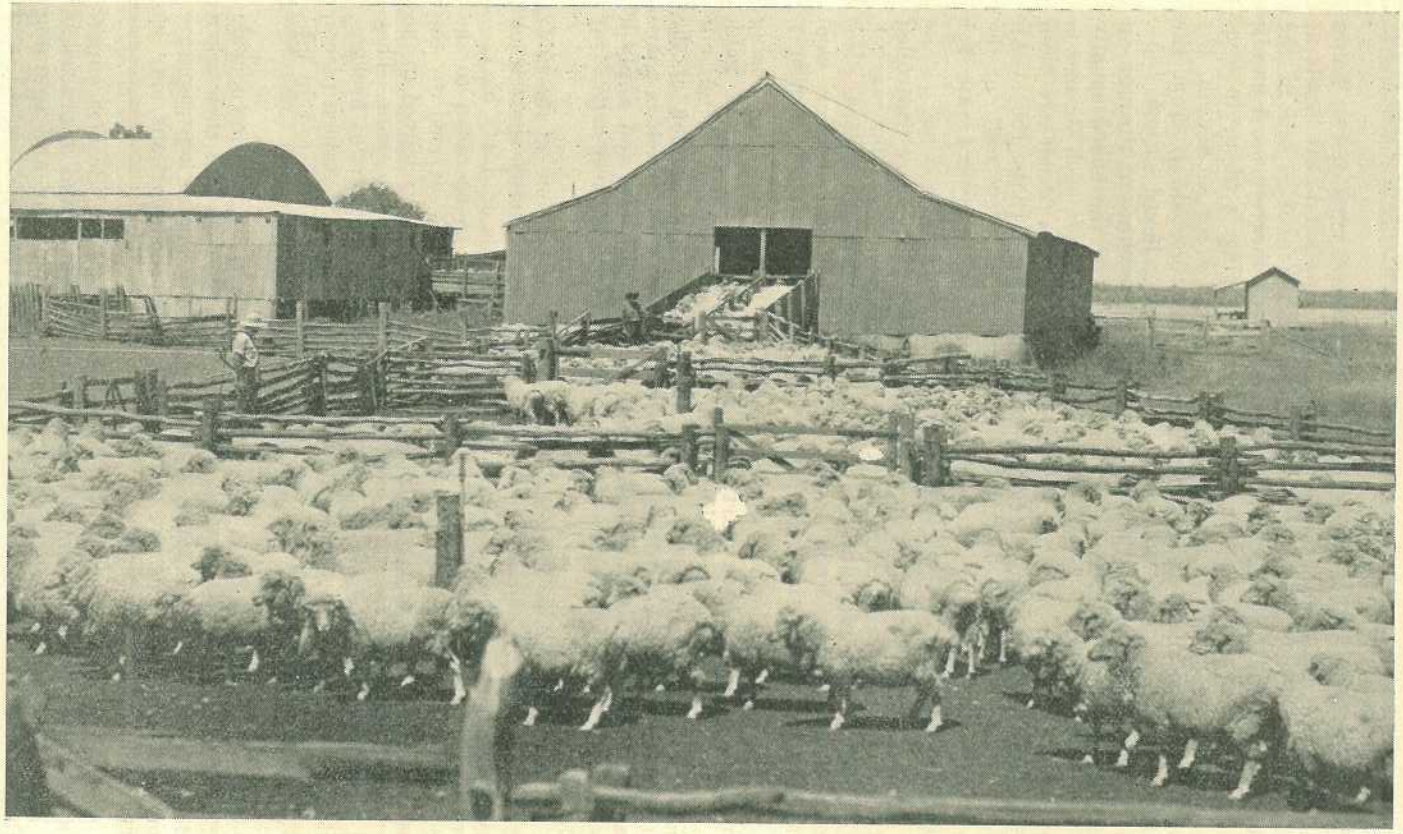


Plate 153.
Sheep yarded for shearing on a Central-Western Station.

hard-working men with the healthy appetites of trained athletes—competent shearing calls for physical fitness—are obviously matters for forethought and judgment.

Shearers work 8 hours each day, divided into 4 runs of two hours each. After the first and third run smoko is supplied to all hands at the shed. The chief meals of the day are partaken of at one of the three respective mess or dining rooms, one for the shearers, shed hands, and station employees, respectively. When shearing is about to commence at any period of the day the machinery is set in motion, the starting signal sounded and the shearers take their sheep from the catching pens and carry them on to the shearing board (Plate 155). When the sheep are shorn they are pushed down a chute or through an opening into a long counting out pen. The boss of the board usually counts out from each pen at the end of every run, when each shearer is credited with the number he has shorn. The shorn sheep are then branded and returned to their respective paddocks (Plate 156). All counts are recorded and each shearer is paid at the "cut out" of the shearing for the total number shorn. The present award rate for shearing is 38s. per 100 for flock sheep.

Besides the shearers, about an equal number of men are controlled by the wool classer and their work is to prepare the wool for market. The classer's team includes the pickers-up, skirters and rollers, piece pickers, belly pickers, wool pressers, bale weigher and brander, wool classer's assistant and the wool classer who has charge of this section.

As soon as each sheep is shorn, a picker-up gathers the fleece, using both hands and feet in a particular way to obtain the correct hold, and then carries it to the rolling table on which it is thrown out cut side down. His other duties are to sweep clean that portion of the shearing board assigned to him, pick up the belly wool which is shorn separately and place it in a basket kept for the purpose, and apply a dressing to any accidental cuts on the sheep, or as the shearer calls, "tar here."

Skirters and rollers skirt the fleece as it is thrown out on the table by removing all that portion around the edge which carries short wool, fatty ends, seedy, stained or faulty pieces, tar brands or dusty backs—all of which, when skirted, is thrown into baskets to be taken to the piece pickers' tables. The fleece is then rolled and carried to the classers' table for classification (Plate 157). All the wool removed in the skirting of the fleece has to be picked over by the piece pickers. They sort out each class, selecting the bigger and better portions as brokens, while the less attractive wool is classed into 1st, 2nd, and stained pieces, according to the condition of the fleece. Each class is placed in bins until a sufficient quantity for the pressers has accumulated.

When the belly wool is shorn from the fleece it is thrown aside by the shearer and placed in a basket by the picker-up and then taken to the belly picker for trimming as required. Belly wool is kept separate from all other wools, but the trimmings and stained portions may be placed with the stained pieces.

The wool classer classes the fleece wools himself. Besides supervising the men in his section he examines each fleece and appraises it for length, character, colour, yield, soundness, handling and spinning qualities. Fleece wools are usually classed into AAA, AA, A, A1, and A Flc. categories—each term being in accordance with distinctive characteristics of the station clip. The classer's chief aim is to have all fleeces in uniform grades and up to class standards.

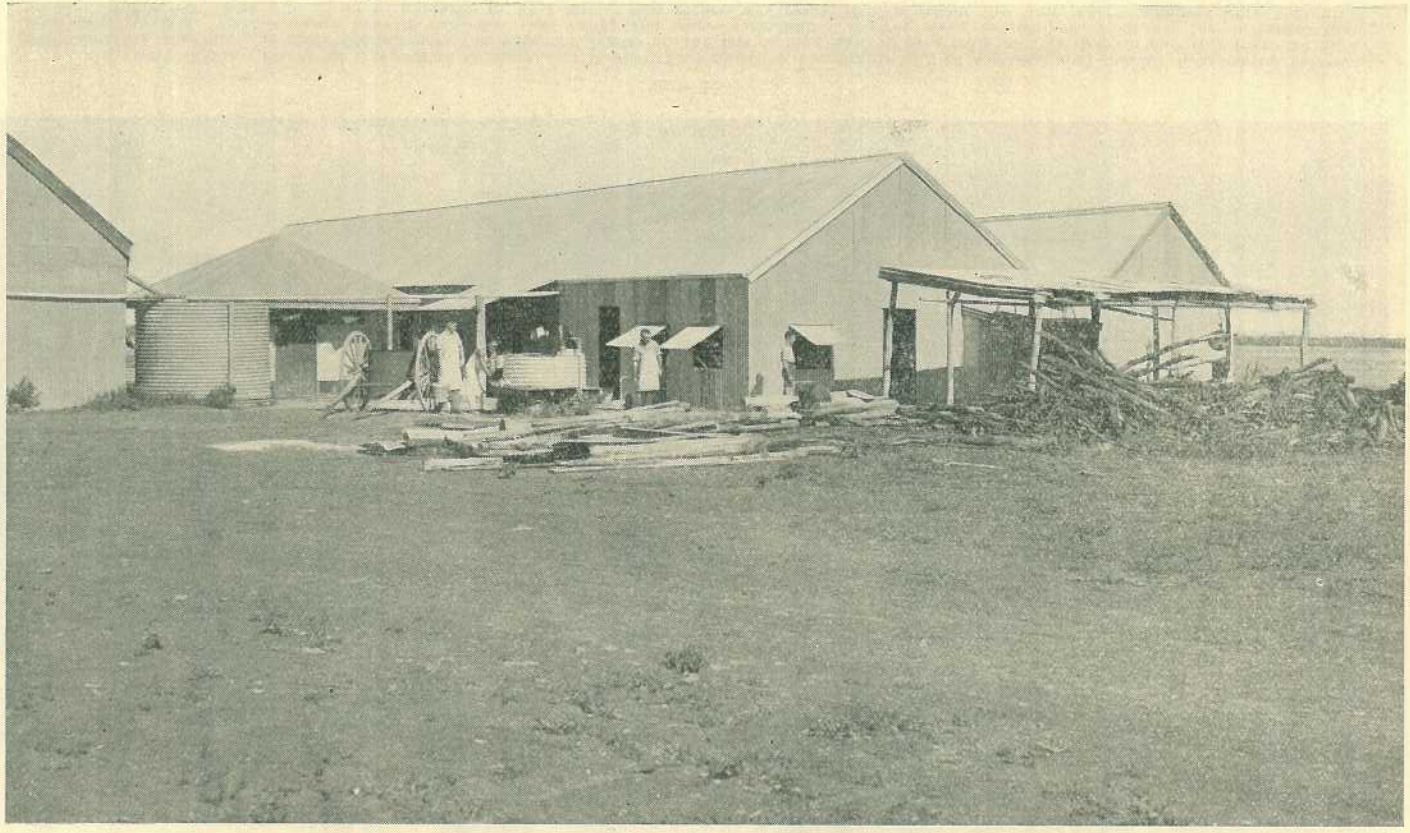


Plate 154.
The Cooks' Galley and Shearers' Mess Hut.

Plate 155.

ON THE SHEARING BOARD IN A WESTERN QUEENSLAND WOOLSHED.—Shearers are highly skilled workers, and display astonishing celerity with shearing machines, as their predecessors did with the blades in the not so long ago, when a tally of 100 sheep a day was regarded as a good performance. Fast workers usually exceeded that tally, and some remarkable records were established, such as, for instance, that of Jack Howe, who shore 336 sheep with blades in 9½ hours. This record was established at about the time when machines were beginning to come into favour, and many machine shearers have attempted to beat it. Since then, however, the size of sheep and weight and density of fleece have increased. Nevertheless, the average number of sheep shorn per man is much higher to-day than when blades were in general use.

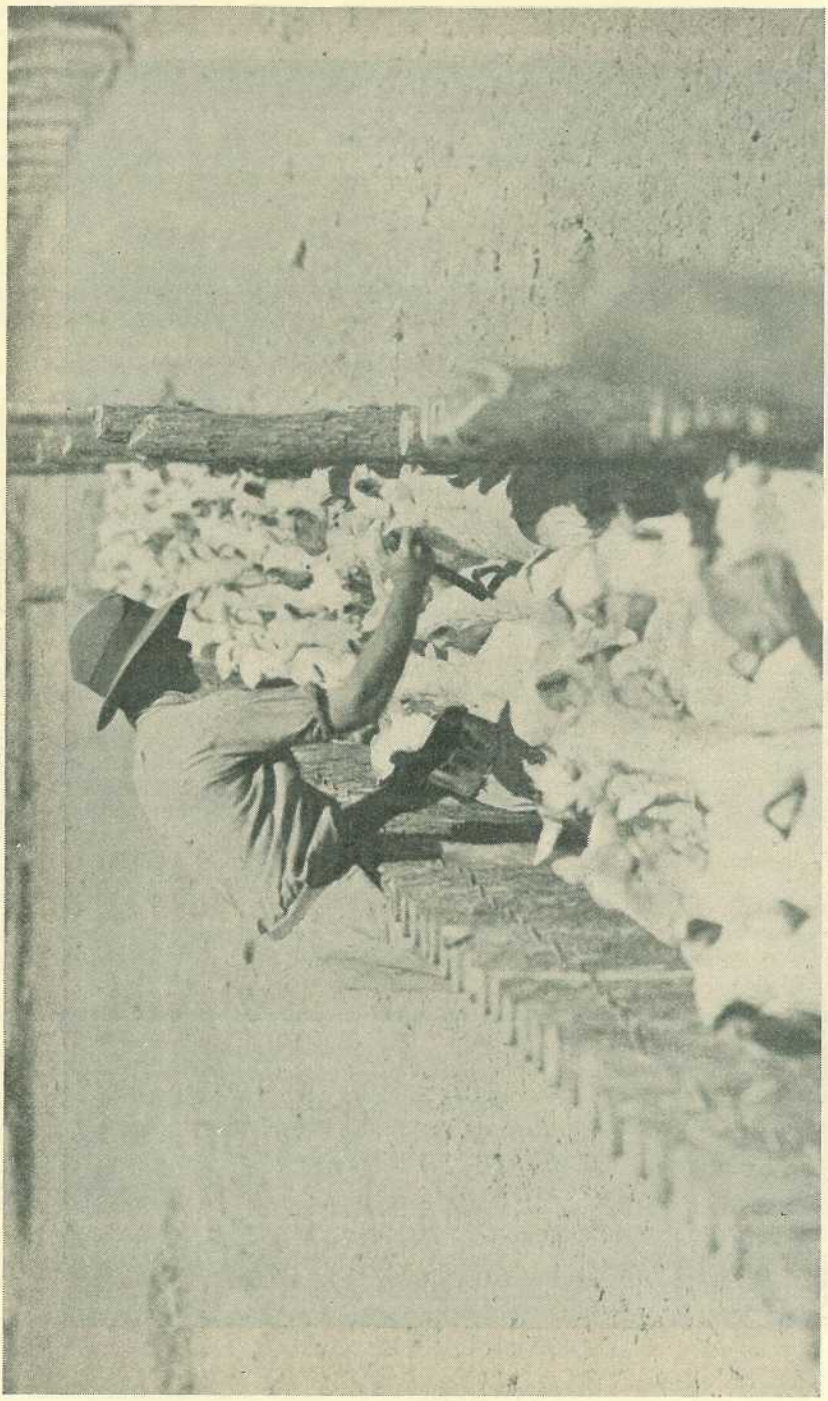


Plate 156.
Branding shorn sheep.

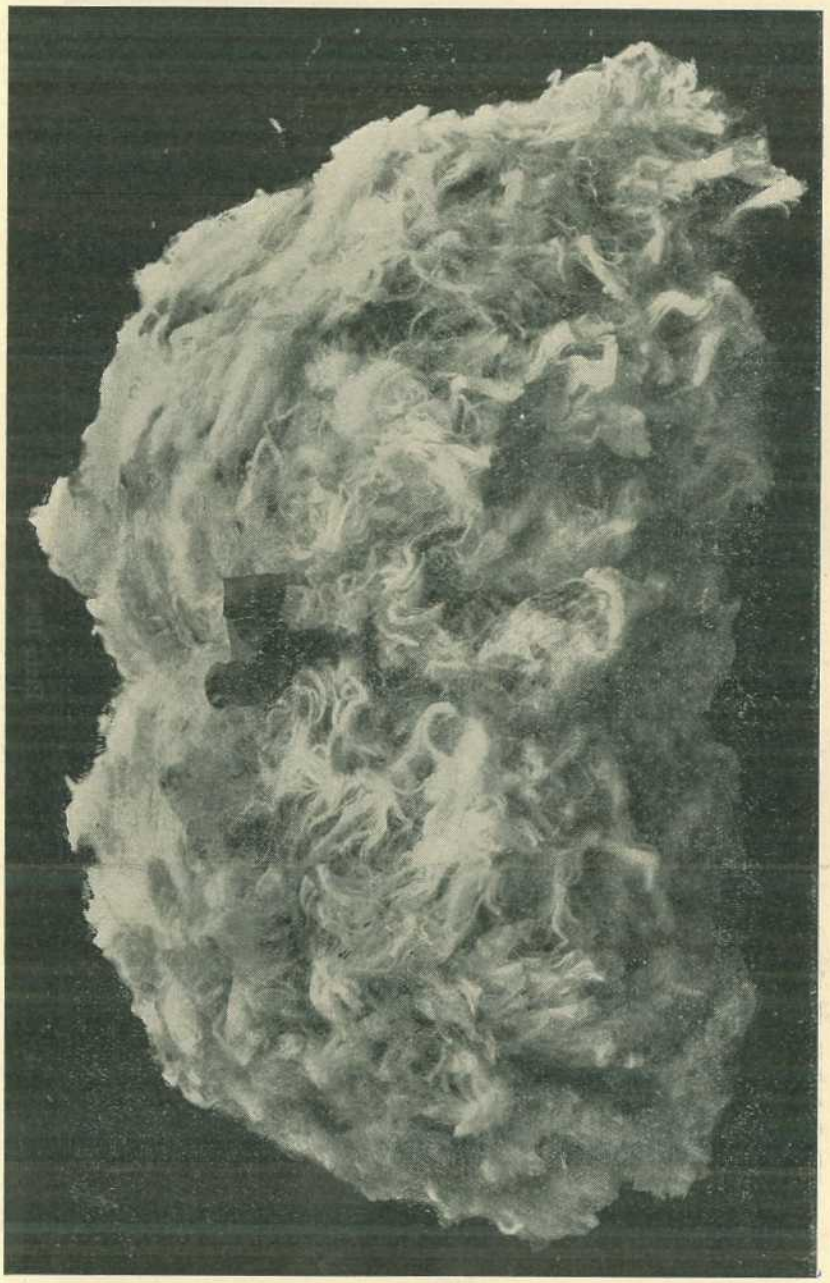


Plate 157.
Fleece rolled ready for classing.

All the tables over which the wool is worked are topped with batons or rollers spaced far enough apart to allow small bits of wool, second cuts, fatty ends and other loose locks to fall between them to the floor. These locks are classed in keeping with the wool which has been worked over the respective tables from which they have fallen. All bins are tabulated in keeping with the technical terms applied to the classes sorted.

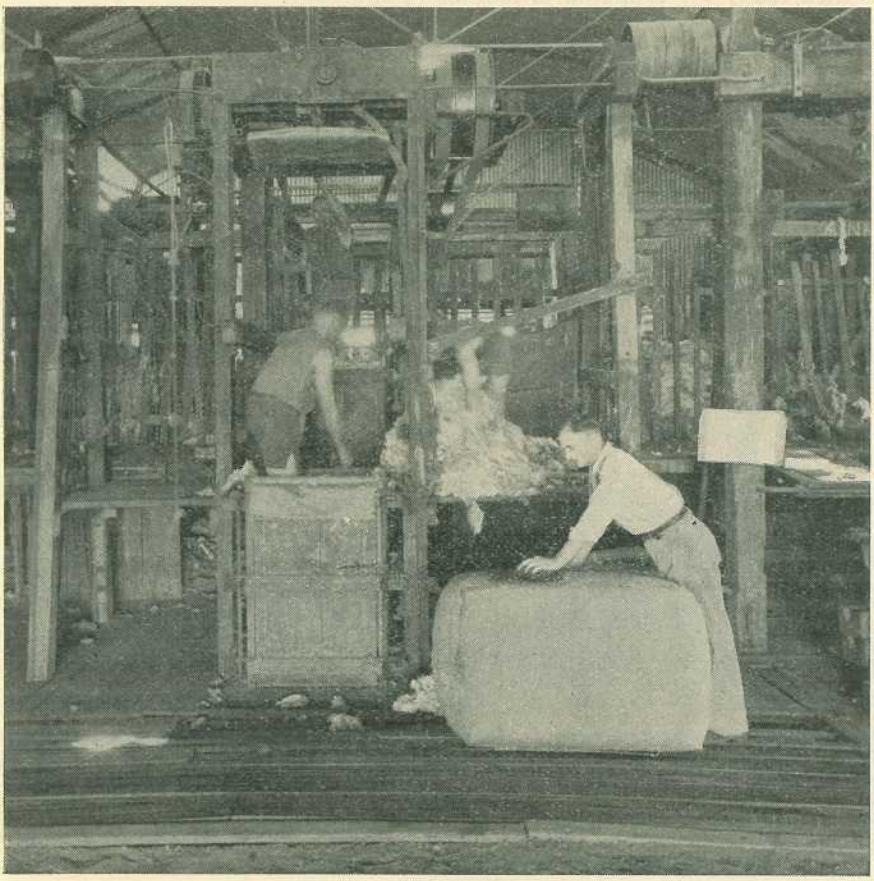


Plate 158.
Wool pressing and branding the bales.

By the time shearing commences, the wool pressers will have put the press and operating gear in good working order. Wool presses of different makes are in use and each has its own particular type of working gear. Practically all have stationary bottom boxes and the top box fitted to swing or tip over for filling. The bundles of wool packs are then opened up and stacked in a convenient place near the press. A pack is placed and secured in the bottom box of the press; both bottom and top boxes are then filled with wool of a particular class. The top box is then swung into position over the bottom box and the bale is pressed by mechanical means to the size desired. The top box is then tipped up and the loose flaps of the bale drawn and secured

with bale fasteners, after which the bale is turned out, chalk-marked according to class and left to the weigher and brander (Plate 158). Each bale of greasy wool should weigh not less than 200 lb. gross, but the weights are usually worked in keeping with the respective classes, good fleece wools under 300 lb. and locks about 500 lb. In branding a bale of wool the station brand, class, sex and numbers should appear on one side and the number on both the top and bottom of the bale, and the bale is then ready for despatch to market (Plate 159).

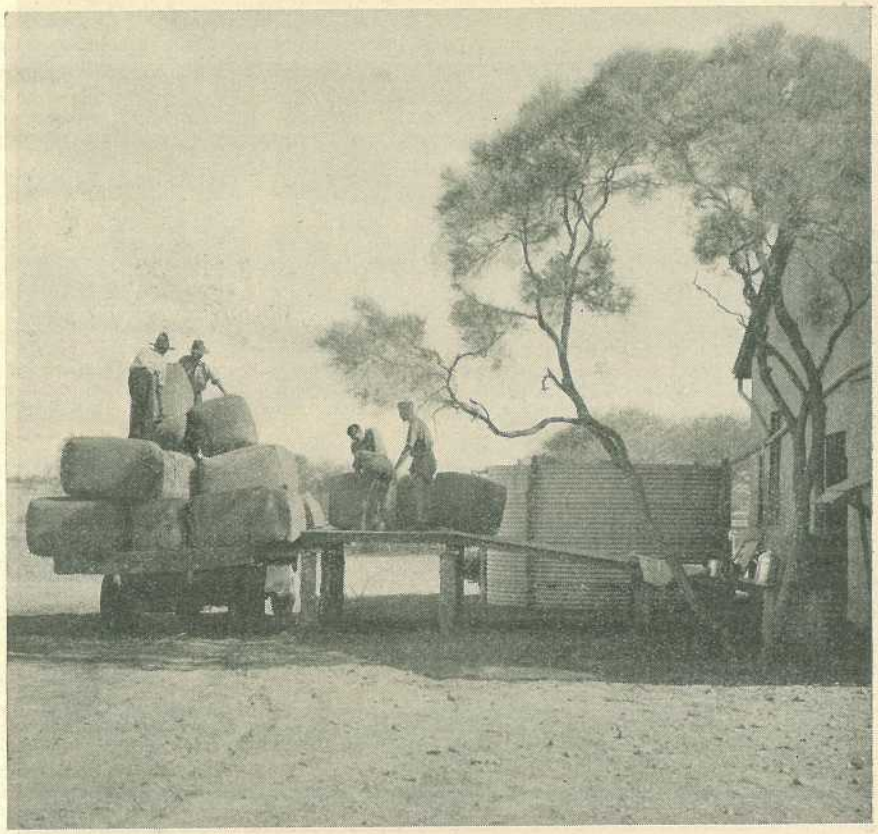


Plate 159.
Loading the bales for dispatch to market.

WOOL MARKETING.

The great bulk of the Queensland clip is auctioned by brokers. When a broker receives the wool, each bale is weighed by a sworn weigher, and recorded to the credit of the owner. A copy of the receival notice is forwarded to the secretary of the Wool Selling Brokers' Association for filing and cataloguing. When the quantity allotted for a sale is received, the closing date is decided and subsequent deliveries are entered up for the sale to follow.

Brisbane is the selling centre for Queensland. Wool sales are usually held in four days' series, about 50,000 bales being allotted for each series of which usually nine or ten are arranged in the course

of the year. Two distinct catalogues are prepared for the sale of wool by auction, one the bulk catalogue which includes all lines having five bales or more, and the other or "star" catalogues having four bales or less. Other wools—fadges, butts and bags—not eligible for either of these catalogues also are received for sale. A fadge is an ill-shaped container not in keeping with the regulation size or measurement. If a properly shaped container or bale gives a gross weight of less than 200 lb. of greasy wool it is called a butt. Bags of various sizes are also received and are sold with the fadges and butts, but are disposed of more by barter and not auctioned.

When the brokers are preparing for a sale a specified proportion of the bulk lines are exposed for the inspection of prospective buyers for a few days prior to the sale. Here the valuers have the opportunity of obtaining the broker's calalogue, which contains all necessary particulars of all the wool listed for sale (Plate 160).

Wool sale week in Brisbane is a busy time for both brokers and buyers, each of whom is engaged in valuing. The broker must, in the interest of the owner, estimate approximate values before the sale. The order of sales during a series is decided by the brokers, and sales usually commence in Brisbane at 3 p.m. at the Wool Exchange.

The wool is offered in accordance with its lot number in the catalogue. Most of the wool sold in Brisbane is bought for export. All bales are dumped before shipment (Plate 161).

Wool included in the star lot catalogue is also sold by auction and the competition is generally well spread, the prices obtained are not as satisfactory to the growers as the prices for bulk lines. Scoured wools also are included in these two catalogues, but, generally, buyers and manufacturers prefer to purchase their wool in the grease.

MANUFACTURE.

The classing of wool for sale as practised in the shearing shed is quite different from classing in preparation for manufacture. In the station shed the fleece is classed as a whole, but for the purpose of manufacture each fleece must be divided or, as it is called, sorted into as many spinning qualities as it contains, and each sort matched with similar lengths and qualities—termed matchings—of other fleeces. As all the wool purchased by the manufacturers must be scoured and sorted it is more satisfactory to sort it beforehand as it can then be handled quicker and sorted with greater accuracy. Knowing the purpose for which the wool is required the station-classed fleeces are acceptable to the manufacturers whose choice is based on the particular spinning quality required.

Length and spinning quality of wool varies according to the breed of sheep producing it. The Lincoln, for instance, carries the longest and strongest wool of any of the British breeds, its wool varying in length up to 12 inches for twelve months' growth, and from 24^s to 36^s in spinning quality. The English Leicester also produces a long, lustrous wool up to 10 inches in length, and from 36^s to 44^s in spinning quality. The Border Leicester is another long wool breed, but its wool is shorter than the English Leicester and has a spinning quality of 44^s to 46^s. Its wool is also of a lustrous colour, a valuable advantage in dyeing. The Romney Marsh is another of the white-faced British long woolled

Plate 160.
A Wool Showroom Floor, Brisbane, Queensland.

breeds, but its wool is shorter than that of the Border Leicester and is of a duller or demi-lustre colour not so distinct in staple or character, and rather harsh and straight in comparison with that of other breeds when length of staple is considered. All of these breeds cross well with the merino, and their progeny produce a most useful type of wool, influenced to a considerable degree by the merino.

