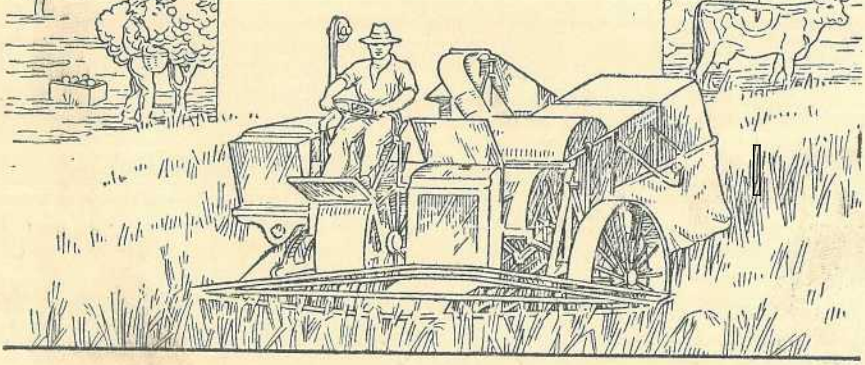
Supplement to the "Queensland Agricultural Journal," September, 1938.

Volume XLIX.

QUEENSLAND AGRICULTURAL JOURNAL

ISSUED BY DIRECTION OF
THE HONOURABLE
THE SECRETARY
FOR AGRICULTURE

EDITED BY
J. F. F. REID



JANUARY to JUNE, 1938

Vol. XLIX. Parts 1 to 6.

Queensland Agricultural Journal

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DAVID WHYTE, Government Printer, Brisbane.

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

Vol. XLIX. 1 JANUARY, 1938. Part 1

Event and Comment

The King's Message to his People.

BROADCASTING a seasonal message on Christmas Day, His Majesty the King expressed gratitude to the people of the Empire for their love and loyalty in "this unforgettable year."

The King's message was:—

"Many will remember the Christmas broadcasts of former years, when my father spoke to his peoples at home and overseas. As the revered head of a great family, his words brought happiness into the homes and hearts of listeners all over the world. I cannot aspire to take his place, nor do I think you would wish me to carry on unvaried the tradition which was so personal to him.

"But as this is the first Christmas since our coronation, the Queen and I feel that we want to send you all a further word of gratitude for the love and loyalty you gave us from every quarter of the Empire during this unforgettable year now drawing to an end.

"We have promised to try to be worthy of your trust. This is a pledge we shall always keep.

"As we look back over the year now closing, we see over parts of the world the shadows of enmity and fear, but let us turn to the message that Christmas brings, of peace and goodwill. Let us see that this spirit shall in the end prevail. Every one of us can help by making that immortal message the keystone of our daily lives. And so to all of

you, whether at home among families as we are, or in hospital, or at posts carrying on the duties that cannot be left undone, we send our Christmas greetings, and wish you, under God's blessing, health, and prosperity in the years that lie ahead."

The Dignity of Agriculture.

"AS life becomes more and more complex, parents are finding an increasing difficulty in determining a career for their sons. Probably subconsciously the question associated with the choice is—What avenue offers security, dignity, and a competence?" That question formed the text of a recent review of the conditions of primary industry in Queensland by the Minister for Agriculture and Stock, Hon. Frank W. Bulcock.

Continuing, Mr. Bulcock said:—

"Carefully one reviews the professions, the trades and the callings and the dubiety of choosing a policy of chance, which in 99 cases out of 100 leads to unskilled, untrained callings.

"Few people rise to eminence in the professions, while failures are not unknown. The trades offer security under certain favourable conditions, but the tragedy of the unskilled is a bitter blot on organised society.

"No training, however, makes the individual secure, for permanent security is not to be found in the established callings.

"History teaches us that the nations that are most secure, most prosperous, and soundest are those that have continued to keep their feet in the soil, so that in spite of advances in modern science it is clear that the persons engaged in growing the foodstuffs and the clothing of a people are likely to be the most secure section of the community.

"So, security suggests that the youngster should tread the road of rural industry in one or other of its several branches. Here in Queensland the line is fairly evenly divided between the main branches of rural enterprise—animal husbandry and agriculture. In the former division much more capital is needed to launch an undertaking than in the case of the crop farmer, but be the undertaking great or small, the individual engaging in it has the satisfaction of knowing that he is a nation builder.

"One often wonders why the agriculturist is regarded as a class apart. Why, for instance, the group that produces our wealth and carries all other sections of the financial community is not rightly appraised? The answer is simple. The other sections of the community do not understand. But happily there is a world-wide consciousness dawning which will speedily place the agriculturist in his correct alignment.

"The fundamental point for consideration is that agriculture is a secure calling, but an agricultural education is essential, experience is necessary and a careful selection of soil imperative. Indeed, the agriculturist, who is earnest and sincere, is by the very nature of his calling practically sure to earn a competence.

"Is agriculture a dignified calling? Just as the producer wears the mantle of the Creator and as he is required to be resourceful, to be an individualist, to have traits of character which no other calling tests so sternly, so it may be granted, in spite of opinions to the contrary, that agriculture is one of the most dignified of human vocations. It is a calling that appeals to the best that is in a man and develops in him a realisation of national service. In this regard, perhaps, the farmer's

prestige has to a degree been lowered by the tendency on the part of certain sections to parade constantly instances of poverty and hardship, and so create an impression that production and poverty are synonymous terms.

"Of course, pioneering may mean hardship, and there are admittedly instances of poverty, but this condition is not confined to agriculture. Undoubtedly it is this unhappy propaganda that has created an impression that farming cannot pay, and has deterred boys from taking up a farming occupation.

"Here in Queensland we are on the verge of a new conception of agriculture. We must abandon one form of pioneering for another. The days are gone when a brave heart and an axe were sufficient to carve out a home and establish a competent production unit. The period of soil exploitation which has characterised our agriculture for so long is passing. Efficiency, and efficiency only, will hold our markets for us and so we turn to that new form of pioneering—the application of modern science to agriculture. The exponents of this school are to be found in increasing numbers amongst our farming communities, the products of agricultural training and study.

"As in all forms of human endeavour, specialisation is the order of the day, but while the professional specialises in one branch of work, the successful agriculturist must be a specialist in each branch of his undertaking, and the duty of the State is to provide that training that fits him for the calling. . . . . But the only title to land is to use it properly, and, once again, the mind turns back to education.

"Fortunately, the fundamentals of agricultural education are well established, and while different opinions are expressed from time to time in respect to methods of training, it is clear that the ideal is to combine the theories of agriculture and animal husbandry with the practical side of production. . . . . The Queensland Agricultural High School and College provides a sound agricultural education. It opens to the student the correct approach to the problems confronting him; enables him to avoid the costly errors that lead to failure; and teaches him the dignity of labour and the joy of the open air and freedom. It sets his feet on the road to security and achievement. But armed with a diploma, the student must not think he knows all there is to be known about agriculture. If he has absorbed the rudiments of this complex science he has done particularly well. At this point he should obtain a job—deliberately a job—on a good farm and acquaint himself with production problems from the producer's angle.

"In a few years and while still in his twenties he should seek a place of his own. We must avoid at all costs training boys to be merely farm labourers. We need farmers, educated, thoughtful men, capable and ambitious, filled with a sense of responsibility and a realisation, and an appreciation of the dignity of their chosen careers. . . . .

" . . . . So the choice lies between the farm and the science branches of agriculture. Each is dependent on the other, and each offers a security, a dignity, and a satisfaction that is shared by no other profession. Might I conclude by saying that I trained in agriculture, and if I had my time over again I would follow the same course. I envy the boys of to-day their improved opportunities for training, and urge parents to remember that a life on the land has compensations not enjoyed by city workers."

The Minister's New Year Message

1937, with all its trials, disappointments, and reverses, draws to a close. Fortunately the New Year dawns with a promise of better things for the farming community.

The grim hand of drought no longer clutches our land and owing to improved conditions, overseas customers are able to purchase many of our goods at a reasonable price. I sincerely hope that any trade agreements entered into during 1938 will strengthen our trade relations with the United Kingdom and other countries purchasing our products.

However, I feel that we can confidently go forward to the New Year hopefully and cheerfully, with the Department of Agriculture and Stock and the producers continuing that close co-operation that has made such an important contribution to a solution of the many different questions that have arisen in the past and will continue to arise in the future.

On behalf of the Officers and Staff of my Department, I extend to the Primary Producers of the State and their families best wishes for a Bright and Happy Christmas and a Prosperous 1938.

Frank. W. Bulcock

Renovation of Paspalum Pastures.

C. W. WINDERS, B.Sc.Agr., Assistant Research Officer.

THE very poor response shown by many coastal paspalum pastures to the rains which fell during October and November demonstrated to dairy farmers in the south-eastern quarter of the State that their pastures have all too frequently lost a good deal of their recuperative powers. Whilst some of the deterioration of the pastures is attributable to the effects of the prolonged dry conditions experienced during the years 1936 and 1937, it is a fact that a decline in productivity and responsiveness of many long-established paspalum pastures has been in evidence for a number of years. In 1924 the Department of Agriculture and Stock instituted paspalum pasture renovation trials at various North Coast centres, and numerous trials have since been conducted throughout the coastal dairying strip from Gympie to the southern border. As a result of these experiments and of privately conducted trials it is possible to indicate, in a general way, the methods of pasture renovation which may be expected, under normal circumstances, to yield payable results in Southern Queensland.

In presenting the following short account of the recommended systems of paspalum pasture renovation, it must be emphasised that the best procedure to adopt will be determined largely by the requirements and the limitations of the individual farm. For instance, a fairly young pasture on a friable soil will need less severe mechanical treatment than will an old, sod-bound pasture on a much-compacted soil. Again, unstumped land cannot be renovated with the ordinary ploughs, and other implements must be used. The farmer contemplating renovation work is advised to give the matter careful consideration, before embarking upon a scheme, in order that the greatest possible benefit may be obtained from the resources at his disposal.

The primary objects of pasture renovation are to restore the pasture, as far as is economically possible, to the productive capacity of its early years, and to maintain its productivity at a high level. For both purposes the pasture must be broken up to some extent, the soil kept opened up to permit rains to enter and soil bacteria to function, and a sufficient supply of plant food maintained. The principles underlying these renovation measures need not be discussed here. It is sufficient to state that it has been amply demonstrated that the periodical breaking up of the pasture and its underlying soil and the adequate feeding of the pasture are necessary.

Renovation by the Use of Tine and Pick Implements.

The simplest method of renovation is to cultivate the pasture by means of tined implements. Narrow tines, spaced about 5 inches apart, are drawn through the sod and the soil. If the operation is performed, to a sufficient depth, first in one direction and then at right angles to that direction, the paspalum plants are appreciably pruned and the soil much disturbed. The effectiveness of the operation depends largely upon securing adequate penetration. Unless at least three, and often four, strong horses, or equivalent motive power, are available, penetration to the desirable depth of about 4 inches cannot be achieved. Where the pasture is in a particularly bad condition it becomes impracticable to employ horses for renovation purposes and a

tractor or motor truck must be used to draw the renovator. It is useless to attempt to renovate a matted paspalum pasture without sufficient pulling power. Merely scratching the surface of the sod effects no appreciable improvement in the pasture.

There are various types of tined paspalum renovators on the market in Queensland. For general purposes a stump-jump, flexible-tine implement is preferable to one with rigid fixed tines. A popular type of stump-jump paspalum renovator, which is sold for about £20, is illustrated (Plate 1). This machine has nine tines spaced 5 inches apart and covers a width of 3 feet 6 inches at each stroke. Points of various types can be obtained for spring-tine renovators. For paspalum pasture renovation the tickler points generally are used, but, if practicable, a wider point may be used with advantage when cross-renovating.

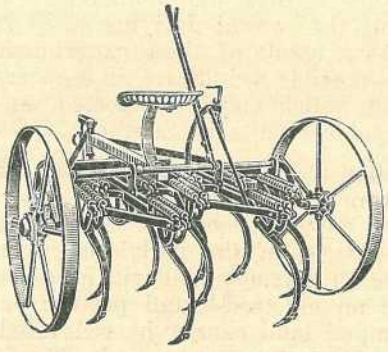


Plate 1.
A stump-jump paspalum renovator.

Another type of machine which is claimed to perform useful pasture renovation work is the power-driven pasture rotor (Plate 2). The tearing of the sod is done by broad, chisel-pointed pick tines or sharp-pointed tines attached to a revolving rotor fitted to the rear of a tractor. This machine has not been tested in official trials in Queensland, but it appears to be as efficient as any other implement for partially breaking up the pasture. Under some conditions the use of broad, pick tines might tend to leave the pasture area in a rough condition, and it may then be advisable to substitute the narrower, diamond-point tines.

Renovation should be carried out at a time when regrowth of the pasture is not likely to be retarded by cold weather or by dry conditions. Slow recovery of the pasture means not only lower production but also susceptibility to weed invasion. Renovators will not work satisfactorily when there is a big body of grass, and the pasture should first be brought into a suitable condition by mowing, by close grazing, or by other appropriate means. Any accumulated droppings should be scattered, by harrowing, prior to renovating.

It is usual to sow clover seeds on the pasture directly after renovation. Whilst the best time for sowing clovers is the early autumn, earlier plantings usually are effective. Some of the seed may germinate shortly after sowing and the seedlings be destroyed by hot weather, but a large proportion of the seed will remain dormant until the advent of cooler weather and germinate seasonably. The best clover to sow is white clover, but it is a very fickle grower in Queensland and in numerous

instances fails to establish or else does not survive for many years. Nevertheless, perseverance with the plant is recommended, since its presence in a pasture is of considerable value. A sowing rate of 2 lb. an acre is recommended, and in all cases 1 cwt. or more of superphosphate should be applied with the seed. White clover is favoured for pasture purposes mainly because it provides late winter and spring feed. Its value, as a leguminous plant, in assisting the growth of the paspalum is not generally recognised. This effect of legumes on grasses leads one to suggest that more use might be made of the summer-growing lespedeza, which already is naturalised in parts of the Gympie and Caboolture districts.

No method of renovation which does not involve the use of the plough or similar implement can be regarded as conferring a long-period benefit upon the pasture.

