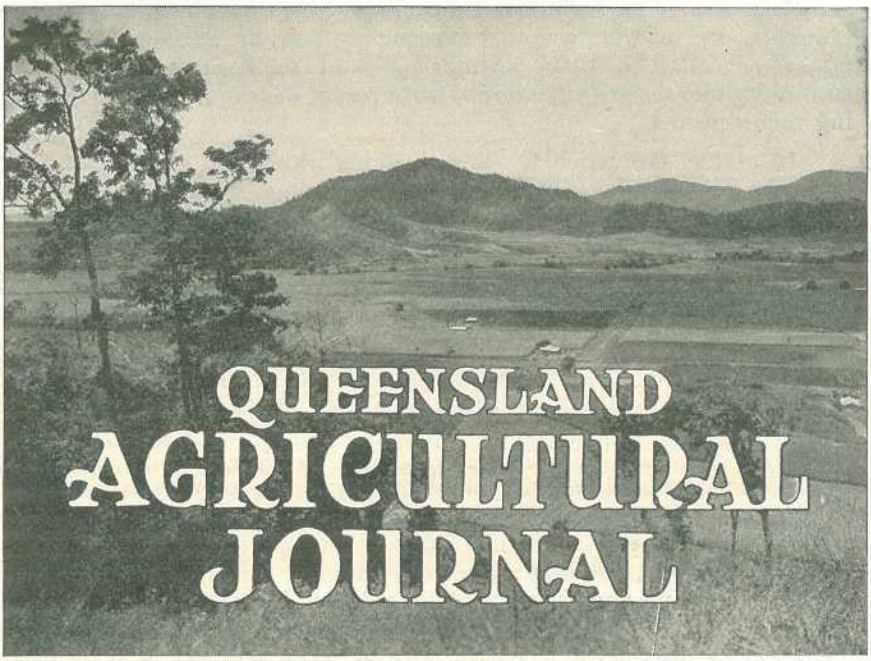
**ANNUAL RATES OF SUBSCRIPTION.**—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



# QUEENSLAND AGRICULTURAL JOURNAL

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## *Event and Comment*

**Education in a Changing World.**

"TO-DAY democracy is challenged; to-day is the day of readjustment and realignment; we must think more of the future and less of the past, except, perhaps, to profit by the lessons of the past. More than ever is the future to the young. The future of democracy rests mainly with them, and the maintaining of democracy will call for an even higher standard of citizenship than in the past. An education system is basically for the young. Besides providing adequately for high standards of education and physical fitness the system should inculcate those lofty ideals of citizenship which will encourage youth to aim at holding and developing the country which is its heritage." With those words the Premier of Queensland, Hon. W. Forgan Smith, LL.D., prefaced a recent thought-stimulating address. Continuing, he remarked that it had been said aptly that the nation which had courageous and forward-looking leaders who, in the midst of the present world crisis, dared to provide, encourage, foster, and improve education—and especially education for leadership—would be the nation that would write the history of the next generation.

A comprehensive system of national education, flexible enough to meet the expanding requirements of a growing State, had always had a strong appeal for the Queensland citizen. He felt, also, that under a genuine democracy the humanities, and the social services generally, should expand in consonance with higher standards of living.

Out of intensive reflection on matters governmental, induced by the acute conditions of turbulent times, arose the thought, amongst other thoughts, as to whether our existing system of national education might not need a little adjustment and expansion to enable its administrators to cope successfully with recent developments and expanding requirements.

In giving expression to some thoughts which had occurred to him, he spoke as one who, during his whole lifetime, had been an earnest seeker after truth and knowledge, which alone brought about understanding. "Most of the evil in life is due to ignorance," he remarked, "and the greatest menace to society is stupidity. It is the aim of education to eliminate ignorance and stupidity, and so set the people free."

As one who had had to foot the rugged road of hard work and who could only dream of the primrose path of ease; as one who had toiled and moiled with the worker, he might claim to know something of the world of work and to be able to sense changing views which emerged from changing conditions industrially and otherwise. Then, in a long period of Ministership and Premiership one naturally got to know much of mankind and of things. One acquired a ripe knowledge of the land and its requirements. And more and more, as wisdom grew, one saw the necessity for a national system of education which was suited to the needs of the pupil and the student of to-day and to-morrow, and felt the necessity for never-ceasing watchfulness in the making of adjustments to meet changing conditions. Care must be taken, however, that readjustment did not cause restriction, but that the system was kept broad-based and tolerant, so as to assist materially in keeping a democratic country democratic. Music, painting, sculpture, poetry, drama, general literature should be fostered. As he had indicated, however, his concern at the moment was with the practical side of education rather than with the highly cultural, although the practical and the cultural should never be divorced.

In a land of bread-winners people must work in order to live; the worker should be a good worker, whatever his calling, but to be a good worker he should be trained properly; the preparatory training, at least, should be given in the schools. He thought that with those simple principles most citizens would agree. Then came the inquiry as to whether the facilities provided by the State were sufficient to enable that training to be given adequately. One thought of all the unskilled workers on the labour market and wondered whether an expansion of the vocational section of the system might tend in time to reduce the numbers of the wholly unskilled. Still pondering, the thought ran through his mind as to whether suitable courses could be evolved which would be sufficiently useful and attractive to hold at school for a longer period a substantial number of those 10,000 age-fourteen children who leave school each year, and who, in time, if wholly untrained, must swell considerably the ranks of the unemployed. Unemployment, the Premier added, was one of the main causes of lowered morale and social unrest. The toning of morale and the allaying of social unrest should be among the foremost objectives of a modern scheme of national education.

Mr. Forgan Smith then went on to speak of the necessity of co-ordinating the educational system with the requirements of trade and

industry. In 1924, when he was Minister for Works, he said, he gave close attention to the question of apprenticeship. As a skilled craftsman, the necessity for adequate preparatory training for the future skilled workers was apparent to him. From his own experience he could appraise the value of a sound system of apprenticeship. The result was the *Apprenticeship Act of* 1924. He was glad to say definitely that the Queensland apprenticeship system had become established on a firm basis. Competent judges gave high praise to the skill of Queensland workers trained under the system.

The Premier stressed the importance of vocational training for both the primary and secondary industries, and referred appreciatively to the scope and standard of secondary education within the State and also to the possibility of even a greater flexibility in adapting itself to the needs of the State. Speaking of the University, he said that, possibly, it more than any other kindred institution was expected to grapple with the changing conditions of a changing world and adapt itself quickly to shifting circumstances. Less and less must it be a cloistered institution, and less and less must it live a life of aloofness. Concluding, he said: "The activities of the State continue to widen steadily; the responsibilities, obligations, and complexities of government grow apace. Close and friendly relationship should exist between University and State. The State should be able to look to the University not only for intellectual leadership, but for guidance and help in the solution of many of its problems. But if the State expects this service it follows that the University should be properly constituted and equipped to render the service."

## Value of Fertilizers.

"THROUGHOUT the world people are beginning to realise that only a certain amount can be taken from the land before something must be put back into it," said the Acting Minister for Agriculture and Stock, Hon. D. A. Gledson, at the recent opening of new chemical and fertilizer works* at Pinkenba.

"Production has increased enormously in the past few years in Queensland," he added. "With the aid of fertilizer companies the Department of Agriculture has been able to advise the farmers what is necessary to get the maximum productivity from the soil. It does not matter how much land there may be or of what quality it is, unless something is put back, it will become useless."

Continuing, Mr. Gledson said that with the new factory, fertilizers best suited to Queensland soil conditions would be produced. The enterprise starting that day would manufacture sufficient superphosphate to supply the whole of Queensland. At present superphosphate had to be imported. The company would supply Queensland with fertilizer that would enable present production to be maintained. The Department of Agriculture and Stock would assist the enterprise in its endeavour to produce the best from the land and to give farmers the best advice as to what fertilizer to use with their particular soil types. On behalf of the Government, he congratulated the company concerned on its enterprise.

* A.C.F. and Shirleys Fertilizer, Ltd.

# Some Parasitic Diseases of Livestock in Overseas Countries of Interest to Australia.

F. H. S. ROBERTS, D.Sc., Animal Health Station, Yeerongpilly.

*In June of last year Dr. Roberts was sent overseas by the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, to investigate the control of parasitic diseases of livestock in other countries. Dr. Roberts was away from Australia for nearly eight months, and during that time visited the United States of America, Canada, Great Britain, Holland, France, and South Africa. As might be expected where domestic animals are concerned, there are many parasitic diseases of livestock common to those countries and our own. A short account of the more important of these diseases as they exist in other lands, as now presented, will be of interest to readers of this Journal.—Ed.*

## THE BLOWFLY PROBLEM.

AUSTRALIA is not the only country where blowflies have become serious pests of stock, for in the United States, Great Britain, South Africa, and New Zealand these insects are also notorious in this respect. Before we discuss the position as it exists overseas, let us consider the status of the problem in Australia.

Occasionally we hear of calves being struck on the pizzle and of cattle being attacked after dehorning, but, for the most part, strike in Australia is associated with sheep. The flies deposit their eggs in the wool on any part of the body, but most frequently in the region of the crutch. Wounds or broken skin are not necessary to initiate strike; in fact, in nearly all cases blowing takes place over the unbroken skin. In order to attract the flies the area must be moist and must remain moist for the development of the maggots. Frequently, the maggots are able to complete their growth without penetrating the flesh, but in cases where restrike occurs, particularly if hairy maggots are present, the maggots may eat into the flesh. Waves of strike are most common during the spring and autumn, sometimes being continued well into the winter, if the winter be mild and wet, as it is sometimes in parts of Queensland. The most important sheep blowfly in Queensland is a greenish bronzy fly, *Lucilia cuprina*. Next in importance are the brown blowflies, *Calliphora spp.* These are native flies, whilst *L. cuprina* is an introduced species. The hairy maggot fly, *Chrysomyia rufifacies*, on account of the manner by which its larvæ behave in a wound, was at one time considered to be the most serious species, but it has since been discovered that in the absence of *L. cuprina* and of the brown blowflies the hairy maggot fly would be of little importance.

The measures advised in Australia to combat the sheep blowfly pest are—(1) crutching, (2) jetting, and (3) culling, or breeding out wrinkly sheep, which are the most susceptible to strike. Control of the flies by means of parasites has been thoroughly investigated, but offered no encouragement. The possible use of traps is still being studied, and every effort is being made to find a suitable dressing for treating the wounds of struck sheep.

Let us now consider the blowfly problem in Great Britain, where again only sheep suffer. Strike in sheep in this country has been known for centuries, but it was not till about 1931 that it was regarded as a serious problem. Since then several severe outbreaks have occurred. Scouring is a source of attraction as it also is in Australia, resulting in crutch strike, but body strike is much more common. One of the most frequent causes of body strike is the pus left behind on the body wool of animals suffering from foot-rot, the wool becoming contaminated from the feet when the animal lies down. Wool rot, also seen in Australia, tick bites, and bits of rotting bracken in the wool are also conducive to body strike. The flies are most abundant during June to September, the most important species being *Lucilia sericata*. This species has been introduced into Australia, but has never developed into a serious pest of sheep. Cases are known of this species striking sheep here, but are relatively few. Another blowfly of importance in Great Britain is *Phormia terrae-novae,* which occurs in Scotland. Scotland suffers much more seriously than England from sheep blowflies, for whereas in England the farms and flocks are small, so that struck sheep are immediately noticed and dressed, in Scotland farms and flocks are much larger and the country rougher, and here struck sheep can easily elude the shepherd and hide away in the bracken.

Crutching and jetting are not employed in Great Britain as preventive measures, though recently investigators are showing some interest in crutching. Dipping in an arsenical fluid is used widely as a means of controlling strike, and it is claimed that this will give two to three weeks' freedom from the fly. Some authorities in Scotland favour spraying rather than dipping, for it is considered that to use a dip which has become foul with manure and urine from sheep is a certain way of securing strike. At present, the main researches in Great Britain are directed towards dressings and securing an arsenical fluid which is not leached from the wool by rain as readily as the mixtures now being used.

In South Africa, the sheep blowfly problem is very similar to that in Australia. It is of comparatively recent origin, and can be traced to the introduction of the Merino sheep. Although as yet not as serious as in Australia, it is increasing in importance and is a cause of serious economic loss. *Lucilia sericata,* the English sheep blowfly, which has also been introduced into South Africa, and the native blowfly, *Chrysomyia chloropyga,* are responsible for most cases of strike. Control measures are similar to those adopted in Australia, though not as yet developed to the same extent.

South Africa has yet another blowfly problem which is most serious among cattle. The fly concerned is the screw worm fly, *Chrysomyia bezziana,* which in its habits and life cycle is similar to the American screw worm fly, *Cochliomyia hominivorax,* which is discussed below.

In the United States there are two quite distinct blowfly problems. There is, firstly, a sheep blowfly problem similar in most respects to that of Australia, and secondly the screw worm problem, in which almost any domesticated and wild mammal may be attacked. In comparison to the seriousness of screw worm, wool maggot flies are of relatively little importance. Strike in the wool of sheep occurs principally among the finer woolled sheep of Montana and Wyoming, and is seen chiefly during the spring following lambing or scouring. The black blowfly, *Phormia regina,* is the most serious fly, whilst in the south and south-west *Lucilia*

*sericata* is frequently responsible. Our species, *L. cuprina,* also occurs here, but is of no importance as a wool maggot fly whatsoever. Very little work has been done on wool maggots within recent years, as this problem has been so dwarfed by that of the screw worm.

The American screw worm fly, *Cochliomyia hominivorax,* is found in tropical and sub-tropical America. It is only in this region that the fly can survive through the winter; but each year, with the onset of the warmer and moister conditions of the spring, the flies become very abundant and gradually migrate northwards. This migration is eventually checked when the summer temperatures become too high and the rainfall too low for the flies to survive. They then become very prevalent again during the more favourable conditions of the autumn. In the southern United States, with its summer rainfall the flies may also at times be prevalent during the summer. The flies are thus most numerous during the spring and autumn, and have much the same seasonal distribution as our green sheep blowfly.

The screw worm fly is an exception among the blowflies, as it never lays eggs on carrion. These are deposited only on living animals, and the larvæ, as a rule, will develop only in living flesh. It will attack almost any warm-blooded animal, and will lay its eggs on any area where blood serum or pus is present. It is also attracted to the navel of new-born animals and the external genitals of animals which have just given birth. The maggots, on hatching, burrow straight into the flesh, the larvæ tearing off pieces of living tissue, which they devour. Livestock, including poultry, suffer intensely, and if unchecked the wounds may prove fatal. When one considers how easily wounds attractive to the fly can be made, some idea of the seriousness of this pest can be gained. It is most serious in the south, particularly in Texas. This State is the centre of the mohair industry of the United States, and Angora goats appear especially prone to attack. So severe have the losses become in recent years that the Insect Pests of Man and Animals Branch of the Federal Department of Agriculture are undertaking an intensive study of the problem. There are four field stations of this division in the south, three in Texas, and one in southern Georgia. A good deal of work is being done on wound studies, dressings, and control, both by biological means and by trapping. In the region of the coast of the Gulf of Mexico there occurs a species of tick, infestation by which is a notorious source of attraction to the fly. The field station in southern Georgia is studying this aspect of the problem. At present, control measures advised include—(1) elimination of all factors likely to cause accidental wounds; (2) such operations as shearing, dehorning, castration, &c., should be made as bloodless as possible and should be confined to times of the year when the flies are least prevalent; (3) births should be gauged to occur also during these periods. Experimental work has shown that in the near future very efficient dressings may be expected.

It is of interest to know, whilst blowflies are being discussed, that infestation of wounds by the maggots of these flies may at times be beneficial. The fact was first noticed during the Great War, when it was observed that the presence of maggots in a wound actually assisted in its healing. Maggot therapy, as it is known, has been used extensively during recent times, and with much benefit in the case of such delayed healing wounds as osteomyelitis. The maggots employed are reared under sterile conditions to prevent introducing harmful bacteria into the wound. The objection raised by many patients against having live

maggots in their flesh and also the difficulties of maintaining supplies of maggots led to further researches by Dr. W. Robinson, of the Federal Department of Entomology, and he found that the healing substance was urea which is excreted by the maggots, and again that allantoin was the active constituent of urea. To-day, both urea and allantoin are proving of great value in the healing of such indolent lesions as osteomyelitis and bad burns, and when applied internally have shown themselves of benefit in the treatment of diabetes.

## THE TICK PROBLEM.

This is another problem of vital interest to Australia. In this country we have two major tick problems. The more important of these is that great scourge of cattle which was introduced from the East during the nineteenth century—namely, the common cattle tick, *Boophilus australis*. As is generally known, this pest is most notorious as a vector or carrier of cattle tick-fevers, but even in the absence of these fevers there is a tremendous loss to the cattle industry from "tick worry" and hide damage. The second tick problem of major standing in Australia is associated with the scrub tick, *Ixodes holocyclus*, which causes paralysis and death among dogs, cats, sheep, calves, foals, and pigs.

The cattle tick, *Boophilus australis*, is found in Queensland, northern West Australia, and in the north-eastern corner of New South Wales, whilst the scrub tick is an inhabitant of the scrubs of the eastern Australian coast as far south as southern New South Wales.

In the southern United States there occurs a species of cattle tick which, in its habits, economic importance, and structure is very similar to our common cattle tick. There are, however, sufficient differences in the structure of the two ticks to give the American species the name *Boophilus annulatus*. By 1906 no less than 741,500 square miles in the southern United States were under quarantine on account of this tick, an area a little larger than the entire State of Queensland. It was at this time that the Federal Bureau of Animal Industry commenced its campaign to eradicate the pest, and so vigorously and successfully has this campaign been carried out that, to-day a little more than 95 per cent. of this area is clean. The main factors by which these results have been achieved may be reduced to four—(1) regular fourteen-day dippings of all cattle and horses in 0·2 per cent. solution of arsenic for a period of nine months from the finding of the last tick; (2) areas which are too rough to permit the regular mustering of cattle for dipping are emptied of stock and the ticks starved out; (3) legislature regarding the movements of cattle from ticky to clean areas; and (4) an intensive education campaign among the stockowners of the tick-infested areas.

No attempt is made either in Queensland or West Australia towards eradication. There are, of course, certain restrictions which must be complied with when cattle move from tick-infested areas, which aim at preventing the tick from spreading beyond the areas it now occupies. Dipping, otherwise, is left to the discretion of the stockowner, and is utilised as a means of control and not of eradication. Under our present system of cattle-tick control it would be dangerous for any stockowner to attempt eradication. The immunity of cattle to tick fevers lasts only so long as the animals are infested by ticks, and for any stockowner to eradicate the ticks from his own property whilst his neighbour's cattle remain infested would in time leave his cattle readily susceptible

to tick fever by invasion by infected ticks. In New South Wales, however, an attempt is being made to eradicate the pest by employing regular fourteen-day dippings in an 0·2 per cent. solition of arsenic. Here the position is somewhat different to that existing in Queensland, as tick fevers are far from being prevalent.

Returning now to the United States, the only areas where the cattle tick is now to be found are in southern Texas bordering the Rio Grande River, a further area in Texas along the Gulf of Mexico, and another area in central Florida. Rather strangely the tick infesting cattle in Florida is *Boophilus australis,* which also occurs in the West Indies. In these islands it is interesting to note that in the eradication campaign being undertaken there, not only cattle and horses must be considered, but also sheep and goats, which are readily infested.

Eradication of the tick from Florida presents grave difficulties. There is little co-operation to be expected from the Indian owners of cattle, and the country infested contains much swamp and jungle which abounds with deer which are suitable hosts for the tick. One of the first steps to be undertaken by the Bureau of Animal Industry towards eradication of the tick in Florida is the removal of the deer from the infested areas, the intention being to restock with deer from clean areas as soon as the ticks have been wiped out.

Emphasis has been given to the role of cattle ticks as vectors of tick fevers. One of these fevers—namely, anaplasmosis, which occurs also in Australia, is causing grave concern among the authorities in the United States at the present time. *Boophilus annulatus* is a recognised natural vector of this disease, but serious outbreaks still occur in areas from which this tick has been eradicated. It is known that the disease may be conveyed by mechanical means, such as by dehorning, and it has also been shown experimentally that the disease may be carried by other species of ticks such as the dog tick, *Rhipicephalus sanguineus.* Outbreaks, however, still occur, whose origin remains unknown, and the opinion is held in many quarters that the disease is being spread from some native reservoir animal by such vectors as biting flies.

In the region of the coast of the Gulf of Mexico another tick problem presents itself. This is the habitat of *Amblyomma maculatum,* commonly known as the Gulf Coast tick. It commonly attaches to the ears of animals causing much swelling, irritation, and abscess formation. One of its most important features is its association with screw worm, for the wounds it makes are very attractive to the fly. At present, the only means of control is hand-dressing the infested ears.

In the western mountainous section of the United States, in the vicinity of the Rocky Mountains and Cascade Mountains, there is found probably the most notorious tick known. This species is *Dermacentor andersoni,* commonly known as the Rocky Mountain Spotted Fever tick, because it transmits to humans a deadly typhus fever of this name. The mortality rate is high, but recently the discovery of a vaccine which has protective properties has made this region comparatively safer. The disease is transmitted by the adult tick, which is the only stage attacking large mammals, the larvæ and nymphs being confined to small wild mammals. This tick also causes paralysis among live stock, which is of the same type as that produced by our scrub tick, *Ixodes holocyclus.*

A milder strain of this typhus fever is found in the east where the vector is *Dermacentor variabilis*. This is a very common species of the woods in this area and is frequently found on dogs. An attempt to control this tick is being made at the present time by the Federal Department of Agriculture and among the several measures being investigated is biological control.

During recent years biological control has been very prominent in the minds of Australian stockowners as being of possible assistance in the control of our cattle tick. Ticks are known to be parasitised by two species of tiny wasp-like insects. One of these, *Ixidophagus texanus*, has been found only in the United States, and the other, *Hunterella hookeri*, also in France, Africa, India, Indo-China, Cuba, and Brazil. In all cases where these parasites have been collected they have emerged chiefly from the nymphal tick, and rarely from the larvæ. So far, they have never been recorded as parasites of ticks which remain on the one host for their entire parasitic cycle, such as the species of Boophilus, to which our cattle tick belongs. As observations have shown that the nymphs may be parasitised whilst feeding on the host, it would seem possible to establish these parasites, particularly *Hunterella hookeri*, which has a wider range of tick hosts than *Ixidophagus texanus*, on species of Boophilus. Whether such an attempt would be worth while, however, is also to be considered. So far as is known both these parasites are relatively scarce wherever they occur, and an attempt to control *Dermacentor andersoni* by *Ixidophagus texanus*, has not given encouraging results.

Great Britain, contrary to most people's belief, also has a tick problem. The tick concerned is the castor bean tick, *Ixodes ricinus*, so called because of its similarity in shape to a castor bean. In Europe it is a vector of a tick fever of cattle, and in Great Britain has recently been shown to be also a carrier of two serious diseases of sheep—namely, louping ill and tick-borne fever. Furthermore, its presence on sheep in certain areas is a source of attraction to the blowfly. The young stages are also a cause of serious mortalities among grouse. At present control rests on certain farming practices and dipping or spraying in an arsenical dip.

One could write at great length on the tick problems of South Africa. This country is almost unrivalled in the wealth of its tick fauna and in the number of serious diseases which these transmit to domestic animals. To mention just a few of the more important of these tick-borne diseases, there is East Coast Fever, a veritable scourge of cattle in this country, heartwater of sheep and cattle, biliary fever of horses and dogs, and tick fevers of cattle. These tick fevers of cattle are the same as we have in Queensland, and are carried by *Boophilus decoloratus* and other ticks. No attempt is made to eradicate any species of tick, except the vector of East Coast Fever, and, so far as this species is concerned, eradication is associated only with areas in which outbreaks of the disease occur. All ticks are controlled by arsenical dips. These consist of a simple solution of sodium arsenite in water. No fats, oils, or soaps are added, as the South African authorities do not believe that the addition of substances such as these to the dip increases the "wetting powers" of a dip and make it more effective against ticks. For five to seven day dippings, such as are employed against *Rhipicephalus appendiculatus*, the chief vector of East Coast Fever, the strength of sodium arsenite employed is 0·2 per cent., whilst for fourteen-day dippings, as are used for *Boophilus decoloratus*, the strength of the dip is increased to 0·3 per cent. of sodium arsenite.

## DIPS FOR SHEEP AND GOAT LICE.

The opinions with regard to dipping fluids for sheep and goat lice vary considerably in different countries. Here in Australia we employ either an 0·2 per cent. solution of arsenic or dips containing phenols and cresols. In England, arsenical dips are preferred, and one is informed that the most heavily-infested sheep are to be found on farms employing phenolic dips. In South Africa, on the other hand, phenolic dips are preferred. In the United States, neither of these types of dips are considered satisfactory, and during the past few years a good deal of work on dips for lice has been carried out. These investigations have been concerned chiefly with goat lice, as in Texas lice infestation among the Angora goats is a serious source of economic loss to the mohair industry. Of the many substances tested, sulphur was found to be most efficient, not only for goat lice but also for lice on sheep. The sulphur must be in a very finely divided state, so fine that the particles would pass through a sieve containing 325 meshes to the square inch. Soft water must be used so that the sulphur may remain in suspension; if the water is hard, a softening agent must be employed. Two dippings at an interval of eleven days are recommended, each in a freshly charged vat.

## NASAL BOTS IN SHEEP.

During recent years much work has been done in the United States and South Africa on the use of fluids which will kill the grubs of this bot fly as they lie in the nasal passages of the sheep. In the former country a 3 per cent. solution of lysol forced into the passages under pressure is now considered to be very effective, whilst in South Africa a small quantity of tetrachlorethylene emulsion injected into each nostril has given very good results.

## WORM DISEASES.

### Sheep.

If it were not for drought, blowfly, and worm diseases, the sheep industry of Queensland would indeed be in a flourishing condition. Worms occur in sheep practically everywhere in our State, even as far west as Cloncurry, Longreach, and Cunnamulla. It is only in those areas, however, where the annual rainfall exceeds about 19 inches, that worms become sufficiently prevalent to cause disease, and the higher the rainfall the more serious do worm diseases become. The most important species in Queensland is the large stomach worm, *Hæmonchus contortus*, which is followed closely by the nodule worm, *Oesophagostomum columbianum*. Occasionally, also, we see outbreaks due to hair worms, *Trichostrongylus* spp. In Southern Australia the large stomach worm and nodule worm become less prevalent, most outbreaks being associated with hair worms. Bluestone, carbontetrachloride, or bluestone and nicotine sulphate, are recommended as drenches for stomach worms, whilst the latter mixture is the only remedy we have of any value against hair worms. For nodule worm, enemas of a watery solution of sodium arsenite are advised.

In the north-western section of the United States—i.e., California, Oregon, and Washington—most of the damage is caused by two species of little consequence in Australia. Both of these are tiny worms infesting the fourth stomach and are called *Ostertagia circumcincta* and *Trichostrongylus axei*. Tetrachlorethylene is used extensively as a drench and is said to give very satisfactory results.

Further south in Texas, where the climate is very similar to Queensland, sheep suffer from much the same species of worms as they do here. The Angora goats in this section also suffer severely. Our species, the large stomach worm, the nodule worm, and hair worms, are very prevalent, though the nodule worm does not appear to be as serious as it is either in South Africa or Australia. Kids, particularly, are severely attacked by hair worms. Goats are browsing animals and do not graze as do sheep and cattle, and consequently goat country in Texas is characterised by heavy growths of edible shrubs. In the wetter parts of Texas, worms are so prevalent that regular three to four weekly drenching is necessary to maintain the flocks. The copper sulphate-nicotine sulphate drench is used extensively. It is not as strong as the one employed in Australia and is regarded as being very effective and quite safe. The only warning given to users of this drench is that it is unwise to treat animals, especially young kids, in the heat of the day.

The large stomach worm and nodule worm continue to be important pests of sheep right along the eastern areas to south-eastern Canada. In fact, in this latter area the nodule worm is considered as the chief factor in preventing sheep raising from flourishing. No attempt is as yet made to apply a treatment for nodule worm in the United States or Canada, though investigations are at present in progress.

In Great Britain, the lesser stomach worm, *O. circumcincta,* and the hair worms are the most harmful species. Outbreaks due to *H. contortus* do occur, but are comparatively rare. The nodule worm is entirely unknown in this country. Bluestone and nicotine sulphate of about the same strength as we use for hair worms in Australia is employed and is very satisfactory. The liver fluke is serious, as it is also in the mountainous country of Western America, particularly in the State of Montana. Carbontetrachloride is used in all countries as a treatment for liver fluke, and is attended by the same unexplainable losses which have condemned its being employed against stomach worm in Queensland. The only area encountered by the writer where this drug could be used safely is in North Wales, where he was informed carbontetrachloride poisoning of sheep is unknown. In the Hawaiian Islands cattle are seriously infested by a closely allied species, *Fasciola gigantica* (the liver fluke of sheep is *F. hepatica*), and here hexachlorethane, a drug closely allied to carbontetrachloride is being used successfully. In all probability the future will see this drug employed instead of the risky carbontetrachloride against liver fluke in sheep.

In England, much attention is being given at the present time to ascertaining why outbreaks of worm diseases occur in sheep. The work being undertaken, in other words, is a study of the effects of environmental conditions which are associated with the eggs and larvæ of the worms as they occur in the pastures. Such factors as longevity of the larvæ in the pastures, what particular areas in the pastures are most suitable to larval survival, what particular type of pasture favours larval survival, &c., are receiving attention. The results of these researches are going to be of great assistance in controlling worm diseases.

In South Africa a tremendous amount of work has been done on the worm diseases of sheep. Conditions there are very similar to those present in Queensland, and as a consequence we find that such worms as the large stomach worm and the nodule worm are the most serious species. Hair worms, contrary to our experience here, are not important in

Merino sheep in South Africa, but are serious, however, in the native fat-tailed Persian sheep. Furthermore, in Australia, a fœtid dark diarrhœa, "black scours," is very definitely a characteristic symptom of hair worm disease, but has not been noticed either in England or South Africa. Hook worms are also serious pests of sheep in certain areas in South Africa, particularly in sandy types of country.

Until comparatively recently, wormy sheep were all treated by powders in South Africa. All worm remedies, by the way, are manufactured and sold to the farmer by the Government Veterinary Laboratory at Onderstepoort, which maintains a special section for this purpose. The powdered remedy is supplied in tins accompanying which are a special tin from which the powder is dipped and a set of spoons, each spoon holding the requisite dose for sheep of a particular age. The mouth of the sheep is opened by a special type of gag and the powder placed on the back of the tongue by the spoon.