Among the Downs breeds are the Southdown, Dorset Horn, Shropshire, Suffolk—all of which produce a strong hosiery type of wool harsh in nature and short in growth. Their wool does not come into the

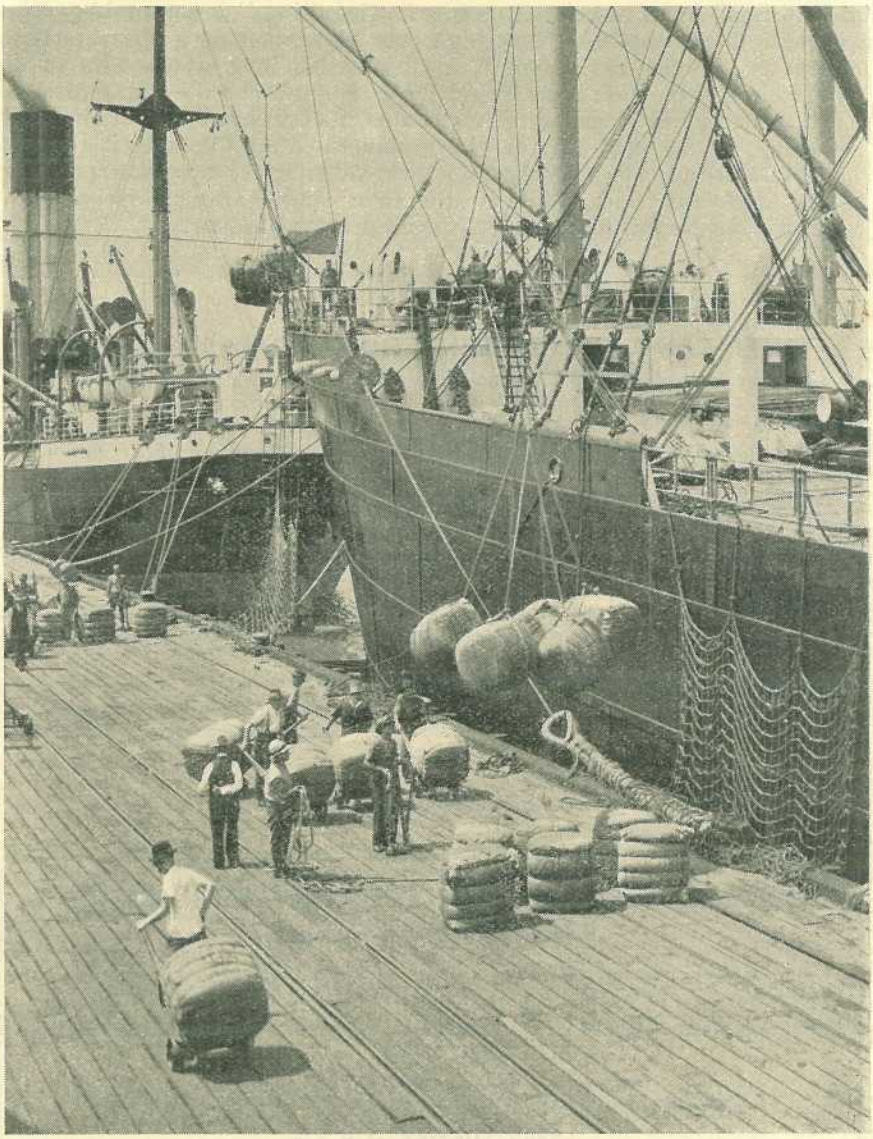


Plate 161.
Shipping dumped wool at the port of Brisbane.

combing class, being strong enough but too harsh and undefined, and it loses too much as noils in the combing process. Moreover, it is of a chalky white colour, and is carded and soft spun for knitting and similar purposes.

Merino produces the finest and best-quality wool of any of the breeds, and as over 98 per cent. of the wool sold in the Brisbane market is merino, its importance to Queensland is undeniable. There are three distinct grades of merino, however, and in spinning quality they vary from 60s to well over 80s in spinning counts. Merino wool is usually a bright white, but not of a lustrous colour; although a creamy white merino wool, when associated with soft "handling," is acceptable. The breed produces wool of a very high character, showing a characteristic crimp, not waves, as is found in the British long wools. Its outer surface in construction is scaly and these crimps and scales or serrations, as they are correctly called, give the wool its remarkable elasticity and softness. As the wool fibre carries innumerable minute cells, it renders its adaptability to absorb moisture a most valuable characteristic peculiar to the wool fibre only, while at the same time is retains its warmth when wet—a very valuable asset possessed by wool alone.

SHEEP LAND FOR GRAZING HOMESTEAD SELECTION.

A resumption from Bierbank holding has been surveyed as portion 2, parish of Fairlie, and will be open for grazing homestead selection at the Land Office, Charleville, on Friday, 12th May, 1939.

The portion is situated about 24 miles south from Cheepie railway station, on the Quilpie railway.

The portion has an area of 38,667 acres, and the term of lease will be for twenty-eight years at an annual rental of 1¼d. per acre for the first seven years.

A condition will be that the selection must be stocked to its reasonable carrying capacity with the applicant's own sheep during the first three years.

The portion is watered by Beechal Creek, waterholes, and by an earth tank, and the country is described as gravelly mulga ridges with several nice flats along the creek frontages, and grassed with button, Mitchell, Flinders, mulga, blue, wire, kangaroo, and other useful grasses and herbage.

Free lithographs and full particulars may be obtained from the Lands Department, Brisbane, the Land Agent at Charleville, and the Queensland Government Tourist Bureaux at Sydney and Melbourne.

Seeds Every Farmer Should Know.

F. B. COLEMAN, Officer in Charge, and R. J. HOLDSWORTH, Inspector, Seeds Fertilizers, Veterinary Medicines, Pest Destroyers, and Stock Foods Investigation Branch.

[*Continued from p.* 622, *Part* 5, *Vol. XLVIII.—November,* 1937.]

PART IV.

XANTHIUM PUNGENS (Noogoora Burr).

(Fig. 9.)

Common Name.—Noogoora Burr.

Description.—The seeds are enclosed in a tough elongated very spiny covering, the spines being up to 3 mm. long, and carrying a small hook at their extremities; at the end opposite to the point of attachment, will be found two—by comparison—very stout spines also carrying hooks. These hooks are usually lost when the seeds have been subjected to any rough handling.

The colour varies from light to dark brown and when weathered is very dark.

Size.—This varies, normal full sized specimens being 25 mm. x 12 mm.

Kernels.—Each burr contains two seeds or kernels of greyish appearance; these vary in size according to the burr from which they originate, the kernels in each burr being unequal in size.

As a rule one of the seeds germinates first and in the process lifts the burr still containing the other ungerminated seed above the soil. Provision is thus made for a fresh crop of Noogoora seedlings during the next suitable season.

Occurrence.—Commercially, Noogoora Burr is sometimes found as an impurity in chaff.

It has been found that the soaking of Noogoora burr seeds for 3 minutes in an arsenical sheep dip diluted 1 part to 200 parts of water (0·2 per cent arsenic) failed to prevent germination, but when the burr seeds were found in wool and this was soaked in the above solution and the burr and wool allowed to dry together over a lengthy period the seeds failed to grow.

The sale of material containing Noogoora burr is prohibited under the provisions of both the Seeds Act and Stock Foods Acts.

XANTHIUM SPINOSUM (Bathurst Burr).

(Fig. 10.)

Common Name.—Bathurst burr.

Description.—The seeds are enclosed in a tough hard very spiny covering. Spines are up to 2½ mm. long, and carry a small hook at their extremities. The two stout spines found on Noogoora burrs are absent in Bathurst burr. With a Bathurst burr the spines are readily rubbed off the seed covering.

Size.—This varies; normal full-sized specimens measuring 7 mm. x 5 mm.

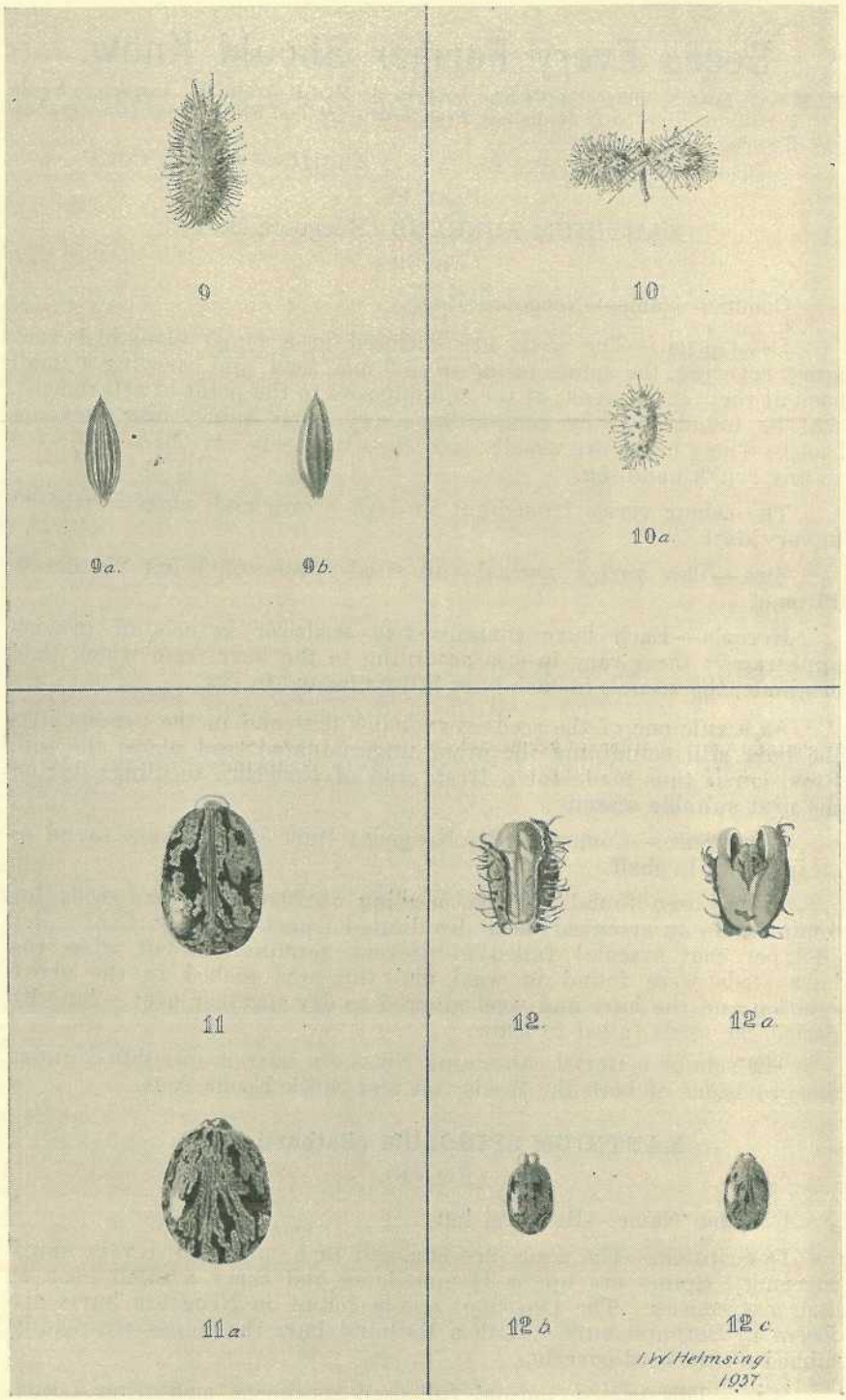


Plate 162.

Kernels.—Each burr contains two seeds or kernels. These vary in size according to the burr containing same.

Occurrence.—Commercially, Bathurst burr is found in seeds of Japanese millet, Sudan grass, Setaria (Panicum), cowpeas, also in chaff.

These two burrs are a serious menace to the wool industry; a careful examination of the burrs will readily convince one of their ability to cling to the wool; as abovementioned, each spine, of which there are many per burr, is provided with a hook that makes a first-class instrument of attachment to the fleece—thereby ensuring their distribution over a wide area.

RICINUS COMMUNIS (Castor Oil Bean).

(Figs. 11 and 12.)

Common Name.—Castor oil bean.

Description.—The characteristic markings of these seeds once seen are easily remembered. The seed, with a distinct point of attachment at one end, gives the appearance of a beetle, which is heightened by the brown and white markings and flattened appearance. No two seeds are patterned exactly alike.

Size.—This varies greatly according to variety, but is commonly from 25 x 14 x 8 to 9 x 6 x 4 mm.

Occurrence.—This seed has not been recorded as occurring in crop seeds, but in the past has been found occasionally in hay or chaff.

Castor oil beans are found growing wild in Queensland, but in some parts of the world are cultivated for their oil content.

Unfortunately the beans of the castor oil plant are toxic, but poisoning is only likely to occur when the beans have by mischance been introduced into hay or chaff. It behoves any person who has these shiny leaved plants growing near hay crops to take such precautions as are necessary to prevent their accidental introduction into stock food.

The residue resulting from the extraction of oil must not be fed to animals; it is usually disposed of as a fertilizer.

Fatalities have sometimes been recorded in Europe from feeding other kinds of oil cake in which traces of castor oil cake have been found.

The castor oil of medicine is extracted from the castor oil beans, nevertheless as the beans are very poisonous they must not be eaten.

DESCRIPTION OF PLATE 162.

Fig. 9 Noogoora Burr—Xanthium pungens.
Fig. 9A Noogoora Burr—Seeds.
Fig. 9B Noogoora Burr — Seeds reverse side.
Fig. 10 Bathurst Burr—Xanthium spinosum, seeds and spines.
Fig. 10A Bathurst Burr—Xanthium spinosum, seeds and spines.
Fig. 11. Castor Oil Bean—Ricinus communis, medium seeded.
Fig. 11A Castor Oil Bean—Ricinus communis, medium seeded.
Fig. 12 Castor Oil Bean—Enclosed in outer coat.
Fig. 12A Castor Oil Bean—Outer coat partly removed.
Fig. 12B Castor Oil Bean—Seed.
Fig. 12C Castor Oil Bean—Seed reverse side.

All natural size.

Toxic Principle.—The toxic properties—according to Harold C. Long in "Plants Poisonous to Live Stock"—of the bean are due to Ricin, a toxin which is similar to bacterial toxins; activity is destroyed by heating at 100 deg. C. The beans also contain the alkaloid Ricinine, the toxic principles of which are regarded as doubtful.

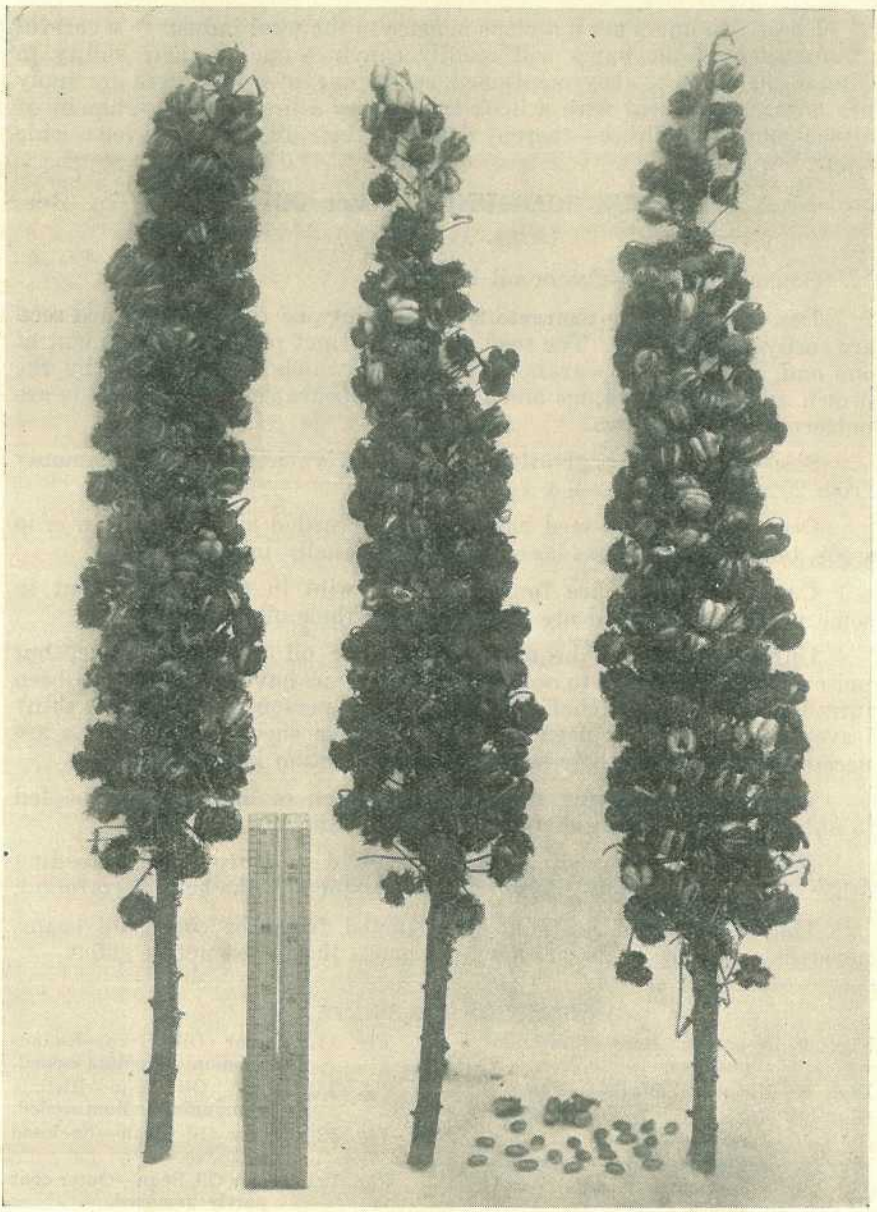


Plate 163.
Three heads of Castor Oil Seeds showing the characteristic seed husks.

Sampling of Seeds.

F. B. COLEMAN, Officer in Charge Seeds, Fertilizers, Veterinary Medicines, Pest Destroyers, and Stock Foods Investigation Branch.

FOR some time it has been apparent that various samples of seeds received for testing do not truly represent the bulks from which they were drawn, or are otherwise unsatisfactory.

The errors involved have included the following:—

(*a*) Samples have been drawn from far too small a number of bags.

(*b*) Some samples have obviously contained seeds drawn from two or more bulks of different origin.

(*c*) The marking of the sample has been insufficient to enable correct identification of the bulk at a later period.

It should be realised that as much care is necessary in obtaining samples as is taken with their examination. The examination of a sample is limited to the quantity received—all of which is under control. On the other hand, when drawing a sample the person concerned is often confronted with many difficulties. For example, the goods are stacked in awkward and often very inaccessible positions; sometimes hard physical work is required to draw a sample from even a small quantity. Variations in the goods themselves, &c., are other complicating factors sometimes met with.

All of these difficulties *must be overcome,* otherwise the sample is valueless.

The objective of any person drawing samples should be to obtain from the bulk a sample (or samples) truly representative of the bulk, irrespective of all or any difficulties that may be encountered, and to then mark this sample (or samples) in a manner that definitely connects up with the bulk.

One should always ascertain whether the whole consignment has a common origin and destination. A separate sample should be taken for each of the following:—

(*a*) Seeds of different kinds.

(*b*) Seeds of the same kind from different origins.

(*c*) Seeds of the same kind for different addresses.

(*d*) Seeds of the same kind bearing different brands or marks on the containers.

It is most important that each portion taken from a bag should be examined to see if it corresponds with the other portions which are together to comprise a sample. For instance, if, when taking a sample of seed there is an observed difference in the colour, size, or appearance of the seed, or the presence of insects or material other than seed, &c., then each difference should be represented by a separate sample; this would necessitate the examination of every bag in the consignment, and a classification of all bags into groups of similar types—one sample representing each different type.

It should be remembered that seeds are not like sugar, flour, &c.—standard products of a factory.

Experience teaches that seeds are liable to vary from bag to bag. Even a consignment from one farm sometimes varies, and further, no two fields necessarily produce seed of equal quality. Therefore, if only one sample is forwarded as representing a mixture of two or more lots of seed, good seed may be condemned or poor quality seed may be passed. *Sampling operations must include intelligent examination and, if necessary, grouping of the portions that are drawn to comprise the sample or samples.*

In cases where variations in a consignment are noticed—such as warrant extra samples—then the particular bags from which the various samples are drawn should be marked either singly or in groups with identification marks such as A, B, C, D, &c., to correspond with the various samples which should be similarly distinguished.

The weights of samples specified in this article are a minimum; larger quantities may be forwarded. The practice of extracting the overweight from a sample found to be slightly in excess of the minimum required, cannot be too strongly condemned.

Of course, in drawing a sample from a large number of bags, it is usually necessary to obtain far more than the minimum weight prescribed —in which case the sample should be thoroughly mixed and a suitable portion extracted as the final sample. This breaking down of large samples is dealt with later.

An understanding of, and strict adherence to the principles underlying sampling procedure are necessary to ensure that correct samples are drawn.

There seems to prevail an idea that drawing representative samples of seeds is a simple matter; the fallacy of such an idea is an ever-recurring fact in our experience.

Let us consider for what purpose samples are intended. In the case of seeds for sowing, the interested parties are concerned as to whether the seeds being sold comply with the prescribed standards. In the case of a producer, wholesale buyer, or wholesale seller, it is primarily desired that the bulk—maybe several hundred bags—is up to the standard prescribed. It is often not realised when handling these bulks that they may ultimately be sold in small parcels, which, of course, must also individually be of the desired standard. An individual purchasing, say, 30 lb. of seed for his own sowing, is only concerned that the parcel purchased by him is of a quality suitable for sowing.

We are now faced with the position that the wholesale buyer and seller are primarily interested in the bulk, whereas the retail buyer is vitally interested in the quality of his small parcel, which to him is of very great importance.

Unfortunately, the method employed by so many who forward samples for testing is based upon the rough and inefficient method of "grabbing" a few handsful of seed from any bag or bags; further, even this is often delegated to a junior employee. It is obvious that a sample

obtained by this method cannot be taken as representative of every small lot that may be sold from the bulk. In certain cases, a number of samples from the one bulk are necessary.

It cannot be stressed too strongly that in drawing samples, as great care is needed in order to make the sample truly representative of the bulk, this important task should devolve on some responsible person who is capable of exercising judgment and discretion.

Sellers of seeds for sowing should realise when purchasing in bulk that they intend to sell in small quantities. Unless the bulk is uniform throughout, it is difficult for them to give their customers satisfaction and to escape the consequences of a breach of the Seeds Act. To illustrate what can happen with the incorrect drawing of samples, the following experience is given in detail.

A sample of *Paspalum dilatatum* seed was received from a seller and found to have a germination of 36 per cent. in six days. An examination of the bulk, bag by bag, however, revealed the following germinations:—

Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
20	22	21	3	11	25	26
21	20	44	20	29	27	28
28	7	22	30	20	31	24

An analysis of the above reveals the following:—

Number of samples that germinated—

Over 30 per cent.	2
20 per cent. to 30 per cent.	16
Under 20 per cent.	3

which means that probably only two, or at most three, bags were used to obtain the sample first examined. Any person who had bought on the sample submitted to this Seed Testing Station, to use a colloquialism, would have "bought a pig in a poke."

If the person who drew the sample in the first place had been experienced, he would have observed differences in appearance, or discovered differences in origin, and would have drawn samples representing several different lots or possibly would have taken a sample from each bag.

A further illustration of the results of incorrect sampling is as follows:—

A merchant forwarded a sample of oats for examination, which was found to contain only a trace of Cape barley and wheat, and 1·4 per cent. inert matter, mostly damaged seed. This sample was drawn from about twelve bags. When a seed inspector drew a sample from the same stock a few days later, he obtained his from over one-half of the bags—the bulk being 100 bags. The subsequent analysis of this sample revealed the presence of 1·8 per cent. wild oats, Phalaris, Cape Barley, and wheat, and 1·5 per cent. damaged seed.

The trace of weed and/or other crop seeds in the merchant's sample became 1·8 per cent. in the inspector's sample.

Because of the unsatisfactory position with respect to samples, all certificates and reports relating to samples forwarded by merchants, and buyers, to the Brisbane Seed Testing Station are marked as follows:—

> "This certificate is not a guarantee by the Department of Agriculture and Stock as to the bulk, but an analysis of the sample received and its condition at the time of such analysis."

Certificates relating to official samples drawn by inspectors of the branch do not bear this statement.

The usual method of drawing a sample is by means of a trier—a brass or steel tube with a sharpened end—which should be inserted to its full length into each bag and a small quantity of seed drawn off.

When sampling seed that does not run—such as Rhodes, Paspalum, and Prairie—a trier is useless, and, therefore, each closed bag must be cut, an "L" shaped incision about 2½ inches by 2½ inches being required. The hand should be inserted through the hole and a portion obtained for the sample.

When a small number of bags is being sampled it is necessary to draw a number of portions from each bag.

Not less than a trier full of seed or a handful should be drawn from any one bag.

The following rules summarise sampling procedure:—

When drawing samples it is of the utmost importance that they be drawn by a responsible person and care be taken to make them truly representative of the bulk.

To enable this to be done satisfactorily approximately equal parts should be drawn alternatively from the top, middle, and bottom of the bags, the proportion of bags to be sampled being as follows:—

1 to 19-bag lots	A portion from each bag.
20 to 39-bag lots	A portion from each of not less than 20 bags.
40 to 59-bag lots	A portion from each of not less than 28 bags.
60 to 79-bag lots	A portion from each of not less than 32 bags.
80 to 99-bag lots	A portion from each of not less than 36 bags.
100 to 199-bag lots	A portion from each of not less than 40 bags.
200 bags and over	A portion from each of not less than 20 per cent. of the total number of bags.

If, when drawing samples, it is observed that great variation occurs in the bulk, two or more samples should be obtained, each from bags whose contents are similar, and representing the variations that may have been noticed. These different lots should be marked with distinguishing marks, and the samples marked similarly.

After a sample has been drawn as above indicated, it should be emptied out on to a large piece of paper, thoroughly mixed, and then a quantity not less than the prescribed weight for the particular kind of seed should be drawn for purposes of forwarding to the Seed Testing Station. A duplicate sample should be kept for reference.

BREAKING DOWN LARGE SAMPLES.

To reduce large samples of seed, the following procedure should be closely adhered to:—

1. After drawing a representative sample from the required proportion of the bags or bulk, place the seed on to a large level sheet of paper, preferably on a table or bench.

Plate 164

Drawing Official Samples.—Note the trier marks in the top, middle, or bottom of the bags. The trier holes have been outlined with marking ink for purposes of demonstration; actually the holes left when rubbed with the point of the trier almost seal themselves up, and are practically unnoticeable.

2. Mix the seed thoroughly together by means of a spatula, plasterer's knife, or large knife blade, taking care the blade is inserted into the heap close to the paper, thereby lifting any small seeds, &c., before turning the blade over to form another heap. This should be done until all the seed has been turned over at least three times. Avoid mixing with the fingers, as this allows small seeds and fine material to collect at the bottom of the heap. This fine material *must be lifted up on the blade and mixed through the sample.*

Now proceed to divide the sample by levelling it out and dividing it into four approximately equal parts, simply by drawing the spatula or knife through the heap from top to bottom and left to right.