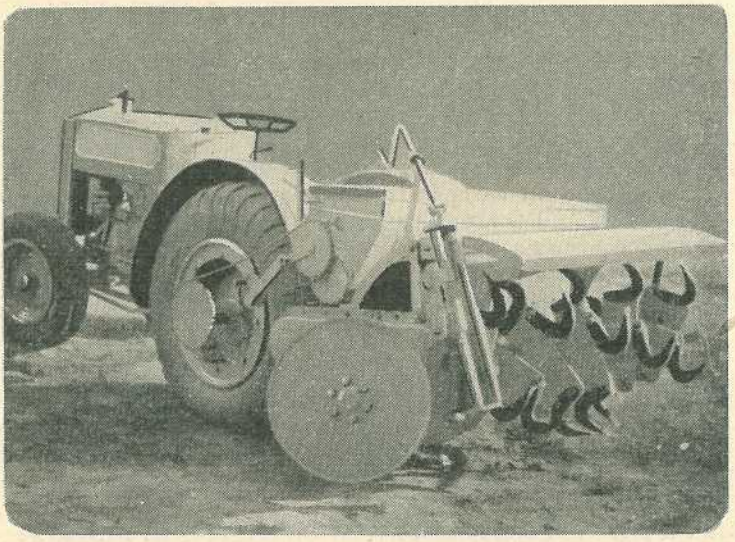


Plate 2.
A tractor-operated pasture rotor fitted with pick tines.

Renovation by Means of Ploughing and Similar Operations.

The mouldboard plough has been shown to be extremely useful in renovating paspalum pastures. On cleared land the ordinary English mouldboard plough can be used, but where the land contains stumps and roots it is necessary to employ a stump-jump mouldboard implement. Furrows 6 to 8 inches wide and 3 to 4 inches deep should be turned. Ploughing in this fashion turns the furrow slice on its side and sufficient pieces of the grass remain protected to provide an even regrowth. Shollower ploughing tends to turn the slice right over and to expose all the roots to the sun and wind, thus destroying a considerable amount of the grass. A mouldboard plough does not leave the ground in very rough condition, and light harrowing subsequent to ploughing will leave an even surface.

Disc-ploughing of paspalum pastures is less satisfactory than mouldboard-ploughing, particularly on hard soils, since the disc-plough tends to scatter the soil in large clumps, making levelling-off difficult.

Fairly satisfactory renovation can be performed with the rotary hoe. The sod and the soil to the depth of operation are chopped up fairly finely, and re-establishment from pieces of the grass may not be very uniform over the field. No doubt seedling growth will assist in thickening up the pasture cover, but usually it is found that regrowth following mouldboard ploughing is superior to that following rotary hoeing.

On undulating or hilly country (particularly where it is necessary to employ a hillside plough), all furrows should conform to the contours of the land. By ploughing across the slope, soil erosion is reduced to a minimum.

The time of renovating by ploughing or similar operation may be varied to suit the requirements of the farm. In specially favored localities, where the winter rainfall conditions are suitable, the farmer may desire to sow down winter-growing pasture plants on the renovated area in order to provide good winter and spring grazing. Renovation towards the end of summer, but prior to the finish of the summer rains, will leave the land in good condition for the establishment of grasses such as Wimmera ryegrass and Italian ryegrass, which will provide grazing while the paspalum is slowly re-establishing itself. Where the usefulness of winter pastures is strictly limited, it is advisable to renovate sufficiently early in the summer to ensure rapid regeneration of the paspalum and the production of a good body of feed with which to go into the autumn and the winter. Whatever time is selected for renovating, a sowing of white clover, and in some instances red clover in addition, should be made, together with an application of superphosphate to encourage the growth of the clover.

Whilst land carrying a very dense crop of grass is difficult to plough, it is advisable to turn under as large a body of grass as the plough will handle. The more grass which is added to the land the better will be the condition of the rejuvenated pasture. The main advantages of ploughing, &c., over less severe forms of renovation are that a greater bulk of organic matter is added to the soil, pruning is more drastic, and the land is rendered more receptive of rains and dead leaves, &c., added subsequent to renovation.

A ploughed pasture, once re-established, is more productive for three or four years than is a similar pasture renovated with a tine or pick implement. There is, however, a progressive decline in the response of renovated pastures, and it may be necessary to replough the pasture every five or six years. It is a good plan to make a point of ploughing-up a fresh portion of the pasture each year for a few years, and then repeat the renovations in the same order.

Renovating by Means of Rotation of Pasture and Crops.

There is no known means of renovating a paspalum pasture so that, without further mechanical treatment, it can be maintained in a highly-productive condition for a long period of time. It must be recognised that a single tine cultivation or a ploughing will have an effect on the pasture for only a short number of years. Tine renovation effects a moderate improvement in production. Ploughing confers a somewhat greater benefit on the pasture. It remains to describe a renovation system which improves on the production from the two already outlined, but which is much more limited in its application.

Crop rotation is accepted as sound agricultural practice for most crops in all parts of the world. It is recognised, further, that, by inserting a 3-5-year stand of pasture in the rotation at fairly frequent intervals, the structure of the soil can be maintained in a desirable condition for most crops. It has been shown, also, that by making a proper selection of crops to rotate with the pasture, the pasture can be made extremely productive during its relatively short life. These facts are significant to Queensland dairy farmers, many of whom regularly crop considerable areas on their farms. In the coastal belt, where paspalum is grown, crop-farming is not yet extensively practised, but there is a growing tendency for dairy farmers to grow more fodder crops, such a maize, sorghums, cowpeas, and lucerne. Probably the best system on coastal dairy farms would be to rotate a paspalum and legume pasture with crops such as those mentioned. Considerable benefit would be conferred on the pasture if a leguminous crop, such as cowpeas, or, better still, lucerne, immediately preceded the sowing of the pasture.

Supplying Plant Foods to Renovated Pastures.

Under the system of renovation last described it is possible to ensure that the pasture is sown down on land rich in available plant foods. Where purely mechanical forms of renovation are practised, unless very large quantities of grass, &c., are ploughed under or are allowed to rot down at fairly frequent intervals, the soil is not enriched to any marked degree. This deficiency can be met to only a slight extent by applying farmyard manure and by scattering accumulated droppings. In some instances the use of artificial fertilizers has conferred an added benefit, but the exact place of fertilizers in pasture renovation is by no means clear. In some districts the problem is complicated by the effect of soil acidity and other soil characteristics on the availibility of applied fertilizers, and everywhere the erratic nature of the rainfall causes wide variations in the response of pastures to added fertilizers. The best recommendation that can be made at present is that farmers test, under their local conditions, the relative values, for stimulating pasture growth, of superphosphate and sulphate of ammonia, both separately and in combination. Between 1 cwt. and 2 cwt. of each should be applied. In cases where the soil is known or believed to be very acid in reaction and where clover does not thrive, a dressing of pulverised limestone at the rate of 10 cwt. to the acre, or an equivalent amount of other forms of lime, should be tried.

WATERPROOFING MIXTURE.

"Lime-tarred" hessian is proof against vermin and rain. Take three-quarters of a kerosene tin full of tar and when nearly boiling stir in gradually (air slaked) powdered lime to make a creamy mixture. It is ready for use when it froths. Hessian so treated will last for years. Apply while hot with a tar brush, and give a second coat when the first has dried.

Poultry Keeping on the General Farm.

P. RUMBALL, Poultry Export.

POULTRY raising is now a very definite and important branch of primary industry. This is due largely, in the first instance, to the labours of the specialist breeder in the production of high producing strains; secondly, to the modern method of reproduction and distribution of chickens; thirdly, to more efficient and organised marketing; and lastly, to the practice by poultry raisers of more or less scientific principles of breeding.

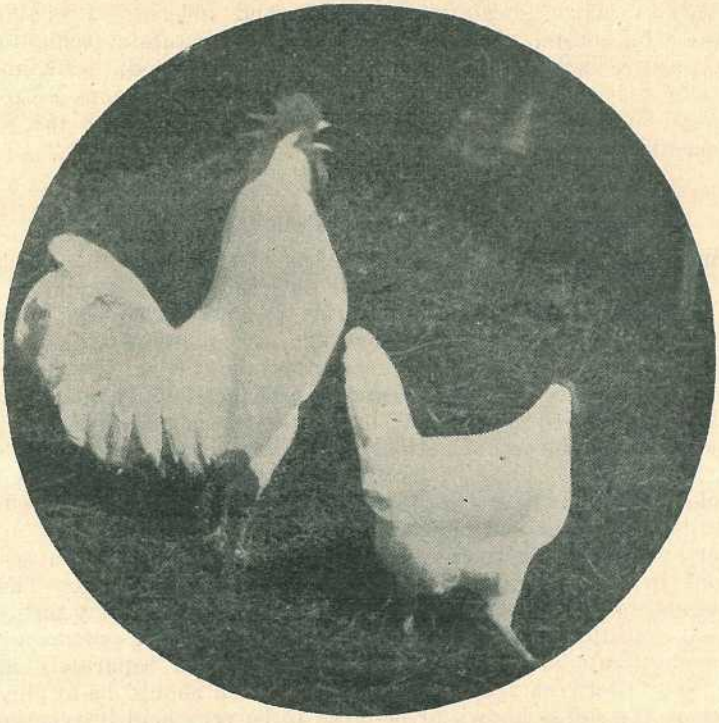


Plate 3.
Bred from Vigorous Stock.

Although the specialist poultry breeder plays a most important part in the maintenance of a highly organised and efficiently conducted industry, considerable quantities of our eggs are produced upon the general farm, and if an expansion of the poultry industry is to take place, such expansion would be sounder as a definite part of general farming than as a specialised industry.

During recent years there has been a very definite increase in the production of eggs, as indicated by the ever-increasing quantities that are exported overseas. Overseas export, however, can only be practised during a few months of the year. Fortunately for the industry this period corresponds with the period of peak production, offering a ready means of effectively dealing with the surplus production that occurs over that particular period. There is, however, no definite break in

production after the export season closes; consequently supplies are temporarily in excess of home requirements, and storage for winter use has to be resorted to.

The first cost of the egg with the added storage charge prevents eggs so treated being sold at prices that will encourage the consumption of extensive supplies; consequently there is a limit to the number of eggs that can be stored for winter use.

Expansion of the industry must go hand in hand with increased local consumption, and this is only possible by creating in the consumers' minds a greater confidence in the internal content of the egg than has been the case in the past.

The confidence of the consumer is largely in the hands of the producer. The fowl produces an article of diet invariably in an almost perfect condition. It therefore remains for the producer, for his own protection, by the exercise of care and efficiency to maintain it in this form.

HOUSING.

To obtain the best results from poultry good housing is as necessary as good stock, good feeding, and good management.

It is not necessary to have elaborate housing, but they must possess the following features:—Correct ventilation, freedom from draughts, freedom from moisture, and have sufficient room for the comfort of the birds.

Poultry houses may be built of a variety of shapes and materials or old sheds or barns may be converted. If a new house is to be built, iron and sawn timber are recommended as being the most suitable material for construction purposes.

Systems of Housing.

There are three practices commonly adopted, viz.:—

(1) Intensive, where the birds are kept entirely under cover;

(2) Free range, where a house is erected to provide sleeping accommodation and unrestricted liberty permitted; and

(3) House and yard, where a house is provided for sleeping quarters, and liberty is restricted by the erection of a netted run.

Under the intensive system the birds are afforded the maximum protection from climatic conditions, ensuring a greater stability in production. The health and condition of the birds are readily observed by the farmer. Further, it is possible to thoroughly free the house from excreta at regular intervals.

Under the free range system some soil contamination from the excreta of the stock naturally takes place, but, owing to the unrestricted range and the feeding on the soil by plant life, soil contamination does not become serious. The birds are, however, exposed to climatic variations, and egg production is not as stable as under the intensive system. There is, however, the compensation in the reduced cost of feeding, as birds on range gather a good deal of food in the form of insect life, grass seeds, &c.

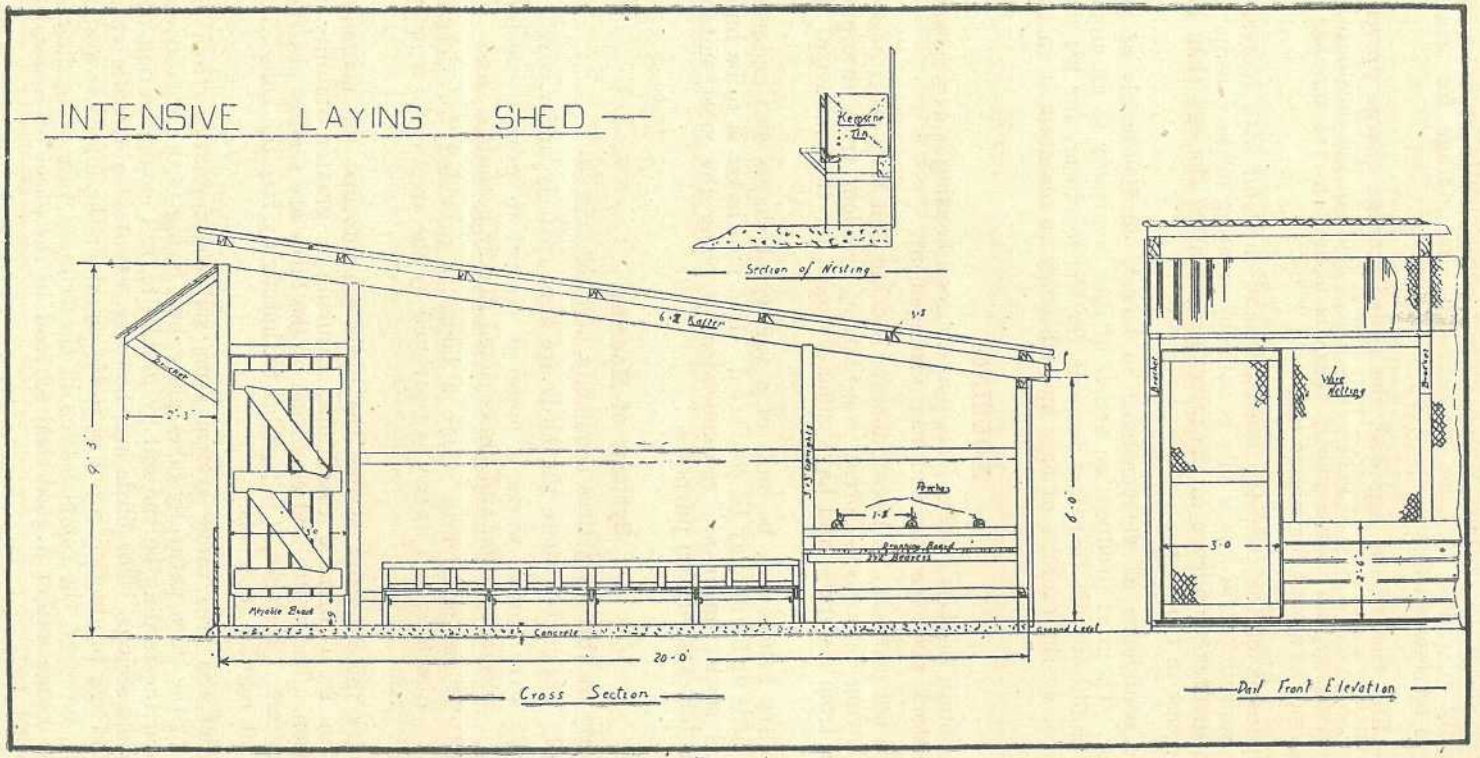


Plate 4.