In this way the Government wireworm remedy, which consisted of powdered copper sulphate and sodium arsenite, was used for years to combat the large stomach worm. Recently it has been displaced by a nodule worm remedy, which is claimed to be effective against both the large stomach worm and nodule worm. The history of the discovery of this nodule worm remedy is extremely interesting. It has been felt for some time, both in Australia and in South Africa, that if the swallowing of the sheep could be controlled so that one could be certain that in most cases a drug given by the mouth would go directly into the fourth stomach instead of falling into the paunch, as it usually does, the worms inhabiting the fourth stomach and intestines would have to contend with a greater concentration of the drug, which would thus be more effective in removing them. If any drug is swallowed into the paunch, by the time it reaches the fourth stomach and intestines it has become much diluted. Whether such a drug falls into the rumen or into the fourth stomach depends upon whether a grove, the œsophageal grove, running along the wall of the paunch remains open or is closed when the drug is swallowed. Work in Australia, and confirmed in South Africa, showed that if copper sulphate solution is placed in the mouth, its contact with the tissues there causes this grove to close in most cases, and any liquid or powder given immediately afterwards is swallowed into the fourth stomach. With this information as a guide the South African workers then set to work to find out whether by first giving copper sulphate and following it with certain highly insoluble drugs they could ensure the powders reaching the nodule worm in the large intestine in sufficient strength to remove it. Certain success has followed their efforts, for they consider that a mixture of copper tartrate and copper arsenate does have this effect. The recommendations were that the sheep be treated on two successive days. This treatment has been tried in Australia, but it was found that whilst in some sheep it had a high efficiency against the nodule worm, in others, unfortunately the majority, it removed only a few worms or none at all. Further work in South Africa has resulted in some alteration in the formula and the recommendation of only a single treatment, which is also effective against stomach worms. This more recent recommendation has still to be tested in Australia.

Hookworms have been combated by first giving a small quantity of copper sulphate and following it with a tetrachlorethylene emulsion. In the preliminary work pure tetrachlorethylene was used. This is one of

the safest drugs that can be used against worms in any animal, but unfortunately it vapourises very readily, and the inhalation of these vapours into the lungs of sheep as the drug passes down the throat causes serious but temporary intoxication. The drug in an emulsified form does not have any ill effect, mixes readily with the ingesta, and at the same time is as effective as the pure drug. The dosage is rather high, which would make the use of the drug rather expensive, here in Australia at any rate, but given after copper sulphate it is highly effective against stomach worms, hair worms, and hookworms; in fact, the writer was informed that three or four doses would remove every worm, including nodule worms.

### Worm Diseases in Horses.

The seriousness of red worm infestation in horses is well known. These worms vary in size from less than half an inch to about 2 inches and more. They inhabit the large intestine. Many of them suck blood, and as a result of infestation the horse becomes weak and anæmic. One of the problems in the control of these worms is the treatment of the manure so as to kill the eggs and larvæ of the worms which occur there. This aim is of most importance in cases where manure is collected from stables and stored and used as fertilizer in pastures to which horses have access. The danger of infected manure around yards and stables must also be borne in mind. This problem is being investigated in the United States and Canada. From Canada comes the information that of some hundreds of substances tested, urine is most effective. In the United States chemical treatment of manure is also being investigated, and here steam treatment is being tried out. Steam treatment requires a special storage compartment into which steam is led from a boiler through a system of coiled tubes, so that the temperature inside the compartment is raised to a point sufficiently high to kill the eggs and larvæ. This type of treatment is still in the experimental stage.

### The Kidney Worm of Pigs.

This is a very prevalent parasite of pigs in coastal Queensland and the northern rivers of New South Wales. The adult worms occur in the tissues around the kidneys and sometimes in the kidneys themselves, while the immature forms are found in the liver and frequently elsewhere in the body. The effect of a heavy infestation on the pig is chiefly to prevent normal growth, but losses through meat inspection condemnations may be serious, as livers and parts of the carcase infested with these worms are always condemned as unfit for human consumption.

In the south-eastern United States losses through meat inspection condemnations are estimated to range from a little more than 1s. to nearly 3s. per pig. In these areas the old system of raising pigs was more or less left to the pig itself, which spent the daylight hours wallowing in nearby swamps and bog holes, places which in time became heavily infested with kidney worm larvæ. As the result of work undertaken by the Division of Zoology of the Bureau of Animal Industry, a system of raising pigs in these areas has been devised, which is successful in controlling not only kidney worm but other worms, such as the large round worm. The farmer is, moreover, encouraged to keep his pigs free from kidney worms by the packing companies operating in this area, who pay him so much extra for any pig in which kidney worm is absent. The educational section of the campaign is assisted by the instructors of the Future Farmers' Association, a branch of the Vocational System of Education so well organised in the United States of

America. Some idea of the success of this campaign against kidney worm is given in the 1938 report of the Bureau of Animal Industry, where, on page 82, it is stated that in a study of 121 projects in Southern Georgia, in 771 pigs from 88 projects rated as good, 80 per cent. of the livers were passed for human consumption, and only 4 per cent. of the kidneys showed worms and lesions, while of 203 pigs from 33 projects rated as poor, only 18 per cent. of the livers was passed as good, and 50 per cent. of the kidneys showed worms and lesions.

## "TICK WASHING" CALVES AND ITS RELATION TO TICK FEVER.

Young cattle possess a natural resistance to tick fever, but this gradually grows weaker until at the age of twelve months for all practical purposes it ceases to exist. The foregoing applies to calves reared in clean areas and also (and this is the important point) to calves reared in ticky areas if such calves are sprayed so often and so regularly as to keep them entirely or almost entirely free of ticks. Under such conditions, the resistance to tick fever of calves in ticky areas at the age of twelve months will be little better than that of calves reared in clean areas.

The matter is worthy of close attention, as some farmers do definitely overdo the treatment of calves for tick infestations. The belief is, of course, that the growth rate of the calves will be increased and their general wellbeing bettered, but although this is true enough, it is, notwithstanding, a dangerous course to pursue, as mortality from tick fever is likely to follow at the age of eighteen months to two years or older.

Calves should be allowed to carry a reasonable number of ticks from a few weeks old onwards. In this way their natural resistance to tick fever will be continually reinforced, so to speak, so that at the age of twelve months it will be just as strong as it was during the first few weeks of life. In normal circumstances, this resistance will, if the animal is continually exposed to moderate numbers of ticks, be retained throughout life.

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**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.**

# Wheatgrowing in Queensland.

R. E. SOUTTER, Senior Research Officer.

ALTHOUGH the staple food of a large section of the human race is rice, wheat is grown more extensively and, in the form of bread, is used as food by practically all the inhabitants of the more progressive countries.

## EXPANSION OF WHEATGROWING.

The trend of the wheat industry throughout the world is, in general, towards expansion, for, as the standard of living in a country rises, so is wheat substituted for rye and other cereals. The wheat-bread-consuming population is increasing, and the area devoted to wheat production accordingly shows a general tendency to expand.

The chief reason why wheat is advancing in favour so universally is because it is a splendid food in itself, and, because of its gluten properties, it can readily be made into a palatable bread that is more easily digested than that made from any other cereal. Because of its wonderful adaptability, it can be grown from within the Arctic circle to the equator, besides which it has a wide range of altitude, having been encountered by explorers in the Himalayas at a height of between 14,000 and 15,000 feet. Although wheat responds well to good cultural operations, it will yield a return when very crude methods are employed, and the manner in which it adapts itself to varying climatic conditions and soils is not possessed by any other grain crop. The area devoted to its culture throughout the world in 1935 was approximately 392,000,000 acres, yielding in the vicinity of 5,513,000,000 bushels. In the 1936-37 season the acreage in Australia under wheat was 12,342,190 acres, which yielded 150,468,321 bushels, or an average of 12·19 bushels per acre.

## GREATEST WHEAT-PRODUCING COUNTRIES.

The greatest wheat-producing countries are the Soviet Union, China, the United States of America, India, France, Argentine, Canada, Italy, Germany, and Australia, these countries being listed in their order of production in the 1936 season. With a few exceptions, these countries produce more than they require, but the surplus is eventually absorbed by those countries whose production of the cereal falls short of their domestic requirements.

The country wherein the highest average yield was obtained in 1936 was the Netherlands with 43·42 bushels per acre; whereas the lowest position was occupied by Iraq with an average of 6·54 bushels per acre.

Throughout the countries of the world, harvesting is going on in one or more the whole year round. The time the crop occupies the land from the germination of the seed to the date of maturity varies considerably, and, as a rule, those countries where the longest period elapses between these two dates have the highest average yield. For instance, in Great Britain it takes the crop ten months to mature and the average yield is 35 bushels to the acre; whereas in Queensland it occupies the land for approximately six months and the average yield for the decade ending 1936 was 15·52 bushels.

## HISTORY OF THE CROP IN AUSTRALIA.

As a crop, wheat was first grown in Australia in 1788, when an area of 8 acres was sown. In 1799 the area devoted to it approximated 3,500 acres. In another decade it doubled, and so the increase has gone on until during the decade ending 1936 there was an acreage of 14,185,784 acres yielding 163,860,707 bushels.

## HISTORY OF THE CROP IN QUEENSLAND.

Although the wheatgrowing industry has expanded in a remarkable way in Australia as a whole, in Queensland (Plate 217) it has not by any means kept pace with development in the other States, notwithstanding the fact the Queensland average of 15·52 bushels is higher than that of the four chief wheat-producing States—namely, New South Wales, South Australia, Victoria, and Western Australia. This lack of progress cannot be put down to the unsuitability of the soil, for yields of up to 66 bushels per acre have been obtained without the use of fertilizers, and yields of up to 40 bushels to the acre are not uncommon in some seasons on farms which have been cropped for many years.

As far back as 1867, the statistics of the State showed a wheat area of 2,657 acres. Six years later 81,008 bushels were harvested. In 1888—fifteen years later—records show that only 500 acres were harvested for a yield of 8,265 bushels, necessitating, in order to meet requirements, the importation of 2,000,000 bushels—*i.e.*, approximately 240 for every one produced. In 1891 the yield was 392,309 bushels—the highest obtained up to that time. The fluctuations in yield and area still continued. In 1930 272,316 acres were harvested for a yield of 5,107,561 bushels. In 1936 the area sown was 11,000 acres in excess of the area sown in 1930, but the yield was considerably less than half of that obtained in the earlier season. The 1937 yield totalled 3,749,443 bushels, while that for 1938 is expected to reach a total of 8,000,000 bushels.

## CLIMATIC INFLUENCES ON YIELD.

It is evident that seasonal conditions have a very marked influence on the wheat yields of this State.

The countries wherein wheat is grown most successfully—by which is meant the countries in which the growers obtain the highest average yield per acre—have cool and moist conditions during the growing period; whereas at harvest time the reverse is experienced, the weather normally being warmer and bright and dry. Conditions similar to these are experienced in the Southern States of Australia, but a glance at the rainfall chart for this State shows that the season of greatest rainfall occurs during the summer months when the wheat crop is not occupying the land and when weed growth is most prolific and evaporation greatest. Again, the season of the most meagre rainfall coincides with the most critical stage in the crop's growth, when a sufficiency of available moisture is of vital importance to the success of the crop. Furthermore, the harvest period in the chief producing centres coincides with the onset of the stormy season. These factors in themselves would appear to be sufficient to prevent the industry from becoming of material importance in Queensland. When the rust scourge is also taken into consideration, it is not only gratifying that the industry has assumed the proportions it has, but it is also highly satisfactory to be able to record the fact that Queensland's average yield per acre exceeds that of the four chief producing States of the Commonwealth.

Plate 217.
A WHEAT FIELD ON THE DARLING DOWNS.

## PROSPECTS OF THE INDUSTRY IN THE STATE.

There was a period when it was considered that, no matter how successful endeavours to evolve wheats suited to Queensland conditions proved to be, it was problematical whether the industry would expand or recede from its then existing dimensions. The outlook, however, has definitely improved, and the chief factor in bringing this about has been the installation of tractors on the farms in conjunction with the all-round improvement in agricultural machinery, the use of which is now termed "power farming." The benefits accruing to the industry from its use are manifold. It has raised wheatgrowing to a considerably higher plane and removed it from the state of drudgery which characterised this branch of primary production when horses were exclusively used as the motive power. It also enables large areas to be dealt with more expeditiously and efficiently, resulting in gross returns being obtained which could not have been hoped for under the old conditions. A farmer is thus able to grow sufficient acreage to recover quickly from a crop failure, which was a very protracted business, even in the best of localities, on the restricted areas it was possible to operate when only horses provided the power.

## WHEAT-GROWING DISTRICTS.

The Darling Downs Division provided the greatest wheat acreage for grain in 1937, the total therein being 343,136 acres; the Maranoa came next with 22,782 acres, Port Curtis being third with 3,657 acres, while the Moreton Division and Wide Bay were represented by 1,761 and 1,579 acres respectively. The Rockingham Division gave a return of 20 acres.

On the Downs the chief producing centres are Pittsworth, Oakey, Clifton, Dalby, and Allora. It might be mentioned that if the present rate of expansion taking place in the Dalby District continues for a few more seasons, that district will be in the premier position. The Downs embraces what might be regarded as the safest area for the further expansion of the industry. In the Maranoa wheat has been grown with varying success since 1882, but the area under crop for grain has been practically stationary for the last twenty years. The figures for Roma, which includes a strip on either side of the western line extending from Wallumbilla to Bindango—a distance of about 45 miles—show that 21,000 acres were cropped in 1936, and at Mitchell—54 miles west of Roma and 372 miles from Brisbane—1,779 acres appear for the same season. Except on the lighter soils in this Division, wheatgrowing is a somewhat uncertain proposition because of the erratic rainfall. In the Port Curtis Division 1,294 acres were sown in the 1936 season. This Division contains a large area of potential wheatlands, and at the moment there are indications that a movement in the direction of expansion is imminent.

## TYPES OF SOILS SUITABLE FOR WHEATGROWING.

Other conditions being favourable, wheat can be grown successfully in Queensland on all types of soil ranging from those of a light sandy nature to the heavy black soil of the Downs country, it being from the latter type that the bulk of the State's wheat crop has up to the present been produced. It is only in those districts which are better favoured with respect to rainfall that the heavy black type of soil can be

farmed successfully. In the drier areas here, as in other parts of the world, the lighter soils are by far the most reliable where the rainfall has to be wholly depended upon as the source of moisture supply for the crops. Sowing on the very light sandy soils of a depth of several feet is not recommended, however, for in excessively wet seasons the leaching of nitrate nitrogen is so great that the crop may be starved for this necessary nutrient.

The heavier types of soil induce a more luxuriant growth, which makes a much greater demand upon the moisture contents of the soil.

Another and very important factor is that light showers of rain are frequently experienced which are of considerable value in the lighter soils, in which, because of their low moisture-holding capacity, they penetrate to a sufficient depth to be available to the crop. On the heavier soils, on the other hand, such light showers are only sufficient to dampen the surface, and after a few hours' sun all trace of them has vanished. The lighter soils are therefore, in general, superior to the heavier types in dry districts and in seasons of light precipitation, but not in wet districts or in seasons of excessive rainfall.

## PLANT REQUIRED.

The next point for consideration is the plant required for wheat production on a small scale. There is no crop which can show greater and more revolutionary changes in the machinery and implements used in its production during the last decade than wheat. For instance, less than forty years ago a farmer with 80 acres of suitable land on the Eastern Downs possessing three horses, their harness, a single-furrow plough, a set of harrows, and a reaper and binder was considered sufficiently well equipped to take up wheatgrowing. To-day the position is very different, and embarking in the industry with an up-to-date plant, which is really essential to success, is an expensive business. It has, however, the compensating factor that the chances of success have also been very much enhanced.

The plant required for grain production will of necessity include the following equipment, the estimated cost of which will be in the vicinity of £1,000:—A tractor, a multiple-furrow plough, a cultivator-drill, a header-harvester, harrows, a utility truck, and a shed for housing this equipment.

## COST OF PRODUCTION.

It is not intended to enter into estimates as to the cost of production or possible income from a given area. Many factors, some of which are wholly uncontrollable, have to be taken into consideration in endeavouring to frame such an estimate, the degree of accuracy of which might be by no means high.

Having the land and the necessary plant does not mean that success is assured even if climatic conditions are favourable, for the ultimate result depends in large measure upon the effectiveness of the cultural methods employed and the suitability of the varieties chosen.

## CULTURAL METHODS.

Even in the more favoured districts on the Darling Downs, where climatic conditions are such that fair to good crops are obtained nearly

every season, the universal practice of the short fallow tends to raise the average yield of wheat. In the Maranoa and Western Downs, where the rainfall is less, the adoption of the long fallow in conjunction with the short fallow is, however, considered essential to success. The value of the long fallow in these two districts was demonstrated by a case in which a yield of 24 bushels to the acre was obtained from a 30-acre field worked thus, on a rainfall of under 2 inches during the growing period of nearly six months; whereas that secured on the short fallow section was only 17 bushels to the acre.

These yields were obviously not produced solely on the rain experienced during the growing period, but were obtained through the moisture and plantfoods that had been conserved previously in the soil. Investigations have demonstrated that, under normal conditions, 7½ inches of water are required to pass through a crop to produce 25 bushels of wheat; hence, even supposing the whole quantity which fell as rain were available for the use of the crop, it was necessary for the moisture content of the soil to be sufficiently high to admit of approximately a further 5½ inches of water being utilised by the plants to produce the 24-bushel crop.

No hard and fast rule can be laid down regarding the conservation of the necessary soil moisture, for the controlling factors are many. The individual grower must, therefore, decide as to the most desirable course to pursue to meet the requirements of his own particular case. Some guidance, however, can be obtained from the suggestions contained in the following paragraphs on cultural operations generally.

## Fallowing.

The difference between a long and short fallow (Plate 218) is that with the former the land is cropped every second year with wheat and during the interim is worked with the object of conserving the maximum amount of moisture in the soil from the rains that occur. The short fallow, on the other hand, is sown to a winter cereal every year, the first cultural operation following immediately harvesting has been completed. With the adoption of a system embracing the long and short fallow, it is advisable to apportion the area to be cropped in three equal sections, two of which will be sown during the first season on a short fallow, the third being worked but not sown until the following year, thereby constituting the first cropped long-fallow area. In the second season one of the two sections will again be sown constituting the short-fallow portion of the crop; whereas the balance will constitute next season's long-fallow block.

As a result of this procedure, two-thirds of the area devoted to wheat will be cropped every year, half of which, after the first year, will be on a long fallow and half on a short fallow.

The practising of the long-fallow in Queensland might be objected to on the grounds of the cost of maintenance of a clean fallow through two summers as well as in the winter, when a considerable weed growth is experienced, before a crop is obtained. It must be remembered, however, that it is advisable to combine sheepraising with wheatgrowing in order to produce wheat economically. Where sheep are available, weed growth can be largely controlled through the long-fallow period. When the additional costs of ploughing, seed-bed, preparation, seeding, and harvesting incurred in the annual planting of wheat are considered,

it can be realised that a high yield is required every season to offset this extra expense as compared with that met with in the practising of the long fallow.

In addition to the conservation of moisture, another very important benefit is obtained through the practising of the long-fallow—namely, the eradication of winter weeds. Undoubtedly, the growth of winter

Plate 218.
PREPARING A FALLOW FOR WHEAT.

weeds is becoming so serious on the average Queensland wheat farm as to nullify to a great extent the increase in yields which should be obtained through the use of improved varieties and cultural methods.

It is imperative, therefore, that the long fallow should be practised more extensively, for this is the most economical method of eradicating winter-growing weeds.

At the Roma State Farm, where the soil is inclined to set hard, the method adopted in fallowing has been to commence operations as soon as possible after harvesting, the idea being to have the whole of the area to be cropped in the following year worked over before the end of December.

If the soil is too dry to be satisfactorily dealt with by the plough, it is double-disced with the disc harrow. This results in the stubble being well broken down, as it is seldom that sufficient growth is produced to enable a burn being obtained. Weeds are destroyed or checked by the double-discing and the surface is more or less broken and roughened, resulting in the trapping and percolating into the soil of a good percentage of the subsequent rains. It is remarkable, more particularly on those areas where the soil is inclined to set hard, how much longer such land remains in a favourable condition for ploughing than that not so treated.

Plate 219.
PLOUGHING A WHEAT STUBBLE FOR THE FOLLOWING WHEAT CROP.

## Ploughing.

In this State the bulk of the rainfall, which is frequently of a torrential nature, is experienced during the period when the land is in the course of preparation for the wheat crop. As the cultivation should then be free from plant growth of any kind, the danger from erosion is very considerable. In view of this, the wisest course to pursue is to devote to wheat the area on the farm where such erosion is least likely to take place. Where there is even the slightest slope, all cultural operations should follow the level contour of the fields, for this practice greatly increases the moisture-trapping capacity of the cultivations and thus helps to reduce erosion.

Ploughing (Plate 219) should be commenced as soon as the land is in a fit condition to carry the tractors or teams satisfactorily after rain has fallen; the same degree of urgency does not exist on land already disced, as this will remain in good ploughing condition longer than the

untreated. Once it was considered necessary to plough the land deeply in order to secure a suitable seedbed for wheat. This, however, has been shown to be a fallacy, for not only is it not essential to do so, but, in the event of having been carried out late in the season, or if the subsequent conditions are unfavourable for soil consolidation, it may even prove harmful and in a season of very light rainfall may result in the failure of the crop. The depth regarded as giving the best results on most classes of soil is in the vicinity of 5 inches, which depth, when worked up, provides a good mulch and seed-bed. Ploughing to this depth will also ensure that the soil will trap and retain a high percentage of the rain when heavy falls are experienced. The trapping of the rainfall is particularly necessary in the case of soils in which penetration takes place slowly in the absence of deep ploughing.

After the first ploughing the inverted soil is permitted to lie in its rough state for five or six weeks, or until sufficient rain has fallen to mellow it, so that a good harrowing will reduce it to the desired condition.

All subsequent tillage operations should be directed towards the retention of soil moisture by preventing the formation of a hard crust and keeping down the weeds. If the mulch has been destroyed by a fall of rain, the necessary cultural operations should be given as soon as possible to restore it.

### Surface Mulch.

On most farms a set of harrows and a tine or disc cultivator are included in the plant, either of which will be found capable of mulching the soil. Should the soil be in good physical condition and free from weeds, the ordinary harrows will do. If it is weedy and the surface has set, the spring tooth or perhaps the one-way cultivator will have to be brought into service. If the ground is clean but set too firmly to respond to the harrows, the tine cultivator is the best to use, for it leaves the surface cloddy or uneven, and consequently it does not bind and run together quickly.

Whatever implement is used, the restoration of the mulch should not be attempted before the soil is in a condition to respond fully to treatment.

### Depth of Mulch.

As a result of observations made over a lengthy period and a wide range of soils in different parts of Australia, it is considered that from 2½ to 3 inches is the most economical depth of mulch. Anything shallower would not prove effective, and a greater depth would be too costly in proportion to any extra benefit accruing. These recommended depths also provide a firm, moist soil just under the seed when planting is done; that will ensure a quick germination, which is always a desirable objective.

Little difficulty is experienced in retaining the desired mulch on the "self-mulching" soils from which the bulk of the wheat crop is at present produced.

### Varieties to Sow.

Owing to mutations, inter-crossing, and environmental changes, the wheat plant has become very complex in character, and to-day thousands of varieties are grown commercially throughout the world, each with just that difference which makes it preferable to the rest for the conditions existing where it is desired to propagate that particular variety.

There are countries like Canada where the bulk of the grain grown is confined to only a very few varieties. This is rendered possible by the similarity of climate and soil throughout the region of production. In Australia the reverse is the case, for here a great variety of soils and an equal diversity of climate are characteristic of the wheatgrowing areas. The climatic and physical features of the Queensland wheat-growing regions have resulted in an expansion of the industry in a latitudinal rather than in a longitudinal direction, as is the case with

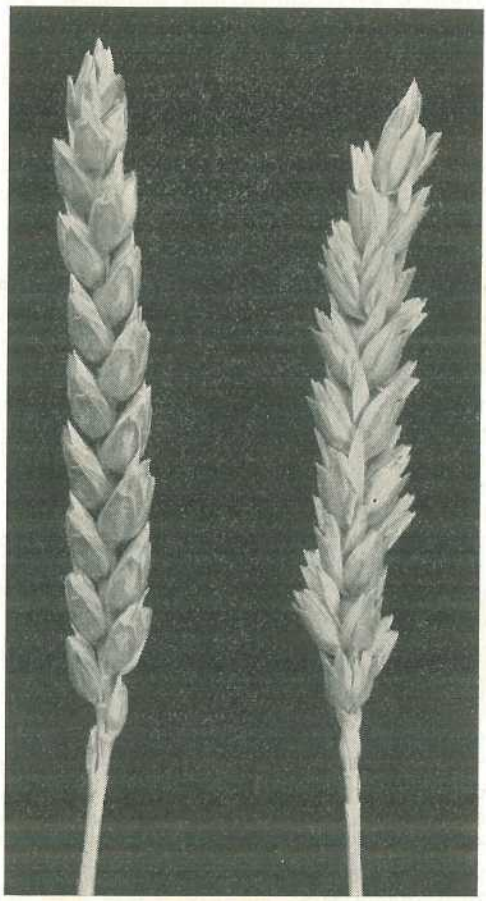


Plate 220.
BUNGE No. 1.

the Dominion just cited. In view of this, it has been necessary to evolve or obtain varieties suited to the varying conditions, which are possibly of wider range in this State than in any other in Australia. Fortunately, the grower of to-day is much better off than the wheat farmer of some years ago, for the knowledge which he possesses of the requirements and merits of a variety or varieties enables him to select the best for his particular set of conditions. Ultimate success depends largely on a wise choice of varieties sown at the right season. No matter what time and skill have been successfully expended on the preparation of the seed-bed, the whole of that work can be rendered more or less valueless by selecting unsuitable varieties or by sowing out of season.

Many of the new wheats introduced to or evolved in Queensland, which have come into general cultivation, are earlier in habit than their predecessors. This is due to the fact that the characteristic mentioned enables them to escape rust to some extent in seasons when it is prevalent,

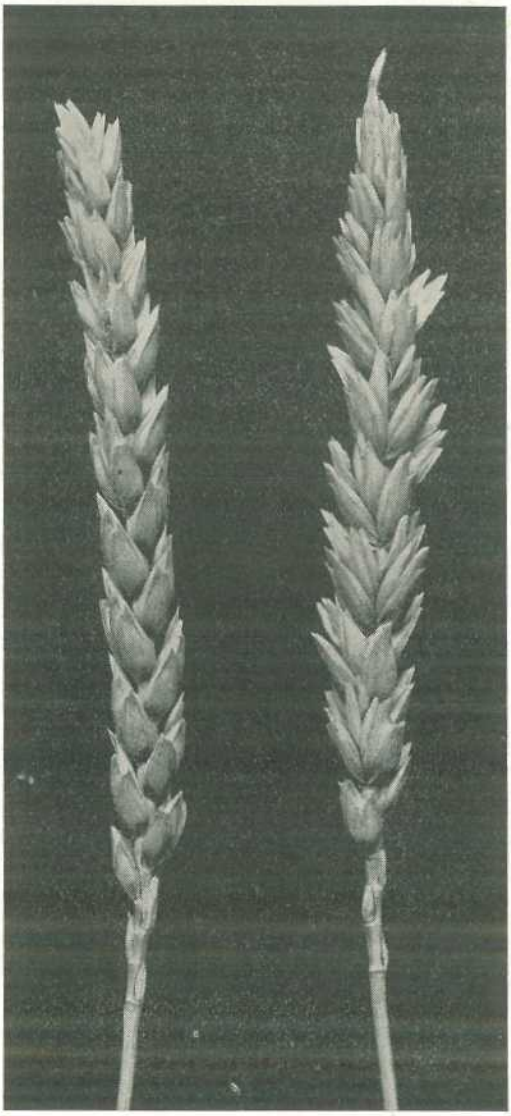


Plate 221.
CEDRIC.

and in years of limited rainfall they produce grain under conditions fatal to slow-maturing varieties. This earliness, however, in conjunction with unseasonable sowing, is also a contributing factor to losses due to late frosts. Many growers interpret wrongly the terms "early" and "late" as applied to wheat. These expressions are used in relation to

maturity, and not to sowing. A late wheat is one to be sown early; an early variety one to be sown late; and a medium late for sowing medium early. It would probably be far better if the terms "quick" and "slow" were adopted instead.

A brief description of the varieties recommended, with their season of maturity and the soils whereon and the districts wherein it is considered they can be grown satisfactorily, is given in the following paragraphs.

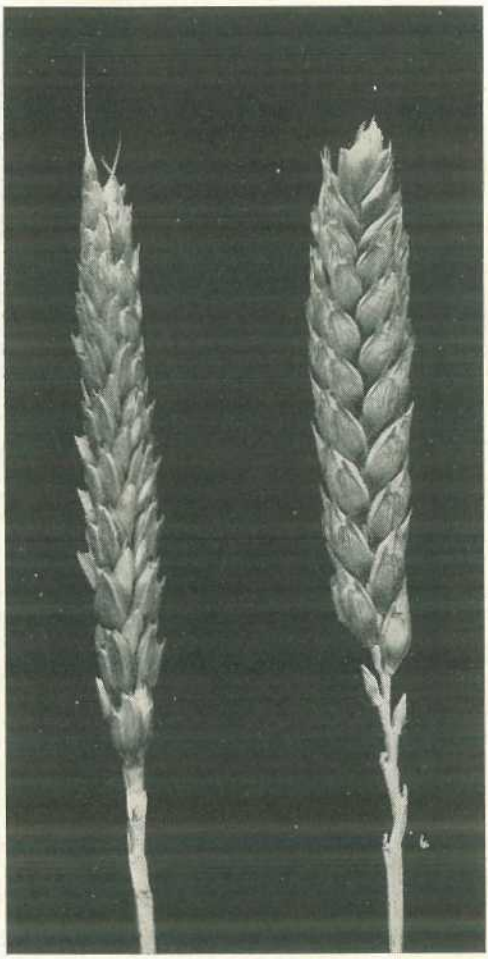


Plate 222.
CURRAWA.

*Bunge No.* 1.—A selection (Plate 220) made at the Hermitage State Farm, Queensland, which was, for some years, first favourite in the Maranoa for hay and grain. It is a medium early, tall, sparse-stooling variety, rust-escaping, but susceptible to bunt. Grain medium large, of fairly good milling quality, stores well, although inclined to deteriorate rapidly if wet conditions are experienced after ripening. Suitable for sowing on all classes of soil ranging from medium-heavy to sandy in any of the wheatgrowing districts.