Now take the top right-hand part and the bottom left-hand part, place them together on a sheet of paper, and keep as the sample. The other two parts should be mixed together and retained as a check sample.

It is obvious that if a portion is rejected this procedure will reduce the size of the sample drawn. After mixing again, the dividing procedure can be repeated to further reduce the size, and so on, if necessary. Too big a reduction of size is not recommended.

A sample, after mixing and dividing, would appear somewhat as follows:—

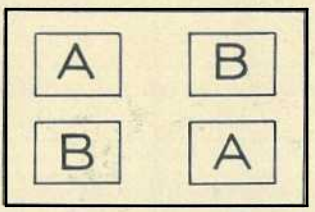


Plate 165.

Parts A, mix and keep as check samples.

Parts B, mix and forward for analysis.

Where samples are taken by inspectors, the Act requires the final sample to be in three separate packets, and a more complicated method of mixing and breaking down is used.

In the accompanying photograph of an inspector drawing an Official Sealed Sample, it will be observed that the stack is numbered 18370. The marking of the packets—Official Sealed Samples are divided into three parts—one for the vendor, one for analysis, and the third is retained by the inspector—would be as follows:—

"Sample of Oats drawn from 50 bags representing a total of 120 bags marked 18370.
Ex S., Farmer of Oatville.

Vendor, A. Seedseller, Summertown.
7th February, 1939."

Sealing is carried out by means of lead seals and sealing pliers which emboss certain marks on the seals.

Samples forwarded for examination should be of the following minimum weight:—

Kind of Seed.	Weight Required.
Barley	8 oz.
Beans	8 oz.
Beet	½ oz.
Cabbage	½ oz.
Canary	4 oz.
Carrot	½ oz.
Cocksfoot	3 oz.
Couch	3 oz.
Cowpeas	8 oz.
French Millet	4 oz.
Grasses	3 oz.
Japanese Millet	4 oz.
Linseed	4 oz.
Lucerne	4 oz.
Maize	8 oz.
Mauritius Beans	1 lb.
Millets	4 oz.
Molasses Grass	3 oz.
Oats	8 oz.
Onion	½ oz.
Panicum	4 oz.
Parsnip	½ oz.
Paspalum	3 oz.
Peanuts	2 lb.
Peas	8 oz.
Phalaris tuberosa	3 oz.
Prairie Grass	4 oz.
Radish	½ oz.
Rhodes Grass	3 oz.
Rice	8 oz.
Rye Corn	8 oz.
Rye Grass	3 oz.
Sorghum	4 oz.
Sudan Grass	4 oz.
Tares	8 oz.
Tomatoes	½ oz.
Vegetable Seeds in made-up packets	5 pkts.
Wheat	8 oz.
White Panicum	4 oz.

Where seeds are stored loose in bulk, the samples should be taken from various parts of the heap or bin, and should be of the like proportion, as nearly as can be fairly estimated, as would be required if such seed were in bags, so that a representative sample of the whole bulk is obtained.

In the case of seeds not mentioned above, the weight set out for the seed of nearest size should be forwarded.

In the case of seeds obviously containing weed seeds or other impurities, not less than double the weight mentioned should be sent.

In the Seed Testing Station great pains are taken to ensure absolute accuracy of work. It therefore follows that all this care is wasted unless the person forwarding samples for examination takes some trouble to ensure that the samples drawn truly represent the bulks from which they are obtained.

Marking of Samples.

All samples must be plainly written on in ink, setting out the undermentioned particulars:—

Sample of seed drawn from bags,
representing a total of bags.
Bags marked:
Purchased from , of , on
Name of sender:
Address:
Date:

The examination of samples without name and address of sender cannot be undertaken.

Samples should be addressed as follows:—

Seed Sample for Examiantion.
Officer in Charge,
Seed Testing Station,
Department of Agriculture and Stock,
Brisbane.

Special care should be taken to securely fasten up the sample. The examination of samples that have been opened in transit is useless for any determination, as only a sample received intact could be taken as representing any bulk.

Fee and Covering Letter.

A covering letter, enclosing the prescribed fee, should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The fee for a copy of the result of any examination of any seeds is as follows:—

1. 2s. 6d. per certificate; or
2. (*a*) £3 10s. for the first fifty certificates and thereafter 1s. per additional certificate during the twelve months ending 30th June, providing the sum of £3 10s. is paid in advance: Provided that—

(*b*) In the event of any person claiming a refund of fees paid under 2 (*a*) on account of the number of certificates being less than fifty, such refund will consist of the amount left after the charge of 2s. 6d. per certificate has been made.

Free Examination.

Samples representing seeds purchased by farmers for their own sowing are examined free of charge, providing that the full particulars as above are marked upon the sample and a covering letter stating the purpose for which the seed is to be used is forwarded.

Complaints.

In case of any complaints regarding analytical purity or germination, the buyer should at once send a sample of the seed, marked with the particulars as above set out, together with a covering letter to the Department advising of the despatch of the sample; this will be examined free of charge.

Examine Goods on the Day of Delivery.

Both buyers and sellers are urged to examine all goods on the day of delivery, and when in doubt regarding any seeds, fertilizers, veterinary medicines, pest destroyers, or stock foods, communicate at once with the Department of Agriculture and Stock, Brisbane, in order that the matter may be investigated.

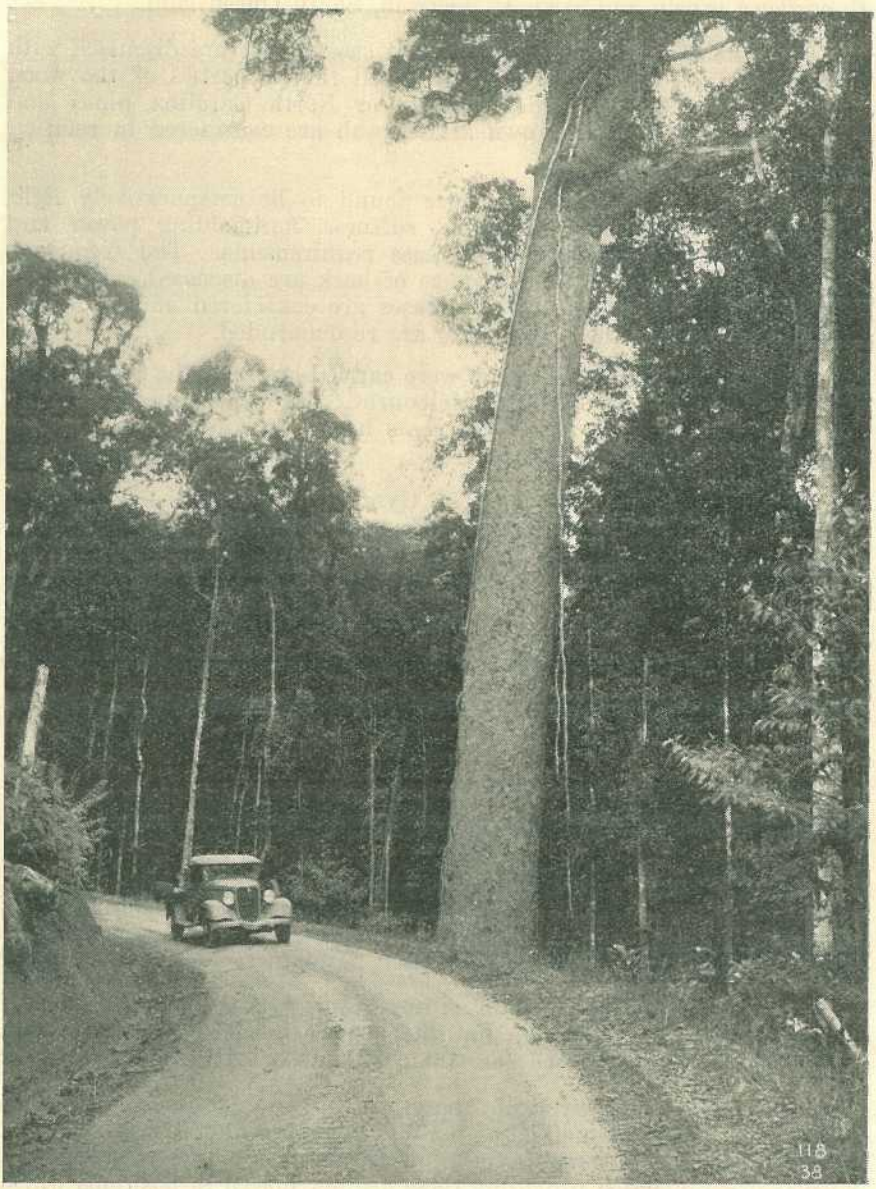


Plate 166. [*Photo.: Lands Dept.*

A Bend in the New Road through the Rain Forest, Danbulla, North Queensland.—Magnificent timber lands and new settlement areas are now easily accessible through the skill of the surveyor in alliance with the engineer.

The Suitability of Thinnings of Pinus taeda and P. caribaea for Pineapple Cases.

C. J. J. WATSON, and D. MOORE, Queensland Sub-Department of Forestry.

THIS report covers a study of the suitability for pineapple cases of timber from nine-year-old unpruned thinnings of *Pinus taeda* and *P. caribaea* grown and sawn at Beerwah, South Queensland.

The general requirements of a fruit case timber are discussed with reference to hardwood and softwood, and the properties of the wood of thinnings of *Pinus taeda* (loblolly or North Carolina pine) and *P. caribaea* (slash pine) grown at Beerwah are considered in relation to these.

The fast grown thinnings were found to be comparatively light and the properties of workability, softness, nail-holding power and colour were very satisfactory for case requirements. The frequency of knots, staining, and the allowance of bark are discussed. The sizes of the boards for making up into cases are considered and the green dimensions to yield the best results are recommended.

Service tests on both timbers were carried out, and the results with packed cases sent to Sydney, Melbourne, and Auckland are given. Trade comments showed that the cases had a definite appeal, both to the grower and the buyer.

In the area from Caboolture to Gympie, including the Kilcoy and Mary Valley branches, it is estimated, on the basis of 1935 production, that about 10,000,000 super. feet log measure (Hoppus) of Pine thinnings are required to meet the annual fruit case requirements. However, on account of the cheapness of the hardwood case (11d. per 1½-bushel case) compared with the pine case (1s. 1d. per 1½-bushel case), about two-thirds of the cases used for bananas and pineapples are of hardwood.

At present, the quantity of pine used annually for all types of fruit cases in this area is estimated at 4½ million super. feet log measure (Hoppus).

Requirements of a Fruit Case Timber.

The present demand for fruit case timbers in Queensland is met by both hardwood (mainly rose gum, the lighter and softer types, blackbutt, and white gum) and hoop pine, the latter being used where a more attractive case is required. The general requirements of fruit cases in Queensland may be summarised as follows:—

Lightness in Weight.—This is important insofar as easy transport and handling are concerned, but the grower is more concerned with lower cost of the hardwood case than with its heavier weight.

Strength.—The mechnical strength of a container is determined to a great extent by the method of nailing and strapping. Both pine and hardwood have sufficient strength for normal fruit case requirements. Knots can be included providing these are not placed in positions which might affect the nailing or the strength.

Grain and Colour.—This must be fairly smooth and attractive and preferably light-coloured for printing and labelling. In this respect, Hoop Pine is preferable, but the trade appears to accept the darker-coloured hardwood case without prejudice.

Workability.—Pine is superior to hardwood as far as softness and easy working are concerned, but the softer and lighter types of hardwoods are used with success.

Freedom from Taints and Moulds.—This is more important in the case of food containers than for fruit cases as far as odour and taste of the woods are concerned, providing this is not entirely objectionable. Certain moulds (such as *Penicillium*) may be harmful to fruit, and care in seasoning is necessary on this account.

Nail-holding Power.—The injury to the contents of the cases depends greatly on the nail-holding power of the timber. The hardwoods often split when ordinary pointed nails are used and the hold is decreased thereby. Blunt nails tend to overcome this trouble.

In the United States of America, it is estimated that the *Pinus taeda* (loblolly or North Carolina Pine) constitutes 70 per cent. of the total amount of yellow pine used for boxes. It is regarded as eminently suitable for this purpose, not only on account of availability and relative cheapness, but because of its softness, good working qualities, and lightness in weight.

The thinnings from the Beerwah plantations are of fast growth and generally less than six rings per inch, which standard is accepted as the optimum for strength purposes. In the first three inches of radial increment the typical rate of growth in stump sections is greater than 2 rings per inch. This growth rate slows down to 3-4 rings per inch and in some cases to 6-7 rings per inch in the 3-inch-4-inch zone measured from the pith. The rate of growth shown by cross-sections higher in the tree are somewhat similar.

The wood from the thinnings is thus lighter than the wood from the more mature trees, but is sufficiently strong for cases. The higher percentage of the softer early wood appears to be beneficial rather than deleterious as far as the nail-holding power is concerned. The lighter weight of the cases of the two Pinus species was favourably commented upon by growers as giving less labour in handling both in shooks and cases.

The workability, softness, and other properties were found to be excellent, and in every way equal to the first quality Hoop Pine.

According to American investigators (Benson H. Paul and A. Koehler), wood of fast-grown *P. taeda* trees showing less than four rings per inch generally shows an excessive longitudinal shrinkage. This defect has been found in some specimens of both *Pinus caribaea* and *P. taeda* grown at Beerwah and is being further investigated.

Even if excessive longitudinal shrinkage occurs through a large part of the fast-grown material, the observations on seasoning have shown that this will not be detrimental to its use for cases, since the shrinkage in a small piece is fairly uniform and the timber is dried before use.

Although some boards showed light-blue staining in places due to rather slow drying and showery weather, this did not spoil the appearance of the case and there was no objection by the growers. The dry pine did not stain the hands as did the hardwoods in a semi-seasoned state.

Growers did not object to a little bark on both edges providing the boards were reasonably strong, and such defects in a few boards enabled a reduction in price to be made. *Mr. Gregory stated, however, that the bark left on some boards was slightly wider than he would recommend and suggested a maximum of $\frac{1}{4}$ inch on *one* edge as a reasonable limit.

Knots were accepted as satisfactory by growers for pineapple cases, but should be limited in banana cases tops and bottoms in which the boards have a considerable bulge resulting in much greater stressing. The weight of packed banana cases are also greater necessitating a greater freedom from knots and defects than pineapple cases. The packed weights of the two cases are—

Pineapple cases	56 to 60 lb. per case.
Banana cases	98 to 116 lb. per case.

The ease with which the Pinus cases nailed was superior to hardwood and also better than Hoop Pine, splitting being absent on account of the greater toughness. An empty case, thrown 15 feet on to its corner, showed no splitting at the nails, and this was stated to be highly satisfactory for such a severe test. The nails were drawn slightly (about $\frac{1}{8}$ inch) and were tapped back into place again, restoring the stability of the case.

The nails recommended by the Department of Agriculture and Stock for banana and pineapple cases are—

Into "end grain"	$1\frac{3}{4}$ inch by 14 gauge.
Into "side grain"	$1\frac{1}{2}$ inch by 14 gauge.

The use of the longer nails in the "end" grain would give a case of uniform strength on account of the decrease in holding power of nails driven parallel to the grain.

In practice, however, it was found that most of the growers used $1\frac{1}{2}$-inch by 14 gauge nails all round for pineapple cases and did not get complaints.

In order to secure a direct comparison with the Hoop Pine and hardwood cases now used, Pinus species cases were made according to the usual trade practice for the service tests.

Green Dimensions of Case Boards.

The boards were cut to the following measurements (green size) :—

Ends	6 inch by	$\frac{3}{4}$ inch by	12 inch.
Cleats	2 inch by	$\frac{7}{16}$ inch by	12 inch.
Sides	$3\frac{3}{4}$ inch by	$\frac{3}{8}$ inch by	$26\frac{1}{4}$ inch.
Tops and bottoms ..	6 inch by	$\frac{5}{16}$ inch by	$26\frac{1}{2}$ inch.

In a few cases it was found that the widths of the ends and cleats were slightly oversize, due to the shrinkage allowance being too great or the boards being cut oversize. In the end boards, the seasoned width for making up should not exceed $5\frac{15}{16}$ inch, allowing the two pieces to be loosely pushed together to give a neat 12-inch width. Growers prefer

* Jas. H. Gregory, Instructor in Fruit Packing, Department of Agriculture.

a slight gap between inner edges of end boards to overwidth pieces which make the case exceed the 12 inches in inside height. At present many of the hardwood "ends" are as narrow as 5½ inch. The standard internal case measurement is 12 inches, and cases less than this, although often seen, are contrary to regulations. Three piece ends would be permitted if securely fastened to the cleats, the boards being of equal width.

Some cleats were unnecessarily wide and a maximum of 2 inches and minimum of 1¾ inches has been recommended by the Department of Agriculture and Stock.

The tops and bottom boards were satisfactory for pineapple cases, but the presence of too many knots towards the centre would render some of them undesirable for banana cases. For the banana cases, two 6-inch wide boards must be used for "tops" and "bottoms" to avoid bruising, but for pineapple cases the "tops" and "bottoms" can be made in three 3⅜-inch wide boards similar to the "sides." This concession in pineapple cases will materially assist in securing a greater number of cases from small Pinus logs, the only wide boards being the ends which can be sawn 5$\frac{15}{16}$ inches wide by ¾ inch thick by 12 inches long.

For the sides, it has been customary to use two 4-inch-wide boards at the edges and one 3-inch-wide board between these, as it is believed that a greater sawn return is secured. Some sawmillers, however, prefer to cut all "sides" the same width (to finish 3⅜ inches) and make three uniformly wide boards to the case side. This method saves considerable time in altering the "fence" on the bench which is probably more important.

The thicknesses of the boards were apparently quite satisfactory.

The following neat green board sizes for pineapple cases are recommended:—

	Ends. Inches.	Cleats. Inches.	Tops and Bottoms. Inches.	Sides. Inches.
Width	5$\frac{15}{16}$	1¾ to 2	3¾	3¾
Thickness	¾	$\frac{7}{16}$	⅜	⅜
Length	12	12	26½	26¼

These sizes will also provide for banana cases for all boards except "tops" and "bottoms" which must be in two boards, each 5$\frac{15}{16}$-inches wide.

Service Tests and Reports.

Twenty-seven (27) cases of pineapples packed at Palmwoods and Montville were forwarded to Sydney for examination by officers of the New South Wales Forestry Commission and the Manager of the Committee of Direction of Fruit Marketing. Thirty cases packed in the same areas were sent to Melbourne and a number was examined by an officer of the Council for Scientific and Industrial Research, Division of Forest Products.

Reports and trade comments on these cases were as follows:—

Sydney (New South Wales Forestry Commission).

"Two cases were seen . . . both being in a first-class condition without any depreciation due to handling. Mr. Wilson states that the cases are first rate and are satisfactory in every respect.

"Five cases were examined at the C.O.D.,* all of which were also in a first-class condition with no sign of breakage. . . . One of the hands who has had considerable experience with pineapple consignments stated that he could find no fault with the cases. . . . In the same consignment certain hardwood cases were damaged, but this did not apply to those made from the pine. One of the hands thought that the knots near the ends of the boards might allow breakage to occur. He was also concerned that nails could be driven so easily into the ends, but against this is the fact that the nails do not draw too readily, which is an important point, so altogether the objections do not appear to be of any serious consequence."

Sydney (Manager, Committee of Direction of Fruit Marketing).

"A good tough material much superior to hardwood both in appearance and rigidity when built. In comparison with the matured well-seasoned pinewood it appears sappy and coarse in texture. Six-inch boards show evidence of difficulty to cut without including bark and an irregular edge; this disability is fully compensated for by its clean appearance in every other respect and the useful feature to withstand the rough handling frequently experienced in transit."

Melbourne (Council for Scientific and Industrial Research, Division of Forest Products).

"The cases arrived in good condition and appeared to have stood up to transport handling as well as ordinary types of pineapple cases. They were of standard construction and of good appearance. Trade comments were favourable as follows:—

A.—The employee in charge of case handling considered the *P. taeda* cases consigned . . . equal in service value to customary types. He believed that the softwood was springier and likely to cause less bruising of the pineapples.

B.—The cases . . . had been sold before advice to inspect was received, but the consignee stated that he had been favourably impressed with them. He stated he was satisfied with their quality and expressed a preference for them compared with hardwood on account of weight and appearance, and believed they could carry pineapples better."

Comments made on this timber both from the growers and from the marketing trade have been favourable.

Pineapples were also packed by a grower at Victoria Point, Queensland, in 20 cases of *P. taeda*, and four cases with *P. taeda* sides and *P. caribaea* ends, and shipped to New Zealand. It is of particular interest to note that these cases were packed with the aid of wood wool made in Brisbane from *Pinus taeda* thinnings.

The consignor reported later that he was in a position to state that the case appealed to him in every way, and enclosed a letter from the consignees in answer to his request for their opinion.

He also stated that the cases were shipped in the usual way and wired, which is necessary for distant markets with any class of case.

The consignees at Auckland commented as follows on the cases:—

"The cases appear to be quite satisfactory and we feel confident in assuring you that you can safely use this box in future.

* Committee of Direction of Fruit Marketing, Queensland.

"You will be pleased to know that the fruit arrived in good condition . . . ."

In view of the above reports and the opinions of many interested growers there is no doubt that the cases appeal to the trade from the points of view of appearance, facility for nailing, toughness and lightness, and are sufficiently strong for normal trade practice.

Fruit Case Statistics.

The number of fruit cases required for the area from Caboolture to Gympie and including the Kilcoy and Mary Valley branches have been estimated from figures supplied by courtesy of the Committee of Direction of Fruit Marketing, to be as follows:—

Type of Case.	Est. No. of Cases.	No. of Super. ft. (Face measure)	No. of Super. ft. (solid measure) Per Case.	Total.
1½ bush.	1,000,000	11,660,000	4·83	4,830,000
1 bush.	300,000	2,502,000	2·56	768,000
½ bush.	200,000	1,104,000	1·65	330,000
Total ..	1,500,000	15,266,000	..	5,928,000

The equivalent number of super. feet (face measure) has also been calculated in the table above.

The case requirements for this area is estimated at about 6,000,000 super. feet of sawn timber (solid measure).

In progress report No. 1 of this Project, the sawn yield on log volume (Hoppus) was estimated at 60 per cent. for small diameter logs of thinnings of *Pinus taeda* and *P. caribaea*. On this basis about 10,000,000 super. feet log volume would be required to meet the case requirements of the above area.

The 1½-bushel cases are supplied both in hardwood and pine, the proportion of pine (according to the Committee of Direction of Fruit Marketing) being approximately one-third for this type of case, the other types being mainly pine.

The present requirements of sawn timber would thus be—

Hardwood (mainly *Euc. grandis*) 3,250,000 super. feet.
Pine .. .. 2,750,000 super. feet.

On this basis, the approximate annual log requirements of pine for fruit cases in this area based on 60 per cent. recovery would be approximately 4,500,000 super. feet (Hoppus). It is to be noted that these estimates are based on 1935 figures.

According to the "Queensland Year Book" for 1938, bananas and pineapples are the most important Queensland fruit crops, and were worth approximately £283,000 and £245,000 respectively in 1936-37. These fruits are produced chiefly in the Moreton and Wide Bay divisions.

Acknowledgement.

It is desired to express our appreciation of the assistance rendered by the Department of Agriculture and Stock, and in particular, Mr. J. H. Gregory, Instructor in Fruit Packing, for his helpful information in fruit case construction, and arranging the packing and forwarding of the experimental cases by experienced growers.

Thanks are also due to Mr. F. Nicklin, M.L.A., and Mr. H. Willmott, Victoria Point, who participated in the service tests and supplied valuable reports.

For fruit case statistics and service reports, we are indebted to the Committee of Direction of Fruit Marketing, Brisbane, the Division of Forest Products, Council of Scientific and Industrial Research, Melbourne, and the Division of Wood Technology, N.S.W. Forestry Commission, Sydney.

Finally, the packing and service tests could not have been carried out without the generous assistance and co-operation of the Queensland Fruit Growers' Society and principal growers at Palmwoods, Montville, and Victoria Point, all of whom showed a keen interest in the tests.

REFERENCES.

N. C. BROWN: Forest Products—Their Manufacture and Use (1919).
BUREAU OF INDUSTRY, QUEENSLAND: Queensland Year Book, No. 2, 1938.

SCIENCE IN FARMING.

The successful farmers in the near future will be the young farmers of to-day who are being trained in the use of scientific methods.

In the Old Country, particular attention is being given to improving the quantity and quality of beef in each animal, as the beef industry is of outstanding importance to the British farmer. Attention also is being given to scientific principles in the raising of all kinds of crops, so that acreage yields may be greatly increased. In Canada and the United States the same principles are being applied. In both those countries, the young farmer movement is very active. It is the same in New Zealand, where scientific methods have almost standardised the size and quality of the lamb and mutton exported to Great Britain.

Below the border, in New South Wales, junior farmers' clubs are taken seriously and they are increasing in numbers and influence. In Queensland, the young farmers' project clubs are also growing in strength. Down south, young farmers are entering crop competitions and are winning prizes against much older competitors. In a competition in the Murray Valley, a member of a junior farmers' club succeeded in growing maize at the rate of two hundred (200) bushels to the acre, although the average of most growers, under similar conditions, was much less than half that quantity. That crop, of course, must have been grown under irrigation.

Wood Wool for Pineapple Packing.

C. J. J. WATSON, Sub-Department of Forestry.

THE qualities of wood wool for industrial purposes such as the packing of breakables, confectionery and toys, and for upholstery and filtering are well known, but only recently has it proved to be of great value in pineapple culture under Queensland conditions.

In the pineapple industry, practical tests by fruit culture experts of the Department of Agriculture have shown that a special grade of wood wool is the most suitable material for—

(1) Protection of the ripening fruit against sun scorch;

(2) Packing matured fruit in cases for marketing.

Pineapple Protection.

During the long hot days and clear skies which are typical of the Queensland summer climate, the adequate protection of maturing pineapples becomes imperative if severe losses from sun scorce are to be avoided.

Grass and other materials have been used for this purpose, but wood wool of a special type has proved to be the most effective protection while being economical in use.

For this purpose, wood wool should be made from selected timbers possessing long tough fibres, while the strands must be accurately manufactured within specified limits with regard to width and thickness. These precautions have been found to be essential to give a product which will provide the correct coverage and protection from the sun, while teasing out well and wrapping securely round the fruit. It has been shown that wood wool with wide thin strands gives the best results.

Wood wool which does not afford adequate protection against the sun's rays, or is brittle in handling and does not hold securely to the fruit in all weathers, is wasteful to the grower both in material and in fruit.

Packing.—The principal requirements in wood wool for pineapple packing are the necessary strength and resilience to support and protect the fruit from damage during transit, attractive appearance, and freedom from odours and mould growth.

As a general packing material, good quality wood wool is much superior to sawdust or straw, as it is free from dust and dirt, in addition to being highly elastic and very light. For packing fruits and other food materials, it must have a light colour and be free from any disabreeable odours, resins, or moulds likely to taint or discolour the materials packed.

To give satisfactory teasing and avoid waste in short ends woods which are cross-grained or brittle in nature must be avoided, and the wood wool strands should not be too thick.

It is also essential to use wood wool which has been dried to a sufficiently low moisture content. Wood wool which is baled in a moist condition rapidly becomes hot and musty in the interior with the possible

risk of firing. High moisture contents also encourage the development of wood staining and fruit-destroying fungi in packed cases. On the other hand, overdried material becomes brittle and much of it may be wasted from breakage into short ends.