SHOWING END SECTION AND PART FRONT ELEVATION OF INTENSIVE LAYING SHED.

End section with the exception of door and battens to carry the iron, should be erected every 10 feet in a shed of these dimensions.

The yard and house system has the disadvantages and none of the advantages of both the free range and intensive systems. The birds are exposed to the climatic conditions as much as they are under free range, and cannot gather any of their food supply as the netted run becomes bare in a very short time. The most serious disadvantage, however, of this system is the soil contamination of the pens.

Where a large number of birds are to be kept the intensive system of housing is recommended, but for the farmer keeping 50 to 100 birds the free range system offers many advantages.

Intensive Housing System.

Under this system of housing, as previously mentioned, the birds are kept entirely under cover in fairly large sheds, and in relatively large numbers. This being so, strict attention has to be paid to the physical condition of the bird, and to the question of feeding. As the bird only has a very restricted space, 4 square feet per bird being about the correct area, exercise has to be promoted to ensure the birds being kept in good condition. This is done by having scratching material or litter, such as grass, straw, leaves, or chips strewn over the floor, to the depth of 4 to 6 inches, and all the grain portion of the ration being fed in it. This naturally promotes a good deal of scratching on the part of the bird in search of grains that have become covered, and it should be patent to all poultry raisers that the feeding of the evening grain should not be left until the day is drawing to a close. Many farmers are in the habit of allowing a good deal of range to their birds, with the consequence that they gather a fair amount of natural food, and naturally do not consume as much as birds kept entirely under cover. If at any time poultry breeders keeping birds under such conditions think it desirable, on account of the damage done by their poultry to crops, haystacks, &c., to change over to the intensive system, the question of feeding assumes a most important point; in fact, any person keeping poultry under these conditions must give the question of feeding the utmost consideration, as it is impossible for the birds to procure anything but what they are supplied with. The overlooking of this point by many poultry farmers has caused this system of housing to be condemned.

Types of Intensive Laying Sheds.

There are several types of laying sheds, the shape of the roof being the principal point, but as the majority of poultry raisers have to do the erection of their own sheds, the lean-to type will prove most acceptable. The illustration shows the cross section of a shed, 20 feet deep, and of indefinite length. This shed can be built in sections of 20 feet, and provision made for additions as required, each section holding 100 laying hens.

The cross section shows a veranda, which commences just under the rafters in front. This veranda serves to prevent a good deal of rain beating into the house from the front, and by not going right to the top of the roof allows a free circulation of air. If it is desired the roof could be extended by 3 feet and the veranda not used, but in that case the height of the shed in front could be a little bit less. Ventilation is also provided for at the back, the iron going from the floor level to the bottom of the 6-inch rafter. This allows a 6-inch space right along the back of the shed between the battens which carry the iron at the back and the roof. This space is protected to some extent from the driving influence

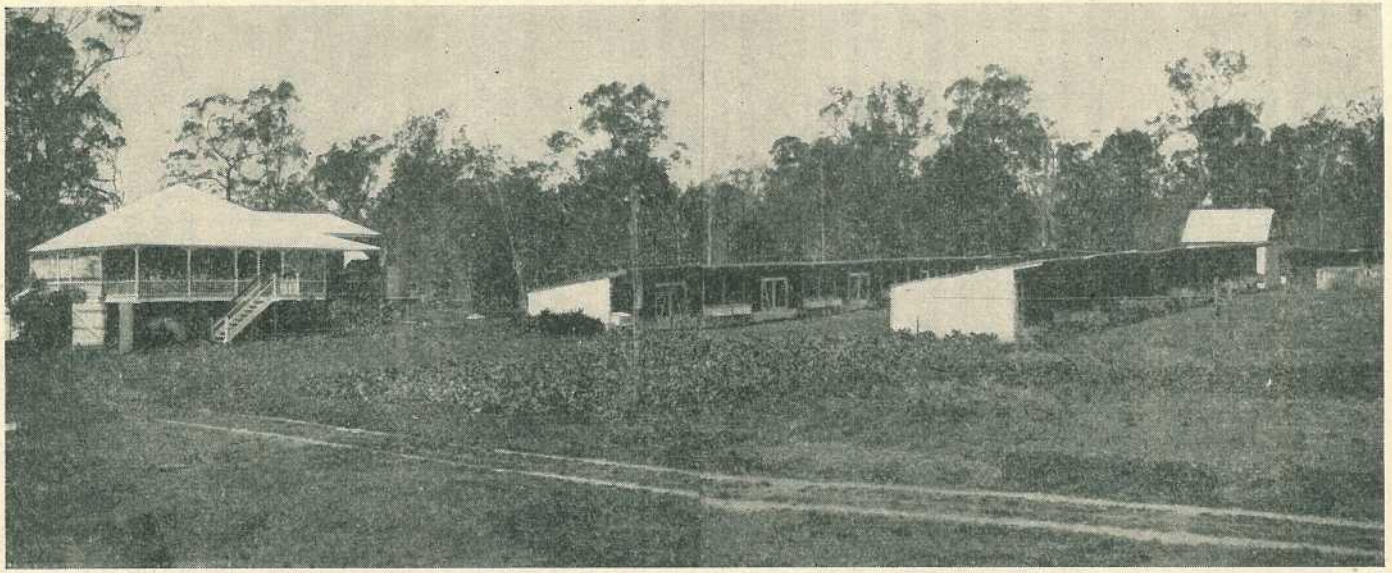


Plate 5.

ON A QUEENSLAND POULTRY FARM. THE INTENSIVE SYSTEM ADOPTED WHOLLY FOR LAYING STOCK.—Housing under the intensive system allows 3½ to 4 square feet of floor space for each bird; under the free-range system 2 square feet are sufficient.

of the wind by guttering being placed on the rafters, which extend beyond the back wall, but further protection for the birds from cats, &c., should be made by netting this space.

The Site.

Site of House.—In commencing to erect a building upon the intensive system, it being a large building and of a permanent nature, the site chosen must receive due consideration, and, as many poultry raisers start in a small way, provision should be made for extensions.

In addition to the foregoing, although it is recommended that the floor be concreted the position chosen should be well drained, and, if the building is to be erected on relatively flat country, the floor should be raised several inches above the surrounding country, and well rammed to provide a solid foundation.

Aspect.—The house should face north or north-east. A northerly aspect permits of the maximum penetration of the sun's rays into the house during the winter, when it is desirable, and the minimum during summer; also a good deal of our continuous rains come from a south-easterly direction.

BREEDS.

Commercial poultry may definitely be grouped in three classes, viz.:—

Light Breeds.

Light breeds are usually breeds developed extensively for egg production with little or no attention being paid to table qualities. This class of bird may also be classed as a non-sitter. Among many strains individuals will be found in which the broody trait has not been bred out, but taken collectively they may be classed as non-sitters. Another character of the light breeds is that they are layers of white-shelled eggs.

Among this class Leghorns predominate, with probably the Ancona being the next most popular, followed by the Minorca.

Heavy or Dual Purpose Breeds.

Breeds of this class have been developed for table and egg-producing qualities. Taken as a group they are not as efficient egg producers as the light breeds, but individuals of this class hold the record as egg producers in this State, namely, 354 eggs in 365 days. Without exception all heavy breeds are very docile, whereas light breeds are of a more or less nervous disposition. Breeds of this class may also be referred to as sitters. Every effort is made to breed this characteristic out, and it has been done to some considerable extent by many breeders, but in the best of flocks broody hens will be found. The egg of this class should be brown in colour, although many pale eggs will be found in all breeds.

The most popular breed of this class is the Australorp. The Langshan is probably the next in favour, followed by the Wyandotte, Rhode Island Red, and Sussex.

Game Class.

This is essentially a table class. Although it may not prove profitable to breed Game fowls for table purposes, if it is found commercially sound to breed birds exclusively for the table the crossing of any dual-

purpose fowl with the Game will add wonderfully to the table qualities of the progeny. This appears to be the most profitable manner to utilise the Game fowls.

Among the Game class is the Old English, Indian, and Australian Game.

STANDARDS.

In order to maintain breed characteristics it is essential to have standards to which to breed. Thousands of fowls are bred yearly by producers with little or no consideration being given to type. The departure from type may be attributed in some degree to the exaggerated specimens at times seen on the show bench, and to greater consideration being given by judges to feather markings than to types and egg-producing qualities.

From the one breed in many instances there has been developed two types, namely the standard-bred fowl and the utility-bred fowl. In trying to perfect his bird from a show point of view the fancier sacrificed egg qualities, while the egg producer in the race to produce eggs sacrificed type. The egg producer sacrificed type to such an extent that commercial breeders years ago drew up a utility poultry standard to be read in conjunction with the standard of perfection as laid down by the Poultry Club of England.

This move has proved of great advantage to the industry, in so far as the improvement in type that has taken place has materially assisted in maintaining the health and stamina of the flocks.

THE WHITE LEGHORNS.

The Cock—General Characteristics.

Head.—Skull fine; beak stout, the point clear of the front of the comb; eyes prominent; comb, single, perfectly straight and erect, large, but not overgrown, deeply and evenly serrated, the spikes broad at their base, extending well beyond the back of the head and following,

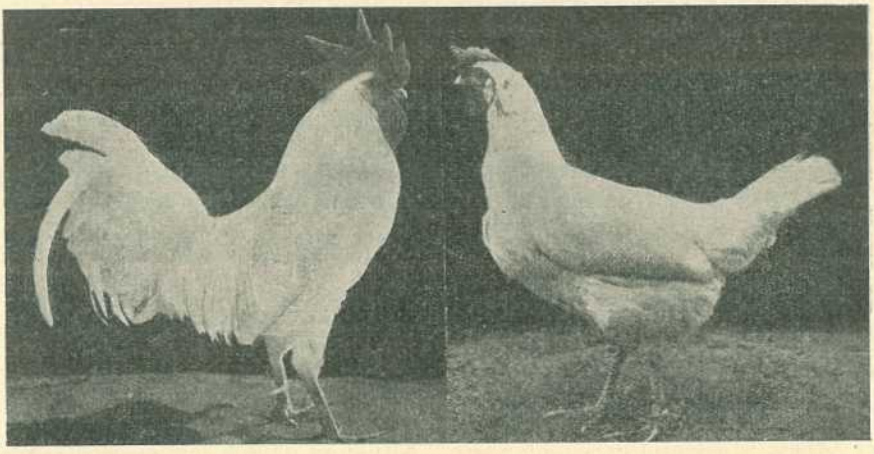


Plate 6.
White Leghorns.

without touching, the line of the head, free from "thumb marks" and side spikes; face, smooth; earlobes well developed and rather pendant, equally matched in size and shape, smooth, open, and free from folds; wattles long and thin.

Neck.—Long, profusely covered with hackle feathers.

Body.—Wedge shaped, wide at shoulders, and narrowing to the root of the tail; round and prominent breast; slightly rounded back sloping to the tail; large wings tightly carried and well clipped up; moderately full tail at an angle of 40 to 45 degrees from the line of the back.

Legs.—Moderately long; shanks fine and round; flat shins objectionable; and free from feathers.

Toes (four).—Long, straight, and well spread.

Carriage.—Sprightly and alert.

Weight.—Not less than 6 lb.

THE AUSTRALORP.

Queensland standard, as adopted by the Australorp Society, the National Utility Poultry Breeders' Association (Queensland Branch), and the United Poultry Club of Queensland.

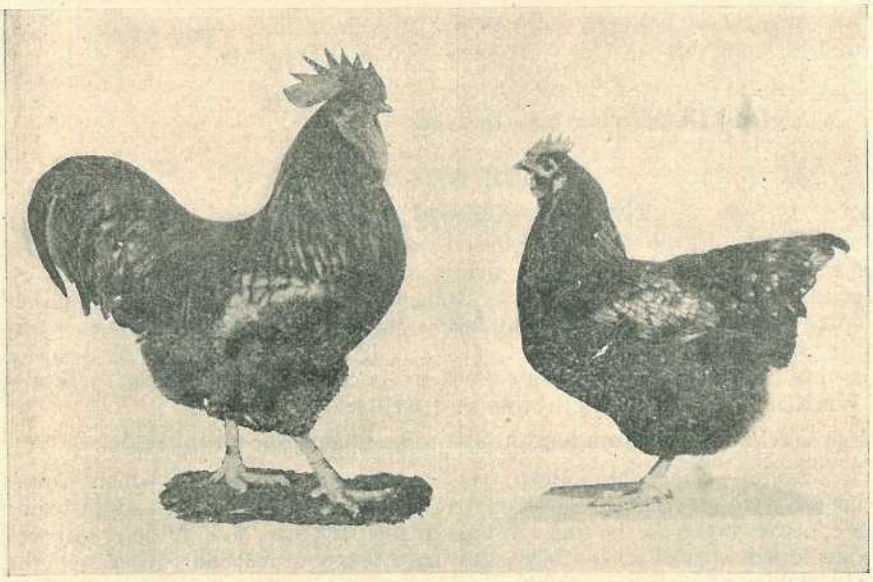


Plate 7.
Australorps.

Head.—Medium in size; skull fine with no fullness over the eyes; beak of medium length, strong and slightly curved; colour, black—5 points.

Eyes.—Full, prominent and expressive, dark brown iris, the darker the better—5 points.