*Cleveland.*—An introduced, slow-maturing variety from New South Wales, and, therefore, suitable for early sowing; grown extensively for green feed and grazing on the Eastern Downs, more particularly on the heavy black soils in the Pittsworth district. It is a vigorous grower and a good stooler, with a straw inclined to be stout; ears medium size, tapering, with white chaff. Fair rust-resister, and not very susceptible to bunt. Grain medium strong, white, plump, of medium size. Recommended for growing on the heavy and loamy soils in the cooler wheat-growing regions.

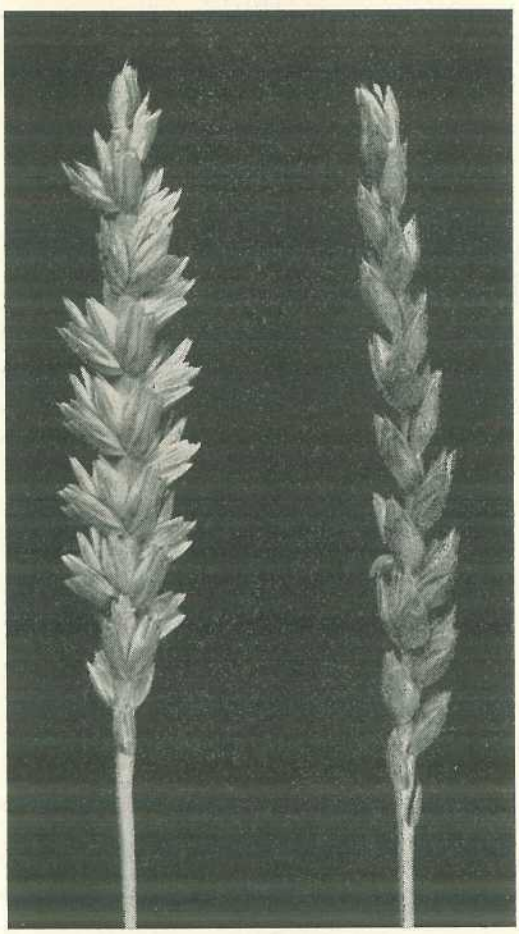


Plate 223.
PUORA.

*Cedric.*—A Queensland variety (Plate 221) resulting from the crossing of Bunge No. 1 and Cedar, a New South Wales variety. Cedric is a mid-season, medium-stooling, tall-growing wheat with a willowy straw. Head bald, medium long, tapering, drooping slightly, with creamy-white chaff. Grain medium large, red, with good milling and storing qualities. Fairly rust-resistant, but susceptible to bunt. Suitable for growing on medium heavy soils, loams, and sandy loams throughout the wheat belt.

*Currawa.*—A slow Victorian variety (Plate 222) which must therefore be sown early to ensure success. It is grown extensively on all classes of soil on the Downs as a dual-purpose crop—i.e., for grazing and grain, for which it excels easily all other varieties, providing as it does, under favourable conditions, plenty of feed; after which, if

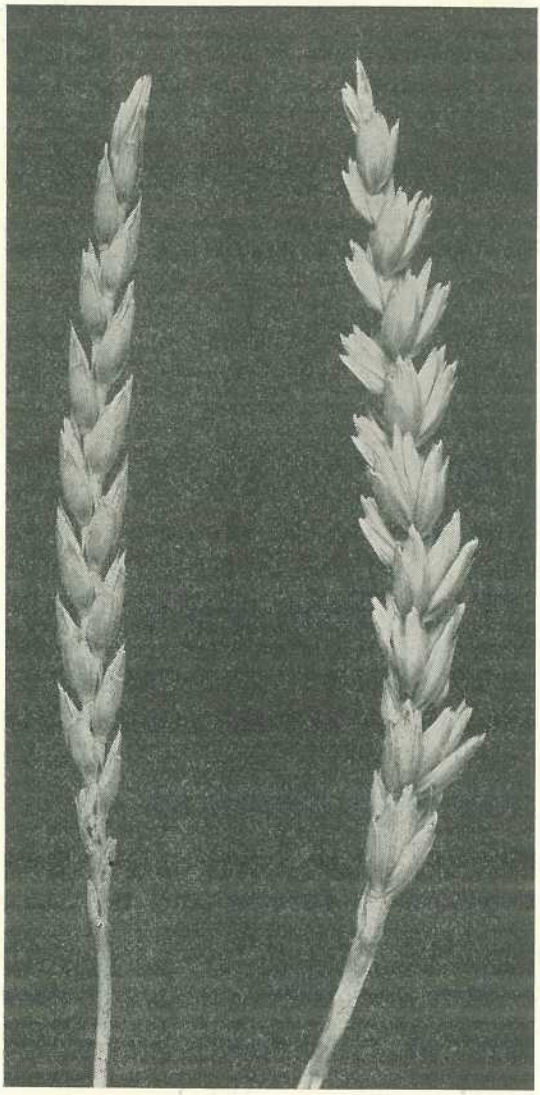


Plate 224.
WARPUT.

permitted, it will very often return a heavy yield of grain. For grazing purposes, it is sown, if conditions are favourable, in March. It tillers remarkably well and has a rather coarse, hollow straw. Ear clubbed, medium length, broad, with few tip awns. Grain yellow and opaque, is not favoured by millers; fairly rust-resisting. Suitable for sowing in

those districts with the longest season and most generous rainfall. It is not recommended solely for grain production, however, as, owing to the quality, it is subject to dockage by the Wheat Board.

*Florence.*—Produced in New South Wales in an effort to evolve a bunt-resistant variety. How successful the effort was may be gathered from the fact that in the susceptibility trials in Queensland in which it was included for some years, it did not on any occasion show infection;

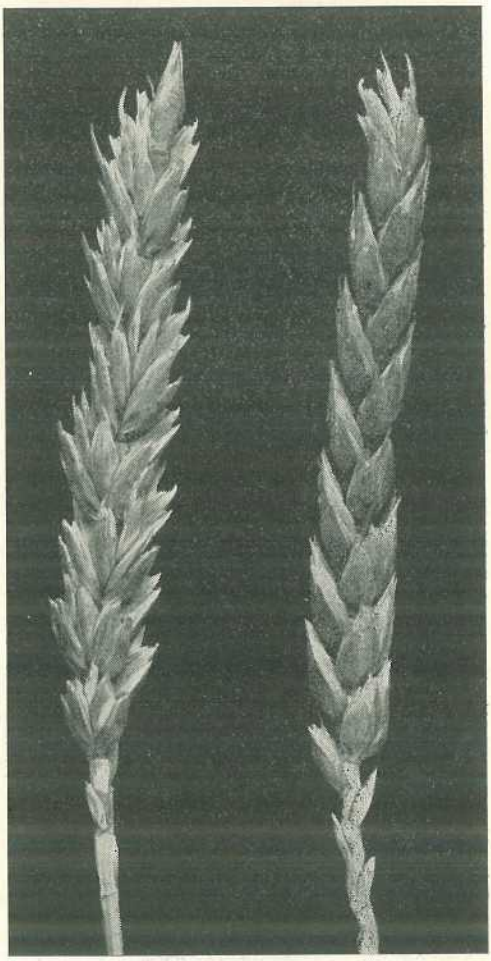


Plate 225.
GLUYAS.

whereas the varieties infected from the same source showed up to 70 per cent. Florence has long been a favourite with growers for late sowing in low-lying locations where there is a danger of late frosts. Fair stooler, with straw of medium height and fineness. Ear tip awned, white chaff and open glumes. Grain of good milling quality, which is inclined to shell out. Suitable for hay as well as grain.

*Ford.*—A New South Wales variety (Plate 226) produced as a result of crossing Fancy with Crossbred 53. Suitable for hay or grain.

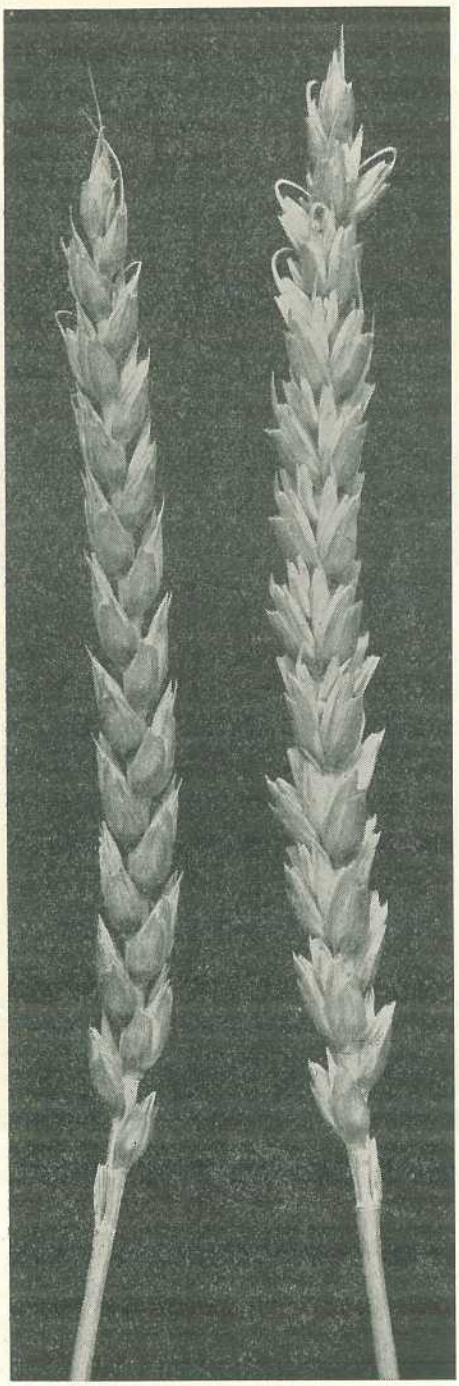


Plate 226.
FORD.

Medium late. Good stooler, tall, yellow-strawed variety. Ear long, tapering prolific, with few terminal awns, chaff creamy smooth. Good dry-weather wheat when sown early, with some resistance to rust. Grain large, yellowish, of medium strength. Appears to be a promising variety for medium early sowing over a wide range of districts.

*Puora.*—A Queensland variety (Plate 223) produced as a result of crossing Pusa and Flora. Grain only. Mid-season, medium tall, erect, yellow-strawed, fair stooling wheat. Ear of medium length and flattened.

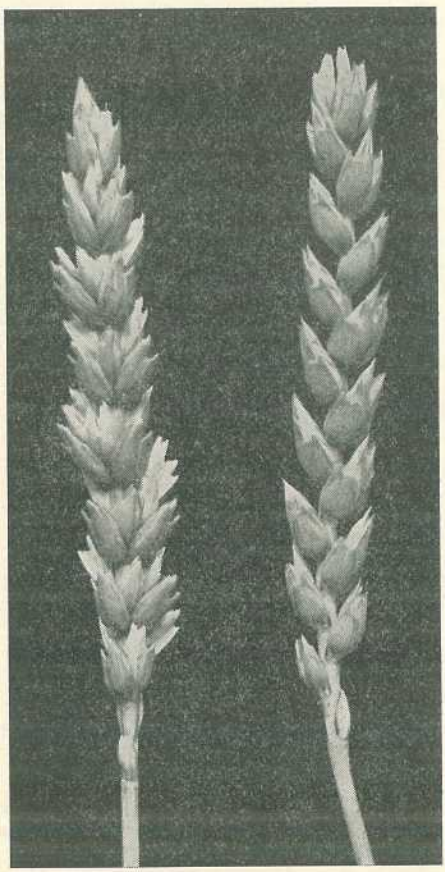


Plate 227.
FLORA.

Creamy smooth chaff well filled. Grain medium size, hard, translucent, of medium strength. Good dry-weather wheat, with slight rust-resistance. This appears to be an excellent variety for the main crop sowing over a wide range of soil types throughout the Downs.

*Warput.*—A Queensland variety (Plate 224) produced as a result of crossing Pusa and Warren. Suitable for green feed, hay, or grain. Medium late, good stooling, tall, erect, yellow-strawed variety. Ear long, tapering, smooth creamy chaff. Grain medium large, medium soft, of medium strength. Slightly earlier-maturing than Ford, but generally suitable for same localities as that variety.

*Gluyas.*—Selected originally from a crop of Ward's Prolific wheat at Telowie, South Australia. Has been a firm favourite in Queensland for over a quarter of a century. Its liability to lodge under adverse weather conditions caused the area devoted to it to recede, more particularly in those districts where the stripper was used to harvest the crop. With the coming of the header-harvester, with which it is possible

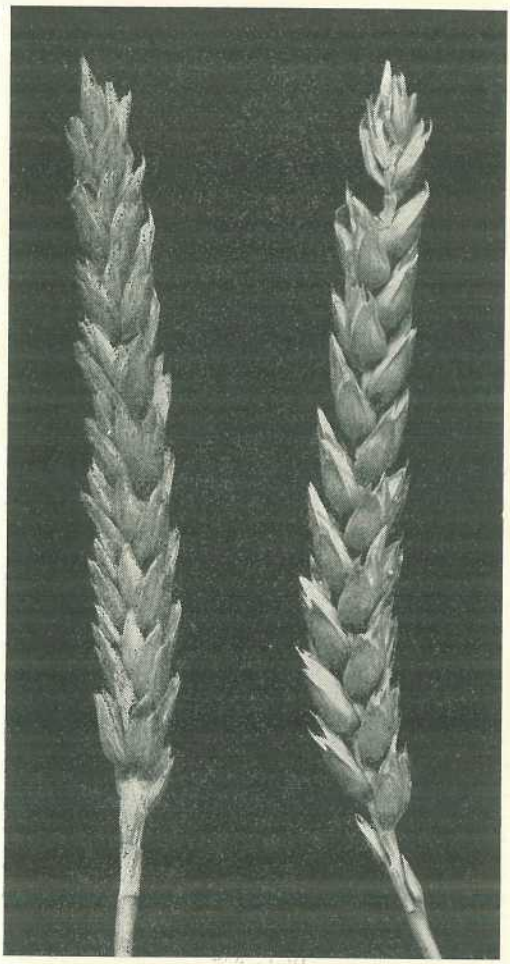


Plate 228.
Novo.

to harvest badly-laid crops with little loss and extra cost, the area under it (Plate 234) has increased again. It is pointed out, however, that the gluten quality of this variety is so low that it is used as the minimum allowable standard in the selection of new creations in the breeding operations.

*Flora.*—A mid-season, erect, fair-stooling variety (Plate 227) of medium height, which has come into favour. The ear is bald, of medium size, with white smooth chaff. Shotty grain, medium size, of pleasing appearance, of medium strong class. Fairly drought-resistant, but susceptible to rust. A Queensland production, the result of crossing

Bobs with Florence. A universally-grown variety, but is particularly suitable for the heavier Downs soils. In 1937 a greater acreage of Flora was grown in Queensland than any other variety.

*Novo.*—A Queensland variety (Plate 228) produced by crossing Bunge No. 1 with Indian Pearl. A medium quick variety, ear short and compact, glumes hooked, willowy, medium length straw, good stooler.

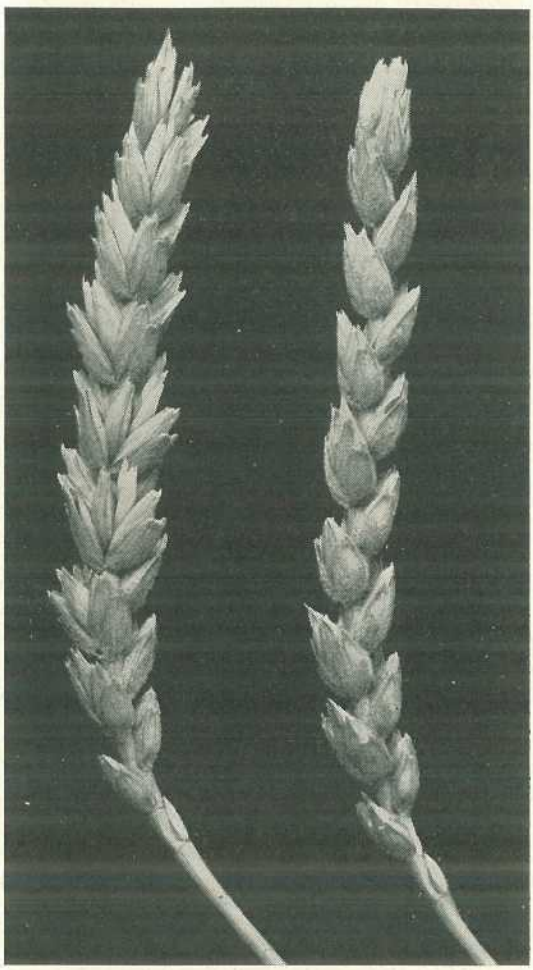


Plate 229.
PUSA.

Grain medium large, hard, tapered, translucent. Fairly drought-resistant, but susceptible to rust and bunt. Is grown most successfully on the light loams.

*Pusa.*—This variety (Plate 229) was introduced to Queensland from Pusa, India, many years ago. A quick, medium tall variety, erect, ear medium length, brownish pubescent glumes, bald, tapering. Although susceptible to frost, it generally escapes rust in normal seasons. Grain hard, translucent, of strong class. It has proved to be one of the best quality wheats in general cultivation throughout the State.

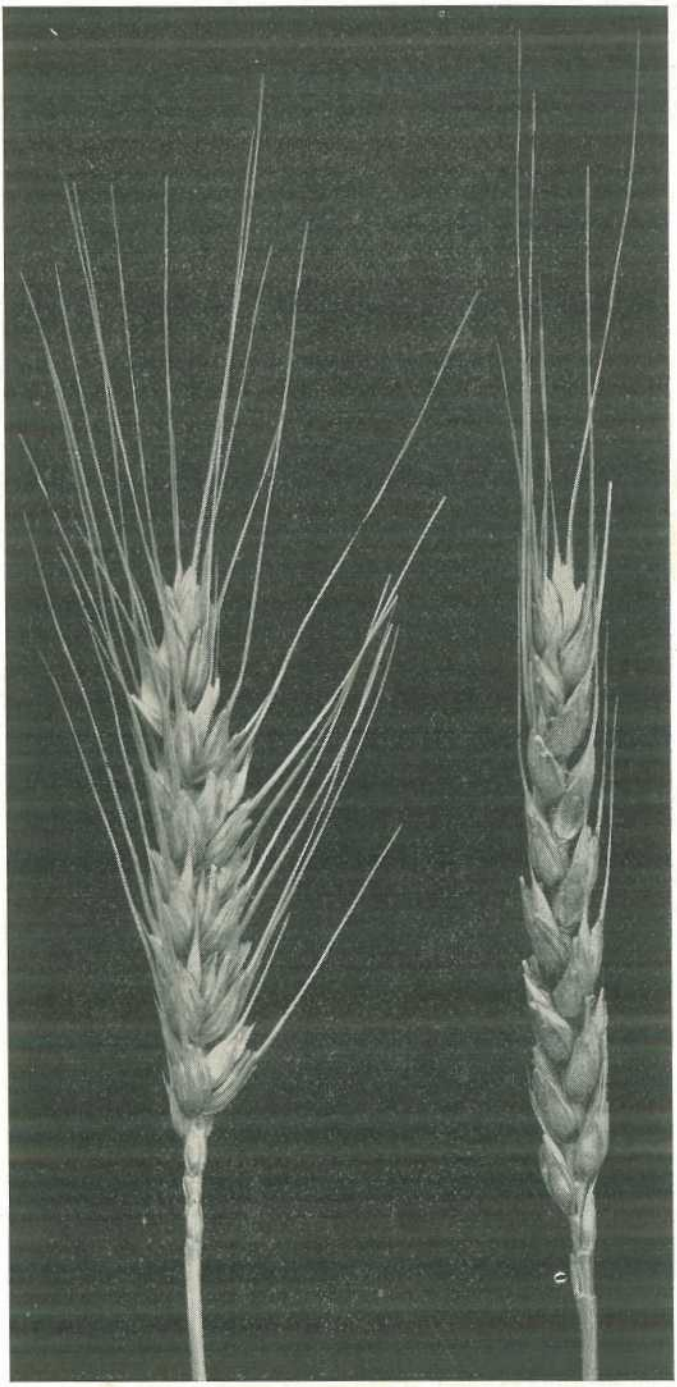


Plate 230.
THREE SEAS.

*Seafoam.*—A Queensland variety, being a selection from Three Seas. A quick, medium, tall, bearded variety; white, smooth chaff. Stools fairly well. Rust-resistant, but susceptible to frost and bunt. Good

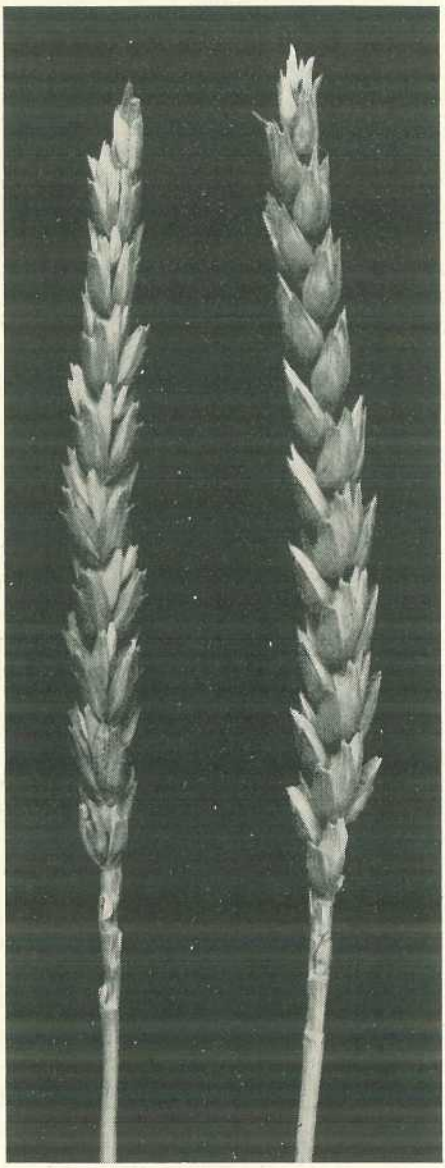


Plate 231.
WARCHIEF.

dry-season variety, prolific. Grain medium soft, of the medium strong class. A promising wheat for the medium to medium heavy soils of the Downs.

*Three Seas.*—Of Queensland origin, being the result of back-crossing Comeback x Cretan with Comeback. A variety (Plate 230) which has come into favour for late sowing, especially on the Downs soils, on account of its rust-resistance. A medium, short-strawed, white, smooth-chaffed, bearded wheat; medium quick and prolific yielder; susceptible to frost. Grain large, medium soft, of the medium strong class.

*Warchief.*—Mid-season Queensland variety (Plate 231), tall, good stooler, ear medium long, bald, tapering, white-chaffed; fairly resistant to leaf rust and bunt, but susceptible to loose smut. Suitable for hay or grain, although a weakness in the straw is sometimes noticeable on rich soils in a good season. Grain white, flat on crease side, belongs to the weak class. Mostly grown in the Downs area.

*Warren.*—A New South Wales variety. This is an old, well-tried wheat, mid-season to slow, good stooler, medium tall, with bald, white, tapering ear. Grain, which belongs to the weak flour class, is of fair size and appearance. Is susceptible to bunt and loose smut, but fairly rust-resistant. Can be grown for hay or grain, although in good seasons on strong soils the straw is inclined to become weak.

## SEED.

Having decided upon the varieties to sow, the farmer should procure his seed from some reliable source, with a guarantee that it is true to name, of the required standard, free from disease, and graded; otherwise, he may be supplied with either an unsuitable variety or with grain that is low in vitality; or it may be infected with disease, with a resultant contamination of his fields, while weeds may be introduced which will give no end of trouble.

A grower should never discard a variety which has served him well over a period of years in favour of another recommended to him, or about which he has read glowing accounts, until he has thoroughly tested it as to its suitability for the local conditions.

A grower using his own seed should be sure that it comes up to standard and that it is free from disease and foreign seeds. Purity is another important matter, and in this connection the grower is reminded that it is next to impossible, with the complicated machinery in present-day use, to obtain access to all the holes and corners which provide lodgment for grain. Therefore, the only course to pursue is to clean the machine as thoroughly as possible before commencing operations on a variety of which it is intended to save the seed and then reserve the requisite quantity from the last harvested.

Before planting, all seed should be graded, by which means weed seeds, cracked and small grains, and foreign matter are removed, and a more regular rate of seeding, better germination, and more robust seedlings are obtained.

### Seed Treatment.

The treatment of seed for the prevention of bunt is still essential, more particularly if seed is procured from an unknown source and if freedom from disease cannot be guaranteed.

Dry powder treatment is now commonly employed, since it is less cumbersome than the wet methods once universally used. The powders, of which there are many on the market, are either copper or mercurial compounds; the rate of application is generally 2 oz. to the bushel.

The powder may be applied to the grain by home-made picklers, of which the one illustrated (Plate 232) is an example, or by machines which are available on the market at a reasonable price. Again, in some districts there are travelling outfits which grade and treat the seed at the same time. Whatever appliances are used, they should result in the seed being thoroughly coated with dust.

As the treatment with copper carbonate does not impair the vitality of the seed, even when stored for twelve months, it should be done as soon after harvesting as is practicable. This is particularly desirable if the grain is weathered or is of softer varieties such as Three Seas and

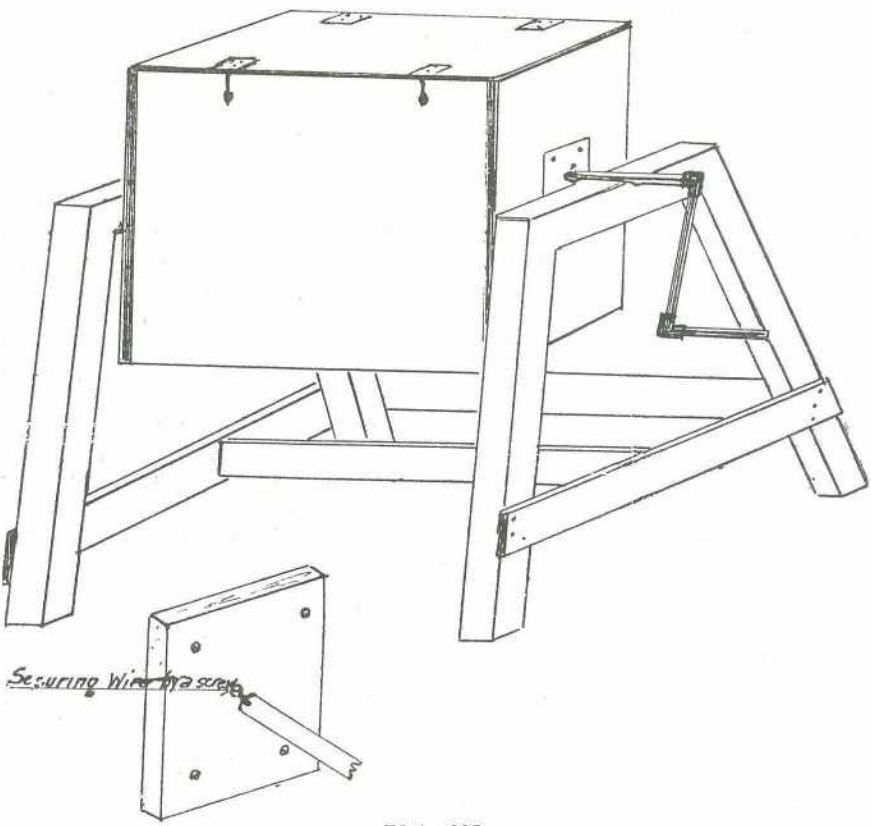



Plate 232.
THE PETROL CASE WHEAT SEED PICKLER.

Seafoam, for such grain is susceptible to weevil infestation. Prolonged keeping of seed treated with mercury dusts, however, should be avoided, as some reduction in germination may occur if storage extends over several months. Though the dusts will not destroy weevils actually in the grain, they will afford it protection if not already infested.

All dusts are harmful if inhaled; therefore, precautions should be taken to cover the mouth and nostrils with a cloth or handkerchief, though a dust mask, such as is used in a flour mill, which can be worn with less discomfort, can be purchased cheaply. Surplus dusted grain,

especially if treated with one of the mercury dusts, should not be fed to stock or fowls. The mercury dusts are, of course, particularly poisonous.

### Storage of Seed.

Wheat seed is generally stored in bags either in a closed barn or outside on a raised platform, but, wherever it is stored, the utmost care should be taken to make it secure from the attacks of rodents and other vermin, and to see that it is not directly exposed to inclemencies of the weather; otherwise, when required, it may be found to be worthless. In the event of weevils making their appearance, which is quite probable if the harvest was a wet one, it will be necessary to fumigate the seed with carbon bisulphide.

## SOWING.

Grain drilled in has a far better chance of germinating satisfactorily than grain sown broadcast, for it can be placed in the soil at the desired depth and it is protected from predatory birds and animals through being well covered. Drilling where the soil is in a favourable condition not only ensures germination, but also results in a saving of 50 per cent. of seed as compared with broadcasting.

Two types of drill are at present in general use—the disc and the cultivator-drill; although the former is the older and more widely distributed, the latter is fast superseding it. Being practically two implements in one, it is possible with the cultivator type to give the final working and to sow the seed at one operation with the soil in a favourable condition to ensure good germination. The cultivator-drill, with its variety of teeth, has been a great boon to wheatgrowers and has filled a long-felt want, especially on holdings where the soils are of a clayey nature and are inclined to run together after rain; it is also a very valuable implement when fields have become foul with winter weed seeds. On soils which tend to cake and bake after rain, a grower working a cultivator-drill can afford to wait until enough rain has fallen to make it sufficiently moist to bring about germination, before sowing. On such soil types, if sown dry, there is always a likelihood of the surface setting to a hard crust, tight enough to prevent the young wheat from breaking through the surface, more especially if only pinched seed has been available for sowing. On weedy soils, as on all others, sowing after rain with a cultivator-drill means also a final cultivation which restores the mulch and ensures the destruction of innumerable germinating weed seeds. Furthermore, if the following rains are long delayed, the young wheat plants can still become well established and so able to compete successfully with any later weed growth.

With the removal of the grain tubes and attachments, the cultivator-drill can be used continually as a spring-toothed or rigid tine cultivator for the summer working of fallows.

Both the disc and cultivator-drill can also be utilised for the sowing of seeds from the size of linseed to peas, and can be purchased with a fertilizer attachment capable of distributing any kind of commercial fertilizer.