It has been found that some pineapple growers have suffered severe losses through the use of certain types of wood wool wihch are totally unfit for field covering purposes and not good for packing.

Complaints have also been made of the lack of standardisation in wood wool offered to growers, and the absence of any descriptive grade which can be confidently recommended to give good results.

In order to assist growers to secure a product of uniform quality suitable for the needs of the industry, the whole problem has been fully considered by fruit culture experts of the Department of Agriculture in conjunction with officers of this department. In addition, a number of practical tests have been made.

On the information secured from this work, the Queensland Forest Service has now prepared the specification given below. This is designed to give the best results both for preventing sun scorch and packing pineapples, and growers are now recommended to order "Q.F.S. Grade A Wood Wool" for all their work.

Wood Wool Specification for Pineapple Culture.

1. *Scope.*—This specification of the Queensland Forest Service applies to wood wool for use in the pineapple industry of Queensland for (*a*) covering the fruit in the field, and (*b*) for packing fruit for shipment.

2. *Timbers.*—The timbers permitted under this specification shall be—

Hoop Pine (*Araucaria cunninghamii*).

Bunya Pine (*Araucaria bidwillii*).

Taeda Pine (*Pinus taeda*) or other approved timbers.

3. *Moisture Content.*—The moisture content calculated on the oven-dry weight shall not exceed 10 per cent., nor be less than 10 per cent. at the time of baling.

4. *Grade Descriptions*—

Q.F.S. Grade A.—Wood wool to be white to cream in colour from straight-grained wood, tough and resilient in fibre, and free from gums, resins, stains, moulds, impurities such as dust, chips, and short ends under 4 inches in length, and any disagreeable odour.

Average fibre width, $\frac{3}{16}$ inch. Average fibre thickness, $\frac{1}{250}$ inch.

Q.F.S. Grade B.—Wood wool to be cream to light-brown in colour from straight-grained wood, tough and resilient in fibre, and free from gums, resins, dark stains, moulds, more than 2 per cent. by weight of short ends under 4 inches in length, and strong odours.

Average fibre width, $\frac{3}{16}$ inch. Average fibre thickness, $\frac{1}{250}$ inch.

The Depreciation of Soil Productivity.

[Bank of New South Wales Circular, Vol. IX., No. 1 (January, 1939); reprinted by kind permission of the bank authorities.]

I.—Two Conflicting Influences.

THERE are two conflicting trends at the present stage in the development of Australia's primary industries. On the one hand is the continued increase in production from nearly every branch of farming and pastoral activity due to the use of more intensive methods and increased expenditure on equipment, and on the other, a decline in the productivity of many areas due to the damage done by soil erosion and pasture deterioration.

These trends counter-balance one another in their effects on total production. For example, soil erosion may have caused a decline in the number of sheep which can be carried on a given area, but the yield of wool per sheep may have been increased by careful breeding and as a result there is no marked change in the total production. Nevertheless the full value of expenditure and effort in improving the quality of the sheep is not obtained, while the real extent of the loss caused by erosion is not apparent. In any attempt to estimate Australia's capacity for primary production in the future, it is essential that the relative importance of each of these factors should be determined. The main purpose of this article is to review those factors influencing the capacity of Australia's soils to produce wealth.

II.—The Trend of Output from Primary Industries.

In the twenty years since the Great War the total volume of primary production in Australia has increased 50 per cent. Under the influence of high prices and good seasons there was, until 1929, rapid expansion of wool and wheat production on the one hand and of the more intensive primary industries on the other. But when the stimulus of high prices was removed the rate of increase in production was checked and separate trends became apparent for the two groups.

First, both wool and wheat showed a pronounced slackening in the rate at which production was increasing. Gains in total wool production during the last ten years have been very small and have resulted mainly from pasture improvement in southern areas of high rainfall. In the vast pastoral areas of low rainfall and the tropical two-fifths of Australia which carry a big proportion of the sheep population, much increase in production by using such methods is not to be expected. Nor can a great deal be expected from the further extension of areas occupied by sheep in the arid regions, for in the last period of high prices sheep settlement was extended practically to the geographical limits, and, in some cases, actually beyond sound limits. Again, stock-carrying capacity has been increased in the past largely by providing

additional water and fences, which improved the thoroughness and efficiency with which pastures could be utilised. But these must be regarded as methods which have already been applied fairly widely and will not be as important again. It seems that possibilities for increased wool production from these areas lie not so much in the land as in improved methods of sheep breeding and management. Such gradual developments will be more than nullified if the present soil and pasture deterioration continues.

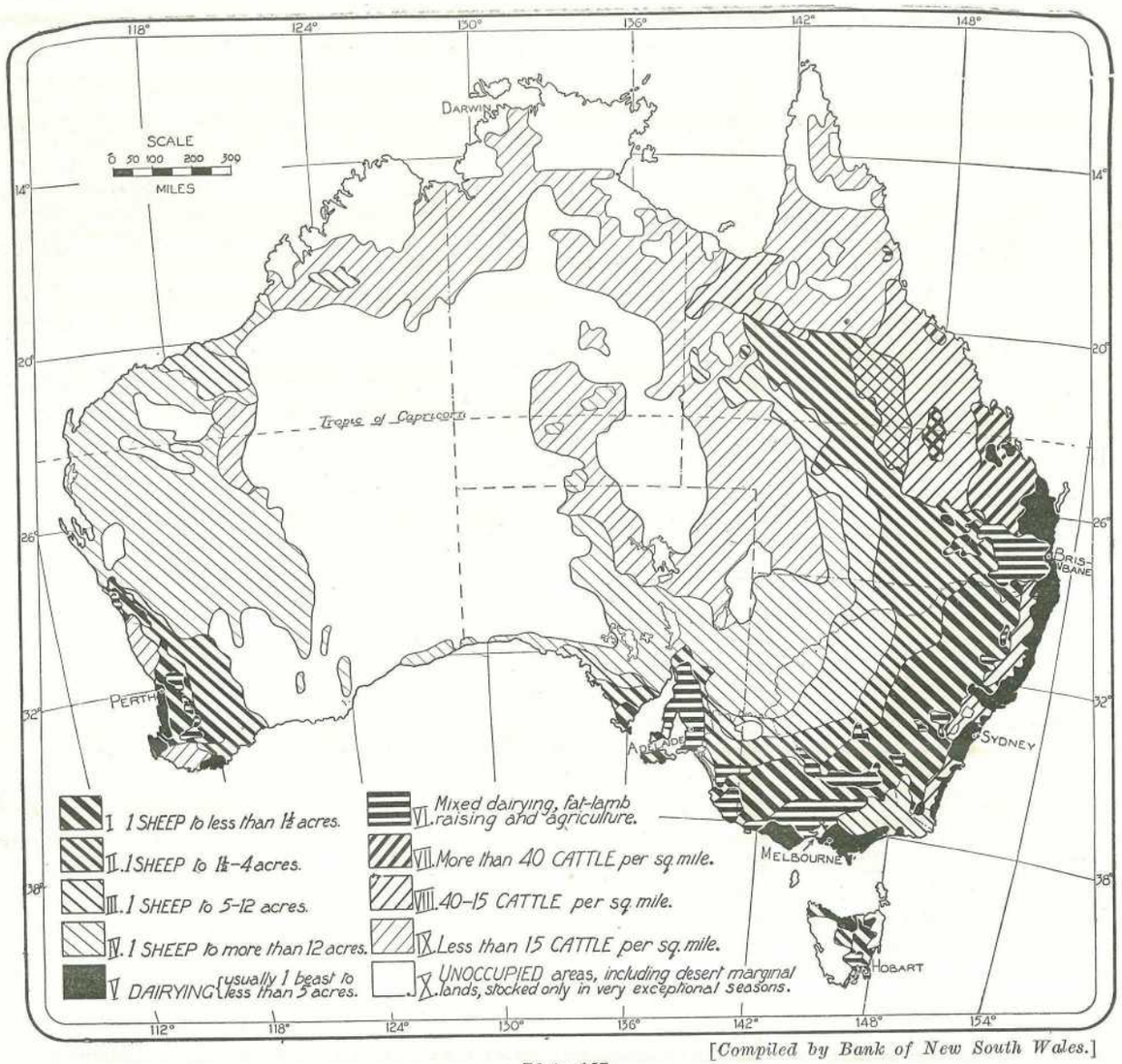
Wheat growing had been extended into marginal areas of doubtful value under the influence of economic and political stimuli which are not likely to be repeated, and to-day the acreage sown has returned to about the same level as it was ten years ago.

Improvements in cultivation methods and wheat varieties have not caused an increase in production from this acreage, for they are offset by unreliable yields in marginal areas and the results of unwise farming by producers who fail to adopt soil-conservation practices. In both the wool and wheat producing areas it is apparent that there is urgent need to conserve soil and vegetation if production is to be maintained.

The areas of intensive farming are comprised within Groups I., V., and VI. on Map I., which shows the general distribution of carrying capacity. Within these areas there has been a continued rapid increase in production of butter, cheese, and fat lambs, while in the irrigation areas, dried and canned fruits can be produced to the limit of the available markets. These increases have been made possible by improvements in farming methods, such as the more general adoption of pasture improvement, by the extension of irrigated areas in the Murray Valley and in Western Australia, and by reclaiming prickly-pear land and opening up new areas in Queensland. The map shows that these regions of intensive production form a relatively small part of Australia, although their economic importance is relatively great. They include those districts where erosion by running water is most serious. Therefore, if the nation is to reap the benefit of progress in methods of farming it is necessary that any deterioration of the soils in these areas should be checked.

The plain fact is that hitherto the importance of conserving soil and pastures has not been sufficiently observed. There are vague misgivings that we may have been profligate in our use of the land, but there is no general appreciation of the nature and extent of the problem. Immediate difficulties always receive more attention than long-term developments of greater importance. The loss of 2,000,000 sheep in a drought-stricken State is regarded with much public concern, but the fact that, at the same time, 20,000,000 acres of land may have suffered permanent damage which greatly lowers their productivity is usually given only slight attention. At the same time, soil conservation is hindered by alarmist and ill-informed reports, such as the much-discussed theory that the pastoral areas of South-western Queensland are threatened by the encroachment of sandhills from the deserts in the centre of the Continent. A recent pamphlet of the Council for Scientic and Industrial Research* shows that there is no foundation for this idea, although in the marginal areas some old sandhills have lost their former stability. These spectacular theories do harm by diverting attention from the real deterioration in pastoral areas caused by forces operating locally.

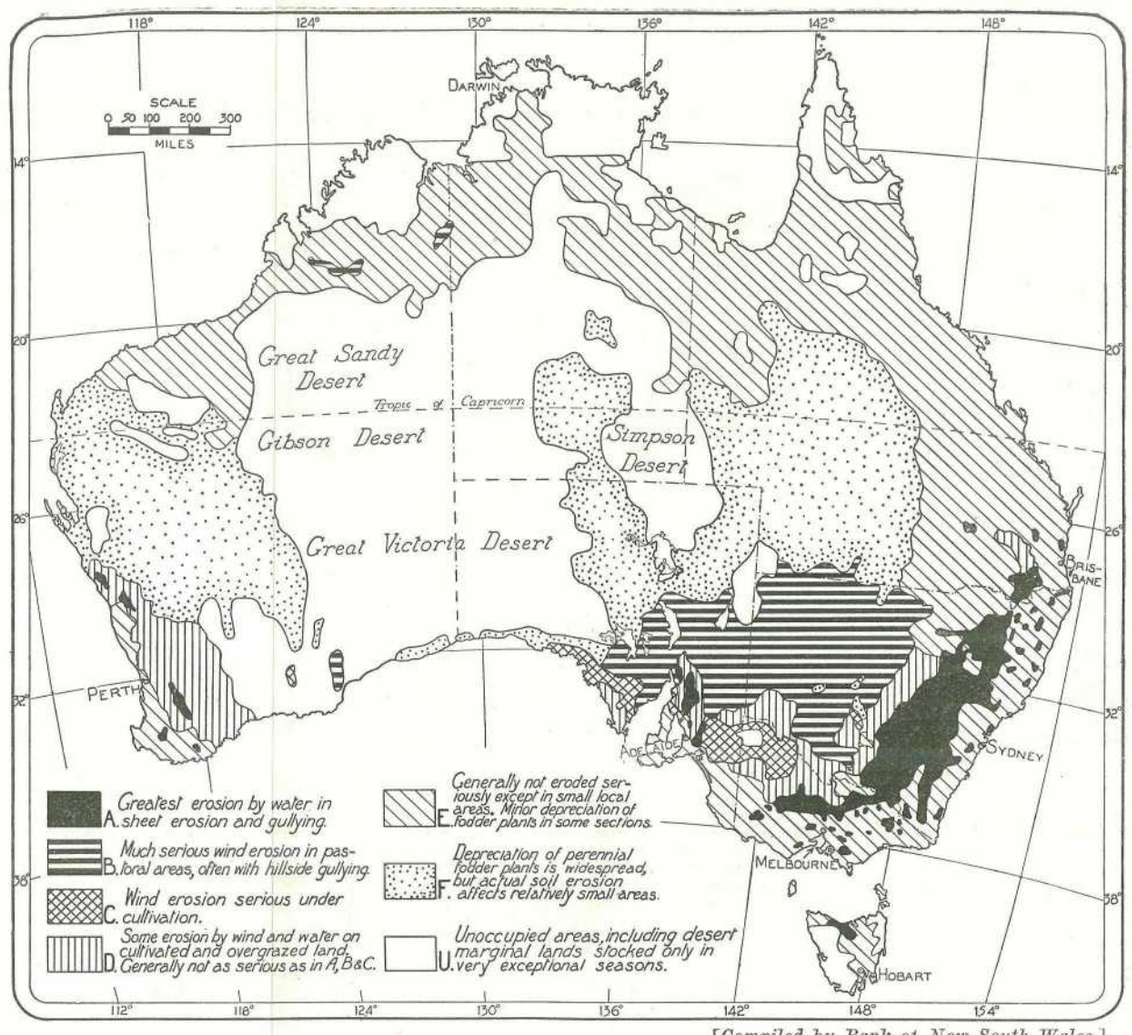
*C.S.I.R. Pamphlet No. 70. "Further Observations on Soil Erosion and Sand Drift, with special reference to South Western Queensland," by F. N. Ratcliffe, B.A.



[*Compiled by Bank of New South Wales.*]

Plate 167.

MAP I.—GENERAL DISTRIBUTION OF CARRYING CAPACITY.



[*Compiled by Bank of New South Wales.*]

Plate 168.

MAP II.—GENERAL DISTRIBUTION OF SOIL EROSION.

In the same way, oft-repeated comparisons with countries like Brazil and parts of South Africa, such as the native reserves, have little value in assessing the Australian position where agriculture and grazing are carried on against an entirely different sociological background. If we are to understand the potential effect of erosion on primary production, the first need is a survey of the facts of the problem in Australia.

III.—How Deterioration Occurs.

Occupied land suffers in two ways; first, by erosion of soil due to the action either of running water or wind, and secondly, by deterioration of fodder plants and soil fertility under occupation, even although soil has not been removed.

Probably the most serious form of soil erosion in its total economic importance to Australia is that caused by running water, but because the greater part of Australia has a fairly low rainfall, erosion by wind is more widespread than that by running water. Under natural conditions before white man's occupation, the soil on most of the forests and grasslands was more or less in equilibrium. The formation of new soil kept pace with the removal of soil by erosion which was very gradual and small. Most activities of man in preparing land and using it for cultivation or grazing animals have tended to upset this equilibrium and hasten the removal of soil.

One example of this is seen in the well-watered, hilly and mountainous regions of New South Wales and Victoria, which comprise some of Australia's most valuable grazing lands. To develop them and encourage the growth of grass, it was necessary to destroy forests. This was quite justified and could enhance the productive value of the land if carried out wisely and with due discrimination on dangerously steep slopes. But there was much unwise and excessive clearing of trees from positions where they were essential to prevent erosion. Also, many trees of great commercial value were indiscriminately destroyed. Where forests have been replaced by scanty pastures providing poor ground cover, often made worse by over-grazing, rainfall is not retained as effectively as on virgin bushland, and with increased run-off, loss of soil follows. Where sloping land is cultivated the same factors operate in still greater degree.

Wind erosion occurs mainly on wheat lands in low-rainfall areas and on certain of the semi-arid pastoral lands. The cause in both cases is the almost complete destruction of natural vegetation on soils of sandy to loamy texture which have proved to be readily susceptible to erosion. The wheat areas affected are in fairly well-defined districts, but the problem in pastoral areas is more complex. Both types are discussed in a later section.

Under many conditions where there is little actual erosion of soil, serious depreciation of pastures and fodder plants is taking place. The map of general distribution of soil erosion (Map II.) shows that about one-half of the occupied area of Australia is not subject to widespread and serious erosion, but this does not mean that there is cause for complacency about its continued productivity. A major factor causing depreciation in the quality of pastures is that for nearly a century they have been continuously grazed with no replacement of the minerals taken away from the soil in wool, meat, hides, and milk. As a result, original pasture species have been replaced by those whoch can subsist on lower soil fertility but which are also lower in nutritive value.

Deterioration of this type can be rectified by scientific fertilizing with, in many cases, the introduction of new pasture species. Such practices are rapidly gaining ground, but there is great need for more activity by many graziers and farmers. It is well established now that pasture improvement can be made a profitable investment under a wide range of soil and climatic conditions comprised approximately within the areas under Groups I., V., and VI. in Map I. There is the further advantage that by increasing the amount of cover on the ground and improving soil texture and water-retaining capacity, erosion can be effectively checked.

The vast sheep grazing districts of Queensland (see Map I.), which have been classified here as not subject to soil erosion, are an important example of an area where deterioration is suspected but where pasture improvement is not applicable. In the main they comprise soils which are not very easily eroded, although there is serious local loss around natural watering places and dams, where erosion occurs along animal pads with consequent accumulations of silt. Among the most valuable regions are extensive downs of fairly heavy soils, carrying annual grasses and herbage, and perennial grasses such as Mitchell grass (*Astrebla* spp.) which provide the principal stand-by in dry times. During the severe droughts of recent years the Mitchell grass disappeared to an unprecedented degree and there were misgivings about the future of these areas. However, when good rains came again, there was a remarkably good recovery.

The important question is whether that recovery was complete. It is very difficult to obtain a satisfactory comparison of the present quality of the pastures with that before the drought period which started in 1926, for there have been no scientifically conducted observations and general opinion is extremely varied and contradictory. There is evidence, however, to show that in many areas denuded in the droughts much Mitchell grass has been replaced by plants of little fodder value such as rolypoly (*Salsola* sp.), and by shorter-lived herbage species (*Bassia* spp., &c.) and annual saltbushes (*Atriplex* spp.). The reasons for this are by no means obvious. In some cases it may be due to heavy stocking of Mitchell grass seedlings, which for about the first six months of growth are shallow-rooted and easily pulled out by grazing animals. If this has been repeated after several rains, each of which has produced germination, the supply of seed in the ground may be depleted. Or it may be that Mitchell grass seedlings become established less successfully under present conditions when there is competition from a greater number of other vigorous plants. On the other hand, there are confusing cases where unstocked paddocks have shown a poorer regeneration of Mitchell grass than have paddocks well-grazed. Apparently regeneration of Mitchell grass is a complex question varying with the grazing history of an area for several years back and with local soil and climatic conditions and, at present, little is known of the true relationship between these factors. As long as this fundamental matter affecting the pastoral industry of vast areas of Queensland is in doubt, there is need for far more vigorous and comprehensive research than is being carried out at present.

IV.—The Extent of Soil Erosion in Areas of High Rainfall.

No detailed erosion survey of any considerable area has yet been attempted in Australia and, until surveys have been undertaken, there will always be doubt as to the exact significance of the problem. The

map of the general distribution of erosion in Australia (Map II.) combines the results of several investigations of a reconnaissance nature, and presents an approximate picture of the problem divided into its broad classifications.

One of the most interesting facts revealed in this map is that the more serious forms of erosion are far less widespread than in the United States of America.* This applies particularly to the area subject to severe water erosion, providing yet another example of the fallacy of assessing Australian problems by comparisons with a country of very different geographical conditions. In Australia the agricultural areas receiving a high rainfall are several times smaller than those in the United States and less extensive water erosion is to be anticipated. Again, the intensity of water erosion within the agricultural regions of Australia is probably less than in corresponding parts of the United States because of the smaller area devoted to crops such as cotton, maize, and tobacco, which are cultivated repeatedly between the rows.

The really important fact brought out by the map is that within the region of serious water erosion is situated a large proportion of the most intensively developed and highly productive land in Australia. Competent observers have commented on the rapid rate at which erosion is developing and on the lack of measures to check this.

Perhaps the most seriously eroded soils are in the wheat belt receiving a moderately high rainfall. These extend in a fairly continuous belt from the Darling Downs in Queensland, through the north-west slopes of New South Wales adjoining the black soil plains and southwards along the inner side of the Great Dividing Range into Victoria. Erosion occurs under similar conditions in South Australia on the slopes of the Mount Lofty Ranges, and in Western Australia, in a narrow belt along the Great Southern Railway and in the northern part of the wheat belt adjacent to Mingenew and Geraldton.

There is a great deal of variation in the degree to which these areas, which are mainly included within Group A. on Map II., are affected; almost every paddock shows some variations from the next one according to differences in slope and management. There are also major regional differences according to soil and climatic conditions. The part played by management in the prevention of erosion is of the utmost importance. Much can be done by adopting methods of rotational cropping, thus avoiding long periods of bare fallow which greatly increase the risks of erosion.

Low prices for primary products, particularly for wheat, indicate the need of greater attention to mixed farming and stock-raising, associated with fodder crops and long-rotation pastures for stock. This is becoming more practicable with increased knowledge about the best methods of growing such plants as lucerne under dry conditions, and the most suitable varieties to use.

The nature of the rainfall also bears closely on the erosion risk. Probably there are pronounced regional differences in the frequency and intensity of heavy storms, and in the seasons at which they occur. In connection with erosion such facts are far more important than average rainfall figures and a study of them is necessary for the

*Compare map "General Distribution of Erosion," facing page 170 in, "A Report on National Planning," December 1, 1934, National Resources Board, U.S.A.

proper design of erosion-control works. At present there is almost a complete lack of scientific observation of these matters. The same is unfortunately true of studies of the extent to which different soils are susceptible to erosion, as most of the detailed soil surveys have been confined to areas of intensive agriculture under irrigation where erosion does not occur.

The general considerations affecting erosion in the wheat belt also apply to other farming areas on sloping land in the high-rainfall regions. Districts of this type are those which produce fodder crops on the coast of New South Wales, or peas and other market garden crops in the central tableland (for instance, near Oberon and Bathurst, New South Wales) and also the upland potato-growing districts of the southern States. Orchards are particularly susceptible because the bare, cultivated surface, maintained to control weeds and conserve soil moisture, offers little resistance to erosion during heavy rains. A score of districts can be mentioned where erosion has played a part in lowering production from orchards, and has in some cases caused farm abandonment. Some of these are in the citrus districts of Gosford (New South Wales) and the Blackall Range (Queensland); the cherry orchards of the Canobolas district, Orange (New South Wales), and Young (New South Wales); apple orchards of the central highlands (as near Bathurst, New South Wales); again further south near Batlow (New South Wales), and in Western Australia as at Donnybrook and Bridgetown.

If the damage could not be remedied, the outlook would indeed be gloomy, but methods of preventing and curing water erosion are known, thanks mainly to work done in other countries, notably the United States and South Africa. The main objects are to decrease the speed with which water runs off the ground, thus decreasing its erosive power, and at the same time to increase the proportion of the rainfall which soaks into the soil. The most common methods are to throw up contour banks across the land to control run-off, to change old methods of cultivation, and to use more pastures in the crop rotation.

Two factors condition the use of these methods. First, trained men must be available to advise and assist in the work, for some measures need technical skill not possessed by all men on the land. The second consideration is the cost involved in carrying out the necessary work, which causes greatest delay in the adoption of erosion control. Land-owners are naturally slow to spend time and money on a matter which is causing perhaps only slight loss year by year, even though the loss is increasing. On the other hand, it has been shown that many control measures are well worth while, quite apart from the checking of further soil wastage; for example, in some cases the construction of contour banks on crop and pasture land has paid for itself in a few seasons by causing increased plant yields, largely because more rain has been absorbed into the soil instead of running away.

Wind erosion is most serious in those agricultural areas shown in group C on May II., although it also occurs within those of group D to a lesser degree. The areas most seriously affected are in the outer mallee of Victoria and in South Australia, with less important local examples in the south-west of New South Wales and the wheat belt of Western Australia. The erosion problem in some of these areas is bound up with an unfortunate economic history. They were opened up in prosperous times with optimism based on the deceptive rainfall

records of a few years, and were developed with methods of settlement and agriculture transplated wholesale before their suitability to the new environment had been tested. As a result, mistakes were made in overcapitalization, in making farm areas too small, in clearing timber in a face from soils which proved highly susceptible to erosion, and in burning stubble and cultivating fallows in much the same way as had been done on areas with a heavier and more reliable rainfall. There followed, particularly in Victoria and South Australia, some of the most spectacular losses in Australia caused by erosion and sand-drift. The maintenance of the water channels, on which settlement in the Victorian mallee depends, has cost an average of £75,000 yearly during the last ten years. Including also the cost of clearing drift sand from railways and roads, the total cost to public authorities for this area is estimated at £120,000 annually, but this loss must be far smaller than the incalculable amount represented by the deterioration of tens of thousands of acres of agricultural land. Necessary adjustments of farming methods and of individual financial positions in order to combat erosion and low rainfall are being made. Whether farmers in these areas are able to build up sound, profitable livelihoods will depend, as much as anything, on the skill and care shown in combating soil erosion.

V.—The Problem in the Pastoral Areas.

The most seriously eroded pastoral areas are in the Western Division of New South Wales and in South Australia where the annual rainfall is low, decreasing from about 12 inches in the better parts to less than 5 inches near Lake Eyre. In the southern section there is a slight winter maximum, but generally the rainfall is irregular in its seasonal occurrence and in total amount. The vegetation shows considerable regional variation. The main feature is the presence of numerous edible trees and shrubs which, under original conditions, protected the soil against erosion, and now provide a fodder reserve for stock in dry times. The annual grasses and herbage species respond with amazing rapidity to the infrequent, heavy rains, but they vary greatly in bulk with seasonal conditions. Little of this region is regarded as having a carrying capacity higher than one sheep to 8 acres, while some of it is stocked as lightly as one sheep to 30 acres.

"Overstocking" is described repeatedly as the first cause of soil erosion. It is certainly prevalent and is rightly to be condemned. Nearly all the area is owned by the States, and hitherto lessees have been practically uncontrolled in their stocking policy. Their errors of judgment or disregard for the land have been reflected in deterioration of State property. At the same time the administration in some States has failed to encourage conservative stocking by insisting on a high estimate of carrying capacity when fixing rents and when alloting additional areas to make up that unfortunate fiction "a home maintenance area." It has been urged that in order to check overstocking on these Crown lands, the authorities administering them should have power to restrict the number of stock carried on any lease. This proposal has many practical difficulties which could be overcome only by experience, and it has been felt by many that the troubles which might result from faulty administration would be too great. It seems now, however, that conditions are so bad that some action is warranted. In New South Wales the representatives of pastoralists in the West Darling district have themselves requested some legislative regulation of stocking in order to control careless lessees.*

*Report submitted to the Erosion Committee by the Pastoralists' Association of West Darling, at Broken Hill, New South Wales, on 27th April, 1936.