Comb, Wattles, and Lobes.—Medium size, smooth and fine in texture; bright red in colour; comb erect, evenly serrated and following the curve of the head; wattles neatly rounded; lobes well developed—5 points.

Face.—Bright red, fine, not sunken, and as free from feathering and wrinkles as possible—5 points.

Neck.—Medium length; slightly curved and profusely feathered.

Body, Skin, and Abdomen.—Body deep, broad backed and of good length, breast of medium depth, broad and nicely rounded, keel straight and of moderate length, the whole giving a well-balanced appearance; wings well formed and carried close to body; skin, white, texture of finest quality. The abdomen to be elastic and full but avoiding indications of excessive fat or abdominal weakness—35 points.

Tail.—Medium length, angle about 35 degrees in the male and 20 degrees in female—5 points.

Legs.—Medium length, strong and wide apart; shanks fine in bone and scale, free from feather or fluff; toes straight and well spread; legs and upper portion of feet slate to black; sole of feet white—5 points.

Plumage.—Soft, close, avoiding fluff and looseness; colour black, with green sheen—7 points.

Condition.—As indicated by general health, cleanliness of feathers and legs—10 points.

Carriage.—Erect and graceful—that of an active bird—10 points.

Weight.—Cockerel, 7 lb. to 8 lb.; cock, 8 lb. to 9 lb.; pullet, 5 lb. to 6 lb.; hen, 6 lb. to 7 lb.—5 points—Total, 100 points.

Disqualifications.—Side sprigs, any deformity.

Serious Defects.—White in lobes.

WHITE WYANDOTTE.

The Cock—General Characteristics.

Head.—Skull short and broad; beak short and well curved. Eyes large and bright. Comb rose, firmly and evenly set, low, square-fronted, gradually tapering towards the back and terminating in a well-defined spike (or leader) which should follow the curve of the neck without any upward tendency; the top of it oval and covered with small rounded points, the side outline being convex to conform to the shape of the skull. Wattles of medium length, fine and well rounded.

Neck.—Of medium length, abundantly covered with hackle.

Body.—Short and deep, with well-rounded sides; broad round breast with straight keel; short back with full and broad saddle rising a concave sweep to the tail. Wings of medium size, well folded; tail well developed, spread at the base, the main feathers carried rather upright, the sickles of medium length.

Legs.—Of medium length. Thighs well covered with soft and webless feathers, the fluff full and abundant. Shanks strong, fine, well rounded, and free of feather or fluff. Toes (four), straight and well spread.

Carriage.—Graceful and well balanced, somewhat resembling the Brahma.

Weight.—Not less than 8 lb.

The Hen—General Characteristics.

The general characteristics are similar to those of the cock, allowing for the natural sexual differences.

Weight.—Not less than 6 lb.

Colour.—Beak, bright yellow (except Buff Laced, yellow or horn tipped with yellow; Columbian, yellow or horn; Gold Laced, Partridge, Silver Laced, and Silver Pencilled, horn shading into or tipped with yellow). Eyes bright bay. Comb, face, wattles, and earlobes, bright red. Legs and feet, bright yellow.

Plumage.—In white variety, pure white, free from yellow or straw tinge.

Principal Varieties.—White, Columbian, and Silver Laced.

Scale of Points.—The White: type, 25; colour, 25; size, 15; head, 15; legs, 10, condition, 10.

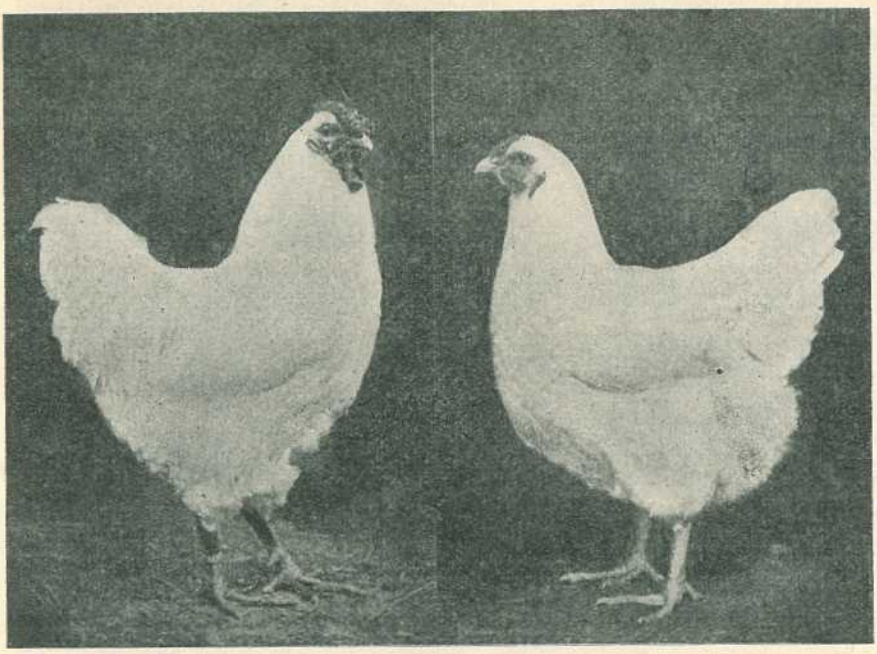


Plate 8.
White Wyandottes.

Utility Poultry Standard.

Type; colour (plumage and lobes); legs and feet (colour); condition—health, furnishing brightness and cleanliness of feather and legs; in accordance with the accepted standard of the breed.

Laying Characteristics, any Breed.

Conformation—

(*a*) Length, depth, width, proportionate to type of breed.

(*b*) Length as taken from base of the neck to base of the tail.

(*c*) Depth to be determined by the vertical space between the back and the breast-bone and the pelvic bones.

(*d*) Width as measured across the saddle and immediately behind the wings as is indicated by the distance apart of the legs.

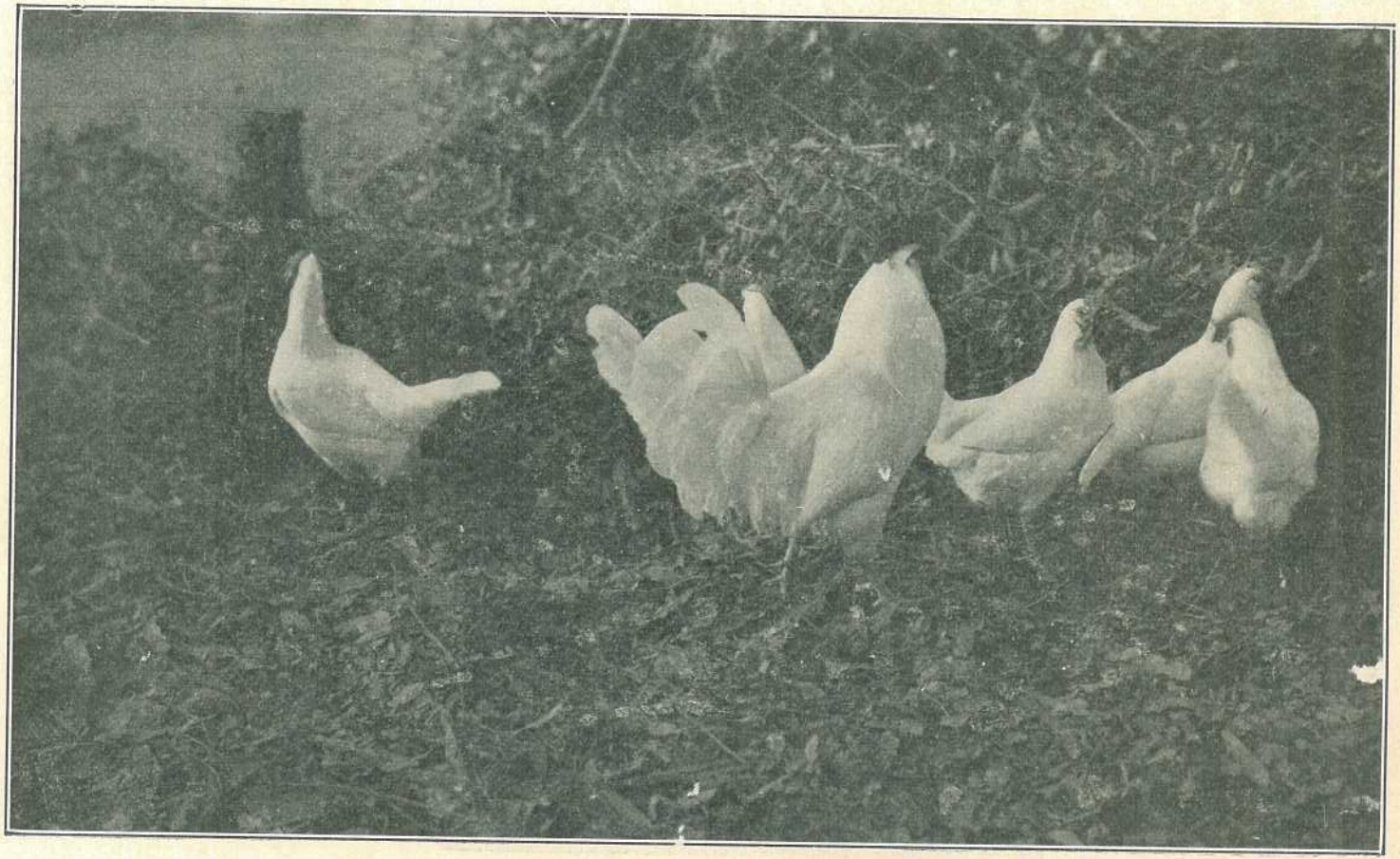


Plate 9.
A Pen of White Leghorns.

Freedom from Coarseness—

(*a*) Shanks strong, as differentiated from either extreme coarseness of bone.

(*b*) Pelvic bones strong at base; long, fine, and straight.

(*c*) Tissue—pelvic bones to be free as possible from gristly covering.

Head.—Finely modelled; skull deep over eyes, full and round at back.

Eyes.—Full, bright, and expressive.

Face.—Bright, lean, free from feathering, and not sunken.

Comb and Wattles.—Neat, fine in texture, and medium size, avoiding "beefiness."

Neck.—Fine and fairly long.

Skin and Abdomen.—Texture of skin to be of the thinnest and finest quality and pliable; abdomen to be elastic, avoiding sagging-in, or fullness indicating excess of fat.

Plumage.—Feathers soft and silky, close, but not hard as in game; fluff moderate.

Weights.—Light breeds, ½ lb. to 1 lb. above minimum, and heavy breeds 1 lb. to 1½ lb. above two score maximum points; if in excess to be cut correspondingly.

Minimum Weights.

Light Breeds.

Leghorns, Minorca, Andalusians, Spanish, Campines, Buttercups, Anconas: cockerel, 5 lb.; pullet, 4 lb.

Hamburg: cockerel, 4 lb.; pullet, 3 lb.

Heavy Breeds.

Orpington, Plymouth Rock, Rhode Island Red, Sussex: cockerel, 7 lb.; pullet, 5 lb.

Langshans, Wyandottes: cockerel, 6 lb.; pullet, 4½ lb.

Any other variety: cockerel, 7 lb.; pullet, 5 lb.

Scale of Points.

Standard Points.—Type, maximum points, 20; colour (plumage and lobes 7); legs and feet (colour), 3; condition, 5.

Laying Characteristics.—Conformation (indicating stamina and capacity), maximum points, 20; freedom from coarseness, 5; head, 7; eyes, 7; face, 6; comb and wattles, 5; skin and abdomen, 5; plumage, 5; weight, 5; total 100.

Disqualification.—Under weight, wrytail, any indications of impurity of breed, dubbing, and faking.

CULLING.

With the best of stock unprofitable birds will be reproduced, and culling has to be resorted to. By the removal of such birds the cost of production is reduced, and greater accommodation is available for the stock retained.

In Egg Laying Competitions an average of 200 or more eggs per bird is usual. This average is not impossible for the poultry raiser to obtain from a flock of well-managed pullets. However, in the second year of a bird's life production is much lower than in her first. Some excellent first-year producers may be exceptionally poor in their second. A similar relationship exists between the production of second and third year, but with the difference that third-year birds invariably do not lay a sufficient quantity to warrant their retention.

Culling, therefore, in the first instance revolves around the disposal of old hens. This being the case, it is essential that there should be some means of identification. Identification may be secured by banding birds or by toe-marking. With the latter system it is necessary to catch and inspect the feet of the bird to determine its age.

In addition to culling upon an age limit all obviously unfit birds, from chickens to the oldest hens, should be removed from week to week. The main culling should be practiced in the summer.

Plate 10.

THE HEAD OF A GOOD LAYER.—Note the alertness of appearance and freedom from coarseness. The bald head is frequently associated with high production.

Before culling the conditions under which birds have been housed and fed should be considered. Only well-treated birds can have the external features of a good layer. If the treatment has not been correct this should be remedied, and the birds given at least 6 weeks to respond.

Flocks that have been well managed and regularly culled require little culling during the summer apart from culling on age. In poorly managed and bred birds considerable culling is necessary. Hens that have given two years' production should with few exceptions be culled on age.

A good grounding of the type of the particular breed to be culled should be gathered. The bird should be examined on the ground first. A good producer should be bright, alert, and active. Those not possessing these characteristics should be removed. Good producers should have length, width, and depth of body. All small undersized birds, although of active appearance, should be removed. This work is best conducted in the house. The birds should be caught by means of a fish landing net. The balance of the birds should be handled. The catching of these is best done by rounding up in corner of house by means of a piece of 6 ft. netting, enclosing 20 to 30 at one time. In the further examination it must be borne in mind that a moulting bird will not have the same measurements as a laying hen. On handling the birds first the weight should be noted. A good producer will be lean but not light. Exceptionally light birds should be discarded. The following examination should then proceed:—

GOOD LAYER.	POOR LAYER.
Comb (hen not moulting).	
Full, smooth, red, and waxy	Limp, small, covered with white scale
Head and Face.	
Lean, fine bone, inclined to length, smooth face	Coarse—Heavy bone, short, dull, and wrinkled face
Eye.	
Full, bright, and prominent	Dull—Small and sunken
Beak—Yellow-skinned Birds.	
White or bleached	Yellow or yellow at base extending to tip
Eye-ring—Yellow-skinned Birds.	
White or bleached	Yellow
Neck.	
Medium length—Fine, avoiding excessive length	Coarse—Short, bully
Back.	
Flat, long, wide—Width extending to tail	Rounded, narrow, especially at tail
Body.	
Long—Deep both front and rear	Short—Shallow, especially at rear of bird
Legs.	
Medium length, fine bone, small close scales, toes well spread	Short and excessively long coarse, round bone
Feathering.	
Soft and close; when hand placed on bird it will not sink. Good layers frequently bald around head	Loose, soft, excessive fluff
Vent (Yellow-skinned Birds).	
White, large, soft, moist, oval, upper part overhanging	Yellow, small, hard, dry and round,
Pelvic Bones.	
Thin, pliable, and relatively wide	Thick, blunt, and close
Abdomen.	
Loose, skin pliable, soft, full when in lay and deep from pelvic bones to keel	Tight, hard, tucked up, pelvic and kee bones close
Moult.	
Late and rapid, many laying and moulting	Early—Slow

FEEDING FOR EGG PRODUCTION.