Though not advocated as a general practice, it is sometimes advisable to sow dry where it is the intention to have a large acreage and the main sowing period has passed. The justification for doing so is that there is always a possibility, when the weather does break, that it

will continue to be showery and it might be weeks before the sodden condition of the field permits the completion of sowing. Of course, the soil wherein the seed is placed must be sufficiently dry not to induce sprouting.

A word of warning must be given at this juncture. Grain left in drills overnight and in drills driven from one field to another is liable to consolidate to such an extent that when the implement is thrown into gear and started up so much strain is thrown on it that a serious breakdown may be the result. More particularly does this apply to grain which has been treated with dry powder for disease control Such a happening can be avoided by giving the grain shaft a turn or two backwards and forwards with the testing handle before starting the machine again on its work.

### Depth of Sowing.

The depth of sowing is controlled by many factors, the chief of which are the type of soil, the condition of the surface, the moisture content, and the season; from 2 to 2¼ inches, however, is considered to be the most favourable depth at which to sow.

Occasionally on light soils grain is planted deeper to ensure germination, while on clayey soils, which set down hard, many seedlings would fail to reach the surface if sown 2¼ inches deep should heavy rain fall immediately after the seeding. Evaporation becomes slow and germination is tardy as the season advances; so the depth of sowing should then be reduced sufficiently to ensure that the seed is buried just deep enough to be protected from birds and other animal pests.

### Rate of Sowing.

The amount of seed to sow per acre is governed by the size of the grain, the condition of the seed, the variety, and the time of sowing. As a general rule, however, 30-35 lb. per acre will suffice in the Maranoa for early and mid-season planting—i.e., from April to the third week in May; whereas on the Downs 40-45 lb. are necessary. On areas sown later in the former district 40-45 lb. is recommended; whereas on the Downs 50-60 lb. are planted.

Weathered grain and that treated for the prevention of disease will not run as freely as a nice, bright sample of untreated seed; consequently, it is advisable, before commencing sowing operations, to weigh out a few pounds of the grain to be sown, and put it in the drill, the grain then being sown and the area covered by it calculated. From this calculation the machine can be set to sow at the desired rate.

Weathered or other grain about the vitality of which there is even the slightest doubt should be submitted to a germination test so that the correct rate of seeding may be determined.

### Direction of Sowing.

With the disc drill it is desirable, if at all possible, to plant at right angles to the last working to ensure that all the seed is well covered and germinates evenly; otherwise, where the drill travels in the same direction as, say, a plough finish, some of the seed is only just covered, and in some instances even left lying on the surface, with the result that it does not germinate until later than the bulk of the sowing, thus resulting

in uneven ripening. With the cultivator-drill there is no necessity for such a procedure and, if the field is level, it can be sown round and round. In the event of the field being on a slope, it is, however, advisable to follow the level contour in the same manner when drilling as when ploughing This will enable the rows of plants to retard the run-off of storm waters and thus obtain a greater penetration of moisture, with a consequent beneficial effect on the crop and a marked reduction in soil loss.

## HARROWING THE CROP.

On responsive soils harrowing a wheat crop results in a loosening of the surface, thereby reducing evaporation and creating the best conditions for the reception of further moisture should rain fall. It also destroys weed seedlings, and induces deeper rooting and possibly increased tillering. Many farmers are not in favour, however, of harrowing the young wheat crop, and such is not recommended for soils inclined to bake and run together.

Should stubble conservation, which is now being adopted in parts of the United States of America and also in New South Wales, be taken up by farmers in Queensland in order to combat soil erosion, then in such cases harrowing should not be attempted

Harrowing can generally be carried out with safety on suitable soils as soon as the young plants have become firmly established, and may be repeated after each rain, up to the time the crop covers the ground. Where harrowing can be done, the operation should be across the drilling in order to secure the best results and to reduce injury to the plants to a minimum Harrowing across the drills is not practicable for the entire field where a crop has been drilled in by going round and round the paddock and finishing in the centre, which is the general practice nowadays In such instances it is advisable to harrow across the direction of the longest rows. Close examination should always be made of the effect of the operation to decide whether more damage than good is being done It is imperative to keep the harrow teeth free of soil and trash; otherwise serious damage will result.

## HARVESTING MACHINERY.

In recent years there has been an all-round improvement in the machinery (Plates 233 and 234) employed in the wheat industry, which has raised it from a state of drudgery prevailing when horses were employed to a high plane of efficiency. With modern machinery and implements, wheat-farming has become a highly organised industry—a matter of mechanics as well as agriculture. So far as Queensland is concerned, the most important mechanical advance has been made in connection with the harvesting branch of the industry.

The fact that the advent of the stormy season in this State coincides with the harvesting of the crop made this period a worrying one to growers when the non-cutting types of harvesters were in vogue. It was the chief retarding factor in the development of the industry, for, though cultural methods could be employed to minimise, to a certain extent, the ill-effects resulting from droughty conditions, nothing could be done to ward off or minimise the damage likely to be occasioned by a storm. All too frequently, seasons occurred when good crops were flattened and wholly or partly lost because of the fact that the machines were unable to handle them effectively.

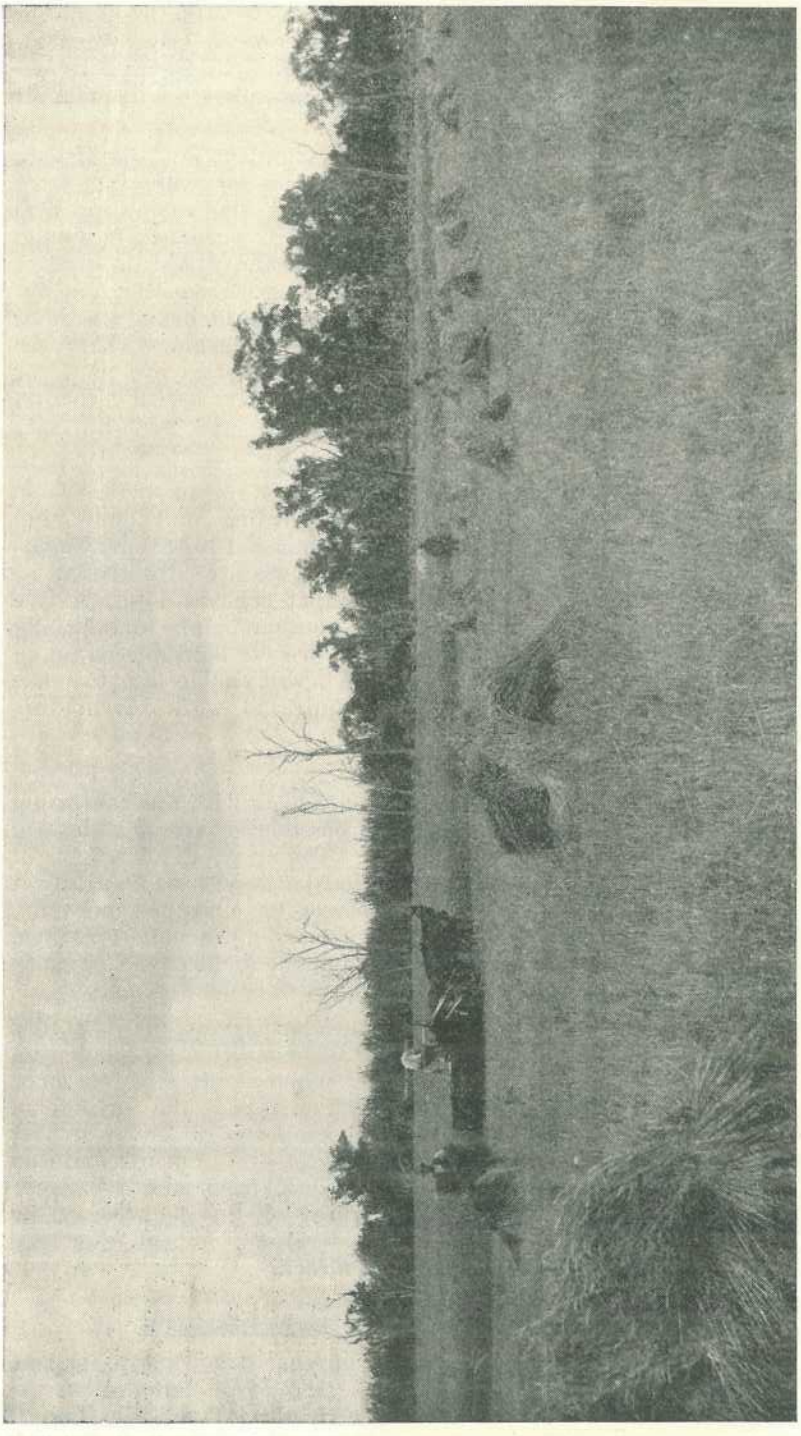


Plate 233.

HARVESTING WHEAT WITH THE BINDER.—This method is now mostly confined to the small farms. The binder is the most suitable machine, however, for cutting cereals for hay.

With the advent of the header-harvester this condition of affairs ceased, for it is possible with this type of machine to garner expeditiously and with comparatively little loss the grain of storm-flattened and weedy crops. There are many makes of machines on the market suitable for Queensland conditions.

Drawn by tractors or horses, the machines gather, cut and thresh, and clean the grain in one operation. Crop-lifters for crops that have been flattened by storms can be readily attached. Chaff-savers can also be obtained. With some makes it is also possible to successfully handle such crops as peas, lucerne, linseed, sorghum, and canary seed in addition to harvesting the wheat. Machines are now fitted with a power take-off, the extra cost of which will be recovered in a season of heavy yields or storm-tossed crops through the saving in time and grain. There are also engine-functioned header-harvesters in which horses are used for draught purposes, these constituting a particularly useful type on hillsides and sandy or loose ground.

## PURCHASE OF PLANT.

There are many types of cultivating, sowing, and harvesting machines specially built for the varying conditions and soils found in the different parts of Australia which are employed successfully and all of which have their advocates. For this reason, it behoves a prospective grower, and one going from one district to another before making any purchases, to seek the advice of those men who have been successful in the locality and obtain the information which will enable him to make a sound selection of the plant he will require to work his holding profitably.

## HARVESTING.

As the advent of the stormy season synchronises with the harvesting period, it is essential that as little time as possible be lost in removing the crop after it is ready for the machines. The crop (Plate 233) is fit for harvesting when the grain has become hard; this can be ascertained by biting or cutting with a knife. Should a crop have ripened unevenly, the grain tested should, of course, be taken from the last patch to ripen. Ripe grain which has lost its hardness through the incidence of showery weather should be allowed to harden up again before harvesting.

The one undesirable feature about the header-harvester is its ability to take crops off when they are not really in a fit condition for harvesting because of the grain being unripe or damp. When an attempt was made to harvest such crops with machines which stripped, the amount of choking which took place indicated that the crop was not fit to harvest and caused a cessation of operations. To harvest grain out of condition does not save time, for it has to be spread out, dried, and rebagged; otherwise a total loss may result. Damp wheat will not be accepted by the Wheat Board's classifiers on any consideration. Wheat even only very slightly damp is susceptible to weevil attack.

## CARE OF MACHINERY AND IMPLEMENTS.

When machinery and implements are purchased nowadays, instructions generally accompany them, and these should be followed to the letter, more particularly in regard to fuel and lubrication. The lives of machinery and implements are more frequently shortened through incorrect lubrication, or absence thereof, than through any other cause.

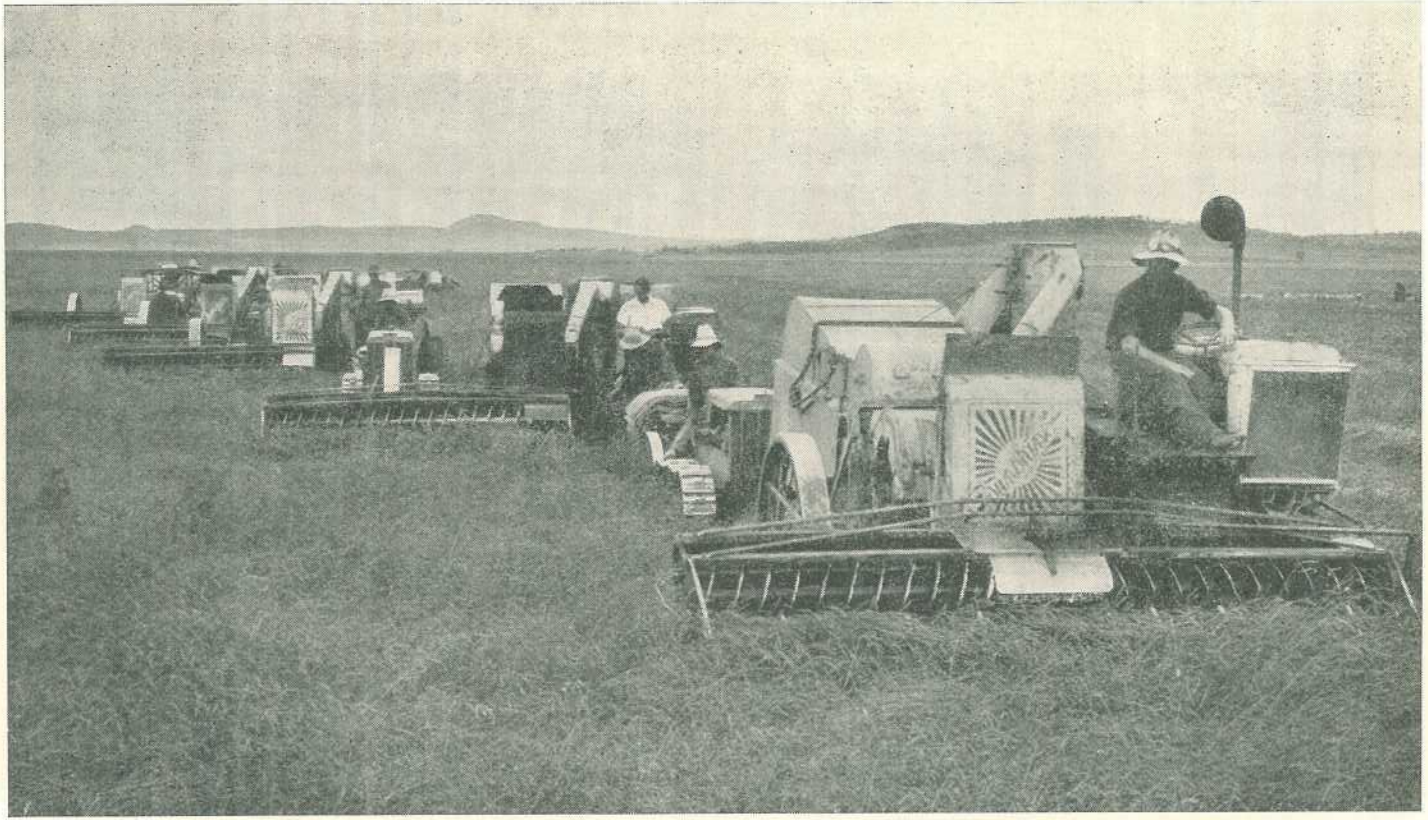


Plate 234.

HARVESTING WHEAT, EVANSLEA, SOUTH QUEENSLAND—Note the lodged condition of the crop.

Plate 235.

READY FOR THE BAG SEWERS IN A WHEAT FIELD NEAR BONGEEN, SOUTH QUEENSLAND.

If possible, all machinery and implements should be kept under cover when not in use, and it is imperative that they be painted and repainted as required, especially the wooden parts.

On the completion of harvesting, or, in fact, of any of the major operations, machinery and implements, before being put away, should be thoroughly overhauled for worn, cracked, or broken parts, and the required duplicates ordered so that they can be used to replace those defective parts when a slack or wet period occurs.

By adopting this procedure, delays occasioned by breakdowns can be reduced to a minimum.

## FERTILIZING.

In South and Western Australia the wheat industry is almost wholly dependent upon an adequate supply of cheap phosphatic fertilizer; whereas in Queensland, because of the high natural fertility of the soil and the comparatively short period during which the wheat lands have been cropped, the application of fertilizer is not practised to any extent. There are, nevertheless, definite indications that a movement in this direction is taking place here also, and many areas of lighter soil which have been cropped for some years will, without doubt, respond well to an application of half a hundredweight of superphosphate per acre.

Comprehensive Queensland trials extending over a period of more than twenty years showed that on loamy soils the increase in yield due to the application of half a hundredweight of superphosphate per acre was little more than sufficient to defray the extra cost incurred. Notwithstanding this, land should not be cropped until it becomes unprofitable before fertilizer is applied; otherwise it may prove a long and costly process to restore its original productivity. It is much easier to retain than to regain fertility.

Analyses of soils from the wheat areas of the State have shown generally that there are ample nutrients such as nitrogen and potash to meet the requirements of a wheat crop in a normal season. Fertilizer trials have usually verified these findings, and it is not believed that fertilizing other than with superphosphate will be of any possible economic benefit for the average wheatgrowing soil.

Where lamb-raising is being practised, the residual effects of fertilizers are of considerable benefit, so that their value cannot be based wholly on the return obtained in grain alone.

## REDUCING FIRE RISKS.

Though the harvested grain itself, through the operations of the Wheat Board, is automatically insured against loss by fire, cover in respect to this danger does not extend to the standing crop. The premium required by companies transacting this class of business is high and beyond the reach of most growers.

The danger of a crop being destroyed by bush or grass fires getting out of control, through being struck by lighting in a dry storm, or by the careless use of matches is ever present, and, furthermore, the risk has not been reduced by the introduction of tractors; hence it is

necessary, in his own interests, for every grower to take the precaution to ensure that, in the event of an outbreak of fire occurring, it will be localised.

Except under abnormal conditions, protection can be afforded to a field by cutting a strip half a chain in width all round the field, with a reaper and binder for preference, when the crop is in the best condition for hay, and then ploughing or sunder-cutting the stubble. Where large areas are sown, the same procedure should be adopted, but, in addition, half-chain tracks should be cut through the crop in such a manner as to divide it into 100 or 200-acre blocks.

In the event of its being known prior to sowing that there will not be a machine available to cut the roadway, strips can be left unsown or, failing this, after the crop has come up the young plants can be destroyed by cultivation, the necessary breaks being thus formed.

## HAY.

Wheat ranks next to lucerne in importance as a hay crop in this State, although for every acre of the former there are ten of the latter. The preparation of the land for a crop intended for hay is similar to that for a grain crop, but it should be sown two to three weeks earlier with a variety specially suited for making hay.

The time at which to cut the crop is very often governed by circumstances beyond the farmer's control, but, in order to obtain the best feeding material, it should be not later than eight days after flowering. Many like to see the grain well formed in the chaff, but at this stage the chaff is more indigestible, while, in addition, the presence of grain in the material is inviting destruction by mice or other vermin unless proper storage facilities have been provided.

The most suitable, and, in fact, the only, method recommended for harvesting is with the reaper and binder. Cut by this means and well stooked, the hay will stand a great deal of weather, provided that a couple of days elapse between the stooking and the occurrence of rain; by that time the sheaves will have settled into position and, in a measure, become weatherproof.

Whether the stooks made are of the round or long narrow type is a matter for the individual farmer, although the latter type is considered to be preferable in the wetter districts.

No hard and fast rule can be laid down as to how long the hay should remain in the stook, as this is governed by the condition of the crop when cut and by the ensuing weather. As soon as it is sufficiently cured it should be carted in to avoid deterioration through wet weather or other causes. One of the most reliable methods of determining whether the material is cured sufficiently to be carted in to the stack or shed is to pull out a handful of straw from a middle sheaf in, say, half a dozen stooks situated in different parts of the field. If, on examination, the upper nodes are found to be shrunken or dried, carting can be gone on with, for it must be remembered that drying is going on the whole time the crop is in the field; also, if it becomes too dry before stacking, it will not make good hay.

If there is any doubt as to whether the hay was sufficiently dry or not when carted in, the simplest method is to push a fork handle or

an iron bar into the middle of the stack and leave it there for a few minutes. A touch of the hand on the bar, when withdrawn, will indicate whether the hay is heating up too much or not. If it is only just warm, it is as required; if hot, it will require to be tried every day and watched carefully, if very hot, the stack will have to be opened to prevent the material from becoming charred, or spontaneous combustion occurring.

## THE WILD OAT PEST.

The wild oat* has been known to infest wheatfields from time immemorial and is found throughout the cereal-growing countries of the world, being as adaptable as wheat to varying conditions. Its importance as a pest varies according to the extent of infestation, which is determined largely by climatic conditions and the cultural methods in vogue in any particular country.

Not only does the wild oat compete successfully with wheat for plant food, but it necessitates extra cultivation, causing loss of soil moisture and the deferring of sowing until late in the season. The risk of loss through drought, storms, or rust is thereby seriously increased. Some success in controlling the wild oat has been obtained in the drier districts by sowing medium to long season varieties of wheat early in April. The early establishment of the wheat plants enables them to develop sufficiently to compete with the later germinating wild oat to such an extent as to suppress the latter's growth.

In some seasons the climatic conditions may delay the germination of the wild oat, and in such circumstances the seed of that plant may be green when the wheat is ready for harvesting. If the wheat is then harvested, the inclusion of the green wild oat seed in a bag of grain may cause heating, with a resultant impairment of the quality of the wheat. If, on the other hand, the crop is permitted to remain until the wild oats are ripe, unfavourable weather may ensue and cause loss through the bleaching and sprouting of the wheat.

With the wild oat, as with other vegetable pests, prevention is better than cure; therefore the greatest care should be exercised in seeing that clean and new areas are not infested through the entry of wild oats with seed wheat or horse-feed.

The chief difficulties encountered in the work of wild oat eradication are due to peculiarities associated with the seed, in conjunction with the fact that the soil, in a heavily-infested field, contains wild oat seed from the surface to the maximum depth to which it has been worked.

The peculiarities of the wild oat seed are the hard, heavy protective covering of the germ and the fact that it normally germinates at a lower temperature than other cereals. This means that, in order to start into growth, it must lie in close contact with the soil at the correct temperature for a much longer period than is essential to promote germination of a grain of wheat. The wild oat has a shorter growing period than wheat, and, even although it does not commence growth till some time after the wheat has germinated, it nevertheless normally matures and scatters its seed before the wheat crop is ready to harvest. It is thus a very difficult matter to eradicate the wild oat from an infested wheat paddock, and it is evident that any system devised for its eradication will result in missing one wheat crop, except in cases where the long-fallow system is practised for, in the latter event, the crop is grown in alternate seasons only.

* *Avena fatua.*

Where the land has become heavily infested with the wild oat, the following procedure in connection with its eradication can be practised where the long-fallow system is in vogue, and will be found more lasting in its effects than growing hay crops for a couple of years or keeping the field out of cultivation for a similar period.

All operations should be planned to produce the optimum conditions for the germination of the wild oat seed, which means that the soil must be brought to as fine a tilth as possible so that when rain does fall, and the soil temperature is right, the bulk of the seed will start into growth. After this has taken place, the land should be ploughed to the maximum depth to which it is intended to go for the next crop of wheat, and should then be harrowed. All subsequent growth of wild oat seedlings should be dealt with by cultivating to a depth of not more than 3 inches, which should, in every instance, be followed by a harrowing in order to retain the desired tilth. Rolling after harrowing has been recommended, for the reason that the seeds will not germinate in the loosely-packed soil because of its drying out too quickly. Rolling would doubtless prove beneficial on "self-mulching" soils, but the consolidating action of the tractors or horses when passing to and fro should prove sufficient on soils that are inclined to run together. Obviously, the operations discussed in this paragraph will have to be carried out during the cooler months of the year, when the conditions are favourable to the germination of the wild oat.

## MARKETING WHEAT.

Progress in the industry in Queensland has not been confined to production methods, but has also extended to the marketing of the crop. For that purpose the Queensland State Wheat Board was established in 1921, with a compulsory pool.

Primarily, the Board was constituted for the purpose of putting growers in a position to control and regulate the marketing of the 1920-21 season's then bumper crop, which amounted to three and three-quarter million bushels. On several occasions since then a ballot has been conducted on the question of the extension of the Board's existence, and on each occasion there has been a large majority in favour of continuance.

In addition to its marketing activities, the Board conducts a co-operative hail insurance scheme, under which all the wheat grown in Queensland is automatically insured against hail damage from the time of coming into ear until it is harvested. The premium is payable only on the actual quantity harvested.

All wheat is insured against fire, and cover under this heading extends from the time it is bagged until it is disposed of by the Board, or, in the case of seed or feed wheat retained on the farm or purchased from the Board, until it has been sown or consumed as the case may be.

The price of wheat is fixed daily, and Darling Harbour rates are a controlling factor.

As the wheat pool is a compulsory one, all wheat is sold through or under the auspices of the Board, and a bag of wheat cannot be consigned on the railway unless accompanied by a certificate from the Board.

## RECEIVING, CLASSIFYING, AND GRADING.

In the sister States all grain transactions are carried out on a f.a.q. basis. In Queensland a different system is in vogue, the grain being classified as it is taken delivery of by the Board, the procedure being as indicated in the following paragraphs.

As each load arrives at the receiving centre, the classifier, in the presence of the grower or his carrier, takes a fair sample of wheat from each bag, and separates the load into grades, according to quality. The wheat is then passed to the stacking contractor with directions as to how to stack it so that the several grades may be available separately at any time for sale and outward delivery. Being in bags, every facility is afforded for inspection and selection, enabling the miller to purchase proportions of the various grades to suit his particular requirements.

The scheme of classification embraces three grades of milling wheat and three grades of inferior or feed wheat. Within each grade of milling wheat there is a range of dockage and premium below or above the mean average quality of wheat as designated Q1 or No. 1 Milling, these gradations descending or ascending by differences of ¼d. per bushel. Q1 or No. 1 Milling consists for the most part of wheat free from foreign substances, with good condition and colour, and of superior quality in every respect. Chondrometer weights range from 62 lb. as a mean, rising to 66 lb. and descending to 58 lb., the description being bright and dry, free from damage or foreign substances.

Q2 or No. 2 Milling consists largely of the same quality of wheat, but it contains other cereals, such as barley and oats, or foreign substances which prove a loss through separation in the process of milling, or it contains wheat which is to some extent bleached or otherwise deteriorated, and also grain which is pinched through dry conditions. This grade does not admit of grains which have germinated to any great extent.

Q2A or No. 3 Milling comprises wheat which, while usable for the purpose of flour manufacture, cannot be admitted into either Q1 or Q2.

To illustrate the scale of dockages and premiums, Q1 grade is determined as follows:—

On chondrometer weight less dockage for any foreign matter that the sample may contain.

| | | |
|---|---|---|
| Mean weight | .. | 62 lb. |
| *Premium* | .. | 63 lb. premium ¼d. per bushel |
| | | 64 lb. premium ½d. per bushel |
| | | 65 lb. premium ¾d. per bushel |
| | | 66 lb. premium 1d. per bushel |
| *Dockage* .. | .. | 61 lb. dockage ¼d. per bushel |
| | | 60 lb. dockage ½d. per bushel |
| | | 59 lb. dockage ¾d. per bushel |
| | | 58 lb. dockage 1d. per bushel |

On Q2 wheat the dockages range from 1¼d. to 3d.

On Q2A the dockages range from 3¼d. to 5d.

F1A or No. 1 Feed is of milling appearance, but is affected by the presence of the objectionable odour of Hexham scent.*

F1 is fully developed grain, but has been affected by weather to such an extent as to exclude it from milling grades, or is musty, or smutty, or otherwise unsuitable for milling.

F2 or No. 2 Feed wheat is similar to F1 in respect of must and smut, but is pinched and generally of low value.

Dockages in feed wheats, in all cases, are tentatively fixed on a flat rate basis, usually 1s. per bushel of the estimated comparative value, according to the proportion of these grades contained in the total crop, but this dockage is reviewed on the finalisation of the season's payments from the net Pool realisations.

In an adverse season a considerable proportion of the lower-grade wheats are not acceptable for ordinary marketing purposes; nevertheless, the Board receives all wheat tendered, provided it is not in so damp a condition as to be quite unsuitable for storage, and even then, if there is a favourable market at the time of intake, such wheat will be received and disposed of without storing and a classification effected accordingly. At no time during the Board's existence has wheat been definitely refused, although growers have been advised to aerate grain and deliver it when found to be in a suitable condition.

Classification at intake is not final, the grower having the right of protest in case of dissatisfaction, and, in such cases, the sample is sealed in the presence of both disputants and forwarded to the head office of the Board for determination by the revising classifier, who, in addition, examines official samples of every delivery made to the Board so as to effect a necessary check on the outside classification.

## SHEEP AND WHEAT.

Sheep and wheat is an excellent combination in most of the wheat-growing sections of the State. Of course, the area of the holding must be sufficiently large to permit of carrying the sheep when the wheatfields are under crop, and therefore not available for the livestock.

Sheep have many uses on any farm, but they are exceptionally useful on the wheat farm, for not only do they assist in the destruction of weeds and keep the fallows clean, but, in doing so, the weeds—otherwise a serious liability—are converted into an asset. Furthermore, in the event of a crop becoming too rank in growth because of seasonal or other conditions, they can be utilised for the purpose of checking it and thereby preventing loss which might occur owing to the crop lodging or being injured by frost.

The number of sheep which it is possible to carry comfortably and profitably is dependent on the district, on the size of the holding, and on the soil and improvements thereon. There are instances of growers on the Downs having 1,200 acres, 500 of which are under crop, chiefly wheat, carrying comfortably over a number of seasons up to 1,000 sheep.

Where the wheat crop is unduly advanced and it is deemed wise to check further growth by feeding it off with sheep, it is essential, after the sheep have been removed, to loosen the surface by running a set of heavy harrows over the field. This restores the soil mulch destroyed by the grazing sheep. Stock should not be permitted to graze a crop, more particularly on the heavier soils, when the ground is wet. If the crop

* *Melilotus parviflora.*

is intended for grain, and sheep are put on when it is considered too forward, as many as are available should be depastured on the crop so that it may be fed off as rapidly as possible. Where the number of sheep is small and the area to be fed off is large, it will be found that after a few days the tendency is for them to remain on the area previously eaten off, evidently preferring the regrowth. In the Maranoa, sheep should be removed from the wheat by the end of June; on the Darling Downs they may be permitted to graze until the end of July with safety. Crops have been grazed until the end of August and a good bagging of grain obtained, but such is exceptional.

Observations over a number of years support the contention that feeding off does not tend to increase the ultimate yield, but rather the reverse. That practice does result, however, in grain being obtained from fields which otherwise might be lost through lodging or frosting. There are stages in the growth of a crop of wheat, or in fact any winter cereal, beyond which it is fatal to feed off if it is intended for grain purposes. Whether this stage has been reached or not may be ascertained by taking one or more average stalks and dismembering them closely and examining them for the miniature ear. If such is discovered, no matter how small, the crop is too far advanced to be fed off if it is required for grain.