A Soil Conservation Committee in South Australia has commented that "because of the wanton carelessness of some pastoralists, control of some kind is required. There appears to be no reason why they (lessees) should have the right to destroy the pastures and soil-holding plants any more thant a tenant of a house has freedom to destroy the capital value of that property." The committee then recommends that "all new leases issued for pastoral purposes should be issued on the basis that leases may be cancelled if land is abused by mismanagement, particularly by overstocking. Restrictive stocking conditions should be inserted into leases of pastoral lands prescribing the maximum number of stock to be grazed" with the provision that "the number of stock may be increased if satisfactory evidence is submitted to the Pastoral Board that the land is capable of carrying more stock."

Such control, if administered efficiently, would make a great contribution towards checking erosion during minor dry spells or droughts. But the main problem goes further than checking what is generally spoken of as "overstocking." It depends on the most essential characteristic of the environment, the fact that severe droughts are to be expected about once in 10 years. The natural vegetation is marvellously adapted to withstand these droughts if not abused by excessive grazing. For example, bladder saltbush (*Atriplex vesicarium*), "the most important fodder bush in arid Australia," resists drought by several devices; an unusual chemical and physical make-up which enables it to store substances retaining moisture and to avoid living on its store of plant-food in droughts; a structure which allows it to absorb moisture through the leaves from a humid atmosphere; and a shallow root system which produces deciduous feeding roots only after rain.* The aboriginal human and animal populations had adapted themselves to a drought environment by following a nomadic existence. This is the ideal adjustment to drought conditions which are rarely continent-wide, but occur rather in patches. The wild animals, and the black men who hunted them, migrated to the best pastures and drought-stricken areas were left alone.

By contrast, pastoral settlement by white men involves immobile occupation. Capital is invested in fences, water improvements, and buildings, generally in expectation of annual returns. Practically all suitable land is occupied so that land for relief purposes is scarce and when it is in demand competition often pushes the price of agistment to undesirable levels. The result is that lessees endeavour to keep stock numbers fairly constant, and therein lies the weakness of the usual arguments about "overstocking." There must come the inevitable drought periods when even a property regarded as conservatively stocked under average conditions will be "overstocked"; it will probably hold out longer without suffering, but in the end a long drought produces much the same results throughout the region it covers. All grass and herbage disappear and the shrubs of the saltbush type are eaten back until they provide little protection to the soil. Then wind erosion causes damage which in many respects is quite irreparable. Not only are roots exposed and many shrubs and trees killed, but the seed-bed is damaged so that their regeneration is difficult. Plants which do reappear are frequently eaten out by stock and rabbits before making much growth, as has happened almost without exception to the mulga throughout South Australia and New South Wales.

*"Regeneration of the Vegetation on the Koonamore Vegetation Reserve, 1926 to 1936," J. G. Wood, Transactions of the Royal Society of South Australia, Vol. IX., 1936.

On the return of seasons with high rainfall, the damage is masked for a time by the characteristic prolific growth of annual herbage and grasses. The tendency then is to think that all is well. But few people can make a reliable comparison of conditions extending back over two or three drought periods, and there is good reason to suspect that in each severe drought there is a progressive deterioration of the vegetation. In some pastoral areas this has been partly obscured by the fact that in each drought new bores and dams have been sunk to provide water so that parts could be utilised which had hitherto been practically unstocked and thus offered a reserve of relatively virgin pasture. But this is no longer possible in most areas and the real position is becoming more obvious.

These opinions suggest a problem more complex than can be fully met by restricted stocking. The most essential need is not altogether to keep down stock numbers continually, and prevent them from soaring in seasons of abundant feed, but to effect a complete removal of stock fairly early in an "old man" drought, when their continued presence means inevitable destruction to soil and vegetation. This presents a tremendous task in practice. There is the difficulty that when it is decided to shift the sheep, they may not be able to travel along stock routes which are notoriously abused and eroded throughout these areas and will probably have been eaten out already. Cheaper and more efficient motor transport is helping to solve this problem by making it possible to carry fodder and to handfeed travelling sheep and in some cases to transport the sheep themselves. There is the difficulty and expense of obtaining country within reasonable distance where sheep can be agisted. And there is always the possibility that after going to the expense of shifting sheep, the drought may break within a few weeks.

These problems can be faced most effectively by owners with big resources who can afford the high costs and risks of providing transport and agistment. In the most arid regions there is much to be said for large companies owning a number of widely scattered properties, one or more of which will usually have some surplus feed and be able to accommodate sheep from drought-stricken areas. There are cases where two or three graziers whose properties are some distance apart have arranged for an interchange of sheep on a co-operative basis according to local conditions. This type of adaptation is very desirable and well worth encouraging.

It is almost impossible for the settler on a "home maintenance area" to make an effective plan to save his property from deterioration in drought time and still make an adequate income. We have pointed out elsewhere that the idea of a "home maintenance area" is not applicable to these regions on economic grounds.* It is equally indefensible from the vital viewpoints of adjustment to drought and soil conservation. Nevertheless, in the Western Division of New South Wales "home maintenance" areas originally subdivided on too small a scale are being enlarged by taking land from the larger leases. The result is often that small holdings are still too small, while large holdings, previously in a position to make adjustments to meet the erosion problem, are being weakened. It must be realised that soil conservation is more vital to the national prosperity than the reduction of Western Division lessees by two or three hundred, for in the long run the number of men employed and the value of the production would probably be greater.

*See "Closer Settlement," Bank of New South Wales Circular, Vol. VII., No. 2.

There are two large pastoral regions subject to deterioration which have not been dealt with yet. They are the acacia scrublands of south-western Queensland and of Western Australia in the Murchison, Eastern Goldfields, and Gascoyne regions. The vegetation of these areas varies greatly, although they have one feature in common, the predominance of edible trees and bushes such as mulgas and other acacias which are commonly referred to as "topfeed." These scrublands are interspersed with small open plains with saltbush (*Atriplex* sp.) and bluebush (*Kochia* sp.) most common in Western Australia, and with grassy plains in the Queensland area. These open patches tend to be heavily grazed, especially in dry periods, and where the soils are of the typical reddish, loamy nature, wind erosion plays havoc. Along watercourses through the scrubs there are also signs of widespread water erosion caused by heavy storms coming when there is little cover on the ground.

More important, however, is the fate of the "top-feed." Because it is not so variable in seasonal amount as are grass and herbage, these regions developed a reputation for safety. But in recent very severe droughts, the "topfeed" has been eaten back as never before and the number of trees and shrubs greatly diminished. For years many of the trees have been lopped and even cut down to feed starving sheep. The scrubs have been further thinned out by the death of many trees through drought and other causes. Generally speaking there has not been sufficient thinning out of the scrub to cause much erosion, but there is some concern for the future, both from the erosion viewpoint and because of reduced carrying-capacity if the regeneration of mulgas and edible shrubs is not sufficient to replace fully those which have been lost. There are some regions where no young mulga trees whatever can be found, and in very few localities is the regeneration keeping pace with the destruction. There is no doubt that this is due to sheep and rabbits eating young seedling trees. Under favourable seasonal conditions mulga will re-establish itself if left unstocked for a few years, and much could be done by rotational spelling of paddocks, particularly if rabbits were kept down. It should be noted that there are areas in Western Australia where young mulgas are growing well on stocked country and it has been suggested that this is due to a resinous covering on the leaves of young mulgas making them unattractive to stock. This does not correspond with experience in the eastern States and it has yet to be established how much of the regeneration is of edible varieties and whether it is sufficient to give a prospect of continued stocking at past levels. More information is required on many aspects of the problem, for the present deterioration is too serious to go unchecked.

VI.—Plans for Soil Conservation.

The damage done by soil erosion has reached serious proportions and is progressing at a rate not recognised even by those most directly concerned. The most urgent need is that there should be exact, scientific observation of the conditions causing erosion and of its extent. It is essential to know the danger spots and the strength of the enemy before planning a campaign of control and prevention. In the preliminary skirmishes up to the present, valuable reconnaissance work has been done by committees, usually comprising officers of the government departments concerned with agriculture, Crown lands, forestry, irrigation, &c. But the time has now arrived for more detailed investigations which can be performed best by specialists. A few men engaged on this work in each State could, in very short time, cover the ground in sufficient detail for present requirements.

The next need is for properly equipped stations to investigate scientifically the technical problems connected with soil erosion control. This can probably be done best in agricultural areas by enlarging the equipment and activities of various government experimental farms. In the semi-arid pastoral areas there is need for many more research projects similar to the Koonamore Vegetation Reserve which is the only area where detailed observations have been made on our dry-land flora. At present there are not more than three men in Australia occupied mainly in research on water erosion. The only equipped scientific laboratory devoted entirely to studying soil erosion is pledged to work on dry-area problems, and these are the least susceptible to control by methods devised in a laboratory. Until research has been conducted with adequate facilities, the best that can be claimed is that methods recommended to men on the land are experiments, for they have been copied almost entirely from other countries and modified by intelligent guesswork to suit Australian conditions.

Once the control of erosion has been placed on a scientific basis there will be need for more active educational work. Provided there is a nucleous of specialists, this can be done most effectively by advisory officers of the agricultural departments who are in constant touch with men on the land.

Looked at in the broader sense there is need to regard the use of land in a more enlightened way than hitherto. Soil erosion is not an isolated feature related only to farming or pastoral practices on the particular spot where it occurs; it is intimately connected with every phase of land settlement. It is linked up with the size of a farm unit in relation to its economic and physical environment. In many cases its control would involve changes in property boundaries and other forms of co-operation between adjoining landholders where the management of one property causes an increase in soil erosion on another. There is also need for road and railway engineers to pay more attention to the influence of their works in accelerating erosion. In thousands of cases badly designed culverts have caused gullies to be eroded on adjacent farm land.

The clash of interests over the use of some regions must also be checked. Thus, in New South Wales there is the continual agitation to have parts of the small remaining forests thrown open for farming, regardless of the risk of erosion on the headwaters of important streams. The further creation of small holdings in dry regions strenuously advocated by some bodies of land seekers must also be discouraged because of the erosion risk. Erosion in the high mountain forestlands of Victoria is believed to have been hastened by graziers annually burning over the forest floor to encourage growth of grass, although foresters deplore this as harmful to the forests. This position is made still worse by the fact that these pastoral leases are on the catchment area of very expensive irrigation reservoirs where siltation might well become a serious matter. Simple experiments could establish beyond doubt whether the annual burning is harmful, and if so, the whole question of control of headwater catchments should be reviewed in an impartial manner.

There is need for a changed attitude towards land, not only by men on the land, but also by the public as represented by government action. A changed mental outlook must be developed which, although following the methods of business farming, will not neglect so seriously the

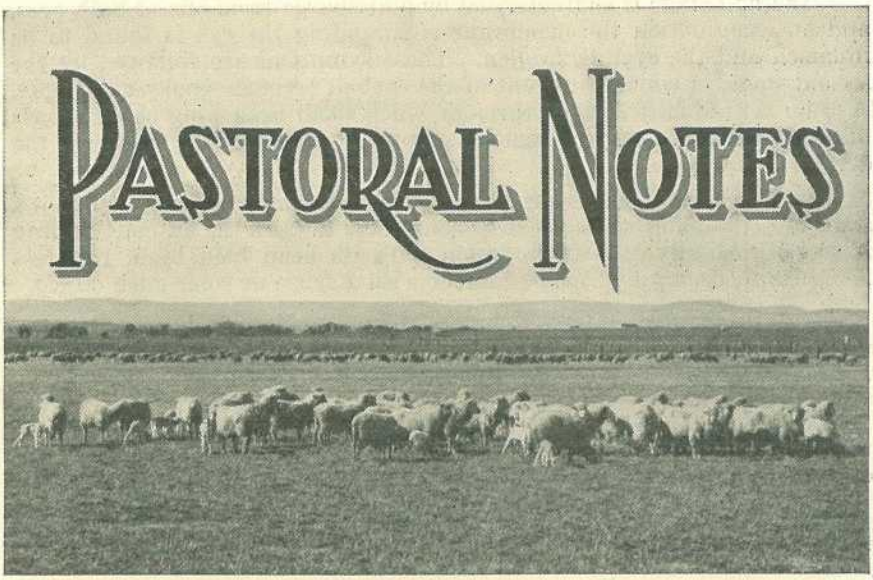
elementary principles of land husbandry; which will not look on indifferently while inches of soil are being washed from a fallowed paddock by heavy rains, or deep gullies are being cut in heavily stocked, treeless hillsides. The attitude that these things are inevitable and anyway will not cause great loss until after the interest of the present owner has ceased, must be changed.

Nor can the State ignore its responsibiity in helping to create conditions conducive to erosion by bad planning of settlement. For instance, when, in subdividing new wheat lands in the 'twenties, farm areas were made too small, excessive cropping was encouraged and soil erosion followed. Such mistakes are bound to occur in developing new areas before conditions are fully understood, but they would not be as frequent if soil conservation were considered sufficiently. Neither is the State entirely blameless of a charge often laid against landholders, that they take too much from the soil and put nothing back. Particularly in some States where land taxation and rents are excessive, more revenue should be devoted to research of value to the land and to subsidising control measures as is done in South Africa. The deterioration of land resources is a subject of great variety and complexity, wrapped up with the whole system of land utilisation. It is a problem which has evolved gradually to a stage where it must be faced methodically and thoroughly, and it must be made clear that no time should be wasted in grappling with this problem so fundamental to the common welfare.

[*Photo.: Lands Dept.*

Plate 169.

UTCHEE CREEK, NORTH QUEENSLAND, NEAR ITS SOURCE.—This scene is typical of the rich rain forest lands of Tropical Queensland, which are coming rapidly into production. Luscious pasture has taken the place of almost impenetrable jungle, and fertile, well-watered country like this contributes abundantly to the butter output of a great dairying State.



Pink-Eye in Sheep.

"PINK-EYE," or infectious ophthalmia, has been known for many years in Australia, and though the mortality is very slight, deaths may and do occur in drought or semi-drought areas where, because of blindness, sheep are unable to get to water.

A great deal of trouble follows outbreaks in travelling mobs of sheep or during mustering for shearing or any other purpose, for the disease is then very difficult to check.

Material from the infected eye of a sheep transferred to the healthy eye of another sheep reproduces the disease, and healthy sheep grazing on tall pasture (for instance, most seeding grasses) and running with infected sheep may also suffer. If, however, the grass is kept well cropped down, the liability to infection is considerably reduced. It is presumed, therefore, that in the field, "pink-eye" is not transmitted from sheep to sheep by direct contact, but by the material from the infected eyes being brushed off by the grasses or herbage, and thus conveyed to the eyes of healthy sheep. Flies also may spread the disease.

An attack of the disease appears to convey an immunity, but if only one eye of the sheep is affected, this is the only eye which possesses the immunity.

It is also known that exudate from the eye becomes non-infective after drying for a short period. Thus, in fine weather, healthy sheep can be turned into previously infected paddocks or driven over stock routes without risk twenty-four to forty-eight hours after infected sheep have been moved out of these places. There is also some evidence to show that any injury to the eyes through dust, grass seeds, or anything else, increases the liability to infection.

The symptoms can be divided into three stages which ordinarily follow one another, although it is quite common for the trouble to clear up at the second stage and not proceed to the final stage of ulceration.

The first stage is characterised by a discharge from one or both eyes, and on examination the membrane surrounding the eye is found to be inflamed and the eyelids swollen. These symptoms are followed by the second stage, in which the front of the eyeball becomes smoky or opaque. A scum is gradually formed through which small branching blood vessels may be seen and a varying amount of pus is present in the corner of the eye.

By this time the sheep is quite blind in the affected eye, and shows signs of acute pain, while the least sound will disturb the animal, causing it to rush blindly in any direction with its head held high, progress being stopped only by violent contact with a fence or some such object.

The third stage, which is not seen in all affected sheep, is one of ulcer formation in the front of the eye. Sometimes the ulcers appear to burst, and the eye becomes practically covered in pus.

Many cases, however, do not go as far as this, and even if left untreated the animal may recover with little or no loss of sight, although complete recovery probably takes a month or even longer.

As in many other diseases of sheep, treatment depends on the facilities for handling the sick animals. All affected sheep should be at once isolated and cut up into small hospital mobs held in small shady paddocks, handy to water, where they can be supervised easily.

A few drops of a 2½ per cent. solution of zinc sulphate in water, made by dissolving 1 oz. zinc sulphate in 1 quart of water, should be dropped into the affected eyes by means of a shearer's oilcan. All pus and other matter is wiped from the eyes with cotton wool soaked in this same solution.

This treatment should be carried out as frequently as possible, and usually the disease will clear up after about a week.

—Ross Nott.

IMPROVEMENTS ON THE SMALL SHEEP PROPERTY.

When money is available a small grazing selection frequently carries improvements fit for a much larger property. On the other hand, when money is scarce, the small holding often lacks even the bare improvements essential to the well-being of the sheep and the handling of the clip.

A property has a certain capital value, and unnecessary improvements merely means over-capitalisation. Interest has either to be paid or allowed for this excess expenditure.

Certain improvements are, however, essential in all cases.

A substantial boundary fence and, should the district be dingo-infested, netting and top netting are obviously necessary.

Next in importance is the water supply. Should there be adequate natural water the selector is fortunate. Failing natural water, wells, sub-artesian bores, surface tanks, or bore drains to conduct supplies from neighbouring bores must be provided. The type of watering facilities to be used is essentially a matter of economics. What pays best, particularly in drought emergencies, should be a guiding principle in the grazier's choice.

A horse paddock and yards for the handy working of house cows are among the first provisions to be made. This paddock should, of course, be handily situated to the homestead and should contain water.

Subdivisions of the property for the convenient working of sheep is seldom given sufficient thought. It involves not only the running of fence lines, but their construction in such a way that water is easily and continuously available to the stock. The fences should be substantially erected to obviate continuous drafting and boxing. Too much money may be spent in wrongly thought out subdivisions, but, generally, the smaller the paddocks the better. The posts used for fencing should be of timbers proved in the district for their durability.

The shearing shed and drafting yards may, on a small holding, be close together. The shed should be well constructed and properly designed, but not larger than necessary for the competent handling of the numbers of sheep ordinarily run on the property. The yards also should be constructed substantially, and their correct design for the drafting of sheep is of first importance. Where shed and yards are together, the latter should be so placed that the shed can be conveniently filled with woolly sheep.

The situation of the homestead should permit the easy working of the property, and its cost should be no greater than the improved value of the holding warrants.

—*J. Carew.*

DISINFECTION.

The object of disinfection is to destroy organisms and ultra-visible viruses which cause disease. It is a job which should certainly be done after the occurrence of one or more cases of contagious disease—such as tuberculosis, contagious abortion, swine fever, and influenza.

Periodical disinfection of stables, milking sheds, piggeries, and poultry runs is highly commendable as a measure of disease prevention.

The extent and thoroughness of the work would depend on the nature of the disease which had occurred, and would not need to be so extensive or intensive when merely carried out as a routine measure.

A common error in disinfecting premises is to first remove accumulations of excreta, discharges, dirt, and dust. Otherwise, the causal organisms and viruses contained in the accumulations are disseminated throughout the building, and may lodge in places which cannot be easily covered by the disinfecting solution afterwards.

The proper way is first to apply liberally to all parts of the premises a suitable disinfectant in solution, and to leave it in contact for twenty-four hours.

After the disinfectant has been allowed to act for that period, the walls and floors should be scraped (or scrubbed), and the scrapings soaked with kerosene and burnt.

Suitable solutions are phenol or other coal tar preparation (1 pint to 4 gallons water), chloride of lime (1 lb. to each gallon of water), or crude carbolic acid (1½ pints to 4 gallons water), to be sprayed on all surfaces.

If shearing sheds and yards are disinfected before shearing commences losses of stock through infection of wounds may be avoided.

IN THE LAMB-MARKING YARD.

Lamb-marking should be done under the most hygienic conditions possible. The work consists of castration and the insertion of the registered earmark on the off ear of ram lambs, and of marking similarly the near ear of ewe lambs. In addition, an age mark is frequently placed on the ear opposite the registered mark. Tails are removed from all lambs.

The ewes and lambs should be mustered and yarded the night before marking, thus avoiding operating when the lambs are in a heated condition, which leads to excessive bleeding.

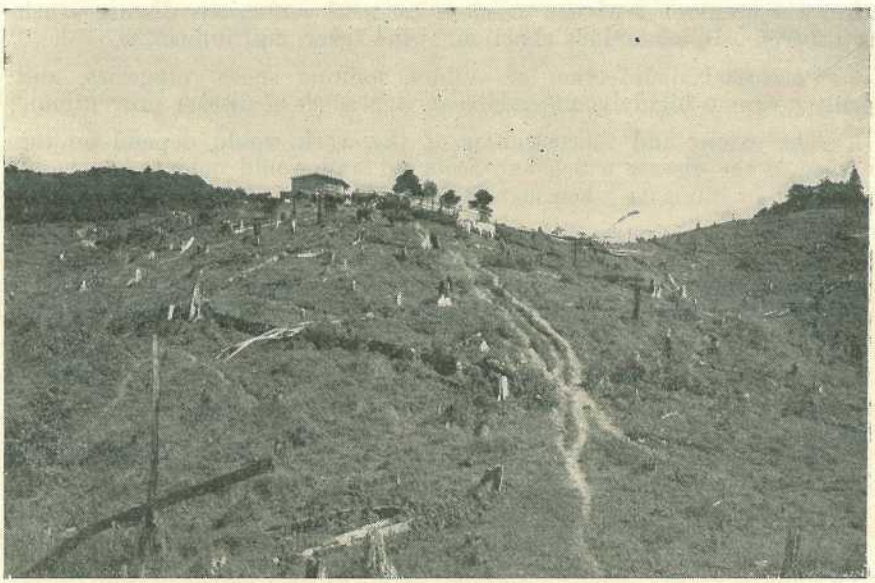
All instruments should be cleaned and disinfected thoroughly. Ear-marking pliers should be frequently dipped in a prepared disinfectant in the course of operations.

There are two recognised methods of castration—viz., slitting and tipping.

Slitting has its advantages in that it leaves the wether with a more pronounced cod. However, when flies are bad there is a greater tendency for the lamb to become flyblown. In tipping, the tip of the purse is entirely removed. Tipping is the better method of the two in the opinion of many sheepmen, as it leaves a cleaner wound with better drainage. The wound so made also heals more satisfactorily. Moreover, tipping is faster—a fact which counts when thousands of lambs have to be marked.

The best age at which to mark is from a fortnight to three weeks. A proved fly remedy, both curative and antiseptic, should be applied to all wounds. The use of old yards should be avoided if practicable.

—*J. L. Hodge.*



[*Photo.: Lands Dept.*

Plate 170.

A SCENE ON NEW-SETTLED DAIRY LANDS NEAR JAPOON, NORTH QUEENSLAND.—Note the vigorous growth of introduced grasses. Although the stumps and charred logs—all that is left of the original jungle cover—remain, a dense sward has been established.

Inferior Grade Cream.

ONE of the most common sources of the contamination of cream, and one that is often overlooked, is the badly washed cream can.

More cream is spoilt by being stored or carried in a badly washed can than by most other ways. This applies to cans in good order as well as those that are dinted and rusty.

The reason is not far to seek. Hundreds of cans pass through the same rinsing water of the mechanical can-washer at the butter factory daily, and although a final steaming is carried out in the last stage of the washing process, it is not of sufficient duration (nor is it practicable) to sterilise thoroughly all of the cans thus treated.

It should be obvious that cans which have contained second-grade cream will require extra attention, in order to prevent the transmission of taints due to bacterial activity—such as cheesiness and rancidity—to the fresh supplies of cream.

A tallowy smell which is often found in returned cans may be due to inefficient washing, followed by exposure to the heat of the sun, causing deterioration of the fat.

It is, therefore, advisable in order to safeguard the quality of cream, to rinse all cans on their return from the butter factory with boiling hot water to which a little washing soda has been added. The cans should then be rinsed with clean boiling water to remove all traces of the soda.

The storage of the cleansed cans is important. They should be placed upside down on a suitable rack to allow for cooling and drying. On no account should anything but boiling water be used for the final rinsing, nor should any attempt be made to dry the cans with a cloth. The storage rack should be placed in such a position as to be well removed from any possibility of contamination from the stockyard.

—*C. L. Moran.*

IMPORTANCE OF STIRRING CREAM.

Some dairy farmers show by the cream which they send to a factory that they lack knowledge in regard to the care of cream on the farm. Clean methods in production may be nullified by the spoiling of good cream in the dairy.

As butterfat is the lightest constituent of cream it rises gradually to the top as soon as the cream enters the can. Therefore, in unstirred cream the lower layers, rich in separated milk—which contains a high proportion of casein, and consequently a low proportion of butterfat—are at the bottom. Changes in the separated milk due to bacteria are often such that when the cream reaches the factory it is graded down as sour and curdy.

A dry film on the top of the cream or layers of different colours and texture through the can tells the grader at once that the cream has not been stirred, and he is immediately impressed by the defects in it.

To keep a uinform consistency of cream and to ensure the best possible ripening conditions the cream should be cool before it is added to any existing supply. Regular stirring is then necessary to liberate accumulated gases and aerate the mass, which ensure uniform consistency. Aeration not only reduces the temperature of the cream, but also retards the growth of undesirable bacteria.

Stirring pays because no dairy farmer can afford to lose the difference in price between choice and lower grade creams on each consignment that he sends to the factory.

—G. B. Galwey.

WHAT IS A FAIR OVER-RUN?

Among dairy farmers the over-run paid out by butter factories is a perennial topic. A question asked frequently is: "What is the maximum over-run obtainable by a factory where all weighings, tests, and other operations are carried out correctly?" Here is the answer—

Over-run in Queensland is the excess butter actually manufactured over the amount of commercial butter (estimated from the approved chart) obtainable from all cream received at the factory. Butter of legal composition must contain at least 82 per cent. of fat, and to obtain the maximum over-run a factory must, therefore, convert every ounce of fat which it receives in the cream into butter containing exactly 82·0 per cent. of fat. Under commercial conditions this is impossible, as there is a proportion of the fat lost in various ways. There is a certain amount of cream spilt, or lost in other ways, during sampling, tipping, and processing; a further quantity of fat is lost in the buttermilk and, finally, there is a loss of butter in the packing process. The percentage of the total fat lost in these ways is approximately 0·2 per cent. in spillage, &c., 1 per cent. in the buttermilk, and 0·25 per cent. in packing —making a total fat loss of approximately 1·45 per cent. The effect of this loss is best illustrated by an example.

One thousand lb. of cream with a fat test of 40 would be paid for as 489 lb. of commercial butter. The actual quantity of fat in this weight of cream is 417 lb. A loss of 1·45 per cent. of this fat means that 6 lb. of fat is lost during handling and manufacture, leaving 411 lb. of fat which can be manufactured into butter. The maximum weight of

butter of legal composition which can be manufactured from this quantity of fat is 500 lb., and the maximum over-run is therefore 11 lb. of butter on the estimated quantity of 489 lb.—equivalent to 2·25 per cent. It is not possible for a factory working under commercial conditions to consistently obtain this over-run, and it can be taken for granted that the over-run obtainable should be no higher than 2 per cent. A factory can only consistently exceed this figure by one or more of the following practices:—

(*a*) Cutting the weights of the cream.

(*b*) Cutting the fat tests.

(*c*) Manufacturing butter of illegal composition.

In the manufacture of unsalted butter, the over-run obtainable is considerably less than the figure given above. The maximum over-run obtainable on unsalted butter is 1 per cent., but under commercial conditions it is doubtful whether it could exceed 0·75 per cent. A factory which manufactures both salted and unsalted butter should, therefore, have a lower over-run than one which makes salted butter exclusively.