The laying fowl has first to provide from her food supply for—

(1) Maintenance of vital functions;

(2) Growth requirements; and

(3) The production of eggs.

The first call upon the food supply is that for the vital functions, then growth, and any surplus nutrients used in the manufacture of eggs. It will therefore be seen that the greater the production the greater will the consumption be, and that egg production is only possible by feeding quantities of food in excess of body requirements. It is generally estimated that a hen in full lay will consume approximately 2 ounces each of grain and mash per day. This quantity, however, will be in excess at times, and again be deficient during the period of peak production.

The majority of cereal foods available are generally deficient in protein, and in preparing a ration it is necessary to use protein-rich foods in the form of milk, milk powders, and meat meal. Protein-rich vegetable foods are available, but it has been found from experience that animal proteins give better results than vegetable. This probably is due to their greater palatability and to the fact that the range of animo-acids is wider. From practice it has been found that rations having a total protein content of 15 per cent. give satisfactory results. As protein-rich foods are the most costly, it will readily be understood that the object of the feeder should be to use the minimum quantity necessary for maximum production.

The poultry raiser who does not desire to prepare his own ration may purchase laying mashes to be fed in conjunction with grain, also all-mash. These laying mashes have approximately 18 to 20 per cent. of crude protein, and when fed in conjunction with grain, say equal parts of maize and wheat, the total crude protein content of the ration is reduced to the vicinity of 15.5 per cent.

In addition to the protein and carbohydrate, the mineral content of the layers' ration has to be taken into consideration. The average amount of carbonate of the egg shell is one-fifth of an ounce. To supply the requirements, say, in the mash, 4 per cent. of calcium carbonate would be necessary, but as hens not laying would only void the material it is a better practice to have shell-forming material in the nature of limestone and shell grit always before the bird in separate receptacles.

Commercially, yolk colour does not appear to have been given much consideration, but the consuming public do not like an excessively pale-yolked egg, and, to overcome this, green feed and yellow maize should form a definite part of a laying ration. Both foods are rich in vitamins, and green feed materially assists in supplying the mineral requirements of poultry. In the absence of green feed lucerne chaff or meal should be used.

The manner in which layers may be fed varies. The most popular at the present time is the feeding of dry mash and grain, although all-mash is coming more into vogue. For those who desire to prepare their own mixture the following rations are suggested as a working basis:—

RATION—GRAIN AND MASH.

Mash.	Per cent.	Grain.	Per cent.
Lucerne chaff or meal	10	Wheat	50
Bran	28	Maize	50
Pollard	30		
Maize meal	20		
Linseed	2		
Meat meal	10		

Supplements to each 100 lb. of mash—

½ lb. Salt.
2 lb. Bone Meal.
1 per cent. Cod Liver Oil.

All Mash.

	Per cent.
Meat meal	5
Lucerne chaff	6
Linseed	1
Maize meal	30
Bran	20
Pollard	40

Supplements—

Bone meal	2 lb.	To every 100 lb. of Mash.
Salt	½ lb.	
Cod liver oil	1 lb.	

REPLACEMENT OF FLOCKS.

As previously mentioned very few hens are retained for egg production beyond a period of two years. This, coupled with the constant culling that takes place on a well-conducted farm, and the normal mortality necessitates the replacement of approximately 60 per cent. of the flock each year, which is a big problem to the general farmer.

It is little use replacing old and culled hens if such replacement is not made with birds that will be better producers.

This replacement may be made by the agricultural producer selecting and mating the best of his birds, by the purchase of eggs for hatching purposes, or by the purchase of day-old chickens.

Efficient breeding is only possible by a close association with the birds in order to obtain records of production, and the necessary ability of effectively selecting for stud purposes birds that will give satisfactory results. This close association is a factor that on the average farm is an impossibility, and it therefore appears as if the most sound practice of replacement would result in the purchase of day-old chickens.

The expansion that has taken place in the poultry industry has brought with it modern equipment that permits of day-old chickens being turned out by the specialist breeder at a price at which the small flock owner could not produce his own. There are operating in this State incubators of the capacity of 16,000 eggs. These machines are working at full pressure for at least three months in the year and they make it possible for breeders to specialize in the production of chickens for sale.

Hatcheries of such a nature make it possible for the farmer to replace his flock with chickens hatched during the most suitable period of the year. They relieve him of the necessity of selection, mating, and incubation on his own farm, and if the chickens are secured from a reputable source insure him of maintaining a profitable flock.

INCUBATION.

Incubation can be successfully conducted throughout the year. However, the most profitable period in which to hatch chickens is from June to September. Chickens hatched later do not thrive and are more susceptible to disease. Ducks can be profitably hatched at any period where cheap foodstuffs prevail.

Eggs must be carefully selected for incubation purposes for size, shape, and texture of shell. It is important that only eggs which exceed 2 ounces in weight be incubated in order to maintain a good commercial

product. Misshapen eggs should be rejected. Eggs having porous or thin shells allow the contents to evaporate resulting in poor hatches. If eggs for incubation are to be kept longer than one week they should be turned daily; by this process they can be kept for three weeks. Fertile eggs must be stored in a cool place free from draughts.

Periods of Incubation.

The recognised periods of incubation are:—

Hen eggs, 21 days; Guinea fowls, 26; English ducks and Geese, 28; Turkeys, 30; Muscovy ducks, 35.

Natural Incubation.

With natural incubation difficulty is always experienced in having hens broody at the right time. When setting a broody hen the nest should be made comfortable and darkened. The bird should be dusted with insect powder before the eggs are placed under her and again before the hatch comes off. After setting she should not be disturbed for 36 hours, but should then be brought off for food and water. She must come off daily for food, water, and must have a dust bath. The hen must be fed on whole grain.

Artificial Incubation.

Instructions are supplied with incubators. These should be followed by the operator.

Housing.

An incubator should be housed in a well ventilated room having an even temperature. Underneath a residence which is on high blocks would make an ideal incubator room. The incubator must be level and stand firm on the ground.

Management.

The machine should be washed and disinfected after each hatch, using Izal or some such germicide in the water The lamp should be filled and the wick and burner trimmed daily; an old tooth brush could be used to clean the wick.

Beginning of Hatch.

The machine should be heated up for at least a day prior to putting in the eggs, so as to regulate it and have the temperature even at 102 degrees with the bulb of the thermometer level with the top of the eggs. The eggs should be set in the morning. The thermometer should be tested for accuracy at the start of the season.

Turning and Cooling.

After having been set, the eggs should be left alone for 36 hours after which they have to be turned twice daily to the 18th day. The eggs have to be cooled every day commencing with 5 minutes the first, increasing the period to 10 and 20 minutes during the second and third weeks.

Testing.

It will be necessary to remove infertile eggs also dead germs during the hatch. This is best done on the 7th and 18th days.

Ventilation and Moisture.

The greater the ventilation the more moisture is required. If there is very little ventilation in the machine, the machine could be successfully operated without moisture.

BROODING.

The artificial brooding of chickens is a difficult process with an inefficient plant. The object of the breeder is to keep the chickens warm and comfortable and to wean them from heat as quickly as possible.

Systems of Brooding.

Two systems of brooding are in common use in the State, namely what is known as cold brooders and heated brooders. In both systems many types of brooders are used.

Cold Brooders.

The term cold brooding is a misnomer. Artificial heat is not supplied, but the heat of the body of the chicken is retained by means of cloths or flannel and a restricted circulation of air. This system of brooding has been practised for many years, but it is only in comparatively recent years that it has been used to any great extent by commercial poultry farmers. The illustration of the cold brooder will convey the nature of their construction. The cold brooder can be operated in brooder houses or rearing pens with an equal degree of success. Although the writer has operated the cold brooder with apparently equal results to the heated brooder, the latter is favoured. It can well be understood that the placing of chickens that have travelled a day or so under a cold brooder, which has to be warmed up with their own bodily heat will not be attended with as good results as would be the case if they were put under a heated brooder. Also that in cold bleak weather the heated brooder would offer advantages above that of the cold.

Heated Brooders.

There are many types of heated brooders, but they can be referred to as the box and the colony. The former system is not used to any extent in this State. This in the first instance may be due to the cost of installation of a suitable type and secondly to the general satisfactory results from the colony system.

Colony Brooder.

Where large numbers of chickens are to be reared the colony brooder appears to be the most economic and as effective as any other type. With this class of brooder several hundreds of chickens can be run together with little more trouble and attention than would be required for a lot of a 100 under any ordinary brooding system. This system also permits of a very much freer movement of chickens once they have been educated as to the source of heat and assists in the retention of that keenness in life that is essential to health and growth.

Five hundred chickens should, however, be the limit in any one colony brooder, but possibly 100 less would give better results. It is also generally a sound rule to depreciate the capacity claimed for brooders by most manufacturers.

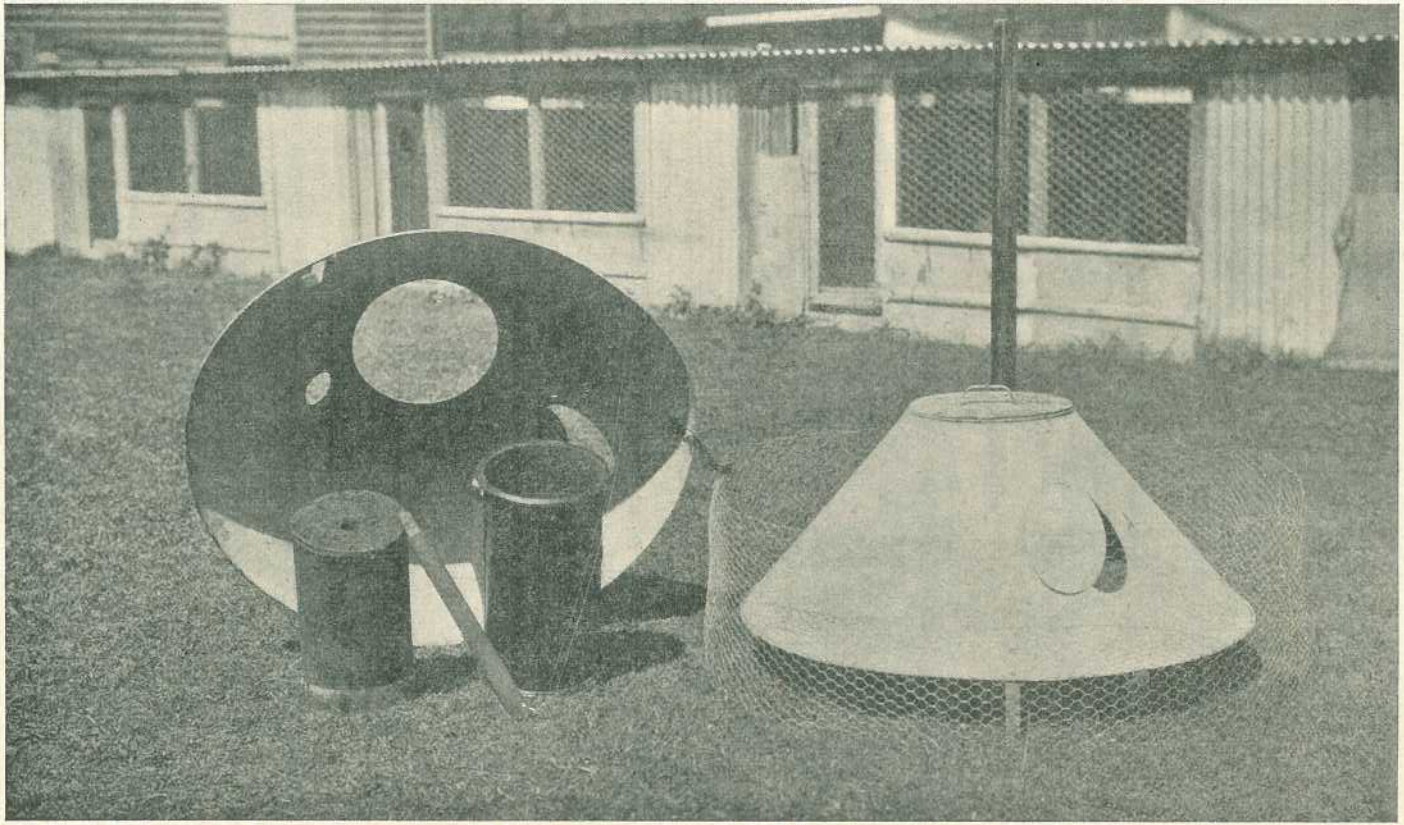


Plate 11.

A SAWDUST-HEATED COLONY BROODER.—Showing fire bucket filled with sawdust which is fitted into the cylinder on right. Note core in centre of bucket for draught.

The colony brooder consists of a heater with a metal hover for the purpose of deflecting the heat. The fuel used may be coke, sawdust, kerosene, or electricity. Whatever type of colony brooder is used it should be housed in a special brooder house. It is possible to operate them in open-fronted houses by cutting off ground draughts but it will be readily understood that when such is the case considerably more fuel is used. In the case of kerosene and electricity-heated brooders the increase in the costs of heating in open-fronted houses would be considerable. With the sawdust and coke brooders costs are not excessive, but the great disadvantage operating in open-fronted houses is to keep the heat at a uniform temperature. It is found in practice that they will burn out within a period of 12 hours and in some cases less with the consequent chilling of the chickens.