## GROW MORE FODDER CROPS.

Every year, producers in the Maranoa and Western Darling Downs districts are confronted with the difficulty of maintaining the condition of stock during the winter months, when pastures are short and harsh. There is only one way out, and that is to take advantage of the better types of soil available and grow fodder crops—not in a haphazard, casual way, but by using a system by which land is given a fallow period prior to the planting of each crop.

The recent bountiful rains throughout these districts provided an opportunity for making a commencement with a fodder programme, and, in view of the erratic seasonal conditions usually encountered, every advantage should be taken of the moisture now in the ground. Many settlers have winter crops—such as wheat, oats, or barley—germinating now, and an excellent practice, particularly after the heavy rains experienced, is to give the crop a light harrowing as soon as the plants have a good hold in the soil. This should be done at right angles to the direction of sowing to check weed growth, prevent evaporation, and give plants a better chance to stool.

Following planting and harrowing, attention should be given to land intended for summer fodders such as Sudan grass, sorghums, Japanese millet, and cowpeas. There is every temptation to utilise every acre of available cultivation for sowing winter crops. In the very rare years when good winters are experienced, plough and plant methods may work out to some advantage, but far better results, on the average, will be obtained if a systemised cropping programme—including rotation of crops and fallowing—is adopted. Wherever possible, therefore, land which has not been prepared for winter crops should be ploughed and left in the rough state for early spring planting. In this way, moisture at present in the ground will be retained, and even light rains in spring will permit planting at that time. Apart from moisture conservation, the aeration of soil by fallowing oxidises plant foods and makes them more readily available to the growing crop.


## The Adaptability of the Merino.

LARGE areas in Western Queensland carry a good covering of high-quality grasses, but are largely devoid of either shrubs or trees. On these exposed plains the breeding of sheep cannot be carried on successfully, but, fortunately, they are within reasonable distance of other areas which, while similar in other respects, are shaded by a variety of shrubs and trees. Many western holdings include both classes of country, and ewes and growing sheep can be held on the shaded area, while wethers for wool production are run on the open plains. On holdings where no shade exists, fully-developed wethers are purchased from properties more favoured for breeding, and are then run for wool production.

In the southern division of the State, the country ranges from the cold granite and traprock country of the Stanthorpe district, to the rich plains along the New South Wales border. Intermediate types are the poor ridges interspersed between fertile plains, the vast areas of brigalow and belah which were held in the grip of the prickly-pear until a few years ago, and the excellent mulga country in the St. George-Charleville-Cunnamulla and far western districts.

Although the mulga country has a low carrying capacity, it is, when partly improved, suitable for breeding purposes, and supports some excellent stud flocks.

Brigalow country in its natural state is next to useless for sheep. When improved by ringbarking, it generally develops a rank weed growth. By stocking heavily with cattle, the weeds will be kept in check, and, subsequently, will give way to a good mixture of grasses, suitable for sheep. When cleared of excess timber, breeding can then be carried on successfully. As a general rule, however, the land should be seeded down to Rhodes or other suitable grasses after ringbarking.

The granite and traprock country is most suitable for running wethers for wool production. The extreme conditions under which merino wethers can be used to advantage is illustrated by the fact that wethers selected for wool production on the open plains of the West, also

do well on the high, cold country of the South-east. The type generally favoured for the western plains is a large-framed, plain-bodied, robust sheep which produces a good length of bold-growing, medium to strong wool. Wethers of this type thrive on treeless plains, with no protection of any kind, and suffer no ill effects when the shade temperatures are high for days, and sometimes weeks, at a time.

The sheep selected for the granite and traprock belt of the South-east are usually four tooths of the finer wooled type, but of similar strain to those selected for the West. Each season, after they have been placed on the granite or traprock country, their wool fines down, probably because of a combination of climatic influences and the finer nature and less nutritive quality of the grasses. They do not cut as heavy a fleece as western wethers; but, if kept free from parasites, they do well even on the cold bleak heights ranging up to 3,000 feet above sea level. The adaptability of the merino to such extremes of climatic conditions is quite remarkable.

## FAT LAMB PRODUCTION.

Gratifying results have followed the scheme initiated by the Minister for Agriculture and Stock with the object of stimulating the production of fat lambs. Rams of British breeds, comprising Border Leicesters, Southdowns, Dorset Horns, Shropshires, and Romney Marsh, were purchased in the South and distributed to farmers who had cultivation available, or who were prepared to cultivate. In certain cases in which a farmer owned a stud ram of a particular breed, stud ewes were supplied with the idea of fostering the breeding of pure stock. All sheep supplied to farmers are on loan, and remain the property of the Department. The progeny and wool, however, become the property of the farmers concerned.

The greatest drawback to the production of fat lambs on the Darling Downs in quantity has been, and still is, the difficulty of purchasing good crossbred ewes as the mother flock.

If a start has to be made with merinos, the best ewe for fat lamb raising is bred by the introduction of one of the long wools, such as Border Leicester, Lincoln, or Romney Marsh into the strong-woolled, robust type of merino ewe. The ewe lambs of this drop should then be retained as the future dams of the lamb-raising flock.

As to suitable ewes for the fat-lamb industry, it is believed that graziers on the fringe of the Darling Downs or further out would find it profitable to join long-woolled rams of British breed with their cast-for-age ewes with the idea of selling the progeny annually as fat lamb ewes on the Downs. Into the crossbred ewe flock, as described, should be introduced a ram of the Downs type. Opinions necessarily differ in the matter of crosses. The Southdown is the fashionable lamb at the present time, but it should be remembered that this cross must suffer no check from birth to block. The Dorset Horn gives a very nice lamb, early maturing and hardy. The use of the Border Leicester should be encouraged in every way. In addition to producing an early-maturing lamb that fills every want, it must be remembered that the skin value of this lamb is worthy of consideration to a far greater extent than either the Dorset or the Southdown.

Pure-bred Corriedale ewes are hard to come by, but should the opportunity occur a farmer would be well advised not to let it slip. Pure Corriedales are hard to beat, good mothers and heavy milkers, besides growing a profitable fleece.

Generally, the wool from a flock retained for fat lamb breeding is a secondary consideration when compared with the production of fat lambs.

## PREPARATION FOR SHEARING.

The shearing season will soon commence, and it behoves graziers to give that necessary attention to the shed, plant, and yards in plenty of time before the start.

Starting is often delayed, because everything has been left to the last minute. The shed itself should be clean, and all pen gates and hinges seen to to ensure convenient working. Grating floors, also, should be attended to where necessary.

The down shoots should be carefully repaired, if necessary, thus ensuring that shorn sheep are not ripped by outjutting nails, splinters, or other projections. Counting-out pens nearly always need repairing. The branding race and the gates at both ends should be in good working order.

Inside the shed, all machinery should be overhauled, belts examined, hand-pieces attended to, and oil cans ready.

The wool bins may need a nail or two, new rungs may be required in the wool-rolling, piece-picking, and classing tables.

The wool press should be overhauled thoroughly and the ropes examined, for if new ropes are necessary rigging them is a long job.

Have wool packs placed conveniently near the press, and all tools used in pressing in their places. Scales should be tested and every other detail attended to. If this work is neglected until the commencement of shearing, delays and frayed tempers are inevitable.

## QUEENSLAND SHEEP LANDS FOR SELECTION AT WINTON.

A resumption from Ayrshire Downs has been surveyed as portions 12, parish of Ayrshire, and 3, Wokingham, and will be open for Grazing Homestead Selection at the Land Office, Winton, on Tuesday, the 4th July, 1939.

The portions are situated about from 30 to 45 miles north-westerly from Winton, and have areas of 24,567 and 23,624 acres, respectively. The term of lease in each case will be for twenty-eight years, at an annual rental of 2d. per acre for the first seven years.

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

The portions are watered by natural hole and by artesian bore drains, sub-artesian bores, and overshot dams, and the country is described as generally consisting of open brown soil downs, well grassed with Mitchell, Flinders, and blue grasses. The channel country is fairly well grassed and fairly well shaded with coolibah. It is excellent woolgrowing and fattening country.

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


# Right Methods in Dairy Practice.

MANY dairy farmers—especially those who have only recently established dairy herds—are often unaware of the essential points for the satisfactory and cleanly production of milk and cream.

The bacteria responsible for the spoilage of milk and cream are to be found in large numbers on the farm, and if careful methods are not used, they may enter from any or all of the following sources:—

(*a*) The udder, if the animal is not absolutely healthy, and if foremilk is not discarded.

(*b*) The cow's coat and skin, if not groomed before milking.

(*c*) Dust in the cowbail or dairy.

(*d*) The milker's hands, clothes or person.

(*e*) Milk buckets and equipment imperfectly cleaned, or not sterilized.

The health of the cow is, of course, of first importance and the farmer must assure himself that every animal in his herd from which milk is being produced is in fit condition and free from any signs of disease.

*Grooming the Cow.*—Some preparation of the cow before commencing to milk is necessary in wet weather to remove the mud and dung splashed on the udder and teats, and, under summer or drought conditions, the dried dust, which is equally dangerous to milk quality.

The flanks and tails should be kept free from caked mud and dung by the occasional use of a currycomb, and the dust removed as often as necessary by grooming with a stiff brush dipped in clean water. It is a common practice on "model" farms to keep the hair on the flanks as well as the udder clipped short to avoid the collection of dust and dirt. Occasional clipping and regular grooming will make the daily routine of keeping the udder clean a very simple task. It is only when cows have been neglected that the washing of udder and flanks takes any great length of time.

The udder and teats should be washed before each milking. This is best done with a cloth (preferably of the woven type) kept for the purpose, and a bucket of clean water, using a separate cloth, with a second lot of clean water if necessary, for finishing off the udder. A small amount of potassium permanganate (Condy's crystals), or some chlorine compound added to the water is an extra precaution observed by many farmers, which is advisable if there are any cases of sore teats, or where the water used is of doubtful purity. The teats are left damp, but not dripping, so that any remaining dust or loose hairs will adhere to the surface and not fall into the milk. Udder cloths must be washed out and boiled every day, otherwise they become a dangerous source of bacteria and the object of washing the udder will be defeated. Both cloths and bucket should not be used for any other purpose.

With practice, this routine preparation of the cow for milking can be very quickly and yet thoroughly carried out. It can be done by a boy, and the time spent—one minute or less per cow—is negligible compared with the reduction in the number of bacteria gaining entrance to the milk and cream from this source.

## WASHING OF DAIRY UTENSILS.

The general principles underlying the proper cleaning of all metal milk utensils are very simple, and once understood they can be adapted to the requirements of individual vessels and apparatus used in dairying. For this purpose it is essential to understand something of the nature and composition of milk and its products. Milk is a complex substance consisting of water, butterfat, lactose, or milk sugar, casein, albumin, and mineral salts. Cream contains the same constituents in different proportions, so that the problem of cleaning is confined to finding effective methods for the complete removal of fats, sugar, proteins, and salts.

The sugar and mineral salts, being mainly in solution, are almost entirely rinsed away in cold water, which will also remove a large part of the fat and proteins. Butterfat, however, occurs in the form of minute globules, and some of these adhere to the surface of milk vessels and require heat and emulsification before they can be washed off. Of the proteins, casein is in suspension in fresh milk (giving milk its white appearance), but it can be coagulated by acid or by rennet to form a solid curd, the hardness of which is increased by heating; albumin is in solution, but, like egg-white, it is readily and permanently solidified by the action of heat. Both these milk proteins possess considerable adhesive properties (casein is used commercially in the manufacture of paints and glues) and they will, *if the preliminary cold-water rinsing is omitted,* stick firmly to dairy utensils, where hot water washing and subsequent sterilisation will only harden them on to the surface. Once fixed there, even in a very thin film, they form a protective layer where bacteria become lodged and breed, and where the sterilising heat cannot reach them, to the detriment of milk and cream quality. Similar protection is afforded by a layer of fat in the form of grease, which can be tested for by passing a finger over the surface of dairy equipment, and which is caused by using insufficient hot water, water at too low a temperature, or the lack of some soap or soda compound to free the fat.

There are, then, three stages necessary to the thorough cleaning of dairy utensils, as distinct from the sterilising, which must follow in order to destroy the harmful bacteria. These three stages are as follows:—

(1) *Cold Water Rinsing.*—Utensils should be well-rinsed as soon as possible after use. This is very important, for milk once allowed to dry is much harder to remove completely. Soaking in cold water for a reasonable time is advisable if washing is not to be done immediately—this will loosen all milk solids and facilitate washing.

(2) *Hot Water and Soda.*—Washing soda, caustic soda, soap, or soap powder are suitable cleansers for farm use (besides many proprietary preparations sold under trade names). Care should be taken to avoid cleansers containing any gritty substance, for this will permanently damage the surface by scratching, and will rapidly remove tinning. The water should be really hot, and enough soap or soda should be used to emulsify the grease, so that no globules of fat can be seen floating on the surface of the water. A stiff brush should be used on each utensil and all loose parts such as taps and strainer discs should be dismantled for scrubbing.

(3) *Hot Water Rinsing.*—A final rinse, using fresh hot water, is needed to remove the soda water before sterilising.

Milk utensils, if not properly cleaned and sterilised, are by far the most fruitful sources of contamination in the course of milking and handling milk and cream, and it should be remembered that both processes are equally essential, for satisfactory and complete sterilisation is not possible without first thoroughly cleansing along the right lines.

## WET OR DRY MILKING?

Many milk producers, careful in every other way to avoid contamination, still continue the unhygienic practice of wet-handed milking. Moistening the hands with milk direct from the teat, or, worse, by dipping into the milk pail, is a deplorable habit, which is responsible for much contamination as well as loss of quality of milk and cream. It is, of course, more serious if washing of the udder and of the milker's hands have been neglected, for then the dirt becomes intimately mixed with and well distributed throughout the milk. A glance at the accumulation between the fingers of a worker engaged in milking an unwashed cow wet-handed will be sufficient evidence of the truth of this statement.

Where washing of the udder and teats and discarding of the foremilk have been carried out and the milker's hands have been washed, "wet" milking is less objectionable, but the fact remains that all the cleanest and most efficient up-to-date dairy farmers milk dry handed, and this is a necessity for the production of milk for sale as "Tuberculin Tested" or "Accredited" in England, and for the majority of organised milkers' competitions. "Dry" milking means that the hands are washed immediately before starting to milk and after completing each cow, being left slightly moist after washing, and are kept as free from milk as possible.

Some farmers, mostly those who have not persevered with dry milking long enough to give it a fair trial, object to it as being slow and difficult, especially as regards stripping. It has, however, been found by hundreds of others to be equally rapid and simple, after a little practice, provided that the hands are left damp and the teats sufficiently moist after washing to make them pliable.

It is true that there are individual cows with badly-formed abnormal teats, or with one or more sore teats, which are difficult to milk dry-handed. For dealing with these, the clean milker uses a small quantity of ordinary vaseline applied to each teat after washing, which not only serves as a lubricant but also assists in the healing of the damaged skin, and helps to prevent particles being rubbed off into the milking pail. Teat sores should be treated with some antiseptic ointment between milkings. This also prevents their becoming more serious through being worried by flies. Great care should be taken by the milker to wash his hands thoroughly after each cow, for obviously, this is a great factor in checking the spread of infectious sores and the transfer of bacteria picked up from the cow's coat, leg ropes, stool, walls, &c., to the freshly-washed udder of the next animal. (If a towel is used, it should be changed often enough to make sure that it is an asset to the hygiene of the milking shed. The clothes of the milker may also constitute a source of danger to milk quality—if, for instance, the same clothes are worn for milking as for feeding the pigs, grooming the cows, and removing manure. A pair of overalls or a sugar-bag apron, kept for milking only, and washed out at least once a week is within the reach of all.

Vaseline may be found of assistance to the man who has made a long practice of wet-handed milking when he first attempts the "dry" method, especially in stripping. It is preferable to use vaseline if, by thus easing manipulation, it prevents excessive downward jerking of the teats, which is often resorted to by an impatient milker, and which is not only quite unnecessary, but ruinous to the delicate udder tissues. After a time, however, it will be found that dry milking can be carried out easily and rapidly with no lubricant other than the moisture supplied by washed teats and hands.

This is being done on hundreds of modern dairy farms, where greater efficiency and increased keeping quality are aimed at, and, once established, this method is seen to be far superior to the old, which appears unhygienic, messy, and insanitary by comparison.

## SCUMMY CREAM.

It frequently happens that when cream is being put through the strainer into the vat at a factory, a quantity of thick greasy substance is retained by the strainer. In most cases, this is due to the inclusion of the thick scum from the interior of the separator bowl with the cream. This is a practice which cannot be condemned too severely and results frequently in the cream being graded down.

## REJECTION OF THE FIRST-DRAWN MILK.

The first step towards clean and, therefore, profitable milking is the washing of the cow's udder and teats to remove dust and dung particles and loose hairs, which, if they fall into the milk, carry with them enormous numbers of bacteria. The second is the removal of the first-drawn or "foremilk," which is a less commonly recognised source of troublesome organisms. The small quantity of milk left after milking within the narrow canal leading from the udder to the outlet of each teat forms a good breeding ground, where nourishment, moisture, and a suitable temperature are available for growth.

On account of their minute size, bacteria can penetrate past the "sphincter" muscle, which closes the teat when milk is not being drawn, and, especially in the case of older cows, where this muscle has become slack, large numbers may enter and become established in the teat canal between milkings. Thus it is advisable, before milking is begun, to remove into a separate vessel—a small pail or billycan is suitable but *not* a milking bucket—the first two or three streams from each teat. This will wash the teat canal free or almost free from contaminating organisms.

Experiments have shown that the foremilk, compared with the middle milk and strippings from the same cow, contains by far the largest proportion of the total bacteria, and, when it is considered that most of these may be from pasture, dung, soil, or contaminated stagnant water, which contain particularly obnoxious types, the value of rejecting the first-drawn milk can be better realised. It has been found to be an important contributory factor in lengthening the life of milk, whether it is intended for human consumption, cheese-making, or separation of cream for butter-making, and in avoiding bacterial taints and troubles such as ropiness and sweet curdling.

A far more important reason, however, why every farmer should make a practice of removing the foremilk regularly at each milking is that it enables him to notice anything abnormal in the appearance of the milk. Early indications of mastitis usually show up in the form of tiny clots or strings in the first-drawn milk, which if observed may mean the detection of animals having one or more affected quarters, before the disease becomes serious. Special care can then be taken to milk the infected cows last, their milk can be isolated from the rest, and the spread of the disease to other cows in the herd prevented.

Under no circumstances must the foremilk be withdrawn on to the floor of the milking bail, for this is one of the surest ways of spreading any infection that may be present. Apart from this, decomposition will take place with accompanying bad smells and attraction of flies.

It is well known that the highest percentage of butterfat in milk is contained in the strippings and that the first-drawn milk is the poorest portion, so that discarding it will involve only a small loss in quantity, which is more than offset by the improvement in keeping quality.

In large herds, where the quantity of foremilk is considerable, it can be pasteurised or boiled and used for calf, pig, or poultry feeding, unless definitely known to be infected. If it contains milk from diseased quarters, it should be disposed of by adding some disinfectant and emptying well away from cowbails and water supply.


## Pig Feeding.

WITH good prices for pigs, it usually pays the farmer to purchase some concentrated foods to feed in conjunction with home-grown foods, which are relatively inexpensive, but insufficient to feed all his pigs properly. It rarely pays to keep pigs in store condition.

Given good weather conditions during the winter, the milk supply may not fall to any great extent, as forage crops would be available for dairy cattle. Forage crops could also be grown for pigs. Good green forage may be used to replace one-third of the growing pigs' ration and two-thirds of the dry sow's ration; hence, when weather conditions are favourable, an effort should be made to provide a succession of forage crops for pigs, and thus save an appreciable amount of grain, meal, and milk.

Crops suitable for autumn and winter planting include rape, field peas, and oats. Rape is a very quick-growing crop under favourable conditions, and is usually ready for grazing eight to ten weeks after planting. If the pigs are removed from the crop when most of the leaves have been eaten, the crop should make fresh growth, and in this way three or more grazings may be obtained. Field peas are best grazed by pigs when the seed pods are well formed, while the plant is still green; oats should be grazed off by pigs when about 10 inches high.

Wherever practicable, grazing is more satisfactory than cutting the crop and feeding it to pigs in their pens. If the regular pig paddocks can be cultivated, cropped, and fed off, the soil fertility will benefit, much labour and food will be saved, and the sanitation of the piggery will be improved.

## OILING PIGS.

In cool weather, pigs do not wallow in mud moles as they do in the warmer months and so they do not have their natural protection from body lice. It will, therefore, be observed on examination that most pigs are now heavily infested with lice.

The pig louse is fairly large—about $\frac{1}{8}$ inch in length—and easily seen if the pigs' hair is turned back, or if sucking pigs are examined around the thighs and under the belly.

Pigs which are heavily infested with lice are unthrifty and slow growing, become debilitated, and are more susceptible to diseases.

The control of lice should receive the attention of pig raisers, for it is uneconomic to have lice-infested stock. Treatment with oil is practicable and inexpensive. Any oil applied to the pig's skin will destroy lice which come in contact with it. An oil in common use is crude petroleum oil. An efficient method of application is by spraying a very thin mist of oil through a pump spray, so that the pigs are completely covered with a thin film of oil. The oiling should be done in the late afternoon so that the sun will not cause the oil to "burn" the pigs. The pigs should be congregated in a race or pen or at the feeding trough, so that time and oil may be saved.

Three thorough oilings given at weekly intervals should assure complete control of pig lice.

## KEEPING PIGS HEALTHY.

By the general practice of hygiene and sanitation in the piggery, coupled with sound feeding methods, the incidence of most pig diseases can be considerably reduced.

The provision of roomy, well-ventilated, but draught-proof sties is essential.

The floors should be swept clean every morning, all refuse being taken away, and the yards raked over. Correct drainage of sties and yards will avoid the accumulation of water and help to keep down insanitary conditions.

Moisture is necessary for the free living stages of nearly all worm parasites; in its absence very few of them can survive for any length of time. Therefore, pig keepers who wish to avoid losses from worms must have dry, well-drained sties and yards.

Unhygienic and insanitary conditions are predisposing causes of rheumatism, catarrh, and some of the more serious bacterial infections—such as suppurative otitis and pneumonia. Piggeries should, therefore, be constructed on high ground, floors should be made of concrete and the run should be well sheltered from inclement weather.

Correct feeding and watering, together with adequate housing and paddocking, are undoubtedly most important factors in the preservation of the health of the pig.


| 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 |
| **Dr. W. Crosse,** Musgrave road, Sunnybank | Brundholme .. | White Leghorns, Australorps, and Rhode Island Reds |
| **Dixon Bros.,** Wondecla .. .. | Dixon Bros. .. | White Leghorns |
| **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 |
| **G. Grice,** Loch Lomond .. | Kiama .. .. | White Leghorns |
| **J. W. Grice,** Loch Lomond .. | Quarrington .. | White Leghorns |
| **Mrs. M. Grillmeier,** Mount View, Milman | Mountain View | Australorps |
| **C. & C. E. Gustafson,** Tannymorel | Bellevue .. | Australorps, White Leghorns, and Rhode Island Reds |
| **P. Haseman,** Stanley terrace, Taringa | Black and White | Australorps and White Leghorns |
| **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 |

| Name and Address. | Name of Hatchery. | Breeds Kept. |
|---|---|---|
| **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 |
| **D. J. Murphy,** Marmor .. | Ferndale .. | White Leghorns, Brown Leghorns, Australorps, Silver Campines, and Light Sussex |
| **S. V. Norup,** Beaudesert Road, Cooper's Plains | Norup's .. | White Leghorns and Australorps |
| **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 Bronze Turkeys |
| **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 |
| **G. R. Rawson,** Mains Road, Sunnybank | Rawson's .. | Australorps |
| **J. Richards,** Atherton .. .. | Mount View Poultry Farm | White Leghorns and Australorps |
| **H. K. Roach,** Wyandra .. .. | Lum Burra .. | White Leghorns and Australorps |
| **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 |
| **A. J. Teitzel,** West street, Aitkenville, Townsville | Teitzel's .. | White Leghorns |
| **W. J. B. Tonkin,** Parkhurst, North Rockhampton | Tonkin's Poultry Farm | White Leghorns and Australorps |
| **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. |
| **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 May, 1939:—

| Name and Address. | Name of Hatchery. | Breeds Kept. |
|---|---|---|
| **W. J. B. Foxwell,** Coomera .. | Foxwell's .. | White Leghorns and Australorps |
| **C. Hodges,** Kuraby .. .. | Kuraby .. | Anconas and White Leghorns |

## BREEDING FOR EGG PRODUCTION.

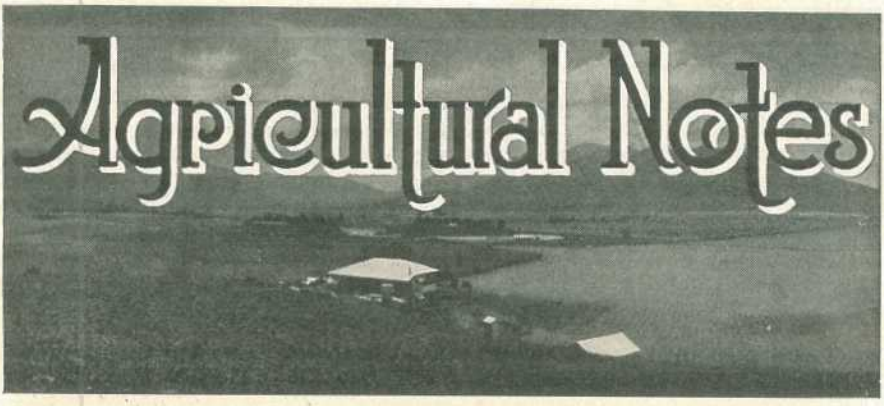
In breeding poultry, the farmer should exercise the utmost care in order to establish and maintain a high quality flock. Considerable progress has already been made in the improvement of breeding practice. Egg production has been increased from about 60 eggs to over 200 eggs per bird per annum, many individual pullets laying over 300 eggs in a year.

In dealing with the egg production in a flock of birds consisting of an equal number of pullets and hens, many authorities quote twelve dozen as a fair average annual production. It is doubtful, however, whether there are many poultry farmers in Queensland who obtain an average production per bird of less than thirteen dozen eggs yearly. In some experiments conducted at the Animal Health Station, using White Leghorns purchased from a poultry farmer as day-old chickens, the average production over the two years was 181 eggs per bird, the variations being—pullet year, from 194 to 209 eggs; second year, from 155 to 162 eggs. In these experiments, 116 pullets were used, and the average of the two years was over fifteen dozen eggs, and even these birds in their second year laid over thirteen dozen. The birds were kept under poultry-farm conditions.

The poultry farmer should be able to obtain an average production at least equal to those figures. A constant high average production is only obtainable by good breeding, in conjunction with good management and feeding.

The chief considerations in establishing standards of good breeding are:—Type, constitutional vigour, action, and laying characteristics. Having selected birds reasonably true to type, care must be taken to see that they are of strong constitutional vigour. This is indicated by the vitality, stamina, health, brightness, and alertness of the bird, and is of equal importance to the knowledge of the actual number of eggs laid. As an example, some years ago the first three birds in a laying test laid 302, 296, and 294 eggs, respectively. An examination of these birds at the conclusion of the test showed that the first and second birds were weak in constitution, whereas the third bird was very strong. All these birds were used as breeders, but while the progeny of the first and second hens were disappointing layers, the descendants of the third bird have performed very well in laying tests every year since. That example should emphasise very clearly the necessity for rejecting birds that are weak constitutionally.

Admittedly, it takes courage not to breed from a 300-egg bird. If such a bird produced the eggs without a heavy drain on her body she would be constitutionally strong. If, however, the bird rapidly loses condition during the year, she is obviously weak in constitution and, consequently, would probably be an indifferent breeder. Any bird that is unable to stand up to a heavy season's laying without losing condition cannot be expected to give high-laying progeny and should be discarded, irrespective of other characteristics.




## Cotton Culture.

COTTON growing is one of the few primary commodities for which there is an unfulfilled demand in Australia.

The Queensland cotton industry is established on a co-operative basis and is one of the few industries in which the product grown is handled by the growers' organisation from the field to the manufacturer. This organisation—the Queensland Cotton Board—takes control of the seed cotton when it leaves the farm, transports it to the nearest ginnery, gins the cotton, markets the lint, and manufactures by-products, all the resultant profits being returned to the grower.

The advantages of cotton as a rotational crop in any farm system, and especially in combination with dairying, should appeal to most farmers with suitable country. Over a number of years, cotton has proved its adaptability to the conditions within the recognised cotton growing regions, and can be successfully grown on most of the main soil types within these areas. It offers distinct advantages over many other crops because of its drought-resistant qualities.

The suitability of cultivations newly broken up out of the original grasslands has been studied carefully for several years, and it is obvious that substantial benefits are obtained on most soils when cotton is grown in rotation with pastures of a sufficient stage of establishment. The benefits which may be expected are increased yield per acre, improvement in lint quality, and reduced costs of production.

Observations have definitely shown that new cultivations, or recently ploughed Rhodes grass paddocks, produce heavier yields of lint cotton than do adjacent cultivations on which crops of cotton have been grown for more than five years in succession. The explanation of the increased yields may be found in several factors. The more important are the restriction of the soluble plant food nitrate-nitrogen in the soil to levels most suitable for the cotton plant and the maintenance of adequate supplies of organic matter (roots, leaves, stems, &c.). The latter prevent the soil particles from packing and give to the soil an open texture that allows of the quick and complete absorption of ordinary storm rains.

Another important feature of the pasture-cotton rotation is the reduction of production costs, brought about by the lessened number

of workings required to keep the field clean in the first three or four seasons after being brought under cotton. Weed and grass growth is less, and the surface does not become compact with the occurrence of heavy rains.

To maintain the Queensland cotton growing industry on a firm basis, it is incumbent on the growers to supply fully the requirements of the spinners. To accomplish this, increased areas are necessary. When the general suitability of cotton for most of the soil types of the south-eastern portion of this State is considered, it becomes all the more apparent that growers cannot afford to exclude cotton from their system of farm cropping.

## WINTER PREPARATION OF LAND FOR MAIZE.

To get the best results, maize requires a good soil in which a plentiful supply of plant food is available—a condition which can only be brought about by an early and thorough preparation of the land before planting, attention to the cultivation of the crop itself, and to the eradication of young weeds during its early growth.