—*L. A. Burgess and O. St. J. Kent.*

DRY MILKING IS CLEAN MILKING.

Milking with hands which are moistened with milk at the beginning of and during milking is known as wet milking. Dry milking—which is used always by the cleanest and most efficient milkers—means commencing with clean, dry hands, which are kept as dry as possible during milking.

The method of milking with unwashed udders and teats and moistening the unwashed hands with milk is an objectionable and dirty habit and seriously contaminates the milk, as well as chapping the teats. To anyone who doubts this no further evidence is necessary than a glance at the accumulation between the fingers of a person who practises wet milking. In some countries where milkers' competitions are held at agricultural shows and elsewhere, deliberate wet milking disqualifies a competitor.

It should be remembered by the dairy farmer producing milk for city or town requirements that wet milking causes loss of keeping quality, a serious disadvantage in a warm climate.

It is often claimed that dry milking is difficult to anyone unaccustomed to it, and in attempting a more hygienic method, vaseline is used as a lubricant to make stripping easier and to help keep the teats soft and flexible. This is certainly to be preferred to careless wet milking, but if the teats are washed before starting to milk and the milker also washes and dries his hands frequently during milking—as required by the Dairy Regulations—both are generally sufficiently pliable and the use of vaseline should be unnecessary.

Injured or chapped teats should be protected during milking by placing round them a piece of cotton wool and afterwards applying a suitable ointment. The ointment hastens healing and softens the teats for the succeeding milking.

—*E. B. Rice.*

FEEDING OF CALVES.

About 87 per cent. of cows' milk is water. Of the remainder, nearly one-third is fat, and a good separator, if properly operated, will remove about 95 per cent of this fat. Very little protein is removed. It follows that, if the separated milk is to be made equal in feeding value to the original milk, either the fat or its equivalent must be replaced. There is no need to replace protein, and for this reason it is not good practice to feed such protein-rich materials as linseed meal in conjunction with skim milk to very young calves.

Dripping obtained from a reputable meatworks, or cod liver oil, may be incorporated in the milk, but they are rather expensive and difficult to mix properly. A better system is to use finely ground maize. Maize meal from good-quality grain contains as much as 5 per cent. high-grade oil and 70 per cent. of easily digested carbohydrate, which, to some extent, serves the same purpose as fat.

The new-born calf should get whole milk for a fortnight if it is to be given a good start in life. For the first few days it may be fed three times daily; after that, twice daily is enough. A safe level to feed is 1 gallon to each 100 lb. liveweight. At the end of the second week a little maize meal is stirred into the milk and the change to separated milk begun. By the end of the third week the maize meal may be built up to a handful, and the change to separated milk completed. By the end of a month the calf begins to nibble grass, and can consume about ½ lb. of meal.

From then on to the eighth week the milk can be replaced progressively by water and a meal mixture. By the eighth week the calf will be able to eat up to 2 lb. daily of a suitable meal mixture.

Such a mixture may contain 35 lb. of linseed meal and 65 lb. of a cereal meal. Pollard and bran should not constitute more than one-half of the cereal meal. The remainder may be crushed oats, barley, or maize. About ½ lb. of salt and 2 lb. of sterilised bone meal should be included in the mixture.

As the animals take more grass or hay, the supply of the meal mixture is restricted. At six months, unless an adverse period is encountered, the calf should be able to fend for itself.

MEAT AND BLOOD MEALS FOR DAIRY CATTLE.

Meat meals and blood meals sold under a variety of names are rich in digestible protein. A high-class meat meal with a crude protein content of 65 per cent. has about twice the digestible protein of commercial cottonseed or linseed meal. In farming terms, this means that 1 lb. of high-grade meat meal has about the same feeding value as 2 lb. of linseed or cottonseed meal.

The cost of meat or blood meal is not greatly different from that of the vegetable meals, and if they can be conveniently included in the ration of dairy cattle feeding costs will be reduced.

Only dairy cattle which have been consistently underfed take kindly to meat or blood meals. Cattle which have been accustomed to small quantities of these meals from birth also present no difficulty.

As a general rule, however, dairy cattle only slowly acquire a liking for concentrates containing meat and blood meals and at first only a few ounces should be included in the regular ration. The amount can be gradually built up to the required level, which will, of course, depend upon the quality and quantity of other foods used. Advice on suitable rations may be obtained from the Department of Agriculture and Stock, but the dairy farmer can usually adjust the concentrates in the ration to conform with the milk yield of the individual cow.

Grain and molasses, grain and salt, milling by-products—such as bran and pollard or such attractive meals as linseed, cottonseed, or cocoanut—may be mixed with the meat and blood meals to attract unwilling cows.

Animals which still refuse to eat these meals may be kept for a short time without any food, other than that offered, if allowed plenty of water. It is important that the feed should be changed night and morning, so that a fresh mixture is always before the cow. If this system appears too drastic the nose-bag method may be used. Freshly-chaffed green maize and the meal are mixed before using, and the contents of the bag should be changed night and morning. Most cattle can be induced to eat meat or blood meals by one or other of these methods.

Both meat and blood meals should be fresh, free from objectionable odour, finely milled, and sterile. An undue greasiness is not detrimental, but, in general, the higher the fat content the less palatable the meal.

Meat meals should show a good analysis. Any preparation with a crude protein content of less than 50 per cent. is not a true meat meal, but a meat and bone meal. Blood meal should show a minimum of 75 per cent. crude protein. It should be almost without smell.

As both meals decompose when allowed to remain in a moist condition they should be stored in a dry place and any excess in the feed boxes should be removed each day. Material which has been "fouled" by moisture soon becomes a source of danger and is then only fit for fertilizing.

CLEANLINESS IN THE MILKING SHED.

Observations at milking time on some dairy farms reveal carelessness which is dangerous from a viewpoint of infection from bacteria. Bacteria in milk and cream are well-known causes of low-grade, inferior products, and safeguards against their introduction are essential.

The milking bucket should on no account be used as a washing utensil, either for the udder and teats of the cow or the milker's hands. The act of washing the udder transfers innumerable bacteria with the dirt and loose hair to the bucket, and a simple rinsing in cold water is not sufficient to remove them all. The need for separate milking buckets and washing buckets is therefore very obvious.

A bucket and cloths for washing the udders and a wash basin for washing the hands before milking each cow are hygienic necessities in the bails. The dairyman may well ask himself the question: "Would I take my meals with hands unwashed after completing milking operations?" The answer would be an emphatic "No!" Yet the cleanliness of his hands during milking is at least as important, for milk and cream are foods which may be easily contaminated.

Clean hands are just as essential during milking as at the dining table. It is therefore remarkable that many people who are scrupulously clean in the home are lamentably careless in the cowyard and dairy.

Another very common practice is the wiping of soiled, milky hands on the clothing. These same clothes, if worn throughout the day, soon acquire a most objectionable smell and attract flies. Sugar-bag aprons—which are easily made, inexpensive, and long-wearing—are suggested for use by all milkers. The aprons should, of course, be washed frequently.

The protection of milk against flies is also a matter of consideration. Most dairymen have in use a large, shallow milk vat, and this should be provided with a lid in which an opening has been left for the milk strainer, or, if milking machines are in use, for the releaser. This lid keeps out dust and vermin, and also is a help in maintaining the temperature of the milk before separating.

Hand milkers frequently moisten the cows' teats during milking from the milk in the bucket. This practice cannot be condemned too strongly, as the hands are usually soiled, and bacteria from the udder of the cow are transferred to the bucket.

The following points are all practised by the most successful dairymen:—

Wash the udders in buckets used only for that purpose.

Wash the hands after milking each cow.

Wipe the hands on a clean cloth, not on the clothes, and wear either an apron or overalls.

Aprons and overalls are easily boiled; so keep them clean.

Don't use an uncovered vat. Under the Dairy Regulations a cover for the vat *must* be provided.

—*E. C. Dunn.*

TO SUBSCRIBERS.

Subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

Live and Dressed Weight of Bacon Pigs.

THE loss of weight in transit of a pig from farm to factory and through the process of slaughter, dressing, and cooling varies with pigs at different weights. Generally, lighter weight, unfinished pigs shrink more than heavier weight, prime conditioned stock.

Factors which affect the amount of loss are the size and weight of the pig; the way in which the pig has been fed and "finished"; the weather, distance from farm to factory; conformation and condition of the pig; and the amount of food eaten before the pig is weighed alive. There also are variations in animal individuality; for instance, some pigs are of a nervous, excitable disposition, and fret, while others are more contented and are unaffected by the journey.

In extensive tests it has been shown that under conditions similar to those ordinarily ruling in Queensland, pigs weighing 150 lb. to 200 lb. alive on the farm lose about 10 per cent. of this weight in actual transit to the factory, and then another 20 per cent. in dressing and cooling off. Lighter pigs, weighing 100 lb. to 140 lb. alive on farm, usually lose approximately 33 per cent. by the time they are dressed and cooled off. While these figures are possibly a fair average, individual pigs varied considerably.

On the sale of about 1,000 bacon pigs from experiments conducted conjointly by the Departments of Agriculture and Stock and Public Instruction in Queensland, results were as follows:—

All pigs were weighed after a 12-hour fast at the sty. They also were weighed at the factory before slaughter not more than 24 hours afterwards and were weighed again in the usual way at the factory after slaughter. The average loss from live weight on the farm to actual cold dressed weight at a factory was 30·5 per cent., varying from 25 per cent. to 34 per cent., with heavier losses on lighter weight stock marketed slightly unfinished for purpose of comparison.

These deductions may be accepted as a guide to the general average of factory deductions in Queensland.

—E. J. Shelton.

BEFORE WINTER COMES IN THE PIGGERY.

Before winter comes, some preparations should be made to ensure comfortable quarters for the pigs on the farm. Although in Queensland the stock may not use the shelters for a long period, when they do have need of cover it should be ready for them.

First of all, the drainage from the piggery should be inspected. After the wet season the drains are often silted up, and pools may have been turned into deep, foul wallows. The drains should be cleared, and the wallows drained and filled in. This will prevent water from lying in the yards after winter rains. Wet, sloppy yards in the winter time make the pigs uncomfortable, and consequently more or less unthrifty. In addition, the discomfort to the men who have to carry on routine feeding, &c., in the piggery is of some importance.

Where the sheds and feeding troughs are movable, they should be shifted to a fresh site. If the sheds and troughs are fixed, any holes or wallows against them should be filled. Then the sheds themselves should be inspected for cracks in the lower walls and floor. Any such cracks should be closed to prevent draughts, which are liable to cause rheumatic and muscular disorders in the pigs. Guard rails should be examined in the farrowing sheds, and all troughs cleaned and examined for necessary repairs.

At the end of summer there is usually a quantity of rank grass growing. If cut and stacked, this will be useful as bedding for winter litters.

Fences in a piggery generally need some attention during the year, and while the other work is being carried out it is advisable to inspect the fences for loose wires and posts, and to fill in holes made by pigs trying to root under the fence lines.

Where foods are boiled for pigs, it is a good plan to examine the fireplace and boiler and ensure that it will not be necessary to make repairs during the winter months when the boiler will be in daily use.

Although much of this labour may appear unnecessary, the farmer who understands animal management will realise that, apart from the fact that equipment is receiving an overhaul, the work is being done with one main object—to ensure the comfort of the stock. Where pigs are kept under comfortable conditions they generally prove more economical growers than those which are neglected, for the contented pig is a quicker grower and usually requires less feed per 1 lb. gain in live weight. Thus, for his own benefit, the pig-raiser should make sound preparations for the winter months.

—T. Abell.

THE FARROWING SOW.

While "in pig" the sow should be given as much freedom as possible, for activity promotes health and good digestion, to the advantage of the sow and its prospective litter.

Her food should not be stinted, but she should be kept in moderate condition. Sows which are too fat at farrowing will probably have trouble in delivery, and may also suffer from many other troubles, of which milk fever is only one. On the other hand, if the sow is kept too short of food she cannot nourish the young pigs properly while carrying them, nor can she suckle them properly when born.

At the time of farrowing a close watch should be kept by the usual attendant—strangers upset the sow—who should not interfere unless there is evidence of trouble in parturition or the sow attempts to bite her young. This sometimes happens when some of the pigs remain to be born and one of those already dropped tries to get to the teats; especially if it squeals, the sow—usually a young one—will seize the piglet in her mouth and quickly squeeze the life out of it. Should she break the skin and taste blood, she may turn on the rest of the litter and eat them. The attendant can prevent this by taking each piglet as it is dropped and putting it aside in a straw-lined box until all are born, when they may be put on to the teats and all will be well.

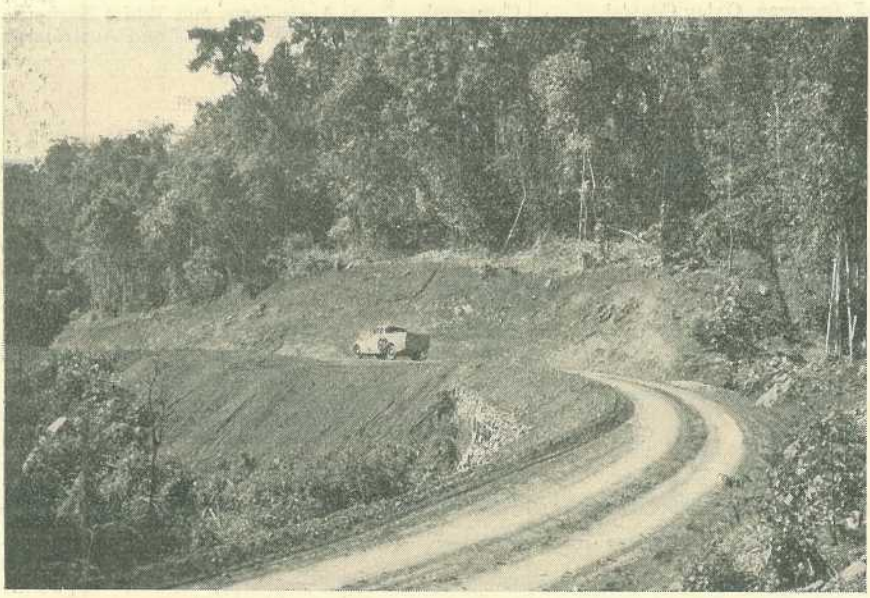
For the first two weeks after farrowing the sow does not require more food than she received during the last two weeks of pregnancy, but after this the supply should be gradually increased as she requires it.

There is nothing commoner than deficiency diseases in young pigs caused by the absence of the requisite amount of mineral matter in the food. Mineral matter is contained in fish meal, while cod liver oil, with its essential vitamins, stands pre-eminent as a constituent in the food of young pigs. One teaspoonful of cod liver oil twice a day is sufficient for pigs up to ten weeks old.

Draughts, dampness, and uncleanliness, as well as unsuitable food for the mother, will cause scouring, which may lead to death.

Given reasonable care and attention, no trouble should arise, and this little extra care means the difference between a strong, healthy litter and a few stunted, unthrifty runts.

—*W. Dixon.*



[*Photo.: Lands Dept.*

Plate 171.

The New Range Road, near Koumala, Mackay District, Central Queensland.

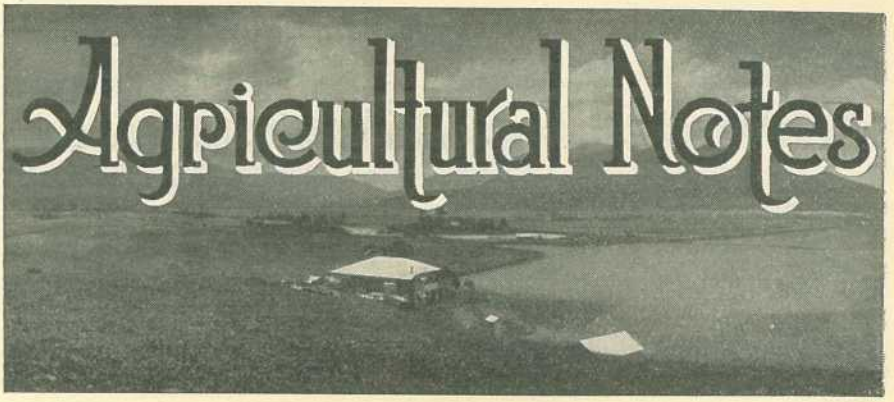
Name and Address.	Name of Hatchery.	Breeds Kept.
G. Adler, Tinana	Nevertire ..	White Leghorns, Australorps, Rhode Island Reds, and Langshans
F. J. Akers, Eight Mile Plains	Elmsdale ..	White Leghorns and Australorps
E. J. Blake, Rosewood ..	Sunnyville ..	White Leghorns, Australorps, White Wyandottes and Rhode Island Reds
J. Cameron, Oxley Central ..	Cameron's ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
J. L. Carrick & Son, Manly road, Tingalpa	Craigard ..	White Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
T. G. Crawford, Stratford ..	Rho-Isled ..	Rhode Island Reds
Rev. E. Eckert, Head street, Laidley	Laidley ..	Australorps, White Leghorns, and Langshans
Elks & Sudlow, Beerwah ..	Woodlands ..	Australorps and White Leghorns
W. H. Gibson, Manly road, Tingalpa	Gibson's ..	White Leghorns and Australorps
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
J. W. Grice, Loch Lomond ..	Quarrington ..	White Leghorns
C. & C. E. Gustafson, Tannymorel	Bellevue ..	Australorps, White Leghorns, and Rhode Island Reds
J. McCulloch, Whites road, Manly	Hindes Stud Poultry Farm	White Leghorns, Australorps, and Brown Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva ..	White Leghorns and Australorps
H. L. Marshall, Kenmore ..	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington ..	Australorps, White Leghorns, and Langshans
J. A. Miller, Racecourse road, Charters Towers	Hillview ..	White Leghorns
F. S. Morrison, Kenmore ..	Dunglass ..	Australorps, Brown Leghorns, and White Leghorns
Mrs. H. I. Mottram, Ibis avenue, Deagon	Kenwood Electric Hatcheries	White Leghorns
J. W. Moule, Kureen	Kureen ..	White Leghorns and Australorps

Name and Address.	Name of Hatchery.	Breeds Kept.
S. V. Norup, Beaudesert Road, Cooper's Plains	Norup's ..	White Leghorns and Australorps
E. K. Pennefather, Oxley Central	..	Australorps and White Leghorns
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, Rhode Island Reds, and Brown Leghorns
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
A. Smith, Beerwah	Endcliffe ..	White Leghorns and Australorps
T. Smith, Isis Junction	Fairview ..	White Leghorns and Langshans
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkin's Poultry Farm	White Leghorns and Australorps
T. Westerman, Handford road, Zillmere	Zillmere ..	Australorps and White Leghorns
P. A. Wright, Laidley ..	Chillowdeane ..	Brown Leghorns, White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns and Australorps

NEW REGISTRATIONS.

Following is a list of those who have applied for the registration of their hatcheries up to the 24th March, 1939:—

Name and Address.	Name of Hatchery.	Breeds Kept.
J. Caspaney, Kalamia Estate, Ayr	Evlington ..	White Leghorns
Dr. W. Crosse, Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
Dixon Bros., Wondecla ..	Dixon Bros. ..	White Leghorns
W. J. B. Foxwell, Coomera ..	Foxwell's	White Leghorns and Australorps
G. Grice, Loch Lomond, via Warwick	Kiama ..	White Leghorns
Mrs. M. Grillmeier, Mount View, Milman	Mountainview	Australorps
P. Haseman, Stanley terrace, Taringa	Black and White	Australorps and White Leghorns
C. Hodges, Kuraby	Kuraby ..	Anconas and Leghorns
D. J. Murphy, Marmor ..	Ferndale ..	White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex
H. W. & C. E. E. Olsen, Marmor	Squaredeal Poultry Farm	White Leghorns, Australorps, Black Leghorns, Brown Leghorns, and Anconas
A. C. Pearce, Marlborough ..	Marlborough Stud Poultry Farm	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell and Indian Runner Ducks, and Bronzewing Turkeys
J. Richards, Atherton	Mount View Poultry Farm	White Leghorns and Australorps
A. J. Teitzel, West street, Aitkenville, Townsville	Teitzel's ..	White Leghorns
W. A. Watson, Box 365, P.O., Cairns	Hillview ..	White Leghorns
G. A. C. Weaver, Herberton road, Atherton	Weaver's Stud Poultry Farm	Wyandottes, Indian Game, Barred Rocks, Australorps, White Leghorns, Anconas, Rhode Island Reds, Buff Orpingtons, Black Orpingtons, and Buff Leghorns.



The Trench Silo.

LARGE quantities of suitable fodders—comprising maize, sorghums, panicum, lucerne, and useful native grass and herbage mixtures on cleared pasture areas—are growing at present in many districts. That interest is being taken by more farmers in the conservation of the season's abundance is shown by the number of pit silos being constructed for the storage of the summer fodder surplus. There also is, however, some evidence of apparent apathy in respect of the establishment of fodder reserves. As much of this material has now reached the prime stage, the best way to conserve it would be to place it in a trench silo, and the attention of dairy farmers is directed towards this cheap and effective method of storage.

A few important points in the construction, method of filling, and emptying of the trench is briefly given for the benefit of interested farmers.

Select a reasonably level and well-drained site as near the place of feeding as conveniently possible. Mark it out according to the capacity required. A trench 30 feet in length, 8 feet wide at bottom, 12 feet at top, and 8 feet deep, having an outslope at each end of 1 in 3 grade, would hold approximately 45 tons. By altering the length and retaining the other measurements, the capacity may be increased a ton for each additional foot length.

To construct the trench, excavate according to the desired dimensions, using plough and scoop and depositing the spoil along either side to back up the logs, which should be placed lengthwise to raise the walls 2 feet above the surface. Complete the job by trimming the walls smooth with mattock and spade.

The cost of construction involves labour only, and the time taken would vary according to the nature of the ground. In ordinary circumstances, two men equipped with suitable plant should excavate a trench of 45-ton capacity in about two or three days.

In filling the trench silo there is no necessity to chaff the material, full-length crops being loaded in the field and drawn through the trench, off tipped, and spread in even layers lengthwise, the empty vehicle passing out the other end. Thus each layer is consolidated as a result of the trampling of the horses' action throughout the whole filling process.

Should the crop be at all dry through over-maturity or as a result of frost, a sprinkling of water may be added during the filling process. The filling should continue well above the surface, forming a parapet of about 3 feet high, sloped towards the sides of the trench.

Complete the filling by covering it with grass well watered, finally topping with a 9-inch to a 12-inch layer of earth.

The material so stored will be fit to use as silage in from two to three months after filling, if so desired, or it may be safely stored for many years without undue deterioration or loss.

To remove the silage for use, the trench should be opened up at one end, taking the earth and grass covering from a portion only as required, and cutting down vertically with a sharp implement, such as a spade or hay knife. When a complete face section from top to bottom has been removed, an adze may be used to slice off additional material in a semi-chaffed or short-chopped form, resulting in its being in a more acceptable condition for feeding direct to stock without further preparation.

The silage may be fed as it is to practically all classes of stock. For cows in full milk, however, better results are obtained by the addition of a small quantity of protein-rich fodder and concentrate—such as lucerne chaff and cotton-seed meal.

Further particulars about silos and silage may be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

—*W. H. Bechtel.*

ONION-GROWING.

As onion sowings are usually made in April and May, the incidence of the rainfall received during the winter months is of the utmost importance, and, when deficient, has to be supplemented by irrigation. Because of its deep-rooting habit, the onion can withstand limited dry spells, but the best results are obtained where the growing period is fairly moist, with drier conditions towards maturity and during harvest.

Rich, well-drained, sandy loams, friable and easy to work, have proved the most suitable, producing onions of good appearance and better keeping qualities than where grown on heavier soil types. Sandy soils tend to produce bulbs of good size but low keeping quality, while heavy soils will induce thickened or bull-necked plants.

The preparation of land intended for onion cultivation will now be nearing completion, and it must be remembered that deep cultivation should be avoided as the sowing period approaches.

The seed may be broadcast in seed-beds from which the plants are transplanted to their permanent positions in the field. Alternatively the seed may be sown in the permanent drills. The latter method is usually adopted in Queensland, utilising the "Planet Junior" type of hand seeder, and placing the seed in drills 12 inches to 15 inches apart, which will be found to call for 2 lb. to 3 lb. per acre. The seed should only be lightly covered with not more than ½ inch of soil, as deeper sowings germinate very poorly.

When the young plants are 4 inches to 5 inches high they are thinned out to a distance of 4 inches to 6 inches in between plants, a practice usually carried out with the aid of a 2-inch chipping hoe.

In the southern districts sowings may be commenced soon and continued until May, while in the central and northern districts the period can be extended to July. If sown too early, losses may result from flowering, while if too late the bulbs may be small owing to insufficient time in which to mature before the hot weather causes scalding. Sow late-maturing varieties early and early-maturing varieties late. Only freshly-grown, tested seed should be utilised, as onion seed deteriorates rapidly, and it is therefore preferable to buy seed from reliable sources.

The Brown Spanish type, including "Early Hunter River Brown Spanish," is the most popular, the onions being of good appearance and flavour and possessing good keeping qualities.

The hand cultivators of the "Planet Junior" type are useful for inter-row cultivation, as all weed growth must be kept in check. The soil should not be thrown up against the bulbs, the object being to draw the soil away rather than towards the plants, thus inducing the formation of bulbs. If the soil is not drawn away, bending over the tops with a twisting motion will assist in the formation of bulbs. When the seed-bed has been thoroughly prepared it will be found that very little hand weeding is necessary.

SOWING OF WINTER PASTURES.

Many farmers will soon be preparing land for sowing winter pastures to provide grazing during winter and spring. The sowing of winter pastures should be done during late March or in April. Later sowings will be successful only if exceptionally good seasonal conditions are experienced subsequent to sowing. Annual winter pastures, which are being sown for the sole purpose of providing feed during the present year, must go in early if a long grazing season is to be obtained.

If through dry weather, or some other circumstances, the preparation of land intended for winter pastures has not been done thoroughly, and a fine seed-bed is not available, the sowing of permanent winter pastures is not recommended. Instead, an annual pasture should be laid down, and after the land has been ploughed in the summer the area should be well worked for autumn sowing with a permanent pasture mixture in 1939.

Winter pastures should be sown only on land of at least fairly good fertility. If success is to be achieved with valuable grasses—such as *Phalaris tuberosa*, perennial ryegrass, Italian ryegrass, and prairie grass—it is essential that the soil should be of good quality. Land not quite up to first-class standard may support Wimmera ryegrass and cocksfoot pastures, but infertile and roughly prepared land cannot be expected to maintain a good winter pasture. Cultivation areas which have been "cropped out" should not be put straight down to winter pasture, as is often done, but should have their lost fertility restored to some extent by green manuring.

The winter-growing pasture plants available for use include perennial species—such as *Phalaris tuberosa,* perennial ryegrass, cocksfoot, red clover, white clover, and lucerne, and annual species, including Italian ryegrass, Wimmera ryegrass, prairie ryegrass, and Berseem clover. Not all of these plants are, of course, suited to all districts, but recommendations regarding suitable mixtures for most localities in the southern dairying and agricultural districts are available on application to the Department of Agriculture and Stock.

—*C. W. Winders.*

CLOVERS ON THE COAST.

A marked increase in milk production in late winter and spring when white clover is plentiful in the pastures is a common experience in coastal dairying districts. Unfortunately, it is not every year that weather conditions are favourable for the development of a good growth of clover in unimproved paspalum pastures.