A suitable sized building to house a 500 colony brooder would be one that measured approximately 14 feet by 16 feet and was at least 6 feet high. The roof may be either a hip-roof or skillion. The building should be lined and ceiled and provided with ample light. It should be built to face north-east or north and arranged so that the sunlight can be freely admitted. Lighting through glass is desirable in bad weather, but direct sunlight is essential to admit of the ultra-violet rays. Failing this, cod liver oil is an essential to all chicken-mashes, in order to supply Vitmin D. A few weeks of brooding without sunlight or cod liver oil would soon result in leg weak chickens. Sunlight is the cheaper.

The house may be built of timber or iron. Iron is to be preferred, being of a more lasting nature and offering less harbour for vermin. The lining and ceiling should, for preference, be of $\frac{5}{8}$-inch tongue and grooved pine, but for economy wheat sacks sewn together and whitewashed will serve. The floor should be concreted and a thin concrete wall sunk into the ground to a depth of 18 inches. This wall prevents rats burrowing under the floor, while the concrete floor is readily cleaned.

Temperatures.

In heated brooders temperature is a very important factor. If insufficient heat is supplied the chickens crowd together. The correct heat is the only method by which this can be prevented. Overheating is also to be avoided on account of its weakening effect and the difficulty that will be experienced in weaning from the brooders. The general comfort of the chickens is a sure index that the temperature is fairly satisfactory, and if the droppings are well distributed under and around the hover in the morning, it is proof that the chickens have been fairly comfortable. When the chickens are first put into the brooder they come from a nursery in the incubator which generally has a temperature of at least 90 degrees and it is as well to start your brooders at this temperature, gradually reducing it until heat can be dispensed with in from 4 to 6 weeks.

Ventilation.

With some types of brooders many chickens are lost through lack of ventilation and over-crowding. Brooders which are usually made to hold a 100 day-old chickens are generally too small for the same number of chickens a week old. It frequently happens also that the attendant makes no allowance for additional ventilation with the growth of the chickens, and, although he has been successful in rearing them to the age of one week, they then start crowding and dying. The lack

of ventilation has a great weakening effect on both young and old stock. It causes the young to crowd, and renders the older birds more susceptible to disease. When chickens have crowded they present a wet appearance in the morning, to which the term "sweating" is applied. Sweating is not the cause. The wetness is caused by the condensation of the moisture content of the breath which would have been carried away if proper ventilation had been provided. Chickens which have been overcrowded rarely recover from the ill-effects, and it should be avoided at all costs.

In brooding under any system the following are the essential points:—

(1) Limited range, increasing with age.

(2) Sufficient heat, which should be reduced as early as possible.

(3) Ventilation, which should increase with age.

(4) Correct accommodation. What is just enough room for 100 day-old chickens rapidly becomes too little as they grow.

(5) Never attempt to brood chickens of mixed ages.

Placing Chickens in Brooders.

When chickens are placed in brooders the floors should have a light dressing of sand or soil to absorb any excreta and to give the chickens a good footing. A small amount of litter in the nature of soft straw or chips will provide exercise and tend to keep the chickens active.

With both hot and cold brooders their liberty should be restrained for a start. This can be done by erecting a barrier of wire netting around the brooder, increasing the area day by day. At the end of about one week they can be given the liberty of the brooder house. With the cold brooder the netting should only allow a range of two or three inches for the first day. With the colony brooder the range will depend upon the heat given off by the brooder.

What is necessary is to educate the chickens as to the source of heat. When this is done to encourage them to take as much exercise as possible by ranging over the floor of the entire brooder house.

Most breeders have outside runs to their brooder houses and the chickens are allowed out in them after they are about a week old. Outside runs are not essential if the brooder house is constructed to permit of abundance of light and sunshine. However, when runs are provided the chickens should be driven in after they have been out for an hour or so upon the first occasion.

They may be allowed out again in the course of an hour or so. This should be repeated in order that the chickens will learn to return to the brooder house and avoid to a large extent the possibility of their being caught out in a rain storm or staying out too long and becoming chilled.

Sanitation.

Cleanliness in every operation is essential. Insanitary conditions not only pollute the atmosphere of the brooders but are frequently the cause of the rapid spread of serious diseases in baby chickens. In very young chickens Bacillary White Diarrhoea is responsible at times for heavy mortality. The chickens are very subject to this disease within the first ten days. The organism responsible is voided in the excreta,

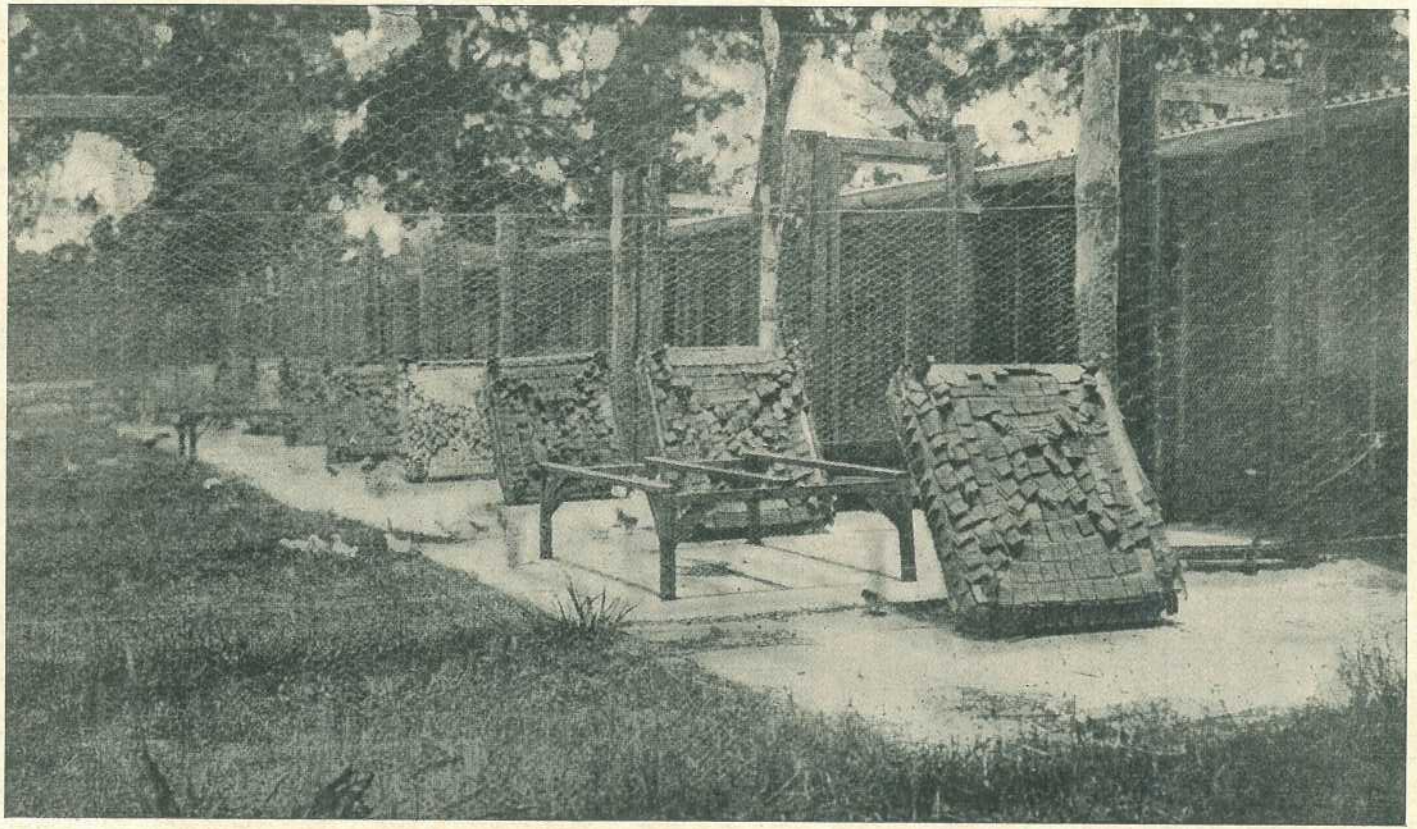


Plate 12.
Cold Brooders.

consequently it will readily be understood that a few diseased chickens could be responsible for the spread of the disease among the whole brood. This fact emphasises the advisability of the destruction of apparently sick chickens and the regular and frequent cleaning of brooders.

Coccidiosis, another disease to which chickens are subject, is spread through the medium of the droppings. With the former disease some affected chickens are the result of affected parents and when hatched are already diseased. With coccidiosis the chicken contracts the disease after hatching. Many adult birds are affected with coccidiosis. The organism is therefore easily carried upon the feet of the person attending them to the brooders. Strict sanitation and the application of precautionary measures gives reasonable assurance of protection against the disorder. Brooder houses should be cleaned out every second day and the sleeping quarters daily.

Weaning.

When chickens are from 4 to 6 weeks old it is generally necessary to remove them from the brooders to make room for others. This is also necessary to protect the soil from becoming too foul and the chickens too soft by prolonged supply of heat. Correct brooding will materially assist the weaning process as the heat should have been gradually reduced.

The chickens were trained in the early stages of brooding and training again is essential. Poultry are largely creatures of habit and can generally with care be trained to act as required. When once they form a habit—good or bad—it is difficult to alter. A little time spent in seeing that chickens take to their new quarters during the first few nights will amply repay the poultry keeper and prevent losses that occur when growing chickens crowd into corners, etc.

Chickens may be placed in permanent laying quarters or colony houses when they are to be weaned. The permanent house may be an intensive laying shed or a special colony house. The colony house is an ideal system provided that it is situated on clean land, and that the colony is not contaminated with the droppings of adult or diseased birds.

The number to be put out together, of course, varies with the accommodation available but larger flocks than 100 are not recommended; 50 would be safer.

A good rearing house for 100 chickens should be at least 10 feet long and 8 feet deep—this, of course, with free range. The house should be 5 feet high at back and 6 feet high in front. Ventilation should be provided by leaving a space between the top of the back wall and roof of three inches. As a protection from the south-easterly weather at least four feet of the eastern front end should be covered with iron. The front should be netted and provided with a gate in order that the birds can be shut in over night as a protection from foxes, etc.

General Management.

When the chickens are taken from the brooder quarters and placed in houses to be weaned they are too young to perch of their own free will. Various arrangements have to be made to prevent crowding. Some breeders bed them down on straw. The straw needs to be fairly

deep and loose and well heaped up in the corners of the house. The chickens appear to be content to snuggle in the straw instead of making warmth by crowding together. It is then only necessary to go around in the evening with a fork and loosen the straw up. In the shaking the droppings fall on to the floor and are readily cleaned up. With this system of weaning perches must be erected later and the birds allowed to take to them at will.

Another system of weaning, and one that educates the bird to perch at the same time, is to erect a wire netting platform about 6 inches from the ground with a netting run up. On the top of this frame several strips of 2 x 1 timber are attached. The chickens at night are not allowed to rest anywhere but upon this platform. They certainly crowd together for a start but soon spread out. The netting allows for a circulation of air and they experience no ill-effects. It is necessary to watch the chickens for the first few nights; but immediately they have settled down they can be left.

In erecting this platform it is essential to make it the full width of the house and to place it at the closed end.

The chickens as they develop must be thinned out. No hard and fast rule can be laid down as to when this thinning out should be done, as the work is dependent upon the space available.

THE FEEDING OF CHICKENS.

In the feeding of chickens it is most important to bear in mind that nature has provided for the first day or so of the chickens life, as, just prior to hatching, the balance of the egg yolk is drawn into the abdomen of the chick. Most breeders allow at least forty-eight hours to elapse before feeding. Chickens fed earlier are subject to bowel trouble. Prolonged starving, however, should not be practised, as it has a weakening effect, from which many chickens do not recover.

Requirements for Growth.

Chickens make very rapid growth in the early part of their life. This development is most rapid during the first six to eight weeks, consequently rations having a relatively high protein content are necessary to give the best development. From experimentation it has been fairly definitely established that rations having a crude protein content of 20 per cent. should be used during the first six to eight weeks, and after that period should be reduced to 15 per cent. The protein requirements of a chicken do not alter as sharply as is suggested, but these periods and protein content are suggested as meeting the practical needs of the poultry raiser.

It is a common practice among poultrymen to cut down the protein content after the chickens are about sixteen weeks of age, in order to delay sexual development. This is desirable if the birds are maturing too rapidly, but development can be controlled to only a very limited degree. Excessive protein feeding must be guarded against, as it is likely to cause deposits of urates in the ureter, kidneys, and other organs, as well as placing an undue strain upon the liver.

It is generally conceded that milk is the most desirable protein feed for chickens and growing stock, but owing to its cost its exclusive use is not possible. Wherever possible milk should form a portion of the ration. It may be given in the form of curds, semi-solid milk,

butter milk, or butter milk powder. As a drink milk is excellent, but it is objectionable owing to the difficulty of keeping chickens clean. Butter milk powder is suitable, owing to the ease with which the powder may be incorporated in the mash, thereby controlling the kind of food that each chicken consumes. It has, however, no definite advantage from a feeding value point of view apart from its concentration. Proteins build up the flesh, but at the same time a bony framework is necessary. Analysis of the chicken at different ages, according to Halman, indicates that it was particularly important to allow for the mineral requirement from the eleventh to the twenty-fourth week. In all experiments conducted by the Department, the increased mineral intake has been allowed for by the addition of bonemeal to the mash at eight weeks of age, and by allowing the birds free access to grit (shell and hard).

Food Consumption of Chickens.

One is often asked how much food should be given to chickens. Probably no better reply can be given than the publishing of a table from actual experiments conducted in this State.

FOOD CONSUMPTION AND WEIGHT OF CHICKENS.

Age.	LEGHORNS.		AUSTRALORP.	
	Weight of Chickens.	Food Consumed.	Weight of Chickens.	Food Consumed.
	oz.	oz.	oz.	oz.
Day old	1·3	..	1·36	..
1 week	1·97	1·64	2·14	1·53
2 weeks	3·31	3·36	3·61	3·32
3 weeks	5·31	4·80	5·84	5·05
4 weeks	7·61	6·46	8·68	7·20
5 weeks	9·94	7·58	12·08	6·89
6 weeks	12·92	8·96	15·86	10·62
7 weeks	16·65	8·65	20·17	13·95
8 weeks	20·41	13·29	25·31	15·05

The variation in weight from week to week and the ever-increasing amount of food required suggests the undesirability of indicating what should be supplied.

The food requirements increase week by week, and a system of feeding where the growing birds may consume all they require is the most desirable.