The land should be ploughed to a depth of at least 9 inches during winter and allowed to lie in the rough until early spring. The action of frost and rain will improve the texture of the soil and will leave it in a mellow condition. In early spring, the land should receive a second ploughing which, if possible, should be a cross ploughing. This should not be so deep as the first ploughing, and should be followed immediately by a harrowing and cross harrowing to work the surface soil into a fine tilth.

If a crop of weeds is turned under during the second ploughing, planting should not be carried out for at least a few weeks to allow the weeds to rot. On land which is not too heavy and moist, rolling is desirable as it consolidates the soil and helps to make a good firm seed-bed. Rolling should always be followed by a light harrowing.

*Preparation of Seed-beds.*—The preparation of the seed-bed is one of the most important points in the production of maize. No amount of after-cultivation will undo the damage caused by planting in a badly prepared piece of land. One has only to see the difference, not only in the growth, but also in the colour of the foliage between a crop grown on thoroughly prepared and another on hastily prepared land, to realise how great the effect is.

Give the young crop a chance to become well established in a well prepared seed-bed—in which the young plants will not have to battle with a host of weeds—and the increased return will more than compensate for the extra time and labour spent.

*Time to plant.*—The best time to plant will naturally vary in different districts. In districts which have a long growing season and a comparatively regular rainfall, planting can be done whenever weather conditions are suitable—from August to late December.

Two very important points are—firstly, to chose a variety which is suitable for the district; and, secondly, to plan to have the crops tasselling, if possible during periods in which rain can usually be expected.

Maize must have moist conditions when tasselling, and if hot, dry winds occur during this period, the pollen is shed too early and fertilization cannot take place.

Seed should be sown in drills spaced 3 feet 6 inches to 4 feet apart. The wider spacing is essential for the tall-growing, late-maturing varieties. As a general rule, single spacing in the rows gives the best results, the grains being dropped singly, with a distance of approximately 12 inches between the grains for the quick-maturing varieties, and from 15 to 18 inches for the late-maturing varieties.

From 9 lb. to 12 lb. of seed is sufficient to plant an acre when sown in this way.

The seed drill is the best implement for sowing maize, as it ensures a good even spacing and no loss of moisture occurs during planting, as is often the case where furrows have to be opened up for hand planting.

## VALUE OF TREES ON THE FARM.

Trees serve many important purposes on farming and pastoral country.

Trees are valuable as—

1. Windbreaks and shelter belts.
2. For isolated or scattered shade and shelter.
3. A reserve supply of fodder for periods of drought.
4. Timber and fuel supplies.
5. Screens around dams and tanks to prevent silting up by dust, and undue evaporation of the water.
6. For the prevention of erosion on slopes and along the banks of creeks and rivers.
7. For ornamental plantations in improving the appearance of the home.

## WINTER-GROWING RHODES GRASS MAY CAUSE STOCK LOSSES.

Although warnings that the so-called winter-growing or frost-resistant Rhodes grass is a potential source of danger to grazing stock have previously been issued, some farmers may not yet be aware that this grass should be grazed with caution. Winter-growing Rhodes grass should not be confused with the more common Rhodes grass which makes a very valuable pasture.

The prussic acid content of winter-growing Rhodes grass has been determined in samples collected both in Queensland and in New South Wales, and the quantity found was sufficient to indicate that the grass may sometimes be toxic to animals. Little is known about the conditions under which stock losses due to ingestion of the grass may occur, and stockowners are advised to be very careful when paddocks of the grass are being grazed.

In districts where high-yielding winter-growing grasses and clovers can be grown, the use of the winter-growing Rhodes grass for grazing purposes is not recommended.

## BINDWEED—A SERIOUS WEED PEST.

One of the most serious weed pests so far introduced into Queensland is the European bindweed. This plant first made its appearance on the Darling Downs about ten years ago, or perhaps earlier, and little trouble has been experienced, in a general way, until recently, but, judging by the number of specimens sent in to the Department of Agriculture and Stock, it has become very widely spread.

Farmers seeing small plots of it in their areas are advised to use every means of getting rid of it, for once it attains serious proportions eradication becomes almost impossible.

It may be described as a slender twiner with long creeping white underground stems, any part of which when broken off may form a new plant. The leaf is about 1 inch long, the flowers are white or pink—mostly white in the Queensland specimens—bell or broadly funnel-shaped, and ½ to 1 inch across.

Some method of eradication must be devised to destroy the underground parts. This is best done by starvation, and if the top green growth can be kept down by cultivation or by sprays, the underground parts will eventually become exhausted.

Pigs are fond of bindweed, and have been found useful in keeping the weed in check, both in Australia and abroad.

It is a much more serious pest at the present time in the Southern States than in Queensland, but unless small plots are destroyed as soon as they appear the plant will multiply rapidly.

## THE BRISBANE SHOW.

The new industrial pavilion at the Exhibition Ground, which is just nearing completion at a cost of £40,000, with its 150,000 square feet of floor space will provide a fine setting for the vast range of primary and secondary industrial exhibits, representative of the State's enormous productive capacity, at the Brisbane Show in August.

The Postmaster-General's departmental display, together with the Queensland Government displays in agriculture and stock, also forestry and irrigation, will be outstanding features of the pavilion.

Another addition to showground architecture which will claim much public attention during the forthcoming show, will be the new Electricity Hall wherein the 1939 Electrical and Radio Exhibition will be staged. The State Electricity Commission, which has organised the various interests responsible for this new show development, is to be commended for its policy of reticulating electric light and power to country districts as rapidly as possible. There is obviously no reason why country people should not enjoy the amenities of the city, both on the farm and in the home. In this great developmental work the co-operation and the resources of the Brisbane City Council Electricity Department, the City Electric Light Co., Ltd., and the Electrical and Radio Federation of Queensland are very important. This display will present much of practical interest to the housewife and home lover. Every phase of the electrical industry, ranging from modern lighting systems, bathroom and kitchen equipments, to the very latest in electrical timepieces and radio equipment, will be interestingly set out.


# Selection and Care of Scions for Grafting Deciduous Fruit Trees.

TOO much care cannot be bestowed on the selection of scions to be used for grafting. Just as the grower expects to receive good trees from the nursery, so should he, in proposing to rework trees, take care to see that his scions are the best procurable, for the life of a reworked tree should be, if the job is done properly, just as long or even longer than if it had not been regrafted.

The scions should be obtained for preference when the wood is quite dormant, and since, "like begets like," they should be taken from selected trees that are healthy in all respects and, if possible, proved good croppers, or they may be taken from reworked trees, the scions of which had been in their turn carefully selected.

Scion wood can be taken from anywhere in the tree, but it should be but one year old—that is, of the previous season's growth and with apples and pears free from flower buds. With stone fruit, this is not always possible, because, in addition to the simple wood buds, they usually have multiple buds—i.e., both flower and a wood bud at the one location; this does not matter, because the outside flower buds will fall off, leaving the dormant wood bud in the middle.

Medium-sized wood is the best. Over-grown, coarse growth with long internodes should be avoided. Small thin growth also is undesirable.

As the grower usually has plenty of wood to select from, he can easily see that he has only the right material. If he has not, then he should get it from a neighbour, rather than attempt to use unsuitable material. The grower should see that he has plenty of scions, and he will find it advisable to allow for only one scion out of each wood stick. Assuming the wood sticks are about 18 inches long, the grower will usually find that with the bottom 4 inches the buds are poorly developed. The top 6 inches are too thin and the buds immature, leaving but 8 inches of the most suitable wood in the middle of the stick, out of which it is

often hard to cut more than one scion. This applies to scion wood other than the peach or nectarine, which is an exception, because in grafting these fruits it is desirable, if the top portion of the scion is of sufficient thickness, to leave the terminal intact.

In grafting, the principle is to graft a dormant scion on to an active stock, and then, when the sap flows from the active stock into the dormant scion, it brings the dormant buds of the scion into life and growth commences immediately.

Some growers experience difficulty in keeping their scions dormant, but they will have no trouble if they go about it the right way.

The scions kept should not be merely an armful or prunings of the required variety buried in a trench in an orchard, sometimes without even a stick to mark the site, which often means hunting for hidden treasure, when the day for grafting arrives. They should first be tied into neat bundles of from forty to fifty scions to a bundle, labelled correctly as to variety and then buried, so that from a third to a quarter of the scion is in the ground and two-thirds to three-quarters above ground.

Choose for the site a place where they have a reasonable amount of moisture, but as little sun as possible, because it is the warmth of the soil that starts them into life. The south or south-westerly side of a building is a good site.

If the grower experiences difficulty in keeping the scions back because of his having a lot of grafting to do, and so that the period has to be prolonged, then he should dig them up one evening, leave them out all night, and replace them in the soil in the morning. This will act as a check without harming them in any way.

With scions of stone fruit, should the flower buds commence to swell or even come into blossom, the grower should not jump to the conclusion that they are too forward, because, on examination, it will usually be found that the wood bud which is situated in between the flower buds is still dormant. It is when the wood bud commences to shoot that they are too forward. Should the scions show signs of withering through insufficient moisture, they should be buried entirely in a moist place for some days. On no account soak them, because this will cause the buds to absorb a large quantity of water, which soon dries out again, and there is grave risk of the buds falling out.

When the time for grafting comes and the scions are dug up, it will usually be found that callus formation has started at the bottom—this is a normal provision of nature. Should some of the scions have failed to form this callus, however, they should be discarded, because usually there is something wrong with them.

Some growers are inclined to start grafting too soon. This is inadvisable. It is much harder to perform the operation if the sap in the stock is not running freely. In the Stanthorpe district it will be found that the best time to start is in the last week in August or the first week in September for stone fruits, and for apples and pears a month later. The period can be extended to so long as the scions remain dormant.

With grafting there are three essentials—(1) healthy trees; (2) good scions; (3) good workmanship. If any one of these three is lacking, then the result must be a failure.

Officers of the Department of Agriculture are in Stanthorpe to assist growers, and should anyone be in any doubt as to whether his trees are

suitable for grafting, he should get in touch with the officer in charge, who will advise him as to their suitability or otherwise, and the best grafting methods to adopt according to the circumstances.

Further, should a grower be in any doubt as to his own capabilities as a grafter of trees, then the Departmental officers will be pleased to give him the necessary instruction. It is at times hard to understand how some growers, who have but a very hazy idea of grafting, have so little compunction in cutting down perfectly good trees and, through ignorance, spoiling them for all time, when an hour or two's tuition would enable them to do the work correctly and without doubts as to its success.

A pamphlet, "Propagation of Fruit Trees," dealing with this and many other points in orchard practice, is available on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

## PRUNING DECIDUOUS FRUIT TREES.

The pruning of deciduous fruit trees has commenced, and this very important work should be done as well as it is possible for the operator to do it.

To make a good job of pruning, good, clean, sharp tools are very necessary. Pruners will find it useful to provide themselves with a light box—fitted with a strap to make carrying easy—for holding secateurs, pruning saw, sharp pruning knife, oil-stone, oil-can, pot of coal tar, a brush, and a bottle of disinfectant.

A good pair of secateurs is essential, and they must be kept sharp and smooth. Every pruning cut causes a wound, but wounds of small diameter soon callus over provided the secateurs are sharp and clean. Many pruners try to cut with their secateurs some of the larger limbs, and thus strain both the secateurs and their own wrists, while generally hacking the limb off and leaving rough edges which harbour pests, and facilitate the entry of fungous diseases. All large cuts should, therefore, be made with a saw which, like the secateurs, should be both sharp and clean.

A sharp pruning knife is necessary for trimming the rough edges left by the saw, for, if they are not pared, callus formation is slow and the wound may not heal.

The need for an oil-stone and oil is obvious. A rub of the secateur blades on the oil-stone now and again keeps them keen and sharp, and makes the work much easier.

Pruners should always have with them a pot of coal tar, for tar is a disinfectant as well as a wood preservative, and being pliable, makes a good surface covering. After pruning one tree and before going on the next, it is advantageous to paint all large cuts over with coal tar. The operation takes only a couple of minutes, and will help the tree considerably.

Both secateurs and saw often require disinfecting, for many diseases can be transferred from tree to tree by these implements. A strong solution of either formalin or corrosive sublimate rubbed over the blade with a rag will reduce any risk.

The foregoing suggestions are valuable, as fruit trees on which a man depends for his living, and which he expects to keep him for many years, deserve the best treatment possible in regard to pruning as well as to cultivation and manuring.

# The Fruit Market.

J. H. GREGORY, Instructor in Fruit Packing.

COLD damp weather in South-Eastern Queensland during May had a detrimental effect on the fruit consumption.

Banana values are being well maintained and pineapples are selling at profitable prices. There is still too much green fruit going on to the Southern markets, thereby detrimentally affecting both price and demand. Cold weather has restricted the sale of tomatoes, and prices have consequently dropped. The demand for avocados eased somewhat. The quality of apples declined as the season advanced. Many lines are arriving from the South in poor condition and are hard to sell. Pears have maintained their quality and have sold well. Citrus fruits are now in full supply, and some excellent classes are on the market. Growers are advised to take particular care in keeping up quality, as a high percentage of waste is a common experience.

Prevailing prices at the end of May were:—

## TROPICAL FRUITS.

### Bananas.

*Brisbane.*—Cavendish: Small, 6s. to 10s.; Sixes, 6s. to 12s.; Sevens, 7s. to 15s.; Eights, 6s. 6d. to 15s.; Nines, 6s. to 17s.

*Sydney.*—Cavendish: Sixes, 14s. to 16s.; Sevens, 16s. to 18s.; Eights and Nines, 18s. to 20s.; Specials, higher.

*Melbourne.*—Cavendish: Sixes, 13s. to 15s.; Sevens, 15s. to 17s.; Eights and Nines, 17s. to 20s.

*Brisbane.*—Lady's Finger, 1½d. to 7d. per dozen.

### Pineapples.

*Brisbane.*—Smoothleaf, 3s. to 10s. case; loose, 2s. to 7s. dozen; Ripley, 5s. to 9s. per case; loose, 2s. to 4s. per dozen.

*Sydney.*—Smoothleaf, 10s. to 18s. case.

*Melbourne.*—Smoothleaf, 10s. to 18s. case; green lines unsaleable; small fruit very hard of sale.

### Papaws.

*Brisbane.*—Yarwun, 3s. to 5s. tropical case; Gunalda, 3s. to 4s. bushel case; Locals, 2s. 6d. to 3s. bushel case.

*Sydney.*—6s. to 12s. tropical case; inferior and green hard to sell.

*Melbourne.*—7s. to 11s. tropical case; green lines not wanted.

### Custard Apples.

*Brisbane.*—3s. to 5s. half-bushel case.

*Sydney.*—6s. to 8s. half-bushel case.

*Melbourne.*—6s. to 10s. half-bushel case; Specials, higher.

### Avocados.

*Brisbane.*—6s. to 8s. half-bushel case.

*Sydney.*—7s. to 10s. half-bushel case

*Melbourne.*—8s. to 10s. half-bushel case.

## CITRUS FRUITS.

### Oranges.

*Brisbane.*—Navels: Gayndah, 7s. to 10s. bushel case; Others, 6s. to 8s. bushel case; Commons, 4s. to 7s. bushel case.

### Mandarins.

*Brisbane.*—Glen Retreat, 6s. to 10s. bushel case; Scarlets, 5s. to 8s. bushel case; Emperors, 5s. to 8s. bushel case; Fewtrells, 3s. to 6s. bushel case.

*Sydney.*—Queensland Mandarins, 11s. to 14s. bushel case.

*Melbourne.*—Emperors, 6s. to 10s. bushel case; Glen Retreat, 10s. to 12s. bushel case; Glen Retreat Gayndah, 12s. to 16s. bushel case.

### Grapefruit.

*Brisbane.*—4s. to 6s. bushel case.

### Lemons.

*Brisbane.*—Locals, 3s. to 8s. bushel case; Gayndah, 6s. to 16s. bushel case.

## DECIDUOUS FRUITS.

### Apples.

*Brisbane.*—Jonathan, 6s. to 10s.; Stanthorpe Granny Smith, 7s. to 11s.; Duke of Clarence, 5s. to 7s.; Sturmer, 7s. to 8s.

### Pears.

*Brisbane.*—Josephine, 8s. to 11s.; Packham Triumph, 5s. to 9s.; Keiffer, 4s. to 5s.; Winter Cole, 9s. to 12s.

## OTHER FRUITS.

### Tomatoes.

*Brisbane.*—Coloured, 1s. 6d. to 4s. 6d.; Ripe, 1s. to 3s.; Green, 1s. to 3s.

*Sydney.*—Cleveland, 2s. to 4s. half-bushel case.

### Passion Fruit.

*Brisbane.*—First Grade, 5s. to 8s.; Second Grade, 3s. to 4s.

*Sydney.*—5s. to 8s. half-bushel case.

*Melbourne.*—8s. to 11s. half-bushel case.

## MISCELLANEOUS VEGETABLES, &c.

**Sweet Potatoes.**—2s. to 3s. bag.

**Carrots.**—3d. to 1s. bundle.

**Cucumbers.**—4s. to 7s. bushel case.

**Pumpkins.**—3s. to 5s. bag.

**Marrows.**—1s. to 3s. dozen.

**Lettuce.**—9d. to 2s. dozen.

**Cabbages.**—Small, 1s. to 2s. 6d. dozen; Prime, 3s. to 5s. dozen.

**Cauliflowers.**—Small, 4s. to 6s. dozen; Larger, 7s. to 16s. dozen.

**Beans.**—4s. to 6s. sugar bag.

**Peas.**—3s. to 8s. sugar bag.

**Beetroot.**—3d. to 6d. bundle.

**Chokos.**—3d. to 6d. dozen.

**Rosellas.**—3s. to 3s. 6d. sugar bag.

**South Australian Celery.**—16s. to 18s. per crate.

# 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, Jersey Cattle Society, Ayrshire Cattle Society, and Friesian Cattle Society production charts for which were compiled during the month of April, 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.). | | | | |
| Valera Sheila (365 days) | M. C. and Q. M. Sullivan, Pittsworth | 16,239·06 | 847·27 | Loyalist of Strathdhui |
| Model 2nd of Alfa Vale | W. H. Thompson, Alfa Vale, Nanango | 14,726·9 | 691·442 | Reward of Fairfield |
| Blacklands Ethel 3rd | J. H. Anderson, Southbrook | 11,310·46 | 453·606 | Fussy's Monarch of Hill View |
| Carleon Kitty | W. Henrichsen, Clifton | 9,919·25 | 414·120 | May 2nd Charles of Cedargrove |
| College Stately 4th | Queensland Agricultural High School and College, Lawes | 10,228·41 | 391·971 | College Robin |
| Happy Valley Annie 5th | R. R. Radel, Happy Valley, Coalstoun Lakes | 9,524·55 | 387·475 | Venture of Happy Valley |
| SENIOR, 4 YEARS (STANDARD, 330 LB.). | | | | |
| Pilton View Vera | P. D. Feichtner, Pilton View, Greenmount | 8,590·7 | 342·551 | Navillus Venus Shiek |
| JUNIOR, 4 YEARS (STANDARD, 310 LB.). | | | | |
| Corunna Laurel (191 days) | J. H. Anderson, Southbrook | 8,321·0 | 326·073 | Viscount of Corunna |
| SENIOR, 3 YEARS (STANDARD, 290 LB.). | | | | |
| Willow Farm Pidgeon 8th | A. H. E. Black, Kumbia | 8,676·5 | 320·486 | Willow Vale Hinkler |
| JUNIOR, 3 YEARS (STANDARD, 270 LB.). | | | | |
| Highfields Princess 4th | J. A. Heading, Highfields, Murgon | 10,451·1 | 409·556 | Headlands Hero |
| SENIOR, 2 YEARS (STANDARD, 250 LB.). | | | | |
| Trevor Hill Aster | Geo. Gwynne, Umbiram | 9,893·93 | 416·391 | North Glen Emblem |
| JUNIOR, 2 YEARS (STANDARD, 230 LB.). | | | | |
| Gem 10th of Alfa Vale | W. H. Thompson, Alfa Vale, Nanango | 10,853·45 | 440·026 | Reward of Fairfield |
| Happy Valley Glory | R. R. Radel, Happy Valley, Coalstoun Lakes | 9,257·95 | 338·632 | |
| Alfa Vale Blossom 4th | F. G. Lamkin, Kaimkillenbun | 7,565·31 | 315·26 | Reward of Fairfield |
| Sunlit Farm Ida | W. H. Sanderson, Mulgeldie | 7,249·2 | 287·241 | Homelea Morning Star |
| Ehlma Park Pearl | N. Bidstrup, Warra | 5,803·65 | 246·142 | Mount Blow Monash |
| Sunlit Farm Lovely | W. H. Sanderson, Mulgeldie | 6,967·8 | 233·303 | Homlea Morning Star |

| | | | |
|---|---|---|---|
| **JERSEY.** | | | |
| MATURE COW (STANDARD, 350 LB.). | | | |
| White Rose of Hamilton .. .. .. .. | J. Wilton, junr., Raceview .. .. .. | 8,705·72 | 505·504 | Retford May's Victor |
| Choice of Hamilton .. .. .. .. | J. Wilton, Raceview .. .. .. .. | 7,938·3 | 383·473 | Retford May's Victor |
| Glenview Lady Lynn .. .. .. .. | F. P. Fowler and Son, Coalstoun Lakes .. | 6,569·9 | 376·065 | Carlyle Larkspur 2nd's Empire |
| Hampstead Beryl 6th .. .. .. .. | J. H. C. Roberts, 230 Herries street, Toowoonba | 8,197·25 | 364·169 | Kelvinside Favourite's Raleigh |
| SENIOR, 4 YEARS (STANDARD, 330 LB.). | | | |
| Belgarth Buttercup 3rd .. .. .. .. | W. E. Lewty, Winera, Leyburn .. .. .. | 6,700·25 | 413·225 | Airlie Thorn |
| SENIOR, 3 YEARS (STANDARD, 290 LB.). | | | |
| Lermont Rosebud .. .. .. .. .. | J. Schull, Lermont, Oakey .. .. .. | 5,608·0 | 312·199 | Woodside Golden Volunteer |
| Morago Robins Rosette .. .. .. .. | J. M. Newman, Caboolture .. .. .. | 5,145·76 | 296·63 | Oxford Robin |
| JUNIOR, 3 YEARS (STANDARD, 270 LB.). | | | |
| Lermont Duchess .. .. .. .. .. | J. Schull, Lermont, Oakey .. .. .. | 8,092·3 | 443·215 | Woodside Golden Volunteer |
| Heatherbelle of Calton .. .. .. .. | Young Bros., Kingaroy .. .. .. .. | 6,613·05 | 383·735 | Retford Glory's King 2nd |
| Cabulcha Beatrice .. .. .. .. .. | J. M. Newman, Caboolture .. .. .. | 5,816·81 | 342·771 | Pymble Twilights Paragon |
| SENIOR, 2 YEARS (STANDARD, 250 LB.). | | | |
| Trinity Pioneer's Daisy .. .. .. .. | Farm Home for Boys, Westbrook .. .. | 6,122·25 | 346·325 | Trinity Dreaming Pioneer |
| Bellgarth Birthday 4th .. .. .. .. | D. R. Hutton, Bellgarth, Cunningham .. .. | 5,718·92 | 294·378 | Trecarne Renown 2nd |
| JUNIOR, 2 YEARS (STANDARD, 230 LB.). | | | |
| Bellgarth Blonde .. .. .. .. .. | D. R. Hutton, Bellgarth, Cunningham .. .. | 4,776·28 | 280·079 | Bellgarth Bellboy 2nd |
| Glenview Sweet Sultane .. .. .. .. | F. P. Fowler and Son, Coalstoun Lakes .. | 4,690·65 | 247·4 | Trinity Governor's Hope |
| Boree Tulip (250 days) .. .. .. .. | W. and C. E. Tudor, Branch Creek, Gayndah .. | 4,767·47 | 240·356 | Mountain Vale May's Squire |
| **AYRSHIRE.** | | | |
| SENIOR, 4 YEARS (STANDARD, 330 LB.). | | | |
| Myola Lady Jean .. .. .. .. .. | R. M. Anderson, Southbrook .. .. .. | 14,377·04 | 684·883 | Fairview Combination |
| **FRIESIAN.** | | | |
| JUNIOR, 2 YEARS (STANDARD, 230 LB.). | | | |
| Ryfield Eva (258 days) .. .. .. .. | P. P. Falt, Ryfield Stud, Wondai .. .. | 7,057·6 | 324·77 | Ryfield Argus 2nd |

# General Notes

**Staff Changes and Appointments.**

Miss M. Osborne has been appointed assistant cane tester at the South Johnstone Mill, in place of Miss M. E. L. Wassell, resigned.

Mr. A. Lewis, Maryvale, has been appointed an honorary protector under the Fauna Protection Act and an honorary ranger under the Native Plants Protection Act.

The Officers in Charge of Police at Calen and Carmila have been appointed also acting inspectors of stock.

Stallion Board appointments:—

*Darling Downs North.*—Messrs. J. C. J. Maunder, B.V.Sc., Government Veterinary Surgeon (Chairman), W. C. Jeffery (Miriam Vale), and G. Elliot (Laidley South).

*Darling Downs South.*—Messrs. A. F. S. Ohman, M.V.Sc., Government Veterinary Surgeon (Chairman), W. O. Scott and W. Frood (Toowoomba).

*West Moreton.*—Messrs. A. F. S. Ohman, M.V.Sc. (Chairman), T. MacDonald (Wooloowin), and D. Jackson (Teneriffe).

*Wide Bay.*—Messrs. R. D. Chester, B.V.Sc., Government Veterinary Surgeon (Chairman), T. Turkington (Upper Pilton), and J. H. Salmon (Rockhampton).

*Burnett.*—Messrs. R. D. Chester, B.V.Sc. (Chairman), T. Turkington, and J. H. Salmon.

*East Moreton.*—Messrs. J. C. J. Maunder, B.V.Sc. (Chairman), R. J. F. O'Bryen (Toowoomba), and D. Jackson (Teneriffe).

*Central Coast.*—Messrs. M. R. Irving, B.V.Sc., Government Veterinary Surgeon (Chairman), M. F. Yore (Logan Village), and E. S. Handley (Pampas).

*Northern Coast.*—Messrs. M. R. Irving, B.V.Sc. (Chairman), J. H. Wall (Rockhampton), and G. Elliot (Laidley South).

*Northern.*—Messrs. A. L. Clay, B.V.Sc. (Chairman), J. L. Bowman (South Brisbane), and W. Frood (Toowoomba).

Mr. C. Burchill, Police Magistrate, Innisfail, has been appointed chairman of the Goondi, Mourilyan, South Johnstone, and Tully Local Sugar Cane Prices Boards, and Mr. C. B. Buxton, Police Magistrate, Mackay, has been similarly appointed chairman of the Farleigh, Marian, Plane Creek, and Pleystowe Local Boards. Messrs. Burchill and Buxton have been given the additional appointment of agent of the Central Sugar Cane Prices Board.

Constable G. C. Cronk (Emerald) has been appointed also an inspector of brands.

Mr. H. J. Clifford (Cannonvale, Proserpine) and Messrs. C. F. T. Allender and R. Norris (Karumba) have been appointed honorary protectors under "*The Fauna Protection Act of* 1937," the lastmentioned in respect of the sanctuary recently established and which embraces the air base and pilot station at Karumba.

Messrs. W. Ferguson (Annerley) and W. L. Smith (Spring Creek) have been appointed honorary protectors under the Fauna Protection Act and honorary rangers under the Native Plants Protection Act.

Mr. G. K. L. Clark, inspector under the Stock, Slaughtering, and Dairy Produce Acts, has been transferred from the Murarrie Bacon Factory to the Oxley Bacon Factory.

Constable F. E. Towner (Tiaro) has been appointed also an inspector under the Slaughtering Act and the Brands Acts.

Mr. W. R. Johnstone, St. John's Wood, Ashgrove, has been appointed an honorary protector under the Fauna Protection Act.

Mr. L. E. Nichols has been appointed a dairy technologist, Department of Agriculture and Stock.

Messrs. F. W. Blackford, B.Sc.Agr., and J. E. C. Aberdeen, B.Sc.Agr., Assistants to Research Officers, Division of Plant Industry (Research), have been appointed Assistant Research Officers, Plant Pathological Section, Division of Plant Industry (Research), Department of Agriculture and Stock.

Mr. R. Walsh, appointed recently an inspector under the Diseases in Plants Acts, will be attached to Brisbane.

Messrs. H. Lambert (Acacia Bank), F. C. Jorss (Maryborough), and R. J. Rollston (Greenslopes) have been appointed assistant inspecting cane testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Bundaberg, respectively. Messrs. Lambert, Jorss, and Rollston have been given the additional appointment of cane tester at each of the sugar mills in their respective districts.

Mr. D. Ryan, Court House, Bundaberg, has been appointed an agent of the Central Sugar Cane Prices Board during the absence of Mr. C. D. O'Brien on special duty.

Mr. M. D. Davies (Commercial House, Queen street, Brisbane) has been appointed an honorary protector under the Fauna Protection Act.

Mr. W. W. Walker, of Dimbulah, has been appointed an honorary protector under the Fauna Protection Act.

Mr. B. Hickman, of Bororen, has been appointed an honorary protector under "*The Fauna Protection Act of* 1937" in respect of the sanctuary recently declared and which embraces properties in the parishes of O'Connell, Rodd's Bay, and Polmaily, Shire of Miriam Vale.

Constable A. E. Genrich, Talwood, has been appointed also an inspector under the Brand Acts.

The following cane testers have been appointed for the forthcoming sugar season:—

Messrs. L. J. G. Becker (Inkerman Mill), C. J. Boast (Qunaba), T. Breen (Marian), L. Chadwick (Tully), P. H. Compton (Maryborough), T. F. Corbett (Mulgrave), T. D. Cullen (Fairymead), L. G. F. Helbach (Pleystowe), T. Herbert (Invicta), J. Howard (Rocky Point), C. H. Humphreys (Mourilyan), H. C. Jorgensen (Babinda), A. G. Kelly (North Eton), J. Macfie (Moreton), S. McRostie (Proserpine), W. Richardson (Racecourse), G. Tait (Kalamia), R. D. Woolcock (Isis), and V. F. Worthington (Pioneer).

Misses D. Bowdler (Millaquin), E. Christsen (Cattle Creek), A. L. Levy (Plane Creek), M. A. Lyle (Bingera), M. A. Morris (Mossman), J. O'Flynn (Farleigh), I. Palmer (South Johnstone), and E. Rowe (Gin Gin).