Generally, the requirements of clovers are a fertile and not too acid soil and a fair supply of soil moisture. Where white clover is naturally abundant in paspalum pastures it may be taken for granted that its requirements are supplied, but it is true that the production of thousands of acres of paspalum pasture could be improved by the encouragement of clover growth.

Soils which are distinctly acid can only be made suitable for clover growth by the use of lime. If the fertility of the soil has been lowered by many years of grazing, it is advisable either to renovate with the plough or paspalum renovator and topdress with fertilizers. On suitable areas it may be preferable to plough out the pasture and grow a green manure or some other form of crop prior to resowing the area with a mixture of grass and clover seeds. Renovation and green-manuring practices, in addition to increasing soil fertility, also tend to increase the water-retaining properties of the soil.

In all cases where pasture has been renovated, or where new permanent pastures are to be sown, it is advisable to add clover seed to the pasture. The clovers which have proven themselves of outstanding usefulness for incorporation in permanent pastures are white clover and red clover, and both should be included in permanent pasture sowings on the sub-tropical coast. White clover provides good grazing from about August until November, while red clover makes the bulk of its growth from September till March. Compared with white clover, red clover is a short-lived plant and dies out in a pasture within two or three years. It is of great use, however, in providing feed during the first year while the white clover is establishing itself.

When sowing on renovated paspalum or in new pasture mixtures, about 1 lb. per acre of each of the clovers should be used. New Zealand strains of white clover are superior to European or local strains of which commercial seed is available; the best seed to use is New Zealand Government-certified white clover seed. New Zealand strains of red clover also are preferable to other commercial types.

—*C. W. Winders.*

UTILISATION OF SWAMP LANDS.

Throughout a considerable stretch of the northern coastal country swampy areas of lesser or greater extent are encountered, particularly in the wetter regions where dairying is now being developed. These lands, to a large extent lying idle, could, at no great cost, be utilised by planting them with para grass. This grass is easy to establish, because of its habit of rooting freely at the nodes. It is a rather coarse, vigorous grower, but has succulent stems and leaves and gives a large quantity of green material per acre. Under favourable conditions, yields of over 30 tons per acre have been obtained in one year. It is easily cut back by frost, and is, therefore, most suitable for the warmer localities.

This grass grows well in swampy localities, the runners going out even into deep water. Once established, it holds its own with any other grass. It has a further advantage in that it is credited with completely drying out marsh lands.

Para grass is usually propagated by runners, which root readily. These runners can be easily planted in furrows about 3 feet apart and about the same distance between the rows.

—T. G. Graham.

CEMENTED BAGS FOR LIGHT FARM BUILDINGS.

The ubiquitous chaff and cement bag can be turned to good account in the building of fowl houses or similar farm buildings of light construction, according to the following plan, which has proved successful in practice.

A framework of timber is first of all built up, after which wheat or cement bags are opened out and stretched very tightly over it, being nailed down with $\frac{3}{8}$-inch clout tacks. Next, a mixture is made up as follows:—

Water, $1\frac{1}{4}$ gallons,
Cement, 12 lb.,
Lime 2 lb.,
Salt, 1 lb.,
Alum, $\frac{1}{2}$ lb.

(In damp wet weather use 1 pint less of water.)

Sieve the salt and lime together through a fine sieve—to thoroughly mix the materials and get rid of any big lumps—add the water and then the cement—stirring while adding—and finally the alum. Wet the stretched bags with water and apply the mixture without delay, using a fairly stiff brush, first on the outside, and then on the inside. Before the mixture sets, but after the initial wetness disappears, apply a second coat to the outside. When this sets, the bags will be quite hard and stiff, somewhat like plaster board. Subsequent coatings will, of course, make a stronger board.

The cost of the process, including bags for the foundations, works out at about 8d. a square yard. From this it will be seen that it is a very cheap and easy method of construction. Sheds built according to this plan three years ago show no signs of disintegration.

—H. W. Ball.

The Spraying of Early Beans.

BECAUSE of the high prices recently obtained for vegetables, bean growers on the North Coast are planting exceptionally early this season, and, with the use of the nicotine sulphate-white oil spray, they hope to control the bean fly sufficiently to ensure the production of satisfactory crops. Prior to the use of this spray, plantings right up to May in other years often succumbed or the yields were markedly affected because of bean fly attack.

In using the spray at present, growers must not overlook the fact that the life cycle of the bean fly is shortened somewhat in this warmer weather. Consequently, instead of the two sprayings earlier suggested—that is, the first to be applied when the plants are four days old and the second four days later—it would be advisable to make the first spraying three days after the first beans have appeared and the second four days later, followed by at least two extra sprayings at four-day intervals. This procedure should be adopted for crops planted while the warm weather continues, that is, until the cooler weather retards bean fly activity.

Up to five and six sprayings have been applied in some cases, but recommendations involving this number of sprayings cannot at present be made, pending the completion of experimental work. Growers, therefore, will have to be guided by the number of flies apparent on the plants and the growing conditions. If warmth and moisture are plentiful the plants may survive a certain amount of bean fly attack and still produce good crops. If conditions are dry, however, the plants usually show the effects of the fly very quickly. The spraying programme will, therefore, probably need to be adjusted to the general conditions.

The formula of the spray is as follows:—One fluid ounce of nicotine sulphate, 8 fluid ounces of white oil, 5 gallons of water. For growers with large areas a larger quantity of spray may be prepared from the following ingredients:—Half-pint nicotine sulphate, 4 pints white oil, 50 gallons water.

—*J. R. Horsley.*

TOMATO GROWING IN CENTRAL QUEENSLAND—A REMINDER.

Widespread rains have stimulated preparations for an early planting-out of seedlings. Many growers will, in all probability, look to nurseries for supplies, but the majority will raise their own plants.

If seedlings are sought from outside sources, they should be obtained from reliable growers offering varieties true to type and free from crop-reducing pests and diseases. Correct attention to the seed-bed is of paramount importance in the production of strong, healthy plants. Hygienic practices in the seed-bed will greatly assist in reducing losses from diseases and pests.

When preparing the seed-bed, select a small area of newly-burnt virgin scrub land on which no lantana had previously grown. Level or slightly sloping ground is preferable. Oblong beds only wide enough to permit the grower to reach to the centre without undue exertion are advisable. They should be dug to the depth of an ordinary garden fork, and raised about 4 inches above the natural surface of the ground to ensure drainage. The soil in the beds should be reduced to a fine tilth and the surface levelled and firmed with the back of a spade before sowing the seed. When seed has been evenly and not too thickly scattered over the beds, cover lightly with fine soil. Treatment of seed with a solution of corrosive sublimate before sowing is a desirable practice. Information on seed treatment methods may be had on application to the Department of Agriculture and Stock.

To assist even germination of seed, the bed may be lightly covered with dry grass or hessian. Should hot sunshine prevail after the young seedlings appear, remove the covering from immediately above them to a higher level on a framework made with light forked sticks and cross-pieces.

Harden the developing plants, so that they can withstand conditions in the field, by gradually reducing the grass or hessian covering until they are fully exposed to the sun for a short period before transplanting. Frequent watering of the seed-bed to maintain an even and ample soil moisture condition is essential. During the time the young plants are growing in the seed-bed they should be sprayed and dusted as a safeguard against pests and diseases. A 2-3-40 formula of Bordeaux spray mixture is recommended as a control of tomato plant diseases in seedlings. The chief seedling pest is the tomato mite, for which dusting with a good grade of dusting sulphur is recommended. The sulphur may be conveniently applied with a dust gun or by shaking it over the seedlings from a sugar-bag or some similar container which allows the dust to filter through the mesh.

When plants have grown to a height of 6 or 7 inches, they are ready for transferring to their permanent location in the field. In removing plants from the seed-bed, care should be exercised to ensure the minimum amount of damage to root hairs during the operation. A thorough wetting of seed-beds before removing plants will greatly assist in reducing undue disturbance of the root system.

A convenient tray for the transport of seedlings from the seed-bed to the field can be made with a shallow box and by affixing two small uprights and nailing a cross-piece between them at the top to serve as a handle. Such a tray will protect plants against damage during transplanting operations.

Sowing seed directly into permanent positions within the field has advantages where irrigation can be practised or where good soil moisture conditions obtain, but it is not a recommended practice for the Central district, because of the unreliability and erratic nature of the rainfall.

—*W. J. Ross.*

SUCKERING IN THE BANANA PLANTATION.

A flush growth of young suckers may appear in most banana areas after heavy summer rains.

Before they form their own root system, these suckers rely solely on the parent plant for their subsistence, and where a number are present they retard the parent plant's growth and the development of its bunch of fruit.

Most growers have a definite time for suckering in their working plan, but others fit in at any time, if at all, with the result that four six, eight, and up to a dozen suckers, ranging in size from "peepers" to fully-grown plants, are seen, *all* of which have robbed the parent plant of some of its vigour.

Even in the most fertile soils the number of suckers left to bear the grower's next bunch should seldom be more than two, and sometimes three. It is desirable, therefore—particularly if a fertilizing programme is carried out—to destroy *all* the suckers which are not required as soon as they peep above the ground. At this stage they are easy to disconnect with little damage to the plant, and the fertilizer applied goes *only* to those suckers which will eventually produce the next cutting of bananas.

—*J. R. Horsley.*

MARKETING CAULIFLOWERS.

Cutting.—There should be no difficulty in marketing cauliflowers to the best advantage. The main stalk is cut a short distance below the base of the leaf stalks. This short length of stalk gives protection and prevents the leaves from breaking away. All first quality cauliflowers should be marketed with the leaves intact, as this prevents the heart from being damaged in transit.

Containers.—A clean chaff sack is the best container, being light and airy. Corn sacks, unless new, are usually unsuitable.

Packing.—The cauliflowers should be packed with the leaves brought together to protect the heart. This assists in preventing bruising and discoloration, keeping the heart white and attractive and in a fit condition to sell at high values.

Grading.—First and second quality cauliflowers should be packed separately. Each bag should contain as near as possible cauliflowers of the same size and quality. Mixed sizes do not sell as well as graded. Any cauliflowers showing leaf damage should be packed as second grade.

Branding.—Where possible, markings should be placed on the bags before filling. Stencils suitable for doing this are easily procured, and save time. The grower's name, or mark, and the number of cauliflowers in the bag should be conspicuously placed on the side of the bag. This makes identification easy, and often saves unnecessary handling.

Packed bags should not be used as a seat when carting cauliflowers.

—*J. H. Gregory.*

The Fruit Market.

J. H. GREGORY, Instructor in Fruit Packing.

ALMOST a month's continuous rain has brought about a great change in the country's prospects. Future supplies of quality fruit are assured from all districts.

Apples are now in full supply for good-quality, well-matured lines. Prices have been maintained at satisfactory levels.

Pineapples have been in full factory supply. A disquieting feature of the pineapple industry is the marked tendency of many growers to rush extra consignments on to the Southern fresh fruit markets when a rise in price takes place. Regularity of consignments (plus quality) is the keynote of successful marketing.

Custard apples are now in good supply. Growers are warned against marketing immature fruit, as it will not ripen and depresses the market.

The banana market should maintain itself at payable levels, as the supply of good-quality fruit has been somewhat reduced as a result of the prolonged dry period before the coming of the rains.

The following were the ruling market prices during the last week of the month of March, 1939:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Small, 7s. to 10s.; sixes, 7s. to 14s.; sevens, 7s. to 16s. 6d.; eights, 12s. 6d. to 17s.; nines, to 18s.

Sydney.—Cavendish: Sixes, 14s. to 17s.; sevens, 17s. to 19s.; eights and nines, 19s. to 22s.

Melbourne.—Cavendish: Sixes, 15s. to 18s.; sevens, 17s. to 18s.; eights and nines, 18s. to 22s.

Brisbane.—Lady's Finger: 2½d. to 7d. dozen.

Brisbane.—Sugars: 4½d. to 6d. dozen.

Pineapples.

Brisbane.—Smoothleaf, 3s. to 6s. 6d. case, 1s. to 4s. 6d. dozen; Ripley, 5s. to 9s. case, 1s. to 5s. per dozen.

Sydney.—4s. to 8s.

Melbourne.—8s. to 12s.; Specials higher.

Care should be taken in selecting fruit for the South, highly coloured lines not being suitable for long-distance transport.

Papaws.

Brisbane.—Yarwun, 7s. to 9s a tropical case; Locals, 2s. to 5s. a bushel case.

Sydney.—6s. to 12s. a tropical case.

Custard Apples.

Brisbane.—3s. to 5s. half bushel.

Sydney.—7s. to 10s. half bushel.

Melbourne.—8s. to 10s. half bushel.

Avocados.

Brisbane.—Some small lines of avocados have come on the market and sold at satisfactory prices. Growers of this fruit must keep all immature fruit off the market to avoid retarding the development of the trade.

CITRUS FRUITS.

Oranges.

Brisbane.—Commons: Howard, 10s. to 14s.; Navels: Gayndah, 14s. to 16s., Howard, 12s. to 15s.; Californian Sunkist Navels, 35s. to 36s. export box.

Grapefruit.

Brisbane.—8s. to 11s. bushel.
Sydney.—Queensland, 10s. to 15s.
Melbourne.—12s. to 16s.

Lemons.

Brisbane.—Local, 5s. to 10s.; Gayndah, 10s. to 14s.; Byrnestown Specials, 18s. to 20s.
Sydney.—Queensland, 12s. to 16s.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Jonathan, 7s. to 11s.; Granny Smith, 8s. to 9s., Specials higher; Delicious, 7s. to 10s.

Pears.

Brisbane.—Keiffer, 6s.; Howells, 7s. to 9s.; Winter Cole, 9s. to 11s.; Beurre de Caps, 5s. to 8s.; Williams, 9s. to 10s.; Packham, 7s. to 9s.

Plums.

Brisbane.—Grand Duke,, 6s. to 7s. 6d.; President, 5s. to 8s.

Figs.

Brisbane.—2s. to 2s. 6d. tray.

OTHER FRUITS.

Grapes.

Brisbane.—Muscats, 6s. to 8s.; Purple Cornichons, 7s. to 10s.; Colmans, 4s. to 6s.; Waltham Cross, 6s. to 9s.

Tomatoes.

Brisbane.—Ripe, 2s. 6d.; Green, 2s. to 5s.; Coloured, 3s. to 8s.
Sydney.—3s. to 5s.; Specials to 6s.

Passion Fruit.

Brisbane.—First Grade, 13s. to 18s.; Seconds, 10s. to 12s.
Sydney.—8s. to 16s. half bushel.

MISCELLANEOUS, VEGETABLES, &c.

Rockmelons.—3s. to 4s. case.
Cucumbers.—3s. to 4s. bushel case.
Pumpkins.—5s. to 7s. bag.
Marrows.—1s. to 4s. dozen.
Lettuce.—1s. to 3s. per dozen.
Cabbages.—Stanthorpe, 5s. to 8s. chaff bag; Locals. 2s. to 7s. dozen.
Beans.—2s. to 3s. sugar bag.
Peas.—7s. to 8s. sugar bag; second quality lower.
Beetroot.—6d. to 1s. bundle.
Carrots.—3d. to 1s. dozen.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and the Jersey Cattle Society, production charts for which were compiled during the month of February, 1939 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (STANDARD 350 LB.).				
Alfa Vale Eveline	W. H. Thompson, Alfa Vale, Nanango	14,322·65	646·946	Reward of Fairfield
Sunnyside Empress 27th	P. Moore, Wooroolin	10,332·8	382·393	Emblem of Sunnyside
Lynfield Sally	F. E. Birt, Lynfield, Sexton	8,516·85	354·26	Lavender's Pride of Blacklands
Cedargrove Irene 20th	J. Redhead, junr., Indooroopilly	9,551·25	350·227	Duke of Cedargrove
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Alfa Vale Lovely 7th	W. H. Thompson, Alfa Vale, Nanango	12,286·7	469·8	Reward of Fairfield
Pilton View Duchess	P. D. Fiechtner, Pilton View, Greenmount	9,149·0	394·552	Venus' Sheik of Navillus
Pilton View Rosebud	P. D. Fiechtner, Pilton View, Greenmount	9,280·3	373·805	Navillus Venus' Shiek
Springleigh Mavis 2nd	H. F. Moller, Springleigh, Boonah	9,528·0	365·793	Springleigh Bruce
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Happy Valley Silky	R. R. Radel, Coalstoun Lakes	7,904·2	292·626	Burradale Emperor
Werona Vale Mayflower 10th	A. H. E. Black, Kumbia	7,544·26	285·899	Blueboy of Glenthorn
Pilton View Melba	P. D. Fiechtner, Pilton View, Greenmount	6,702·4	277·437	Navillus Venus' Shiek
Laguna Empress	F. G. Lamkin, Kaimkillenbun, Dalby	6,823·6	273·441	Morden Marcus
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Highfields Perfect 5th	J. A. Heading, Highfields, Murgon	6,398·4	329·895	Greyleigh Legend
Rhodesview Bumper 12th	W. Gierke and Sons, Helidon	6,273·27	265·082	Blacklands Prospector
Sunnyview Fairy Fly 2nd	N. L. Siemon, Beaudesert	6,266·6	253·069	Burradale Byron

JERSEY.

Mature Cow (Standard 350 lb.).

Woodlands Pansy 3rd	W. E. Lewty, Leyburn	8,317·25	476·136	Carnation Golden Duke
Brooklands Royal Cherry	W. and C. E. Tudor, Branch Creek, Gayndah	8,637·78	417·478	Retford Earl Victor
Fern's Surprize of Inverlaw	R. J. Crawford, Inverlaw, Kingaroy	8,484·31	373·174	Montrose Gipsy of Glen Iris

Senior, 3 Years (Standard 290 lb.).

Stoneleigh Comet's Pride (270 days)	W. and C. E. Tudor, Branch Creek, Gayndah	6,664·14	317·952	Brookland's Comet

Senior, 2 Years (Standard 250 lb.)

Lady Evelyn of Windsor	E. J. and H. G. Johnson, Gleneagle	8,432·66	425·556	Bobs of Wingate
Hawthorn Brae Lady Colleen	P. Kerlin, Killarney	5,887·9	292·92	Hawthorn Brae Navigator

Junior, 2 Years (Standard 230 lb.).

Bellgarth Buttercup 4th	D. R. Hutton, Cunningham	5,968·33	319·246	Trecarne Renown 2nd
Carnation Golden Bell	Geo. Harley, Childers	5,654·57	286·835	Vinchelez Golden Victory
Broadview Princess	W. S. Kirby, Byrnestown	4,673·6	237·518	Glenview Mason
Pineview Fawny	J. Hunter and Sons, Borallon	4,492·32	232·48	Oxford Fawn's Lad

General Notes

Mr. Bulcock's Overseas Mission.

Following is an extract from an editorial in THE QUEENSLAND PRODUCER:—

Possessing as he does an amazing capacity for hard work combined with exceptional administrative ability, Mr. Bulcock has stood up to the exacting test with flying colours. Having regard to the fact that no previous Minister has held such a long unbroken record in control of this important department, and that he was recently re-elected for the seventh time President of the Council of Agriculture and chairman of the executive committee, the achievement is certainly one to be proud of.

Nominally he is supposed to enjoy a period of relaxation from his arduous tasks while abroad, but according to the programme he has mapped out and the investigations he intends to make in South Africa, the Argentine, and the United States, we are inclined to think that Mr. Bulcock will find his tour more in the nature of a "busman's holiday."

That the Minister has earned the esteem and gratitude of the vast majority of producers has been clearly demonstrated by the eulogistic terms in which his ability was referred to by speakers at the dinner of the dairying industry to wish Mr. Bulcock bon voyage and safe return.

While there have been times when certain sections of producers were unable to see eye to eye with his Ministerial policy, the fact remains that Mr. Bulcock's sincerity of purpose and desire to bring about an improvement in their conditions has never been in question. His sympathy for and understanding of the producers' problems, and never-failing assistance and active co-operation in trying to evolve practical solutions, have been a real source of encouragement.

On first taking over the control of the Department of Agriculture and Stock, he created the impression that technical matters were his main preoccupation. In due course, however, Mr. Bulcock turned his attention to the study of economic trends adversely affecting the returns of farmers, fruitgrowers, and graziers, and as a direct result the administration of the department has become more evenly balanced and helpful.

This tendency to emphasise the value of science as applied to agriculture and stock-raising, was perhaps the outcome of Mr. Bulcock's early training. Born on an irrigation farm in Victoria, and having studied agriculture at the Wagga Experiment Farm, it was quite natural that he sought to raise the standard of efficiency of his officers and through them that of the producers. It may be claimed that success has attended his efforts in both directions, but for a time serious doubts were entertained whether the policy did not lean too heavily on science instead of the practical side.

Be that as it may, agricultural economics in relation to production and marketing receive to-day from Mr. Bulcock the full consideration that this vital factor warrants, and as a consequence he is regarded with greater confidence by the man on the land.

In all the circumstances, therefore, he is well equipped to carry out his important investigations in three countries. The information Mr. Bulcock will be able to glean concerning both technical and economic problems, and the contacts he will make with research workers, economists, and administrators during the course of his tour, are certain to prove of inestimable value to our producers and to Queensland when he comes back and takes over his Ministerial duties again.

We heartily wish Mr. Bulcock God speed, happy hunting for information in his travels, and a safe return invigorated in health and knowledge.

Deputy for Acting Director of Marketing on Dairy Products Stabilisation Board.

An Order in Council has been issued under the Dairy Products Stabilisation Acts amending an Order in Council constituting the Dairy Products Stabilisation Board to provide that a deputy for the Acting Director of Marketing on such Board may be appointed by the Minister.

Staff Changes and Appointments.

Mr. V. Kleinschmidt (Hidden Vale, Grandchester) has been appointed an inspector under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock.

Mr. R. Walsh, Field Assistant, Biloela, has been appointed an inspector under the Diseases in Plants Acts, Department of Agriculture and Stock.

Messrs. H. C. Macartney (Yeppoon) and R. L. Hunter (Freshwater, via Cairns) have been appointed honorary protectors under the Fauna Protection Act. The latter also has been appointed honorary ranger under the Native Plants Protection Act.

Constable F. R. West (Roma) has been appointed an inspector under the Brands Acts.

The following inspectors of stock, slaughter-houses, and dairies in the Department of Agriculture and Stock have been appointed also inspectors under the Brands Acts:—Messrs. J. J. Purcell, V. J. Brimblecombe, C. N. E. Barr, T. W. Murray, J. E. Mahar, W. Williamson, C. L. Mudd, P. McCallum, and A. E. Mitchell.

Mr. V. J. Anderson, Court House, Childers, has been appointed chairman of the Isis Local Sugar Cane Prices Board and also an agent of the Central Sugar Cane Prices Board.

The following transfers of officers in the Department of Agriculture and Stock have been approved:—

Mr. A. F. H. D. Singh, Inspector of Stock, Slaughtering, and Dairies, from Chinchilla to Willowburn Bacon Factory;

Mr. J. J. Purcell, Inspector of Stock, Slaughtering, and Dairies, from Zillmere Bacon Factory to Chinchilla; and

Mr. E. J. Taylor, Inspector of Stock, Slaughtering, and Dairies, from the Willowburn Bacon Factory to the Zillmere Bacon Factory.

The resignation of Mr. L. A. Downey, Instructor in Pig Raising in the Department of Agriculture and Stock, has been accepted as from the 24th March. Mr. Downey resigned his position consequent on his appointment as Pig Expert in the Victorian Department of Agriculture.

Mr. J. Byron, cotton grader, Department of Agriculture and Stock, has been transferred from Brisbane to the Glenmore Ginnery, Rockhampton.

The following transfers of inspectors under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock, have been approved:—Messrs. J. P. Dowling, from Kingaroy to Dalby; J. Wyvill, from Wondai to Kingaroy; and T. W. Murray, from Oxley Bacon Factory to Wondai.

Mr. W. Eastgate, of Juliet street, Mackay, has been appointed an honorary protector under the Fauna Protection Act.

Other fauna protectors appointed in an honorary capacity under the above-mentioned Act are—Messrs. J. K. McConnel, Mount Brisbane, Esk; G. Sheil and B. E. Shaw, Somerset Dam, via Esk; W. W. Williams, Union Bank Chambers, Creek street, city; D. Macdonald, M.L.A., Peachester; Inigo Jones, Crohamhurst Observatory, Peachester; T. Davies, Jimna Mills; D. P. Kennedy, Kilcoy; and P. Copley, Stanley House, Crossdale, via Esk. The abovementioned have been appointed in connection with the sanctuary for the protection of fauna, recently established, which embraces the Stanley River catchment and Mr. J. K. McConnel's property at Mount Brisbane.

Mr. W. G. Hancock, inspector under the Diseases in Plants Acts and agent under the Banana Industry Protection Act, has been transferred from South Johnstone to Woodford.

Constables K. H. Bateson (Georgetown) and S. McKinnon (Almaden) have been appointed also inspectors under the Slaughtering Act.

Mr. W. F. Rose (Bald Hills) has been appointed an honorary protector under the Fauna Protection Act.

Open Season for Duck.

An Order in Council has been issued under "*The Fauna Protection Act of* 1937" providing for an open season for wild duck in Southern Queensland from the 6th April, 1939, to the 31st August, 1939, both inclusive.

The area in respect of which the season will be opened is approximately that portion of the State south of the 25th parallel of south latitude.

The attention of shooters is drawn to an Order in Council which prescribes that twenty (20) wild ducks is the maximum number which any one person may take during a period of twenty-four hours.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of Mr. W. D. Francis, Botanist.

"Byfield Fern."

T.W.H. (Brisbane)—

The specimen from Mallanganee, is *Bowenia serrulata*, sometimes called "Byfield fern." It is not, however, a fern, but a cycad. It is extensively used as a table decoration. Plants should be obtainable from Byfield.

Devil's Fig.

D. (Yeerongpilly)—

The plant is devil's fig, *Solanum torvum*. The Solanums as a group are mostly regarded as suspected poisonous plants, although it is quite true that no deaths have been associated with the fruit of the common wild tobacco (*Solanum auriculatum*). On occasions, the devil's fig has been suspected of poisoning stock. It is possible that this might be the cause of the trouble.

Colocynth.

J.C. (Brisbane)—

The specimen from Muckadilla, is *Citrullus Colocynthis*, the colocynth. It belongs to the melon and cucumber family. It is a native of Africa, and has ran out in some parts of Western Queensland. The fruit is reputed to be poisonous in large quantities. The dried pulp of the fruit is used in pharmacy and has a strongly purgative action.

Barnyard Millet.

A.C.V.B. (Brookstead)—

The specimen is the barnyard millet, *Echinochloa colona*. This is a nutritious and palatable grass, which does well on the Downs. It makes particularly luxuriant growth in damp situations. It is a native species.

A Common Tropical Shrub.

J.T.M. (Mackay)—

The specimen belongs to a common tropical leguminous shrub or small tree, known botanically as *Leucaena glauca*. This plant has a good reputation as a fodder for stock, except that horses which feed on it are reported at times to lose the hair from their manes and tails.

A Snapdragon. Button Weed.

W.A.K. (Clermont)—

The specimens you send have been determined as—

1. *Morgania floribunda*, a plant belonging to the snapdragon family (Scrophulariaceae).
2. *Centipeda orbicularis*, button weed.

Neither is known to be poisonous or harmful to stock. We presume the specimen referred to as "fine mint weed" is No. 1. It is not allied to the mint weed.

Water Couch.