The all-mash method of feeding chickens by reason of the fact that the kind of food consumed is easily controlled, and that it is always in front of the birds, is suggested as being the most desirable. All-mash should be placed in shallow trays about 1 inch in depth during the first few days. The trays are then increased to a depth of 2 inches, and by the end of the first week troughs about 4 inches wide may be used. At this age chickens will commence to scratch, scattering the feed from the trough. This can be prevented by placing a piece of netting on top of the mash loose enough to sink as consumption takes place. During the first week 8 feet of feeding space should be allowed for every 100 chickens, and later increased to 12 feet. Prior to the mash being covered with netting it is important that only a little food at frequent intervals should be placed in the trays in order to avoid wastage.

In fact, the frequent feeding of all-mash appears to induce a greater food consumption, with the result of better development.

Breeders who do not desire to feed an all-mash could make use of commercial chick grains and growing mashes. These could be fed as directed by the manufacturers. It has been the general custom for many poultry raisers to use scratch grain only for a short period of a chicken's life, but in the view of the more satisfactory results obtained by feeding a ration of a relatively higher protein content than chick mixtures usually have, early mash feeding appears essential.

Chickens may be reared satisfactorily upon moistened mashes and grain from about two weeks of age, but the mashes must be fed at frequent intervals. This system offers the advantage of utilising milk as a medium of moistening the mash when such is available. The feeding of dry mash, however, is suggested as a safer method of feeding, as the possibility of food becoming sour, with the probable consequence of bowel trouble among chickens, is avoided.

Suitable All-mash Mixture.

The following mashes have been used successfully in experiments conducted by the Department, and are suggested as a basis upon which to work. At times it may not be commercially sound to stick hard and fast to the ingredients suggested, but from the table of analysis supplied it will be possible for the breeder to compound other suitable mixtures.

Ration.	1–8 Weeks.	8 Weeks to Maturity.
Maize Meal	56	63
Bran	12	13½
Pollard	12	13½
Meat and Bone Meal	6	5
Dried buttermilk	14	2½
Salt	1	1
Cod Liver Oil	1	1
Lucerne Meal	..	2½

FARM FACTORS INFLUENCING MARKETING.

The question of marketing has to be considered in relation to—(1) the egg, (2) table birds, including birds specially reared for table purposes, stock that have ceased to be profitable, and young males, and (3) poultry manure.

The latter product is not of great importance at present, as the demand for it is very limited, and in many instances it is found more profitable to use it as a fertiliser for the growing of green feed than to sell it. At the best sales possible, it little more than covers the purchase price of material used for scratching purposes.

Marketing, particularly in the first stage, is most certainly a function which definitely concerns the individual poultry-keeper. It is not merely the task of the Egg Board or the commission agents. The poultry keeper considerably influences the ease of marketing by the retention of the quality of the egg. If every consideration is not given to the preservation of the quality of the egg as laid, the task of marketing is made most difficult. Producers should therefore remember that the earlier the egg reaches the consumer after being laid the better.

The principal factors influencing successful marketing are:—

(1) The production of unfertile eggs.

(2) Clean and ample supply of nests. (Eggs when laid are moist, and dust and other matter readily adhere.)

(3) Gathering at frequent intervals to prevent eggs becoming soiled.

(4) Collecting in clean and dry receptacles.

(5) Storage (pending marketing) on the farm in cool quarters free from draughts and foreign odours.

(6) Regular and frequent despatch to market—twice weekly during warm weather; once weekly during winter.

(7) Using dry, clean fillers, and cases free from moulds when packing for market.

Egg production has outstripped the local consumption at present, and producers must make every effort to encourage a greater demand by careful attention to the quality of the egg, as quality plays the most important part in demand. It is economically unsound to continue to produce eggs in excess of the ability of the market to absorb them.

The basis of the poultry industry is egg production, for which breeds such as Leghorns, utility Orpingtons, &c., are bred, the former variety predominating. Under these conditions the class of bird which forms the bulk of poultry sold for table purposes are young cockerels of both light and heavy breeds and hens culled on account of their age, or for other reasons which have rendered them unprofitable as egg producers.

The individual producer has to give consideration to such questions as the time of marketing, conditions of stock, grading, and crating.

Cockerels constitute possibly the majority of the birds that a producer has yearly for sale, and present greater difficulties by reason of the fact that they have to be disposed of during a relatively short period. They may be sold at various ages, each age having its special advantage. Although the majority of the buyers prefer young stock for table purposes, they will not pay high prices for small half-grown birds when larger hens are available, which would proportionately be much cheaper. Having this in view, it is not a desirable practice for the producer to send half-grown cockerels to the market and expect to receive good prices for them during the period when the great majority of our old hens are being disposed of on account of age. This period varies, but usually extends from some time in January until April. Young half-grown birds will find a ready sale from August until the Christmas season. After that period young stock should be well grown to command good prices, but not kept until they become staggy, which is indicated by spur growth.

It is necessary to give some attention to the general condition of the birds to be marketed. No good is done by sending on stock to sale-room low in condition, especially when it is considered that, in old hens particularly, there are only a few in such a state. It is not suggested that any attempt be made to fatten this class of bird, as they generally are constitutionally unfit, and the producer's ends would be better served if they were destroyed, as it may happen that these particular birds will be those examined by prospective buyers.

Cockerels, however, should receive some consideration and not treated, as they too frequently are, as an encumbrance and not worth feeding. If they are to be kept for any time at all they should be well treated and receive the same attention as the pullets; they have got to be grown, and the cheapest and quickest way of doing this is to feed them well. They require, for economical growth, the same ration as the pullets. They should be kept free from intestinal worms and disposed of as early as possible.

DUCKS.

Breeds.

Heavy—Muscovy, Aylesbury, Pekin, and Rouen.

Light—Indian Runners, Orpington, and Khaki-Campbell.

The heavy breeds are principally bred for table purposes, whilst the light breeds are bred for egg production.

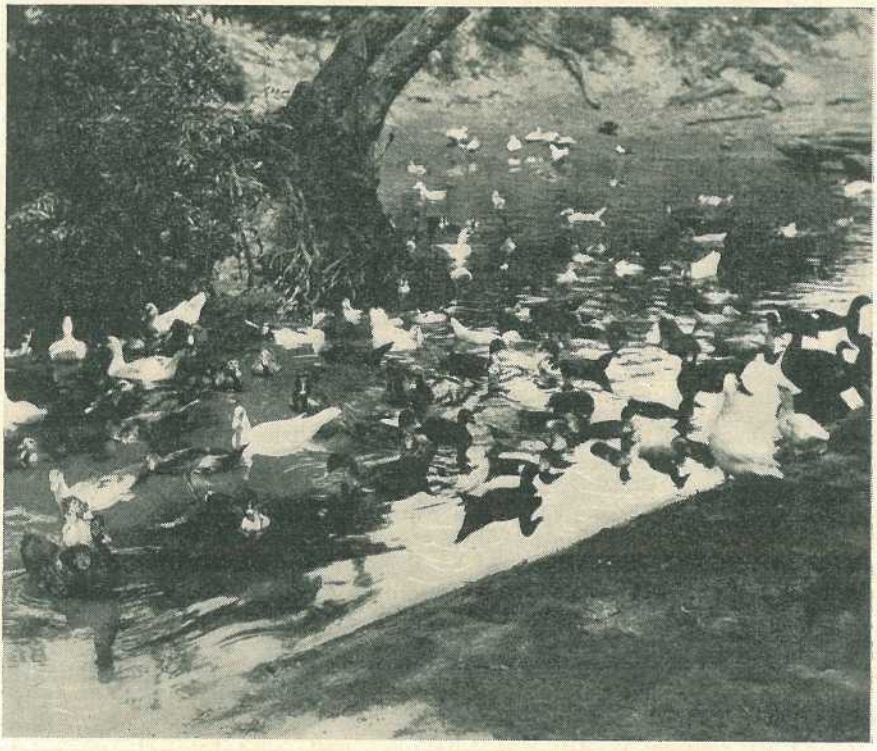


Plate 13.
Ducks in natural surroundings.

Housing.

Ducks do best on well-drained land having a sandy natured soil, land having a gradual slope to the north or north-east being ideal. Houses can be built similar in design to poultry houses, a lean-to building facing north or north-east, open fronted with a ventilation space at the top of the back wall. The roof need not exceed 4 feet in height

at the back. It is not necessary to erect expensive buildings for the accommodation of ducks. Allow 2 square feet of covered floor space for each duck. It is essential for the floor to be dry at all times; a damp floor in the duck house will cause many deaths among the birds. To ensure having dry floors, build up the floor several inches above the level of the surrounding land, and also excavate drains outside the house to prevent flooding during the wet season. A good hard earth floor is satisfactory. To facilitate cleaning, sprinkle sand over the surface. The floor should be covered with litter, such as grass or straw. Nest boxes should be provided, these to be placed on the floor against the walls. If the ducks have access to a swimming pool, it will be necessary to confine them to the house or netted run until about 9 o'clock in the morning, as by this time they should have finished laying: otherwise many eggs would be laid in the pool. A swimming pool is not essential. However, ducks keep in better health, have more exercise, are more free from external parasites, and the plumage is cleaner when they have access to a pool. Better fertility also results when water is available for swimming purposes.

Breeding.

It will be most profitable to adopt the same breeding season for light breed ducks as for poultry, namely, from June to September. Ducks hatched during those months will commence laying when egg values are high, and continue for about 12 months before moulting. Heavy breeds can be successfully bred from at any time, providing cheap foodstuffs are available. Care must be exercised in the selection of breeding stock, and particular attention must be paid to size and type. Any bird showing breed defects should be rejected. The number of females to mate with each male varies considerably with the age of the male, the size of the run, and whether the birds have access to a pool. On the average mate between six and eight females with each male, light breeds; and from four to six females with each male, heavy breeds.

Incubation.

The period of incubation is 28 days for all breeds with the expection of Muscovy eggs. These take 35 days to hatch. The incubation of duck eggs is best done with ducks. If broody hens are used, it will be necessary to sprinkle the eggs with water regularly. Also by sprinkling water on the ground close to the nest, when the hen comes off, she will dust bath, and the feathers will be moistened when she returns to the nest. The duck, however, will moisten her feathers sufficiently before returning to the nest. With artificial incubation, the temperature should be about one degree lower than that for hen eggs, namely, 102 degrees. After setting the eggs should not be disturbed for 48 hours. After this period they should be turned twice daily, and cooled daily. Each time the eggs are turned, before being returned to the machine they should be sprinkled with warm water. This sprinkling is essential, because the eggs require a lot of moisture. The eggs should be tested and infertile eggs and dead germs removed. The machine should not be opened after the ducklings commence chipping, until the hatch is complete. Ducklings take longer to break out of the shell than chickens.

Rearing.

Ducklings are very hardy and easy to rear, therefore the rearing can be carried out by artificial methods. Cold or fireless brooding will prove satisfactory. Any type of box, well ventilated, with flannel hanging down and plenty of dry straw or grass on the floor will be suitable.

However, the ducklings must not be too crowded, and they should receive more room each week, because they grow very rapidly. Ducklings are best reared in small numbers. At about four weeks old they can be placed in houses.

Feeding.

Ducklings require no food for 48 hours after hatching. During this period they should have water, coarse sand, and charcoal constantly before them. A mash that will give good results, if fed from the first meal until they are about four weeks old, is prepared by mixing together:—Pollard, 10 lb.; maizemeal, 8 lb.; dried buttermilk, 2 lb.; bonemeal, ½ lb.; fine salt, 4 oz. If this mash was mixed, the amount for each meal could be moistened as required. Feed several meals daily—a little, and often, is a good motto. After four weeks they could be fed a mash similar to that fed to the adults. Adults' mash:—

	Per cent.
Pollard	55
Bran	25
Maizemeal	10
Meatmeal	10
Bonemeal	1
Fine salt	1

Growing stock should be given three meals daily. With adults, a small meal of whole maize could be fed in the evening in addition to the mash. In fattening ducks, cheap foodstuffs in the form of potatoes, pumpkins, &c., could be boiled and added to the mash to the extent of 40 per cent. Chaffed young greenstuffs should be added, but when, other cheap foodstuffs are used, it should be omitted, as otherwise the mash would be too bulky.

Water.

Ducks must always have access to drinking water. This is most important with ducklings, and the water vessels should be deep enough for them to submerge their heads. Many ducks die annually, and this may be attributed to lack of water.

Common Ailments.

Colds:—Symptoms: Running nostrils and watery eyes; Cause: Damp camping quarters; Remedy: Keep the floors of the houses dry.

Staggers:—Symptoms: Ducklings stagger about and fall on their backs before dying; Cause: Drinking to excess, after a shortage of water. Remedy: Keep a constant supply of water before the ducklings at all times. The water vessels should be so constructed to prevent the ducklings swimming during the first week, otherwise they may get cramps. This applies particularly to cold weather.

TURKEYS.

Suitable Localities.

The farm, by reason of offering turkeys ample range, enables them to gather considerable quantities of their own food in the form of grass, insect life; and, when stubbles are available, grains. Districts in which the soil is of a light nature and undulating are more suited

to turkey raising than low-lying, wet country. Scrub country offers ideal conditions, especially where there is a good supply of green feed and water.

Housing.

It is natural for turkeys to roost in the open; but, when there is no suitable belt of timber to afford protection, certain housing methods should be adopted to obtain the best results. These houses need not be very elaborate, but should be so constructed as to permit of a free circulation of air. Old open-fronted lofty barns are well suited for this purpose, but in districts in which turkeys have to be protected from the fox it may be advisable to adopt the following system:—Enclose an area of land, about half an acre, with a 6-foot netting fence, and build a shed in the middle. This shed should face north, and be open in front with a 6-inch space between the back of the top wall and roof. The dimensions would vary according to the number of birds to be housed, but each bird should have a floor space of 15 square feet. The house should be 9 feet high in front and 7 feet at back. Perches should be about 3 feet high, all on the same level and 3 inches wide. Suitable nests could be placed around the enclosure and made to look as natural as possible with the help of bushes. The turkeys could be confined to these quarters at night, and allowed range during the day.

Breeding Stock.

There are several varieties of turkeys, but the American Bronze holds pride of place. This is a large and hardy breed, which has supplanted most other breeds and appears to be well suited to our climate as well as our markets. Mature stock should only be used for breeders, two years and over being more suited than stock only a year old. One vigorous tom (male bird) can be mated with as many as ten hens, but probably six to eight females on the average would give better results.