The following have been appointed assistant cane testers for the forthcoming sugar season:—

Messrs. R. Anderson (Bingera), P. C. Boettcher (Proserpine), C. Boone (Kalamia), A. Byrne (Millaquin), L. C. J. Clifton (Kalamia), W. C. Cocking (Farleigh), D. M. Corbett (Tully), H. J. Heidke (Qunaba), J. D. Kinnon (Inkerman), J. Mackenzie (Pleystowe), B. McMaugh (Invicta), R. A. Mahony (Pioneer), C. M. Martin (Marian), V. B. Martin (Maryborough), J. H. Murtagh (Babinda), R. D. R. Rex (Bingera), W. P. Snowin (Racecourse), C. Steley (Plane Creek), R. A. Stephenson (Invicta), J. Y. Taylor (Moreton), P. A. Van Lith (Cattle Creek), D. Walton (South Johnstone), and S. Wilson (Isis).

Misses D. Aldridge (Isis), A. Anderson (Bingera), F. Atherton (Marian), K. Backhouse (Farleigh), E. A. Crees (Plane Creek), F. G. Eadie (Pioneer), F. Foubister (Racecourse), N. Hooper (Pleystowe), M. H. Makings (Moreton), K. M. O'Brien (Proserpine), W. A. Page (Fairymead), P. Southwick (Tully), P. Thorburn (Fairymead), M. E. L. Wassell (South Johnstone), and S. Wilkinson (Mourilyan). Mrs. M. E. Nally (North Eton).

**Wheat Payments.**

A distribution of a sum of £65,525 to 3,800 wheatgrowers in this State will be made by the Department of Agriculture and Stock according to a recent announcement by the Assistant Minister for Agriculture and Stock (Mr. D. A. Gledson). This payment, which represents a first advance of a grant to growers under "*The Wheat Industry Assistance Act*, 1938," is made on the basis of two pence (2d.) per bushel of wheat of the 1938-1939 crop harvested on or after the 1st October, 1938, and sold or delivered for sale.

The payment is made out of the fund created by collections of flour tax during the first year of operation of the legislation. The total payment per bushel which growers will eventually receive cannot be stated at this stage, as it is dependent on the amount collected under the flour tax, but to meet the convenience of growers, and in order that the money will be available to them to assist in meeting the cost of the forthcoming crop, an advance distribution is being facilitated.

**Flour Excise.**

The Acting Minister for Agriculture and Stock (Mr. D. A. Gledson), commenting on statements made by some members of the State Wheat Board, as reported in the metropolitan Press of the 13th May, said that in these statements board members sought reasons for the apparent difference between States in the rate and date of the first payment from the excise on flour.

For the enlightenment of wheatgrowers generally, Mr. Gledson pointed out that, according to the estimate of the Commonwealth Government, the flour tax collections up till the 30th June next would amount to approximately £1,890,000. From these collections special assistance amounting to £553,000 has been set aside for the relief of necessitous growers in the States of New South Wales, Victoria, South Australia, Western Australia, and for a special grant to Tasmania. Queensland did not participate in this particular allotment. The balance of the fund, amounting to approximately £1,337,000, was to be distributed amongst the six States of the Commonwealth on a wheat production basis. The Commonwealth Statistician estimated the total Commonwealth production for the season at 150,000,000 bushels, of which Queensland deliveries, to 30th April last, totalled 7,864,976 bushels.

In anticipation of the flour tax collections, advances were made to the States to enable an interim payment to be distributed. The maximum advance to which Queensland was entitled to the 30th June next permitted a payment of two pence (2d.) per bushel to growers. A sum of £65,525 was absorbed in this payment, and a balance of £1,475 is held to meet claims on late deliveries. When funds are made available by the Commonwealth Government a final distribution will be made to growers. If Queensland growers are treated impartially in the allocation of the grant, it is not clear how there can be any differentiation between the grant per bushel made to this State and that made to each of the other participating States under section 6 of the Wheat Industry Act.

Any criticism of the delay in the distribution of the bounty was obviously made without a knowledge of the facts, said the Assistant Minister. For purposes of an efficient and correct check, his Department took over the work involved in the distribution of the grant, and, in doing so, it was necessary to check 80,000 delivery notes covering consignments to the Board by 3,800 growers who participated in the grant. Payment has been made in this State on all deliveries to 30th April, 1939, and cheques for the amount payable were despatched last week to all wheatgrowers concerned.

Inquiries made to-day reveal that the first advance in the other mainland States of the Commonwealth is still in course of distribution, whereas that of Queensland has already been finalised. Surely, suggested the Assistant Minister, wheatgrowers should be appreciative of the efforts of the Department to expedite these payments, and he also emphasised the fact that this work was performed by his Department at no expense whatever to growers.

**Mulgrave Cane Disease Control Board.**

Executive Council approval has been given to the issue of an Order in Council under "*The Sugar Experiment Stations Acts*, 1900 *to* 1938," constituting the Mulgrave Cane Disease Control Board in and for the cane-disease infested area declared by the Minister by notification in the *Gazette* on the 25th February, 1939—namely, the lands comprising the Mulgrave mill area. The Board consists of two representatives of millowners—Messrs. M. A. Doolan and M. C. Graham, of Gordonvale—and three representatives of canegrowers—Messrs. C. H. Crossland (Cairns), W. C. Griffin (Gordonvale), and S. H. Warner (Cairns), who will hold office until 31st March, 1941. Thereafter, members shall be elected biennially for a period of two years.

**Pig Improvement Scheme.**

Referring to the importation of British-bred pigs by the Queensland Department of Agriculture and Stock, the Assistant Minister (Mr. D. A. Gledson) said recently that good progress had been made by the Department in the distribution of the progeny of the imported pigs in furtherance of the scheme of pig improvement.

The young Tamworth pigs have been eagerly sought after, and the Berkshires, of which several have been sent to North Queensland, have given much satisfaction.

A number of excellent quality Middle White pigs have also formed the foundation for new herds of this breed, some now being located in Central Queensland.

Mr. Gledson remarked that information as to the breeding and availability of these pigs could be obtained on application to the Department of Agriculture and Stock, Brisbane.

**Plywood and Veneer Boards.**

Orders in Council (two) have been issued under the Primary Producers' Organisation and Marketing Acts amending the definition of a grower in the case of the Plywood and Veneer Board and the Northern Plywood and Veneer Board. In the existing constitutions of these boards, the definition of growers—"persons who own plywood and veneer plant and have produced plywood and veneer for sale"—does not give effect to the original intention, as the veneer manufacturer, who does not make plywood, would appear to be excluded from control by the board which has jurisdiction over the area in which he operates. The amendment approved, therefore, provides that a grower shall be a person who owns plywood and/or veneer, and has produced either or both of these commodities for sale.

**Open Season for Duck and Quail.**

An Order in Council has been issued under "*The Fauna Protection Act of* 1937," declaring an open season for duck and quail in Central and North Queensland.

In Central Queensland the open season will extend from 1st July, 1939, to 30th November, 1939, both inclusive; and in North Queensland from 1st June, 1939, to 31st October, 1939, both inclusive.

The attention of shooters is directed to an Order in Council which prescribes that twenty (20) wild duck and twenty-five (25) quail are the maximum numbers, respectively, which any one person may take during a period of twenty-four hours.

**Wild Life Preservation.**

An Order in Council, issued under "*The Fauna Protection Act of* 1937," declares the property of Mr. E. G. Lawrence, "High Tor," Maleny, to be a sanctuary for the protection of fauna.

An Order in Council has been issued under "*The Fauna Protection Act of* 1917," declaring the camping and water reserve at Baffle Creek, near Lowmead, a sanctuary for the protection of fauna.

**Cane Disease Control Boards.**

An Order in Council has been issued under "*The Sugar Experiment Stations Acts,* 1900 *to* 1938," constituting the Bundaberg, Isis, Maryborough, Moreton, and Mackay Cane Disease Control Boards in respect of the Cane Disease Infested Areas declared by the Minister by notification in the *Government Gazette* of 4th and 25th February, 1939. The Boards consist of two representatives of millowners elected by the millowners of the areas and three representatives of canegrowers elected by the canegrowers of the areas concerned. Members of the Boards shall be elected biennially for a period of two years.

**Milk Supply Regulations.**

Regulations have been issued under "*The Milk Supply Act of* 1938," which prescribe, amongst other things, the procedure of business at meetings of the Brisbane Milk Board; the registration of producers and wholesale vendors of milk; the issue of licenses to pick up and convey milk and cream on milk and cream routes; and the returns to be lodged by producers, wholesale vendors, and milk carriers.

**Sale of Wheat.**

The Acting Minister for Agriculture and Stock (Mr. D. A. Gledson), in a recent Press statement, clarified the position so far as the sale of this season's wheat crop is concerned.

The Acting Minister pointed out that several conferences had been arranged between representatives of the Wheat Board and the millers, at which no satisfactory decision could be arrived at. It was eventually agreed between the parties that the price of wheat for the season 1938-1939 should be determined by arbitration, and that this price should operate for the period from the 5th December, 1938, to the 15th October, 1939, inclusive, and that the decision of the arbitrator should be final and binding on both the Wheat Board and the millers.

Mr. T. A. Ferry was appointed arbitrator by the Government, and the matter was heard in the Industrial Court Room, Brisbane, on the 27th April last. The arbitrator has now submitted his decision to the Assistant Minister, and this decision is to the effect that the price to be paid by Queensland millers to the State Wheat Board for milling wheat for the current season, 5th December, 1928, to 15th October, 1939, inclusive, shall be Darling Harbour price, as at present determined by arrangement between the millers and the board on rails at sending station, less 2½d. per bushel, plus premiums and less rebates and other conditions as at present applying.

In announcing this decision, Mr. Gledson expressed his satisfaction that finality had been reached in a matter which had presented many difficulties.

# Answers to Correspondents

## BOTANY.

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

### Transplanting Palms.

J.A. (Mackay)—

It is true that small plants, especially of the Bangalow or Pickabeen palm, are very difficult to transplant. It has been found much easier to transplant larger plants, say, 3 to 4 feet high. Even with these plants, the whole of the root system must not be bared. A good idea is to employ a cement cask sawn in halves cross-wise to transport the palm plants. A ball of earth about 1 foot from the base of the stem all round should be lifted with the plants. When transplanted in this way into a garden, palms in many cases take well in their new surroundings. Most palms which grow in the scrubs prefer a fairly good soil. If the soil in the garden to which the palms are to be transplanted is of a poor character, it could be enriched with some of the surface soil from the scrub or river forest.

### Convolvulus.

W.S. (Helidon)—

Your specimen has been identified as a native vine of the Convolvulus family. It is known botanically as *Ipomoea plebeia*. It is occasionally a weed in cultivation, and if it is growing in or near a cultivation area, it should be destroyed.

A certain amount of publicity has been given to a serious weed pest on the Darling Downs and other places, which is known as European Bindweed (*Convolvulus arvensis*). This plant is different from that sent in by you.

### Candle Nut.

L.L.R. (Bundaberg)—

The nuts come from the Candle Nut, *Aleurites moluccana*. This species is a native of the rain-forests of North Queensland, the Islands of the Pacific, and the East Indies. At times the nuts have been eaten without ill-effects. However, at other times violent purging has resulted. We cannot recommend them for human consumption on this account. In the Pacific Islands it is stated that the natives place the kernels on sticks and light them. On account of the oil the kernels contain, a light is provided in this way. The common name "Candle Nut" is derived from this circumstance.

### Brachiaria Miliiformis.

C. Bros. (Home Hill)—

These specimens represent *Brachiaria miliiformis*, a grass with a very wide distribution through southern Asia, the Malayan Archipelago, and Australia. It is very abundant in Queensland, but unlike most native species, favours ground that has been broken, such as old cultivation areas, railway embankments, &c. It is not a common constituent of the ordinary pasture, though fairly frequent in sandy forest lands. It is very palatable and nutritious, and unless protected, soon disappears under stocking. It is a frequent weed of cultivation, but not in any way aggressive. It is an excellent hay grass. It comes in with the early summer rains, and dies off on the approach of autumn or early winter.

This grass is not a species of Mitchell grass.

### Flannel Weed.

H.J.J. (Nikenbah)—

The weed is, as you suspected, the Flannel Weed. Its botanical name is *Sida cordifolia*. It is not known to be poisonous or harmful to stock. In tropical parts of Queensland, especially in the vacant lands about Townsville and Cairns, it is a serious weed. At times vacant allotments are covered by it to the exclusion of everything else.

**Common Wormwood.**

H.J.H. (Kumbia)—

The specimen you send belongs to an introduced plant, and is a species of *Artemisia*. It looks very much like *Artemisia Absinthium*. This plant is a native of Europe, where it is known as Common Wormwood. It yields a volatile oil consisting of absinthol and absinthin. This oil has tonic and febrifuging properties. The plant is chiefly used for the manufacture of the French liqueur absinthe.

**Tick Trefoil.**

E.A. (Cannon Pocket)—

The specimen is a native Tick Trefoil, *Desmodium triflorum*. This is a leguminous plant which is a fair fodder, although it grows too close to the ground to afford much feed for cattle. It is common throughout many coastal pastures. Probably you will find that in the spring and summer the Kikuyu grass will grow over it.

**Asthma Plant.**

M.M.B. (Mount Byron)—

The specimen is from the Asthma Plant, *Euphorbia pilulifera*, a decoction of which is used in the treatment of asthma. It is a very common plant in rockeries and on the edges of asphalt paths. It is not known to be poisonous to stock, although stock do not seem to eat it.

**Rattle Pod.**

G.W.K. (Bogantungan)—

The specimen is one of the Rattle Pods, *Crotalaria incana*. At different times species of Crotalaria have been suspected of poisoning stock, on account of their close relationship to the Rattle Pod *Crotalaria striata*, which was shown by experiments at Port Darwin to be poisonous to stock. Nothing definite, however, has been proved as to the harmful character of *Crotalaria incana*.

**Green Cape Gooseberry.**

C.F. (Jondaryan)—

The specimen is the Green Cape Gooseberry, *Physalis minima*. As you can see from the plant, it is closely allied to the edible Cape Gooseberry (*Physalis peruviana*). We have no records of the green Cape Gooseberry being poisonous to stock. We have received several reports to the effect that the ripe fruit when cooked have been eaten. It is noticable, however, that stock appear to avoid this plant, which suggests that it is at least unpalatable.

**Jack Bean.**

J.H.L. (Riverleigh, Gayndah Line)—

The specimen comes from a Native Jack Bean, *Canavalia obtusifolia*. This climbing plant is often very common in scrubs near beaches, in addition to being found in districts like yours. These beans are not considereed to be wholesome, but we have little information as to their effect on stock.

The genus Canavalia contains beans which are cultivated in the tropics, such as the Sword Bean and the Jack Bean. Some of these beans are wholesome, and others very closely allied to them are poisonous.

# Rural Topics

### More Wool.

What we want is more wool per sheep per acre without additional cost to the producer, so that, if he is forced to sell it cheaply, his greater output may help to make up for the loss in value. It is felt that this cannot be done by simply muddling along. Some positive plan of campaign is essential, and such a plan might take in the reclamation of at least a portion of the waste which we all know occurs at the wool scour.

In some countries, most of the grease in the fleece is saved and converted into lanoline, chemical preparations, lubricants and other commodities, but whether it would pay to instal the necessary plants to extricate these products on a commercial scale in Australia is, of course, a matter for our economists.

Much scientific work has already been done in relation to these by-products, and it is hoped that investigations now in progress may reveal new uses for wool grease. If so, its commercial value will be enhanced, and this will help to swell the return per sheep.

Another point is the saving that may be gained in the production of wool tops in Australia. There is really no sound reason why a much bigger percentage of our export wool should not be shipped in this semi-manufactured condition, instead of being sent abroad in the grease. Apart from the additional employment to Australian workers, it would greatly reduce transport costs, because more than half of every bale we ship to-day consists merely of dirt and grease.

Even without the top-making business, it should be possible to do most of the scouring here, and so save the by-products and cut transport costs substantially.

—From notes by "Mulga" in the *Sydney Morning Herald.*

### Wessex Saddleback Pigs.

Writing in regard to his experience in the handling of a large herd of Wessex Saddleback pigs, Mr. R. Turpin, of Kentville (Q.), advises that following his original and more recent importations of this type of pig, coupled with local experience in handling a herd of up to fifty breeding sows, he is quite convinced it pays to keep these pigs as pure breds in preference to using them for indiscriminate crossbreeding. He states he keeps none but purebred pigs as he has satisfied himself from the appraisal of export carcases from the Royal National Exhibition at Brisbane that he has developed a system of breeding and feeding which results in production of a very desirable export type. He adds that where crossbreeding is practised, instead of getting 100 per cent. type you never know which way the pigs develop.

His herd now consists of 50 or more sows and he expects soon to be marketing at least 1,000 pigs annually.

One of his sows, a progeny of Pensilva Star, farrowed recently a litter of eleven by the imported boar. These are well marked and the type sought.

—*E. J. Shelton.*

### A Record in Cabbage Planting.

This is how it is done on a farm in the south-east of England: Cabbages are planted with a machine which can plant 6,000 an hour. It is towed at a walking pace by a tractor while four men seated on it keep it supplied with plants.

### Best Time to Poison Green Timber.

The autumn is the best time to poison green timber with arsenic pentoxide or sodium arsenite. If the job is done when the sap flow in the tree is ceasing, suckering will be reduced to a minimum.

### Treatment of Cream.

Dairy farmers are again advised to give close attention to the cooling, aerating, and stirring of cream. The flush growth of grass in the wet season often causes a gassiness in cream, as well as a "feedy" flavour. Aeration and cooling will do much to offset the development of these defects.

### Risks of Imported Grain Varieties.

Now and again, farmers and others introduce seed of foreign grain varieties of which they have heard or which they have seen referred to in some newspaper either local or foreign, instead of obtaining advice or authentic information from the Department of Agriculture and Stock. As reported in the "Sydney Morning Herald" some little time ago, a well-known farmer in a neighbouring State introduced a hundred pounds (£100) worth of seed of a European wheat, which turned out to be very late-maturing, red-grained winter wheat, which never came into head until the normal Australian varieties were nearly ready to harvest, and which, of course, was a rank failure.

Later, a cable message from England was published in the Australian Press and which boosted a new English variety of wheat. This variety was said to be superior to any other variety in Great Britain, and highly resistant to rust.

Inquiries were made at the Cambridge Plant Breeding Institute and a reply was received to the effect that the original Press notice was wholly inaccurate.

A new English variety called Holdfast has been under observation. It proved to be about four weeks later in maturing than Yandilla King, and is definitely of no value to the Australian wheat grower.

Plant introduction is so intimately related to plant breeding that it should be kept in the hands of the practical plant breeder, who is the best able to speak of the most likely source of varieties similar in type to local varieties, and to utilise in cross breeding any characters of value in such introduced material.

### Careful Droving Pays.

The droving of stock has taken on a new significance nowadays. A slight bruise suffered by the animal when it is alive will disfigure the carcase on the hooks and will reduce the value of the carcase to a considerable extent.

Cattle intended for the exacting chilled beef trade have to be handled with the greatest care, and if the stockowner is not doing his own droving, only a drover in whom he has the greatest confidence should be considered for the job.

Rough handling means reduced profits, and the grazier who has taken the greatest pains to produce the best quality beast may have all his good work undone by a careless drover. A good drover will always get a good delivery at the yards.

In driving mixed lots of fat and store animals, the competent drover regulates the pace to suit the heavier beasts. The careless drover—in fact, there shouldn't be a careless drover, he has no business on a stock route—only succeeds in running the beef, or mutton, off the mob.

### Manuring by Water.

American farmers who discovered years ago that they could water their crops by gravity, now find that they can mix fertilizers in their irrigation water and let gravity give their crops a feed and a drink at the same time.

Long past the experimental stage is this method of crop manuring. One firm selling ammonia gas for irrigation water says that their sales have increased over ten times in the last four years; another, selling calcium nitrate, reports similar increases. All indications point towards an even greater increase.

It's not a new idea. A methodical Chinese gardener applies it by throwing a shovelful of chemical fertilizer at regular intervals into an irrigation ditch. It may be crude, but the method works surprisingly well.

Helped along by research workers, farmers in the western States of America (according to a report published in "The New Zealand Farmer") have originated devices which measure carefully and distribute an exact amount of commercial nitrogen into irrigation channels. One concern has recently bottled ammonia gas (80 per cent. nitrogen) in steel cylinders. The gas bubbles from the cylinder into the water.

With this method of manuring, hauling and spreading are eliminated. Fertilizer can be applied at any time during the growing season, which is not possible when broadcasting. This assures a supply of nitrogen when the crop needs it most.

Commercial nitrogen (such as calcium nitrate and ammonia sulphate) are being used in much the same way as the ammonia gas. Some farmers mix it in a tank and let the concentrated solution drip into the irrigation water; some scatter the material in irrigation furrows; others simply slash open a bag and hold it in the irrigation dish until all the material has been dissolved.

### Grassland Management—How It Is Done in New Zealand.

Some interesting information has been brought back by some southern farmers who returned recently from a tour of New Zealand. The graziers in the party agreed that, despite the difference of conditions in the Dominion, Australia could learn a lot from New Zealand, chiefly in respect of rotational grazing. This is fast becoming the accepted practice in New Zealand, especially in districts of intensive production where it is regarded as quite as important as pasture improvement.

On a property in the Palmerston North district, the party visited a farm of one hundred acres (100 acres), on which a thousand (1,000) breeding sheep are carried all the year round. During the flush of the season, the owner said, up to 2,500 ewes and lambs are carried; and, in addition, 182 tons of grass hay are taken from one seven-acre paddock.

The present owner told his visitors that when he took over the farm some years ago the carrying capacity was estimated at not more than three sheep to the acre. The adjoining property still carries only that number. The secret, he claimed, was in subdividing the area, as well as improving pastures, and then grazing strictly according to rotation.

The farm is divided into twelve paddocks, all sown heavily with rye grass and clovers. All the sheep on the place are put into one paddock at a time, but never for longer than one day. Thus every part of the pasture is eaten down completely, no corners are left ungrazed, and the paddock then has twelve days free from grazing in which to recover.

The New Zealanders impressed the party with the thoroughness with which they explored every possible way of improving their stock and pastures.

### Coastal Counter Lunches for Stock.

Officers of the New Zealand Department of Agriculture have observed recently that all along the northern portion of the eastern coast of the South Island stock are keen to keep to the beaches to browse on various kinds of seaweed which is washed ashore in, it is estimated, thousands of tons.

Both cattle and sheep appear to relish this free counter lunch, and observers state that the animals which feed on seaweed seem to have more vitality and "a certain liveliness" which is not seen in animals running on pastures further inland. The reason for this is not yet certain. Some farmers look upon the washed-up seaweed as good feed, but others more versed in scientific agriculture are of opinion that the seaweed eaten is not so much an actual feed as a tonic. A chemical investigation has been started so as to find out the nutritional or tonic properties of this "buckshee" ration.—*The New Zealand Farmer.*

### A Good Farming Recipe.

Mr. M. L. Mosher, of the Illinois College of Agriculture, gave this recipe for good farming at a local gathering of farmers:—

Good rotation and field management.
Suitable class and number of live stock.
High crop yields.
First-class farm animals.
Careful employment of labour.
Effective power and machinery.
Good buildings and fences (but not over-capitalised).
Close study of markets.
Mixed with—
Love of farm work and farm life.
Constant study of farm business.
Timeliness and regularity.
Kindness—cleanliness—and thoroughness that will do a good job.

### Salt for Pigs.

Salt is harmful to pigs only when fed in excess. In tests to determine whether salt has any toxic effect increasing amounts up to 2.5 oz. of salt a day were fed to pigs without any harmful result, and the animals gained normally in weight. This result was obtained under conditions in which the pigs had free access to water, for if pigs are fed increasing amounts of salt without water the result will be disastrous.

# Orchard Notes

## JULY.

### THE COASTAL DISTRICTS.

IN many centres the bulk of the citrus fruits, with the exception of the late-ripening varieties, will have been harvested, and cultural operations should be receiving attention.

Trees which show indications of impaired vigour will require a somewhat heavy pruning, both in respect to thinning and shortening the branches. Where the trees are vigorous and healthy a light pruning only will be necessary, except in the case of the Glen Retreat mandarin. The densely-growing habit of this variety leads to a profusion of weak shoots, which, if allowed to develop, will cause overbearing with resultant small and inferior fruit at an early age.

Where trees show signs of failing, investigations for the presence of collar rot should be made at or near ground level. The roots should be examined for disease, and in the North Coast districts for the presence of the citrus root bark channeller. A light application of paradichlorobenzene buried a few inches deep in circular drills around the tree and with the surface stamped firmly has been recommended for controlling this pest. The distance between the circular drills should be not more than 18 inches, and care should be taken to prevent the crystals of paradichlorobenzene from coming into contact with the roots. It may be necessary to repeat the application after an interval of three or four weeks.

Where it is necesary to control black spot, melanose, and scab, the fungicide should be applied at the correct time. The control measures recommended are—

**For Black Spot.**

Bordeaux of 3-2-40 strength or Bordeaux of 3-2-40 strength + 1 per cent. of oil emulsion—

(1) As soon as the fruit has set;

(2) About a month to six weeks later;

(3) If black spot has been serious previously, another application just prior to the February rains.

**For Melanose.**

The use of a similar fungicide—

(1) Immediately the fruit has set;

(2) A month to six weeks later, or more often if the weather conditions are exceptionally wet.

**For Scab.**

(1) Bordeaux mixture 6-4-40 or Bordeaux 6-4-40 + 1 per cent. oil emulsion immediately before the new growth commences; this will help to clean up fungus on the old scabs;

(2) Bordeaux 3-2-40 or Bordeaux 3-2-40 + 1 per cent. oil emulsion at about the middle of the flowering period; this and subsequent applications are for the protection of young foliage and fruit;

(3) Bordeaux as soon as the fruit has set;

(4) If the season is exceptionally wet, it is advisable to give one or two further applications in order to keep the young fruit and foliage well covered.

Where for any reason healthy trees of vigorous constitution are unprofitable, they may be headed back—in fact, have the whole of the top removed—leaving a few selected arms. All other branches should be cut away at their source of origin. The three or four remaining arms, of which lengths will vary from 2 to 4 feet, will form the future framework of the tree. Care must be taken to cover the whole of the exposed bark with a suitable coating of whitewash to prevent sunburn. The numerous shoots which will grow from main arms should be suitably reduced, leaving from two to four on each arm. Under favourable conditions, these will be in a fit condition to receive selected buds from desirable trees by the following autumn. It is desirable that when shoots intended for budding have attained a length of from 6 to 9 inches, their terminals should be nipped off in order to stiffen their growth and guard against the possibility of damage by strong winds.

Fertilizing should be completed as early as possible, the mixture for the spring application being high in readily available nitrogen. Ploughing should then be completed, the depth being regulated by local conditions and the nature of the original preparation of the land. Following the ploughing, the land should be worked down to a fine state of tilth. On hillside orchards, attention should be

given to the care of possible storm waters. Cultivation should be so arranged as to form shallow drains or banks along the tree rows and across the heaviest slope, leading into suitable side drains which may be grassed to prevent erosion.

The planting of trees may be continued and, with the exception of custard apples, expedited. The attention of citrus growers should be confined to varieties suited to their local conditions.

The pruning of grape vines should be completed, and where cuttings for planting are required these should be selected, trimmed, and heeled-in in slightly dry soil. Canes intended for cuttings should not be allowed to lie about and dry out, but should be treated the day they are severed from the plant. Cuttings are frequently made of excessive length. From 10 to 12 inches is a suitable length which allows for insertion in the soil so as to permit of the top bud, with a short section of the internode, protruding above the surface.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL pruning other than that applied to peaches and varieties which are late in coming into growth should be completed this month, and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. When there are indications of the swelling of the buds, the time is opportune for working over unprofitable trees, where the stock is reasonably vigorous. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

The pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation as they are subject to much variation.

The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted, deep working is most detrimental. The matter of seedling stocks for apples and the inferior plants frequently received from Southern nurseries prompts a query as to how many seeds have been stratified for spring planting, and whether any effort is being made towards raising a local supply of nursery stock.

## WINTER ACTIVITIES IN THE ORCHARD.

Clean up all orchards and vineyards, destroy all weeds and rubbish around the trees likely to harbour pests of any kind, and keep the surface of the soil well stirred, so as to give the birds and predaceous insects every chance to destroy any fruit-fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Pruning can be started on fruit trees which have shed their leaves, as it is a good plan to get this through as early in the season as possible instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—not vines. (The later vines are pruned in the season the better in the Stanthorpe district, as the late-pruned vines stand a better chance of escaping injury by late spring frosts.) All worthless, badly-diseased, or worn-out trees which are no longer profitable, and which are not worth working over, should be taken out and burnt, as they are both valueless and a harbour for pests.

Land intended for new orchards should be got ready at once. The preparation of the land should be thorough. All stumps and roots should be removed to a depth sufficient to ensure their not impeding cultivation. The preliminary cultivation should consist of a light ploughing of a depth sufficient to turn the weeds or grasses so that their roots are exposed, followed by cross-ploughing and harrowing, whereby light roots, &c., are collected and removed. When perennial weeds, of which couch grass is a fair sample, are eliminated, the land should be ploughed and cross-ploughed as deeply as possible, and the soil reduced to a fine tilth. Where subsoiling can be practised, it is a decided advantage in admitting root penetration and conservation of moisture.

# Farm Notes

## JULY.

WHEAT sowings can now be finalised in Darling Downs districts where seasonal conditions may have delayed operations owing to unsatisfactory soil moisture. Early-maturing varieties, such as Florence, Novo, and Seaspray are very suitable for late sowing, while the popular medium-early varieties Flora, Three Seas, and Pusa, may also be sown with every chance of success.

Stock should be removed from early-sown wheat subjected to grazing by the end of the month, if a satisfactory yield of grain is desired.

Canary seed, which has proved suitable for the black basaltic Downs soils, may be sown during July, drilling in approximately 15 lb. sound seed per acre. Although usually harvested for seed, the crop will make excellent hay or provide useful grazing.

Potato planting will be commencing on lands east of the Main Range where late frosts are not a deterrent. Cut sets may be used, dusting the cut surfaces with wood ashes or slaked lime shortly after cutting, but whole seed not less than 2 oz. in weight is to be preferred.

Seed-bourne disease can be prevented by treating with either hot formalin or with corrosive sublimate, as advised in a leaflet issued by this Department.

Old potato lands deficient in humus can be made more productive by ploughing in green manure crops, and the application of suitable fertilizers when planting.

Following the harvesting of late maize, old stalks should be ploughed in and allowed to rot. All headlands will be improved by clearing up weeds and rubbish, preferably with a good fire.