W.S.R. (Cooroy)—

The specimen is water couch, *Paspalum distichum*, an excellent fodder grass, both palatable and nutritious. It grows best on low lands, but in places is a bad weed in cultivation. We have no chemical data as to its content of protein, but judging by its effect on stock it appears to be quite as nutritious as paspalum or Rhodes grass. We recommend it to be planted on any low-lying country which is not used regularly for the cultivation of crops.

A Cultivated Plant (Phyllanthus nivosus).

Inquirer (Yeerongpilly)—

The specimen is a cultivated plant, *Phyllanthus nivosus* var. *roseo-pictus*, a native of the South Sea Islands. We have no record of its being poisonous to stock, although it belongs to the family Euphorbiaceae, which contains some virulent poison plants, such as the castor-oil plant.

Rural Topics

A Word for the Horse.

We have so often yarned about cattle, sheep, and pigs and other farm stock that we seem to have forgotten the horse, which, after all, is an important partner in the farming business. What do we think of our horses, anyhow? Are they pieces of machinery, like the plough or the mower, or do we regard them as real friends. A horse likes to be talked to, and though he may not know what it is all about, he certainly does understand the tone of voice, and if treated as a friend he learns to look for his boss and shows pleasure when he comes into the yard. We all know that whinny of recognition—ask any Digger who worked horses during the war! A lump of sugar, an apple, or a carrot given with a pat on the neck will make the day brighter for the horse. The "Old Brig's" (a famous Australian Light Horse leader) command at the end of a march—"Make much of your horses!" was based on a wise army custom. In terms of money, at even a minimum wage, every horse easily earns enough during his best working days to maintain him in leisurely comfort in his old age. It is not, therefore, just sloppy sentiment to urge that an old horse should never be sold or given away to someone who may treat him badly. It is merely giving a horse a fair deal to turn him out on to a well-grassed paddock when his useful days are over; that, or a painless death when to prolong his life would mean nothing but misery and slow starvation to one of the best of man's dumb friends.

Soil or Dust?

According to Canadian experience, one of the chief causes of soil drift through wind erosion is a too-fine tilth in summer fallows. Among other remedial measures, one recommended by the Canadian authorities is the use of the one-way disc for cultivation, so that a rougher and more cloddy surface results.

The Necessity of Keeping Farm Records.

A farm manager is at the helm of a real business, in which physical effort is not enough to make things go. There must be thought and planning behind every move. There must be records which will show at the end of the year which farm operations have paid, and which have been carried on at a loss. With records as a guide, it is possible to avoid making the same mistakes a second time.—*New Zealand Farmer.*

The Hum of the Busy Bee—A Word for Every Wiggle.

Scientists have just discovered that bees don't hum with the buzz of their wings, but with the movements of their bodies. According to the bee specialist at the University of California—Dr. J. E. Eckert—there's a word for every wiggle. Most of the body movements performed in the air, and from which the "hum" or buzz is derived, tell other bees where to locate a new supply of food.

The Erosion Problem.

Here is a picture presented at the annual conference of citrus growers in Victoria—a picture not overpainted, and which represents, in part at least, similar conditions in other parts of the Commonwealth:—

> "The ruthless clearing of timber from hillsides, and indiscriminate burning-off by settlers and others, is gradually bringing about an intolerable position. It costs the Victorian Water Commission £60,000 a year to cope with sand drifts in the Mallee and Wimmera. This is only part of the bill; the cost to the State in damaged watersheds and in ruined farming land is incalculable. Much of the damage should never have occurred. It was caused mostly by stupid—I hope that term is not too strong—handling of the land, by denudation by removal of natural cover, by indiscriminate cropping and by overstocking. The remedy naturally lies with the landholders themselves."

Grooming of Dairy Cattle.

Grooming of dairy cattle is a refinement in farm management, which calls for consideration. High producing animals are usually kept on high-priced farms, from which natural scratching or rubbing-posts—trees or stumps—have been cleared. Frequent milking and stall feeding prevent during much of the day the natural function of self licking. Both these small inhibitions have an effect on milk production and it has been observed that, under these conditions, some grooming is decidedly beneficial.

Farm Notes

MAY.

WHEN seasonal conditions permit, the May sowing of wheat is recommended in the Maranoa and Central districts, where such early sown crops invariably outyield those established later in the season.

For the main Downs sowing, June is preferred unless sheep are available to check the early growth, as the principal varieties now grown, Flora, Florence, Pusa, Three Seas, Seafoam, and Glugas, are all sufficiently early maturing for early sowings to risk damage by frost. All seed wheat should be graded and treated with copper carbonate or a reliable mercury dust as a preventative of ball smut, utilising 1 to 2 oz. per bushel. Seed barley and oats are preferably treated with formalin, or with either of the mercury dusts Agrosan and Ceresan.

Succession sowings of oats, barley, or wheat required for grazing purposes can be made during the month, mixing field pea seed or tares therewith, as described in previous issues of this Journal.

Winter grasses should now be well established, but if previous sowing has been postponed owing to dry weather, land now in good condition may still be sown with suitable types, preferably *Phalaris tuberosa*, Wimmera Rye, or Prairie Grass, all of which will withstand fairly dry conditions. Sowings later than May are certainly not advised.

Lucerne sowings can be continued, drilling the seed to a shallow depth only, on soil containing sufficient moisture to induce satisfactory germination. Rolling is beneficial if the surface is somewhat loose and rough, but should be followed by a light harrowing.

Potatoes will have received their final cultivation and hilling, so that cultivators can now be diverted to the root crops such as mangolds and swede turnips established for pig-feeding purposes.

The sowing of onion seed may be continued on suitable soils, drilling in permanent position, in rows spaced from 12 to 15 inches apart, and lightly covering with not more than ½ inch of soil. Hand seeders are useful for this work if the areas are not extensive.

Mature sweet potatoes may be dug, allowed to dry in the sun for a few hours, and if desired for home use placed in dry sand until required. Sweet potatoes are mature when the cut surface dries white and does not turn greenish black round the edge.

Attention should be given to the important work of seed selection for future sowings before finalising the harvesting of maize, sorghum, sudan grass, cowpea, pumpkin, &c., as it is wise to be sure of varietal purity rather than depend on the seedsman from year to year.

Orchard Notes

MAY.

SUCCESS in fruitgrowing depends not only on the proper working and management of the orchard, but also on the way in which fruit is handled and marketed. With citrus fruits particularly, none pay better for extra care in packing and presentation.

Some growers do not realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions.

In order to prevent injuring the skin when gathering, all fruit should be cut and not pulled. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. If, however, the injury is only slight, it can be sent to a local market for quick sale.

For oversea and interstate markets, only choice fruit should be selected. It should be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention.

Banana and pineapple plantations should be put into good order, and kept free from weed growth.

Land to be planted with fruit trees should be got ready, as, if possible, it is always advisable to allow newly-cleared land to "sweeten" before planting.

Plate 172.
Stacey's Creek, near Ballandean, Stanthorpe District, South Queensland.

Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

THE ONLY CHILD.

IN giving advice about the management of the only child for application in the home, we need to consider whether that home is in the city, small town, or isolated in the "outback."

There are two main points that parents should remember first; that all educationists and psychologists, who differ on many points, agree on one, namely, that character is formed before six years of age. After that, training and environment still count, of course, but not to the same extent. The second point refers especially to the only child, or one leading the life of the only child, and is that man is a social being.

Companionship with children of his own age or, better still, of his own stage of development is a necessary part of a child's life. Without it he has little opportunity of learning to make adjustments and is apt to become "a spoilt child." By adjustment is meant the process of learning how to fit harmoniously into a group of children, how to give and take for the good of the group, the process of acquiring judgment, balance, and control. In the light of future citizenship it means that the young child is learning to co-operate, to work for the good of the whole social group or community. He is gradually learning to put into practice the universal law of interdependence: interdependence of one individual upon another, of one part of the community upon another, of one nation upon another. Every intelligent teacher and parent has this in mind when training the baby or older child.

The best solution of the problem of the care of the child leading the life of an only child in the city is to send him to a nursery school or kindergarten. The trained director in charge is qualified to handle intelligently and sympathetically the various types of children who come under her supervision—the so-called difficult or problem child, the child over-attached to his mother, the irritable and emotionally unstable child, and others. The mother with a selfish and mistaken type of affection who is afraid to trust her child to the care of anyone but herself will be gratified to observe the improvement in her child after he has attended such a school. The child becomes more content as the result of his new interest, his emotional life is able to develop along healthy channels in his new environment, and his intellectual growth can take pace normally. To the onlooker it may seem that all the activity that goes on at the nursery school and kindergarten is just play. Behind it all growth and development are proceeding. Characters are being formed. The process is slow but sure. Attention is paid to the physical as well as the mental development. A sound mind in a sound body is the motto of the kindergarten.

There may be no nursery school or kindergarten in the town in which you live. In this case, social development being most important for your child, it may be possible to invite some children in to play. You can exercise supervision unostentatiously. If you are able to play just a little with them or show an interest in their play, or tell them a story, or read some nursery rhymes to them, how they will love you! Perfect English is not maintained under normal circumstances anywhere while children are young and imitative. Mistakes in grammar, even "swearing," appear for short intervals in all well-conducted homes and schools; children love to imitate anything new.

For the parents of a solitary child in the "outback" there is often only one solution of the problem—the mother or guardian must give up much time, at the cost of some other duties, to give the child companionship. But the companionship must aim at strengthening, not weakening, the child. Let all games, all "jobs," all enjoyments, keep as near a fifty-fifty basis as possible. Train the child to be a "good loser." Develop responsibility by letting him keep pets and have entire control of their welfare. For mental culture, good books with clear pictures are essential. Handwork, be it connected with small house duties, carpentry, drawing, or other activities, is useful in helping to keep the only child practical. Aim always at turning his thoughts outwards, away from himself. Any creative work should be steadily encouraged; finishing things started is an important part of efficiency, so guide him to start only things simple enough to finish. Above all, if the parents co-operate and "pull together," then wherever the only child may be living he has the greatest help of all—the unified, harmonious home.

Bring your toddlers as well as your babies to the Baby Clinics for advice and for periodic examination and weighing.

You may obtain information on all matters concerning child welfare by visiting the nearest Baby Clinic, or by writing to the Sister in Charge, or by communicating direct with the Baby Clinic Training Centre, Alfred street, Valley, N. 1, Brisbane.

HOME ECONOMICS.

FOLLOWING is an extract from an article—"Home Economics as an Education for Life"—by Miss G. M. Sedgwick in *Farming in South Africa* for February:—

We have made an auspicious beginning in South Africa. Some of our universities offer courses leading to the B.Sc. degree in home economics, but there is need for others to follow suit and to expand the field in more ways than are possible at present. Our technical colleges and other institutions offer courses in domestic science, but these emphasise mainly the development of skills and techniques in sewing, cooking, household management, &c.

It has long been felt, however, that this practical side of home-making, invaluable though it is, is not enough. Many of the time-honoured processes have disappeared from the home. What of spinning and weaving and the manufacture of clothes, breadmaking, dairying, the preservation of foods, to name only a few? The factory has assumed complete control of some of these processes, and is gradually taking over more and more. But this does not mean that we are free from all responsibility. On the contrary, it renders home-making more complicated, in that we now feel the need for a training in economics—home economics—which teaches us how to judge quality in food, clothing, textiles, and home equipment, so that we may buy wisely and obtain the maximum value for our money and the satisfaction which economical spending brings.

Health the Basis of Home Economics.

Basic to all home-economics teaching is health, and by health is meant mental as well as physical health. Maximum health for the family is sound economics, but to ensure this is no hit and miss affair. One of the most important aspects of home economics, therefore, is the study of foods in relation to health and growth. Healthy bodies are built up by nutritious and carefully-balanced meals; consequently a knowledge of food values and the principles of preparation and serving is essential. Hand in hand with nutrition goes the study of hygiene and sanitation, biology, chemistry and bio-chemistry, physiology, and physics, in order that the student may have an adequate appreciation of the many factors on which health is dependent.

Art in Home Economics.

Another phase of home economics is the question of beauty in the home. Beauty is no longer the exclusive possession of the rich; it is within the reach of all. Nevertheless, many who strive for beauty succeed in making for themselves only pretentious and unsuitable surroundings, because they do not know how to create the desired effect. Home economics teaches the basic principles of obtaining suitable, restful, artistic effects in our homes through knowledge of design, colour, and arrangement, rather than through the expenditure of large sums of money.

Home Economics as an Integrating Force.

Finally, home economics now embraces a still wider field, one which is intimately connected with every individual and which through the individual reaches out to the world at large, viz., the field of family relationships.

In order to gain insight into and to understand the many problems which beset the young wife and mother a thorough grounding in child guidance and in adolescent and adult psychology is given in order to stimulate interest in the solving of such problems as will arise during those first years when all too many promising marriages are wrecked and home life is spoiled. We can no longer trust to instinct. In the first place, we know very little about instinct, and we cannot be sure that instinct will help a girl to develop into a successful wife and mother any more than it will help a boy develop into a successful farmer or business man. Men have been studying their relationships to their employees for some time, but we are only beginning to see the importance of understanding the relationships with those persons with whom we are continually in contact in our home or social life and from whom we cannot be easily separated.

Home economics is trying to teach women that marriage is a life work worthy of their finest efforts, and not a welcome relief from some hated environment. The girl who takes this attitude stands far more chance of conserving and appreciating romance than does the one who marries for the sake of a home or social status, or the immature type who thinks that marriage should be merely a continuation of the courtship and who is poorly equipped to understand and to know how to cope with difficulties as they arise.

The problem of the care of children is now receiving wide recognition and attention. We find that children whose mothers have been trained to care for them are likely to be well-nourished and to have their mental and spiritual welfare cared for with intelligent effort and interest.

IN THE FARM KITCHEN.

COOKING WITHOUT WASTE.

It is amazing how much waste there can be in cooking if a careful watch is not kept on the little things. For instance, quite a lot can be wasted by ordering more food than is actually required, and by throwing away left-overs which, perhaps, could be used up for another meal.

Quite often, far too much fat is used when frying, and the same applies to eggs and crumbs when egging and crumbing. If any food is left over, use it up at the following meal or next day.

Following are some suggestions for variations of the dinner menu:—

MENU FOR OVEN DINNER.

Fillets of Fish with Cheese Sauce.

Take 6 fillets fish, 1½ cupfuls cooked spinach, kipper paste, 1½ tablespoonfuls grated cheese, 1½ cupfuls cheese sauce, nutmeg, pepper, salt, a little cayenne, juice ½ lemon.

Spread each fillet with kipper paste, using it very sparingly, then fold in two. Prepare spinach in the usual way. Season to taste with grated nutmeg, salt, pepper, and a little cayenne, and place in the bottom of a shallow, buttered, fireproof dish. Place fillets in another buttered fireproof dish. Add lemon juice. Cover with buttered paper and bake in a moderate oven for fifteen minutes, then place on top of the spinach. Sprinkle with the liquid from the fish dish. Cover with cheese sauce and sprinkle with grated cheese. Bake till golden brown.

Stuffed Roast Breast of Veal.

Take 4 lb. boned breast of veal, ¼ lb. breadcrumbs, 2 teaspoonfuls minced parsley, 1 beaten egg, ¼ teaspoonful grated lemon rind, 2 oz. suet, ½ teaspoonful dried herbs, salt, pepper, cayenne to taste.

Mix parsley, suet, crumbs, herbs, and lemon rind with enough egg to bind. Spread over veal. Add seasoning. Roll up and tie into a neat roll. Place in a baking tin. Cover with buttered paper. Cook in a very hot oven for ten minutes, then reduce heat and roast, allowing twenty minutes to the lb. and twenty minutes over. Baste frequently. One hour before it will be ready, add peeled potatoes brought to the boil, strained, and dipped in flour. Baste them with the hot fat in pan. Turn when brown below.

Apricot Cobbler.

Take 1 large tin apricots, ½ cupful milk, 2 cupfuls flour, 2 tablespoonfuls butter, ½ cupful cold water, 5 tablespoonfuls margarine, 1½ tablespoonfuls castor sugar, 1 tablespoonful lemon juice, 1 teaspoonful salt, 4 teaspoonfuls baking powder.

Pour apricots into a buttered pie-dish, keeping back ¾ cupful of the juice. Sprinkle with lemon juice. Dab with pieces of butter. Rub margarine lightly into the flour, sifted with the baking powder and salt. Stir in the sugar, then milk—and water if needed—to make a dough. Roll dough out, and place it on top of apricots. Do not bring it over the rim. Neaten round the edges. Prick with a fork. Brush with milk. Place in a hot oven. Bake for thirty minutes.

STEAMED DINNER MENU.

As the meat course is white, make tomato, split pea, or brown soup. Cook the chicken in the second tier of the steamer, above the water, the artichokes above that, and rhubarb on top. If using a waterless cooker instead of a tiered steamer, place the chicken in the bottom with the potatoes sliced round, but the bottom must be well greased. Dab the potatoes with butter or fat. Place the artichokes in one greased container, and put the rhubarb in the other.

Oatmeal Stuffing.

Take 1½ cupfuls oatmeal, 3 tablespoonfuls chopped suet, pepper, salt, 2 peeled onions, pinch dried herbs, beaten egg.

Mix all the ingredients together, chop the onions finely and add them. Bind all together with as much beaten egg as is necessary, and stuff the prepared fowl with it. Rub the bird with a cut lemon and place in steamer or cooker. Steam for two to three hours, depending on age of bird. Arrange potatoes round, if steamed in a cooker. Sprinkle with pepper and salt, and dab with butter.

Steamed Jerusalem Artichokes.

Take 1½ lb. artichokes, small piece butter, cold water, vinegar, pepper and salt.

First wash and scrape artichokes and drop at once into cold water, mixed with vinegar, to prevent discolouring (one tablespoonful to a quart of water). One hour before chicken is ready, place in a pan of the steamer or in container of cooker after buttering well. Sprinkle with pepper and salt and cook.

STEWED DINNER MENU.

Fillets of Fish.

Take 1 lb. fish fillets, 1 oz. butter, ½ pint milk and water mixed, 1 oz. flour, salt, and pepper.

Mix flour to a smooth paste with a little of the milk and water. Place the remaining milk and water in a saucepan and bring to boiling point. Add margarine, seasoning, and fish fillets. Keep under boiling point till the fish is cooked (in about fifteen to twenty minutes), then remove the fish and drain thoroughly. Add the blended flour to the liquid remaining in the saucepan and stir till boiling. Put the fish on a hot dish, pour sauce over, and garnish with lemon and parsley.

Stewed Scotch Rabbit.

Take 1 rabbit, 2 carrots, 1 sliced tomato, 2 tablespoonfuls bacon fat, 2 cloves, 8 small onions, 1 small turnip, 2 stalks celery, salt and pepper, flour.

First scald, dry, and joint rabbit. Dip in seasoned flour. Melt bacon fat in a saucepan. Add rabbit joints and fry until brown all over. Add peeled onions and brown a little, then stir in sliced tomato, carrots, turnip, celery, cloves, and pepper and salt to taste. Barely cover with boiling water. Cover with lid. Simmer gently from two to three hours or until meat is tender. Serve with steamed potatoes.

Stewed Prunes.

Take ½ lb. dried prunes, ¾ cupful sugar, ¼ teaspoonful ground cinnamon, 1 quart water.

Wash the prunes well, drain, and place in a basin. Cover with the quart of water and stand overnight. Next morning, turn prunes and water into a saucepan. Add sugar and cinnamon, and when sugar is dissolved, simmer until tender. Serve with whipped cream.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1939 AND 1938, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of years' records.	Feb., 1939.	Feb., 1938.
North Coast.	In.		In.	In.
Atherton	10·84	38	29·56	16·68
Cairns	15·74	57	38·63	14·91
Cardwell	16·93	67	21·84	12·23
Cooktown	13·71	63	17·70	13·36
Herberton	8·12	53	18·01	15·28
Ingham	16·48	47	28·15	28·83
Innisfail	22·76	58	38·18	28·99
Mossman Mill	18·57	26	35·13	20·90
Townsville	11·22	68	9·47	15·35
Central Coast.				
Ayr	9·20	52	18·20	12·87
Bowen	8·75	68	10·01	9·94
Charters Towers	4·48	57	5·65	5·84
Mackay P.O.	11·80	68	11·76	12·86
Mackay Sugar Experiment Station	11·21	42	14·45	11·56
Proserpine	12·49	36	27·90	12·18
St. Lawrence	7·68	68	1·36	2·01
South Coast.				
Biggenden	4·28	40	2·29	0·54
Bundaberg	6·43	56	2·36	0·72
Brisbane	6·32	87	2·61	5·62
Caboolture	7·69	52	1·62	3·80
Childers	6·59	44	2·74	2·13
Crohamhurst	12·58	46	4·45	2·27
Esk	5·34	52	0·38	1·48
South Coast—contd.				
Gatton College	3·43	40	0·33	0·83
Gayndah	4·16	68	1·25	1·34
Gympie	6·72	69	1·79	1·76
Kilkivan	4·84	60	2·15	0·55
Maryborough	6·73	68	2·05	1·86
Nambour	9·57	43	3·23	4·22
Nanango	3·99	57	0·79	0·68
Rockhampton	7·64	68	3·37	0·46
Woodford	8·29	52	2·83	1·13
Central Highlands.				
Clermont	4·20	68	0·77	4·88
Gindie	2·68	40	..	0·10
Springsure	3·79	70	1·50	0·24
Darling Downs.				
Dalby	2·77	69	1·93	0·32
Emu Vale	2·51	43	..	1·69
Hermitage	2·31	33	..	0·40
Jimbour	2·55	51	1·18	..
Miles	2·64	54	0·50	0·01
Stanthorpe	3·13	66	0·28	1·86
Toowoomba	4·47	67	0·94	1·80
Warwick	3·01	74	1·05	2·12
Maranoa.				
Bungeworgorai	2·18	25	..	0·80
Roma	2·87	65	0·13	0·65

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—FEBRUARY, 1939.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·78	85	75	89	3	72	12	1,770	18
Herberton	..	78	64	85	19	58	20	1,801	18
Rockhampton	29·91	87	71	95	3	69	6, 11, 15 to 18	337	13
Brisbane	30·01	84	69	103	3	65	9	261	9
Darling Downs.									
Dalby	29·99	87	64	98	3	59	5, 11, 9	193	4
Stanthorpe	..	82	58	92	3	48	8, 14	28	2
Toowoomba	..	82	62	96	3	57	5	94	4
Mid-Interior.									
Georgetown	29·80	90	73	104	1	67	13	1,107	17
Longreach	29·84	96	74	107	3	66	28	113	8
Mitchell	29·92	89	69	98	3	63	11	31	2
Western.									
Burketown	29·77	89	76	99	1	69	13	1,399	16
Boulia	29·78	94	72	109	3	57	28	294	6
Thargomindah	29·86	94	74	104	2	58	28	299	4

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	April. 1939.		May, 1939.		April. 1939.	May., 1939.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	6·1	5·50	6·18	5·20	3·35	3·36
2	6·1	5·49	6·18	5·19	4·18	4·17
3	6·2	5·48	6·19	5·19	5·1	5·1
4	6·2	5·47	6·19	5·18	5·43	5·47
5	6·3	5·46	6·20	5·17	6·26	6·35
6	6·3	5·45	6·21	5·17	7·11	7·26
7	6·4	5·44	6·21	5·16	7·58	8·18
8	6·4	5·43	6·22	5·15	8·47	9·10
9	6·5	5·42	6·22	5·14	9·37	10·2
10	6·5	5·41	6·23	5·14	10·37	10·55
11	6·6	5·40	6·23	5·13	11·21	11·44
12	6 6	5·39	6·24	5·12	..	..
					a.m.	a.m.
13	6·7	5·38	6·25	5·12	12·11	12·38
14	6·7	5·37	6·25	5·11	1·3	1·29
15	6·8	5·36	6·26	5·10	1·55	2·20
16	6·8	5·35	6·26	5·10	2·46	3·15
17	6·9	5·34	6·27	5·9	3·40	4·12
18	6·10	5·33	6·28	5·9	4·32	5·8
19	6·10	5·32	6·28	5·8	5·28	6·8
20	6·11	5·31	6·29	5·8	6·23	7·8
21	6·11	5·30	6·30	5·7	7·22	8·9
22	6·12	5·28	6·30	5·7	8·22	9·7
23	6·12	5·27	6·31	5·6	9·17	9·58
24	6·13	5·27	6·32	5·6	10·17	10·48
25	6·13	5·26	6·32	5·6	11·11	11·32
					p.m.	p.m.
26	6·14	5·25	6·33	5·5	12·1	12·15
27	6·14	5·24	6·33	5·5	12·49	12·57
28	6·15	5·24	6·34	5·5	1·31	1·35
29	6·15	5·23	6·35	5·4	2·15	2·16
30	6·16	5·22	6·35	5·4	2·55	2·57
31			6·36	5.3		3·42

Phases of the Moon, Occultations, &c.

4th	Apr.	○ Full Moon	2	18 p.m.
12th	,,	☾ Last Quarter	2	11 a.m.
20th	,,	● New Moon	2	35 a.m.
27th	,,	☽ First Quarter	4	25 a.m.

Perigee, 1st April, at 9.0 p.m.
Apogee, 13th April, at 7.0 p.m.
Perigee, 28th April, at 8.0 p.m.

The most interesting conjunction will occur at noon on the 22nd, when Venus and Jupiter will be separated by less than half a degree. With some magnification they may be found, at their nearest approach, about half-way from the zenith to the point where the Sun sets. Both planets will set at nearly the same time, 3.50 p.m. Very interested observers will see them above the eastern horizon in the early morning, as they will rise within a few minutes of one another, about 3.30 a.m.

Mercury rises at 6.16 a.m., 15 minutes after the Sun, and sets at 5.55 p.m., 5 minutes after it on the 1st; on the 15th it rises at 4.46 a.m, 1 hour 22 minutes before the Sun, and sets at 4.44 p.m., 52 minutes before it.

Venus rises at 3.1 a.m., 3 hours before the Sun, and sets at 3.58 p.m., 1 hour 52 minutes before it; on the 15th it rises at 3.20 a.m., 2 hours 48 minutes before the Sun, and sets at 3.56 p.m., 1 hour 40 minutes before it.

Mars rises at 10.48 p.m. on the 1st, and sets at 12.39 p.m. on the 2nd; on the 15th it rises at 10.30 p.m., and sets at 12.12 p.m. on the 16th.

Jupiter rises at 4.34 a.m., and sets at 4.59 p.m. on the 1st; on the 15th it rises at 3.53 a.m., and sets at 4.15 p.m.

Saturn rises at 6.42 a.m., and sets at 6.25 p.m. on the 1st; on the 15th it rises at 5.56 a.m., and sets at 5.36 p.m.

Barring a total solar eclipse with its marvellous phenomena, an annular eclipse would be a most fascinating sight. On the 19th the Moon, one day before New, will arrive at one of its nodes; the point in its orbit where it crosses the path of the Earth and is directly between us and the Sun, and its solid body cuts off the light from our globe—but not entirely. Being near Apogee, its furthest distance from us, its shadow does not quite reach the Earth, and it looks smaller than it does at Perigee, its nearest approach. It, therefore, does not quite cover the Sun's bright face, and a narrow luminous ring is left in the darkened sky. In this instance it will only be seen in Alaska and the Arctic Regions, and at its most favourable position will last but one and a-half minute. A partial eclipse will be seen in the British Isles and throughout North America.

4th	May	○ Full Moon	1	15 a.m.
11th	,,	☾ Last Quarter	8	40 p.m.
19th	,,	● New Moon	2	25 p.m.
26th	,,	☽ First Quarter	9	20 a.m.

Perigee, 23rd May, at 10.0 p.m.
Apogee, 11th May, at 3.0 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.