Mangolds, swede turnips, and similar root crops which are making satisfactory growth, should be thinned out to suitable distances apart in order to encourage full development, while the necessary inter-row cultivation should not be overlooked. The root system of autumn-sown lucerne should now be well established, and will be strengthened by an early mowing if fair top growth has been made.

Any infestation of weeds during the spring can be kept in check by frequent mowing without regard to the quantity of hay secured. When fully established, cuttings can be regulated to coincide with the commencement of flowering.

## QUEENSLAND SHOW DATES, 1939.

### June.

| | |
|---|---|
| Biloela | 1st and 2nd |
| Lowood | 2nd and 3rd |
| Childers | 5th and 6th |
| Boonah | 7th and 8th |
| Bundaberg | 8th to 10th |
| Wowan— | |
| Show | 8th and 9th |
| Rodeo | 10th |
| Gin Gin | 12th and 13th |
| Gladstone | 15th and 16th |
| Rockhampton | 20th to 24th |
| Toogoolawah | 23rd and 24th |
| Mackay | 26th to 29th |
| Kilcoy | 30th June and 1st July |
| Proserpine | 30th June and 1st July |

### July.

| | |
|---|---|
| Bowen | 5th and 6th |
| Ayr | 7th and 8th |
| Cleveland | 7th and 8th |
| Esk Show and Campdraft | 7th and 8th |
| Townsville | 10th to 13th |
| Nambour | 13th to 15th |
| Rosewood | 14th and 15th |
| Charters Towers | 18th to 20th |
| Laidley | 19th and 20th |
| Maleny | 20th and 21st |
| Innisfail | 20th to 22nd |
| Cairns | 25th to 27th |
| Gatton | 25th to 27th |
| Caboolture | 28th and 29th |
| Tully | 28th and 29th |

### August.

| | |
|---|---|
| Atherton | 1st and 2nd |
| Crow's Nest | 2nd and 3rd |
| Pine Rivers | 4th and 5th |
| Home Hill | 4th and 5th |
| Ingham | 4th and 5th |
| Royal National, Brisbane | 14th to 19th |
| Jericho | 25th and 26th |

### September.

| | |
|---|---|
| Imbil | 1st and 2nd |
| Canungra | 2nd |
| Pomona | 8th and 9th |
| Rocklea | 9th |
| Mount Tamborine | 9th |
| Beenleigh | 22nd and 23rd |
| Malanda | 27th and 28th |
| Southport | 30th |
| Ithaca | 30th |

### October.

| | |
|---|---|
| Nerang | 6th and 7th |


## 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 CHILD FROM TWO TO FIVE YEARS.

#### Periodic Examinations.

MANY mothers who are prepared to be advised by their Clinic nurse and to exercise great care in regard to feeding, handling, and general management and care in avoiding infections during the first year of baby's life, relax their efforts during the second and succeeding years. Although the first year is very important because the foundations of baby's future progress are being laid, it is important that every mother should attend the Clinic with her child until he has reached school age. While the earliest and most urgent work of our Baby Clinics and Child Welfare Centres is naturally concerned with the first year, a very important part of our work is that associated with the care and welfare of the pre-school child or toddler. There occur many cases of badly-fed and poorly nourished children whose mothers have not realised that toddlers require knowledge, care, and skill in their management and in the building up of strong, healthy bodies.

Every toddler should be brought to the Clinic for examination at least once, but preferably twice, a year, and should be taken to his dentist once every six months. By doing this and not waiting until something is wrong, the child comes to regard his doctor and his dentist as his friends and he is not afraid of them when something is required to be done. The Clinic nurse with whom both mother and child will have become familiar will be able to give advice regarding the planning of a balanced diet and to suggest methods of management whereby health

can be preserved. Behaviour which may be the prelude to the formation of bad habits, physical defects which may limit chest expansion, diminish the intake of fresh air and lead to faulty posture and poor resistance to disease, may be recognised at a time when correction is relatively simple.

### Co-operation.

If the parents, by intelligent handling and sympathetic understanding in the early years, have gained the confidence of their child, co-operation between him and those concerned with keeping him fit will be readily established and problems associated with his upbringing later will be more easily solved.

### Achieving Independence.

As the child develops, the more primitive activities of sucking and grasping become replaced by the more complex and co-ordinated movements associated with mastication, sitting, crawling, standing, walking, running, and talking, and later by other activities requiring greater skill. The exercise of these activities is important in enabling the child to adjust himself to his surroundings in his efforts to achieve greater independence. After the parents have provided a suitable playroom or playground and material, they should allow the child free scope for his activities. While they may be interested onlookers, they should not interfere with his play. At the same time they should be ready to respond when an appeal from the child indicates that he is in need of help or guidance.

### Toys.

Simple toys such as blocks of wood often provide more pleasure to children than the most elaborate mechanical ones. Generally speaking, the younger the child the larger should be the toy. Among other considerations the fact must not be overlooked that a child of two years and older puts into his mouth things which may be accidentally swallowed or find their way into his air passages. Toys with rough or sharp edges and balloons attached to pointed sticks, should be avoided. Provide toys which can be washed. Apart from their value in providing means of teaching the child cleanliness, washable toys are more hygienic than those which are not. Once having decided upon a suitable toy and handed it over, the parent should regard it as the child's property to be treated as he chooses. He should be allowed to learn by experience what treatment the toy requires. In any case, a broken toy may be just as precious to him as one which is whole. The child must value and be interested in his toy if it is to have the desired effect of amusing him.

At an earlier age when sight, hearing, and feeling played so important a part in the child's development, coloured toys or toys capable of making a noise or those from which he could derive pleasure from handling, were suitable.

### Playmates.

By the time he has reached the age of two years he is beginning to show an interest in other children and to join in games with them. He will harness up his playmate and play horses, he will throw a ball to another child. He likes toys to which he can impart motion such as wooden trains or engines, wheelbarrows or carts. He tries to hit a ball with a racket or bat. The small girl loves her doll which she dresses and undresses. Companionship with children of his own age is important in the development of the child.

### Gaining Confidence.

Soon after a child begins to walk, he shows an interest in going up and down stairs. How often a mother is alarmed to find her small child engaging in activities which to her seem most hazardous. In reality it is seldom that he comes to serious harm. It is in this way that he gains experience and confidence. If he has been allowed to develop without unnecessary thwarting of his activities, the child, by the time he is two years old, has learnt to do many things which require more or less skill. Encourage him in his attempts to undertake new tasks. Do not allow him to be discouraged by failure, but be ready to give him unobtrusively just that little extra assistance which he may require in order to reach his objective, allowing him to experience the joy of achievement when it is possible.

Reference to the value of the nursery school and kindergarten in the development of the child of pre-school age has been made in a previous article.

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

## IN THE FARM KITCHEN.

### SOUPS.

AT the end of a cold day there is nothing more cheery than a bowl of soup, tasty and piping hot. Here are a few hints and recipes:—The best base for soup is lean and uncooked meat in the proportion of a pound to a quart of water. Meat bones well broken up and added lend a very delicate flavour. A combination of meats, such as beef, mutton, veal, and ham-bones, will make a higher-flavoured soup than any one meat. It is well to remember that it is the meat and bones from the legs that are rich in gelatine, and these should be purchased in preference to all others for soup making. Soup should have merely the flavour of salt, and there should be in it the warm tone which the judicious use of pepper gives. Other flavourings are sage, thyme, mint, parsley, bay leaves, mace, cloves, celery seed, and onions.

#### Ten-minute Soup.

Take 2 oz. butter, 2 oz. flour, 2½ pints milk and water or milk and white stock, 3 or 4 tablespoonfuls tomato ketchup, seasoning.

Melt the butter, add the flour, and mix them until well blended. Stir in the milk and water or stock and stir until the soup boils and thickens. Let it boil gently for a few minutes, then add tomato ketchup and seasoning to taste. If liked, a few drops of cochineal may be added to improve the colour of the soup. If too thick, thin the soup down with a little more liquid. This makes an excellent emergency soup.

#### Vegetarian Tomato Soup.

Take 2 lb. tomatoes, 2 pints water, 1 oz. butter, a few celery seeds or a small piece of celery, 1 carrot, 2 onions, cornflour, salt and pepper, sugar, 1 clove garlic.

Prepare the carrot and onion and cut them in slices. Melt the butter and cook the vegetables in it for a few minutes without letting them brown, then draw the pan aside and add the tomatoes cut in slices, the water, garlic, and celery. If using celery seeds tie them in muslin. Cook the vegetables until tender, then remove the garlic and celery seeds, and rub the soup through a sieve. Return it to the pan, season with salt and pepper, and a little sugar if liked, and thicken it with a spoonful of cornflour mixed to a smooth paste with cold water. Boil the soup for a few minutes and serve it with croutons.

**Mulligatawny Soup.**

Take 1½ lb. scrag of mutton, 3 pints cold water, about 1½ oz. dripping, 2 carrots, 2 onions, 2 small apples, a few mixed herbs, a small piece lemon, 3 dessertspoonfuls flour, 2 teaspoonfuls curry powder, 2 or 3 dessertspoonfuls rice, seasoning.

Scrape, wash, and slice the carrots. Peel and slice the onions. Peel and quarter the apples and remove the core. Melt the dripping in a saucepan, add the carrot, onion, and apple, and fry until lightly browned. Stir in the flour and curry powder and fry again for a few minutes, then draw aside. Cut the mutton into small joints and add to the vegetables, with the water, herbs—tied in muslin—and seasoning to taste. Bring all slowly to the boil, remove the scum, and simmer for about two and a-half hours. Take out the meat and herbs and rub the soup through a sieve. Skim off any fat from the top, then reheat the soup. Squeeze in a little lemon juice and serve. Have ready the boiled rice and serve separately. If necessary, add a few drops of browning to the soup just before serving.

To prepare the rice, wash it well. Put it into a saucepan of boiling water, with a little salt added, and boil until tender—it will take about fifteen minutes. When cooked, strain it through a colander, pour cold water through it to separate the grains, then place on a dish in a warm oven to dry, and reheat.

**Hasty Soup.**

Take 1 small vegetable marrow, a dust of nutmeg, a pint of milk, 1 quart water, 1 oz. butter, salt and pepper to taste, 1 tablespoonful flour.

Peel and cut up the marrow, put it in a pan with the butter, water, nutmeg, and one teaspoonful of salt, and some pepper. Cover the pan and simmer for about an hour. Then rub the marrow through a sieve. Return to the pan, add the milk and the flour, smoothly mixed, and boil up. A little cream is a great improvement.

**American Soup.**

Take 1 lb. neck mutton, ¾ lb. peas (fresh, dried, or split), ¾ lb. tomatoes (fresh or tinned), 1 onion, 1 carrot, 1 turnip, saltspoonful of sugar, a little celery, pepper, salt, 2½ quarts water.

Soak the peas and put them in a pan with the mutton and water. Boil up, then add onion, carrot, turnip, and celery, cut into small pieces, and the sugar. Boil slowly for two hours, then add the tomatoes, also cut up small, and boil for half an hour longer. Take out the meat and put the soup through a fine sieve. Return it to the saucepan, add the pepper and salt, and serve with small squares of fried or toasted bread.

**Cream of Carrot Soup.**

Take 2 cupfuls cooked carrots, 2 tablespoonfuls butter, ½ cupful fine breadcrumbs, 1 cupful evaporated milk, 1 quart stock, 1 medium onion, pepper, 1 teaspoonful salt, sugar to taste.

Cook the onion in butter for five minutes, without letting it brown. Add crumbs, stock, salt, pepper, and sugar, and simmer for twenty minutes. Then stir in the carrots and evaporated milk. Reheat and serve at once.

## PUDDINGS, PANCAKES, AND FRITTERS.

A batter, as the word implies, has to be well beaten, since the beating introduces air, which expands when heated, and so makes the mixture rise. All batters should be allowed to stand for at least one hour before they are cooked. The egg is a very important ingredient in a batter pudding. Do not economise too much in the quantity of eggs. It is better to use half milk and half water than too little egg. If it is necessary to use less egg, then make the batter slightly thicker. There is no need to whisk the egg before adding it to the flour, as it gets well beaten afterwards. The mixing of a batter is also important. An even consistency—similar to that of a thick sauce—should be maintained during the whole process of mixing.

**Batter Pudding (Baked).**

Take 1 egg, ¼ lb. flour, pinch of salt, ½ pint milk, dripping.

Sieve the flour and salt, put them into a basin, and make a well in the centre. Break the egg into a cup, pour it into the well, and mix with a small quantity of flour until a smooth paste is formed. Then take half the milk, and add it gradually, mixing in the flour by degrees. When it is all mixed and free from lumps, before adding the other half of the milk, beat the batter for a few minutes. Then stir in the remainder of the milk and leave the batter to stand for about an hour or longer. Melt about 1 oz. of dripping in a small baking tin or pie dish, and, when hot, pour in the batter. Put into a fairly hot oven to bake. It will take about forty-five minutes. Serve at once.

**Batter Pudding (Steamed).**

Take 4 oz. flour, ½ pint milk, 1 oz. castor sugar, 2 eggs, pinch salt.

Sieve the flour and salt into a basin, make a hole in the centre, break in the eggs and beat till smooth, adding the sugar, then the milk, by degrees. Beat well while doing so, and let the mixture stand for half an hour. It must be perfectly smooth and free from lumps. Put mixture into a greased mould, cover with a well-scalded and floured cloth. Steam for one and a-half hours. Turn out and serve with golden syrup.

**Batter Cakes.**

Take ½ lb. flour, pinch of salt, 1 teaspoonful of cream of tartar, ½ level dessertspoonful of carbonate of soda, 2 dessertspoonfuls castor sugar, 1¾ gills of milk, 2 eggs, lard, jam.

Sieve together the flour, salt, soda, and cream of tartar, and add the sugar. Whisk up the eggs, pour them into the centre, and mix to a smooth, thick batter, adding the milk gradually. Beat well for a few minutes, then let stand for one hour or longer. Melt some lard in a frying pan and, when hot, put the batter into it, allowing a small tablespoonful for each cake. About four of these can be fried at a time. Fry until a golden brown, keeping them well basted with fat, and then turn over. When both sides are brown, lift out and drain on paper. Spread with hot jam, sandwich two together, and dredge with castor sugar. Serve immediately for afternoon tea.

**Nut Fruit Batter.**

Take 4 oz. of seedless raisins, 1 oz. almonds, 2 eggs, ½ lb. flour, 1 pint milk, pinch of salt.

Sieve the flour and salt into a basin. Make a well in the centre and pour in the eggs. Mix these with some of the flour, then take half the milk and add gradually. Mix to a smooth batter. Beat well, then stir in the remainder of the milk and leave the batter to stand as long as possible before cooking. When ready to bake, stir in the raisins and the blanched and cut up almonds. Turn into a greased fireproof dish and bake for about one hour. Serve with castor sugar.

**Batter Souffle Pancakes.**

Take ¼ lb. of flour, 1½ gills milk, 1 egg, 1 extra egg-white, castor sugar, pinch of salt, lard, cream, raspberry jam.

Sift the flour and salt into a basin. Separate the egg and pour the yolk into the centre of the flour, then take 1 gill of milk and add this gradually until all is mixed to a smooth batter. Beat it well, then stir in the remainder of the milk and let the batter stand before using. When ready to fry the pancakes, whisk the two egg-whites to a stiff froth and fold them lightly into the batter. Melt a good-sized piece of lard in a frying pan, and when a faint blue smoke rises from it pour in sufficient batter to coat the bottom of the pan (owing to the texture of the mixture, these will be somewhat thicker than the ordinary pancake). Fry each pancake gently, till golden brown, turn on to the other side and brown it, using a knife with a rounded blade. Turn each pancake out when cooked and spread it with filling, then fold it lightly in half, dredge with castor sugar, and serve as quickly as possible.

To prepare the filling, whisk the cream until it hangs from the whisk, then stir in an equal amount of raspberry jam.

**Banana Fritters.**

Take 3 or 4 bananas, juice of ½ lemon, castor sugar, deep frying fat.

For the frying batter: Take 2 oz. flour, ½ gill of water, ½ tablespoonful salad oil, 1 egg-white.

Cut the bananas in half, lengthways, and sprinkle them with lemon juice. Make a smooth batter with the flour, oil, and water, and let it stand for an hour, if possible. Add the stiffly-beaten egg-white just before frying. Coat each slice of banana by dipping it in the batter. Put it carefully into smoking hot fat and fry a golden brown, turning it over when brown on one side. After frying the fritters for about three minutes, drain them on paper. Sprinkle with castor sugar and serve very hot.

For apple fritters, core and peel the apples and cut them in rings.

For orange fritters, remove all the white pith and separate the orange into sections.

# RAINFALL IN THE AGRICULTURAL DISTRICTS.

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

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | April. | No. of years' records. | April, 1939. | April, 1938. | | April. | No. of years' records. | April, 1939. | April, 1938. |
| *North Coast.* | In. | | In. | In. | *South Coast—contd.* | In. | | In. | In. |
| Atherton .. .. | 4·15 | 38 | 3·87 | 0·79 | Gatton College .. | 1·89 | 40 | .. | 1·41 |
| Cairns .. .. | 11·10 | 57 | 10·09 | 1·12 | Gayndah .. .. | 1·47 | 68 | 3·38 | 2·92 |
| Cardwell .. .. | 8·62 | 67 | 7·70 | 0·12 | Gympie .. .. | 3·42 | 69 | 4·35 | 1·01 |
| Cooktown .. | 8·65 | 63 | 15·67 | 1·38 | Kilkivan .. .. | 2·24 | 60 | 3·21 | 0·77 |
| Herberton .. | 3·71 | 53 | 2·78 | 0·47 | Maryborough .. | 3·85 | 68 | 3·16 | 3·00 |
| Ingham .. .. | 7·33 | 47 | 15·40 | 0·43 | Nambour .. .. | 6·09 | 43 | 8·27 | 1·02 |
| Innisfail .. .. | 19·65 | 58 | 22·98 | 2·41 | Nanango .. .. | 1·93 | 57 | 3·60 | 0·73 |
| Mossman Mill .. | 7·82 | 26 | 13·69 | 0·62 | Rockhampton .. | 2·55 | 68 | 1·77 | 3·37 |
| Townsville .. | 3·28 | 68 | 1·75 | 0·09 | Woodford .. | 4·59 | 52 | 5·29 | 1·45 |
| *Central Coast.* | | | | | *Central Highlands.* | | | | |
| Ayr .. .. | 2·41 | 52 | 0·24 | .. | Clermont .. | 1·56 | 68 | 2·94 | 0·34 |
| Bowen .. .. | 2·64 | 68 | 1·54 | 0·76 | Gindie .. .. | 1·13 | 40 | .. | 0·62 |
| Charters Towers .. | 1·46 | 57 | 2·36 | 0·13 | Springsure .. | 1·51 | 70 | 2·26 | 0·46 |
| Mackay P.O. .. | 6·02 | 68 | 9·81 | 0·40 | *Darling Downs.* | | | | |
| Mackay Sugar Experiment Station | 4·52 | 42 | 9·37 | 0·05 | Dalby .. .. | 1·39 | 69 | 3·03 | 0·60 |
| Proserpine .. | 5·51 | 36 | 11·26 | 0·04 | Emu Vale .. | 1·38 | 43 | 1·86 | 0·81 |
| St. Lawrence .. | 2·73 | 68 | 2·45 | 0·62 | Hermitage .. | 1·36 | 33 | .. | 0·12 |
| *South Coast.* | | | | | Jimbour .. .. | 1·37 | 51 | 3·16 | 1·05 |
| Biggenden .. | 2·15 | 40 | 3·31 | 2·15 | Miles .. .. | 1·46 | 54 | 2·47 | 2·05 |
| Bundaberg .. | 3·26 | 56 | 3·27 | 3·06 | Stanthorpe .. | 1·75 | 66 | 2·87 | 0·24 |
| Brisbane .. .. | 3·75 | 87 | 4·47 | 1·01 | Toowoomba .. | 2·60 | 67 | 3·50 | 1·41 |
| Caboolture .. | 4·45 | 52 | 5·91 | 1·60 | Warwick .. .. | 1·64 | 74 | 3·00 | 1·10 |
| Childers .. .. | 2·85 | 44 | 3·99 | 4·10 | *Maranoa.* | | | | |
| Crohamhurst .. | 6·59 | 46 | 9·20 | 0·98 | Bungeworgorai .. | 1·09 | 25 | .. | 0·50 |
| Esk .. .. | 2·97 | 52 | 3·59 | 1·19 | Roma .. .. | 1·27 | 65 | 2·16 | .. |

A. S. RICHARDS, Divisional Meteorologist.

# CLIMATOLOGICAL TABLE—APRIL, 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 .. .. | 29·87 | 85 | 71 | 95 | 3 | 65 | 29 | 1,567 | 21 |
| Herberton .. .. | .. | 74 | 63 | 81 | 3, 18 | 49 | 20 | 278 | 22 |
| Rockhampton .. .. | 30·02 | 82 | 65 | 87 | 6 | 55 | 27 | 177 | 14 |
| Brisbane .. .. | 30·11 | 76 | 62 | 81 | 30 | 55 | 27 | 447 | 18 |
| *Darling Downs.* | | | | | | | | | |
| Dalby .. .. .. | 30·11 | 76 | 55 | 86 | 1 | 39 | 27 | 303 | 7 |
| Stanthorpe .. .. | .. | 69 | 50 | 75 | 2, 15 | 33 | 26, 27, 28 | 287 | 14 |
| Toowoomba .. .. | .. | 70 | 55 | 76 | 3 | 40 | 27 | 350 | 19 |
| *Mid-Interior.* | | | | | | | | | |
| Georgetown .. .. | 29·90 | 89 | 67 | 95 | 7, 14 | 58 | 20 | 348 | 3 |
| Longreach .. .. | 29·99 | 85 | 62 | 95 | 2 | 48 | 28 | 197 | 9 |
| Mitchell .. .. | 30·08 | 77 | 56 | 87 | 2, 4 | 38 | 28 | 226 | 6 |
| *Western.* | | | | | | | | | |
| Burketown .. .. | 29·91 | 90 | 70 | 95 | 3 | 57 | 20, 21 | 51 | 3 |
| Boulia .. .. .. | 30·00 | 89 | 64 | 97 | 5, 6, 7, 8 | 50 | 20, 30 | 58 | 3 |
| Thargomindah .. | 30·04 | 80 | 60 | 91 | 7, 9 | 46 | 27 | 316 | 5 |

# ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

## TIMES OF SUNRISE, SUNSET, AND MOONRISE.

### AT WARWICK.

| | June. 1939. | | July, 1939. | | June. 1939. | July, 1939. |
|---|---|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. | Rises. | Rises. |
| | | | | | p.m. | p.m. |
| 1 | 6·36 | 5 3 | 6·46 | 5·6 | 4·28 | 4·53 |
| 2 | 6·36 | 5·3 | 6·46 | 5·7 | 5·16 | 5·48 |
| 3 | 6·37 | 5 3 | 6·46 | 5·7 | 6·8 | 6·39 |
| 4 | 6·37 | 5·3 | 6·46 | 5·8 | 7·0 | 7·32 |
| 5 | 6·38 | 5·3 | 6·45 | 5·8 | 7·55 | 8·21 |
| 6 | 6·38 | 5·3 | 6·45 | 5·9 | 8·48 | 9·14 |
| 7 | 6·39 | 5·3 | 6·45 | 5·9 | 9 39 | 10·4 |
| 8 | 6·39 | 5·3 | 6·45 | 5·9 | 10·32 | 10·56 |
| 9 | 6·40 | 5·2 | 6·44 | 5·10 | 11·20 | 11·47 |
| 10 | 6·40 | 5·2 | 6·44 | 5·10 | a.m. | .. |
| | | | | | | a.m. |
| 11 | 6·40 | 5 2 | 6·44 | 5·11 | 12·15 | 12·42 |
| 12 | 6·41 | 5·2 | 6·43 | 5·11 | 1 6 | 1·36 |
| 13 | 6·41 | 5·2 | 6·43 | 5·12 | 1·57 | 2·36 |
| 14 | 6 41 | 5·2 | 6·43 | 5·12 | 2·46 | 3·34 |
| 15 | 6·42 | 5·2 | 6·42 | 5·13 | 3·52 | 4·37 |
| 16 | 6·42 | 5 2 | 6·42 | 5·13 | 4·53 | 5·34 |
| 17 | 6·42 | 5·3 | 6·42 | 5·13 | 5·51 | 6·29 |
| 18 | 6·42 | 5·3 | 6·41 | 5·14 | 6 52 | 7·20 |
| 19 | 6·43 | 5·3 | 6·41 | 5·14 | 7 52 | 8·7 |
| 20 | 6·43 | 5·3 | 6·41 | 5·15 | 8·42 | 8·52 |
| 21 | 6·43 | 5·3 | 6·40 | 5·15 | 9 ·31 | 9·35 |
| 22 | 6·43 | 5·3 | 6·40 | 5·16 | 10·14 | 10·16 |
| 23 | 6·44 | 5·4 | 6·40 | 5·16 | 10·55 | 10·57 |
| 24 | 6·44 | 5·4 | 6·39 | 5·16 | 11·36 | 11·40 |
| | | | | | p.m. | p.m. |
| 25 | 6·44 | 5·4 | 6·39 | 5·17 | 12·16 | 12·24 |
| 26 | 6·44 | 5·5 | 6·38 | 5·17 | 12·57 | 1·11 |
| 27 | 6 44 | 5·5 | 6·38 | 5·18 | 1·39 | 2·0 |
| 28 | 6·45 | 5·5 | 6·37 | 5·18 | 2·24 | 2·52 |
| 29 | 6·45 | 5·6 | 6·37 | 5·19 | 3·12 | 3·41 |
| 30 | 6·45 | 5·6 | 6·36 | 5·19 | 4·3 | 4·34 |
| 31 | | | 6·36 | 5.20 | | 5·26 |

## Phases of the Moon, Occultations, &c.

| | | | | |
|---|---|---|---|---|
| 2nd | June | ○ Full Moon | 1 11 | p.m. |
| 10th | „ | ☾ Last Quarter | 2 7 | p.m. |
| 17th | „ | ● New Moon | 11 37 | p.m. |
| 24th | „ | ☽ First Quarter | 2 35 | p.m. |

Apogee, 8th June, at 9.0 a.m.
Perigee, 20th June, at 6.0 a.m.

On the 16th there will be a near approach of Venus and the Moon at 7 a.m. In New Zealand this will be an occultation, a rare occurrence. No other planet in this year will be passed over by the Moon.

Mercury rises at 6 a.m., 36 minutes before the Sun, and sets at 4.33 p.m., 30 minutes before the Sun, on the 1st; on the 15th it rises at 7.26 a.m., 44 minutes after the Sun, and sets at 5.38 p.m., 36 minutes after it.

Venus rises at 4.36 a.m., 2 hours before the Sun, and sets at 3.33 p.m., 1 hour 30 minutes before it, on the 1st; on the 15th it rises at 4.58 a.m., 1 hour 44 minutes before the Sun, and sets at 3.38 p.m., 1 hour 24 minutes before it.

Mars rises at 8.49 p.m. on the 1st, and sets at 10.24 a.m. on the 2nd; on the 15th it rises at 8.5 p.m., and sets at 9.41 a.m. on the 16th.

Jupiter rises at 1.31 a.m. and sets at 1.34 p.m. on the 1st; on the 15th it rises at 12.45 a.m. and sets at 12.45 p.m.

Saturn rises at 3.19 a.m. and sets at 2.44 p.m. on the 1st; on the 15th it rises at 2.30 a.m. and sets at 1.52 p.m.

At our Winter Solstice, on the 22nd, the Sun will reach its furthest declination north, and for a short space will seem to halt in its course before we begin to notice its southward movement along the horizon. This seems to our eyes the simple truth, though we know that it is our planet Earth which has reached a turning point in its orbit; also that it is the fact of its yearly revolution around the Sun and, wonderful provision, of a tilt in its axis of rotation which accounts for all the phenomena of Nature from Solstice to Solstice.

In the Northern Hemisphere the Earth is in Perihelion, nearest the Sun, in its Winter. Here it is in Aphelion, furthest from the Sun, on the 5th of next month.

Mercury, in Cancer, has travelled through nearly four constellations since the middle of May. It will be an evening star and attain its greatest distance east of the Sun on the 13th of July.

| | | | | |
|---|---|---|---|---|
| 1st | July | ○ Full Moon | 4 16 | p.m. |
| 9th | „ | ☾ Last Quarter | 7 49 | p.m. |
| 17th | „ | ● New Moon | 7 3 | a.m. |
| 23rd | „ | ☽ First Quarter | 9 34 | p.m. |

Perigee, 18th July, at 9.0 a.m.
Apogee, 5th July, at midnight.

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.

# In Memorium.

## ROBERT WILLIAM WINKS

Mr. R. W. Winks, whose death in his 80th year has been announced, was one of the best known personalities associated with the foundation and progress of the dairy industry in Queensland. Of fine pioneering stock, among whom were some of the first settlers in the Fassifern and West Moreton Districts, he spent most of a long and useful life in rural industry, either as a producer or on its administrative side.

The late Mr. Winks joined the Department of Agriculture and Stock in 1893. He was first associated with the travelling dairy, an institution which did much to establish the industry in this State. Later he became a dairy instructor, and was some time in control of the dairying activities of the Department. On the passing of "*The Dairy Produce Act of* 1904" he assumed charge of the work of grading dairy products for export. When compulsory grading of butter—an innovation in Australia—was instituted he encountered considerable opposition, a circumstance which enabled him still further to demonstrate his marked ability, which was characterised by tact, firmness, competency, and the faculty of obtaining the whole-hearted co-operation of all associated with him. Subsequently, the Queensland grading system was adopted by the Commonwealth Government. He was senior grading inspector when he reached the retiring age twelve years ago. The valued service of Mr. Winks to the industry is now part of the history of the development of dairying in Queensland.

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## WILLIAM CHARLES THURLOW

Death claimed another old and valued officer of the Department of Agriculture and Stock when Mr. W. C. Thurlow passed on in his 79th year, just twelve years after his retirement from the Public Service in 1927. His first appointment was that of inspector of livestock and meat exports in 1899. He was afterwards appointed an inspector under the Slaughtering Act, and in the course of his duties became widely known and respected in all branches of the meat industry. He had a deep knowledge of livestock, was a recognised canine authority, and a noted breeder of pedigreed dogs. He also was an importer and breeder of milch goats, mainly of the Saanen breed.

In the course of a long and useful career, the late Mr. Thurlow rendered good service to the State, as well as to the department of which he was so capable an officer.