In selecting, strength and vigour, coupled with the knowledge that the stock comes from healthy parents, is of primary importance. The head should have a clean and healthy appearance, body compact and long. Sturdy shanks and strong toes with fair-sized bone indicating stamina.

Extra heavy show specimens do not make the best breeders. What is required is stock in good hard condition, and not fat; on the other hand, stock that are thin should never be used, as the lack of condition may be due to some inherited weakness. Hens weighing 16 to 18 lb. and male birds 25 to 30 lb. in fair condition will be found to give satisfactory results.

Inbreeding should be avoided, and new toms from healthy parents, introduced occasionally. As a further precaution these should be isolated for two or three weeks. The best hens raised on the farm should be reserved for breeding purposes.

Hatching by Natural Methods.

Vermin must be carefully guarded against, and when nesting in enclosed quarters both the hen and the nest should have a good dusting with insect powder for a start, and again a few days previous to hatching. By taking these precautions the young poults will be assured of a start in life free from vermin, which is a great aid to successful rearing. A turkey will only cover properly fifteen to eighteen eggs, and it is

a good plan to set a few eggs under broody hens at the same time as the turkey is set, and when hatched to give all the chicks to the turkey, as she can comfortably mother about twenty-five. Food, water, and grit should always be handy to the sitting hen, and if the tom is at all savage it is advisable to protect the nest and young.

Rearing.

It is found best to let turkey hens mother the chicks. When hatched, the young poults should be left undisturbed until thoroughly dry, they then may be temporarily removed to induce the turkey to remain on the nest, if it is found that the eggs are hatching irregularly. After the hatch is complete a coop which affords protection from wind, rain, and dampness should be provided. This coop should permit of a free supply of air, and be moved on to new ground daily. The hen and poults should be confined to the coop for ten days to a fortnight, but if the weather is fine the poults may be allowed a little liberty when the dew is off the grass; after this period it is generally safe to allow range, providing the grass is not too long and wet. When they have reached the age of five weeks entire liberty can be given, allowing them to roost in barns, houses, or trees, according to the policy adopted.

Feeding.

No food should be given for at least forty-eight hours after hatching. Hard grit, charcoal, and water should be the first food provided. The hard grit assists in mastication, and charcoal has no equal as a bowel corrector. Turkey chickens will gorge themselves if allowed, and this gorging is responsible for a considerable amount of trouble. Turkeys in their wild state would gather their food very slowly, and it is found best to reproduce these conditions as far as possible by only feeding the young chicks a little at a time, and fairly frequently. This prevents them from overloading their digestive organs and helps to retain that keenness of appetite which is essential to the health of the birds.

Stale bread soaked in milk and then squeezed fairly dry is the most handy food on the farm, and also gives excellent results. This can be fed five times a day for a few days, and variety can be made by the replacement of some of the meals with chick grains, mashes of bran and pollard mixed with milk, to which can be added a small amount of minced meat and tender green feed. This mash should be made crumbly and not sticky. When on range the quantities of food will vary according to what they can gather for themselves, but surplus milk can be fed at all times either thick or fresh, but it is as well to always feed it in the same condition. Green feed should be fed in abundance to both growing and adult stock, but where range is allowed on good green pasture it is not so important.

Grains should always be fed at night to induce the flocks to return to their camps. Oats, maize, and wheat are suitable for this purpose.

In the management of turkeys, especially in the rearing of young stock, cleanliness is essential. Food should not be allowed to lie about or become decomposed, and a strict outlook must be kept for vermin of all sorts.

THE GOOSE.

The farm, with the facilities for free range and an abundance of green feed, is the natural habitat of the goose. Although the keeping of geese on a large scale is not recommended, a small flock upon the farm will be found economical and profitable to keep.

There are two breeds of commercial note kept in this State—the Toulouse and the Embden.

The Toulouse.—This breed originated in France. It is grey in colour with the exception of the lower portion of the body, which is white. The bill is pale yellow and legs and feet reddish-orange. The bird is large in frame and loosely feathered, giving it a massive appearance.

The female is a fair layer and a good mother. The young are hardy and easily reared. The standard weights are—Gander, 28 to 30 lb.; goose, 20 to 22 lb.

The Embden.—This is a white goose with bright blue eyes, bill and legs of orange colour. It is a large and compact goose. The females are excellent layers and good mothers. The young goslings are very hardy and make rapid growth.

Standard weights are—Gander, 30 to 34 lb.; goose, 20 to 22 lb.

Management of Breeding Stock.

Only strong well-developed birds should be used. This is particularly important with females, and no birds under two years of age should be used for breeding. Geese form strong attachments, and consequently unless they have been running together for some time do not mate readily. The geese and gander that are to be mated should be penned together some time before the breeding season, with the object of overcoming this difficulty. One male should be used with two to four females, depending upon the age and condition of the gander.

Very little housing will be found necessary, but they must have dry bedding and shade. Breeding birds can, with advantage, have access to a pond; in fact, a pond or stream is desirable for all adult stock.

Quite a considerable quantity of the ration of adult geese can consist of green feed. If the birds have access to green pasture a little grain during the evening will be sufficient. In order to induce laying during the breeding season a mash with similar ingredients to that used for feeding laying fowls should be given.

The laying of the goose varies with individuals. A good goose may lay thirty to forty eggs while others again may only lay ten. After laying the goose covers her eggs. It is a good plan to collect these eggs daily and so try and prolong the laying period. When once the goose goes broody, she can be given ten or so to sit upon and the balance given to broody hens. A hen will cover five or six.

Some breeders make a practice of taking away the young goslings as they hatch, owing to the slowness of hatching. If this is done the goslings should be placed in a warmly lined box and kept warm until the hatch is completed, when they can then be returned to their mother. These eggs take from 28 to 32 days to hatch, some even extend to 34 days.

A nest should be provided for each female.

Rearing Goslings.

Goslings need no feed for the first day or so; after that they may be fed bread soaked in milk and squeezed dry. This food should be given in small quantities five to six times a day, or if an ordinary growing ration is more convenient it may be used. After the goslings commence to feed a moist mash of bran, pollard, maize-meal, green feed mixed with milk, or failing milk water, should be fed four or five times a day, and continued for three weeks. When milk is not available, 5 per cent. of meat-meal should be added to the mash.

At two to three weeks of age goslings can be given their liberty, but must have abundance of green feed and water before them at all times. If the grazing is good, one feed of mash will be sufficient per day.

When goslings are three months of age they should be ready for the market, but three weeks before this they should receive a topping-off treatment. This treatment consists in confining the birds to small pens or sheds and feeding them three times a day upon a good mash. In penning it is advisable to pen together one complete hatch, as if this is not done some will fret and lose weight. They should at this age weigh from 12 to 16 lb.

PROTECTION OF NATIVE BIRDS.

The young Australian boy is responding splendidly to the nature study movement in our schools, but there are still some homes, even on farms, into which appeals for the protection of useful native birds and against unnecessary cruelty have not yet penetrated. Nest destruction and useless egg-collecting have happily become rarer, but the pea-rifle menace is still real, especially at holiday time. To its youthful owner, every innocent thing in fur or feather is an excellent target. And so where most of our beautiful and useful bush birds were once a common sight in flight they are now extremely rare, and those that remain are becoming victims to a gradual process of extinction.

The economic value of bird life is most evident on the farm, and it is fitting that it should be most appreciated there. In fact, protection of useful birds is almost instinctive with the true countryman. Shooting game birds for the pot, without indiscriminate slaughter, may be all right, but it is the height of folly to kill insect-eating birds for food, just as it is to attempt to excuse an unreasoning and barbarous lust to kill.

A study of the habits of insectivorous birds is well worth while. They destroy incalculable numbers of insects, in both their pupal and winged stages. Continuous shooting in any district will make useful birds shy of remaining in it; they fly further afield for feeding and breeding, and so the wise farmers suffers from the folly of the less enlightened. In some districts, flocks of ibis were once very common. They followed the plough along the furrows and fed greedily on upturned grubs, but now, through the thoughtlessness of some of the local inhabitants, only an odd ibis may be seen here and there filling its craw with cane crop pests.

Banana Growing in Queensland.

H. J. FREEMAN, Senior Instructor in Fruit Culture, and Chief Inspector of the Banana Industry Protection Board.

THE banana industry in Queensland, though not so extensive in acreage as a few years past, still provides the greatest production of any fruit grown in this State. The primary purpose of this contribution is to set forth the fundamental principles of banana growing in Queensland coastal areas. In view of the fact, however, that bananas are grown in Queensland over 1,000 miles of coast line, in some instances allowance must be made for specific differences occurring in widely separated districts.

HISTORICAL.

The banana, as a producer of food for man, is a plant of very respectable antiquity. Alexander the Great found it growing in India during the course of his campaign in 327 B.C. History tells us that it is sculptured on the monuments of ancient Egypt and Assyria of much earlier date. Southern Asia is believed to be its original home, and from there arose the curious legends connected with this fruit. It has been linked with the story of the Garden of Eden as being the tree of good and evil and the fruit of knowledge—hence the names given by the early botanists to the two best-known species: *Musa paradisiaca* and *Musa sapientum*. These still apply to the plantains and most of the tall-growing edible varieties. It is certain that at a very early date the banana was spread over the South Seas by the Polynesians in the course of their wanderings. To-day bananas are found in most countries enjoying suitable climates between the limits of about 29 deg. north and south latitude.

As the Cavendish is the most widely-grown variety in Queensland its distribution over the world from its original home in Southern China is of interest. In 1826 a few plants were taken to Mauritius, where they were greatly esteemed. In 1829 two plants were sent to England and grown and propagated in a hothouse. The Duke of Devonshire obtained one, and its progeny became features of interest in the Duke's garden at Chatsworth, for at this date the banana was a great curiosity to Europeans. The name *Cavendishii* was given to the variety after the owner's family name of Cavendish. In 1838 some plants were taken by the Missionary John Williams to the South Sea Islands, where their high-bearing capacity and low stature made them very popular. Since the Cavendish banana is self sterile and reproduces itself only by means of suckers, it is very probable that many of the Cavendish banana plantations established in the Pacific countries of to-day originated from the plant owned by the Duke of Devonshire over a hundred years ago.

CLASSIFICATION.

Botanically, the two divisions of the higher plants are the Dicotyledons and the Monocotyledons. The banana belongs to the latter, which division includes such diverse plants as bullrushes, palms, grasses, lilies, pineapples, &c. The family name is Scitaminaceae, which has three members—The *Musaceae,* comprising Musa (bananas), Ravenola, Strelitzia and Heliconia, all of which except the lastnamed can be examined in the Brisbane Botanical Gardens; the *Zingiberaceae* or arrowroot; and the *Cannaceae* or cannas.

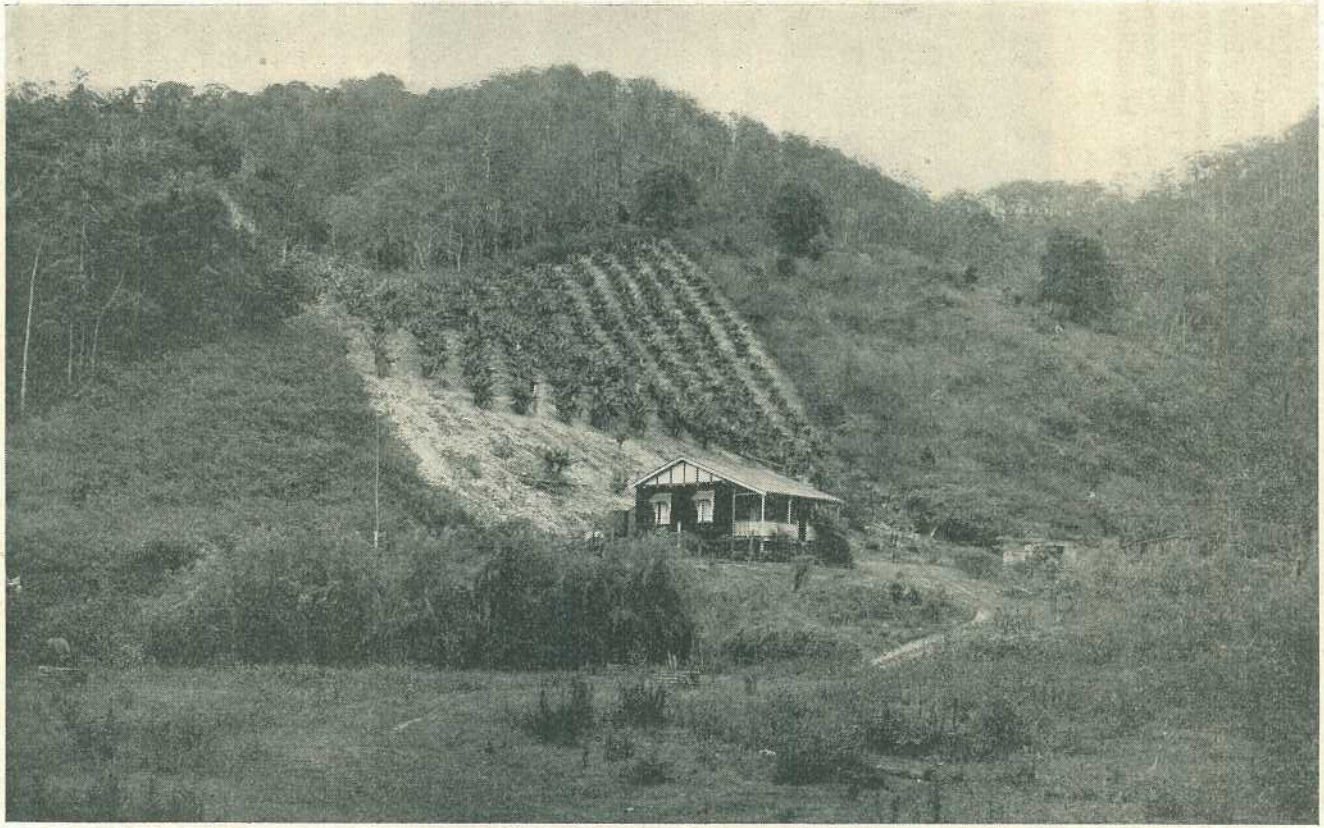


Plate 14.

THE BANANA GROWER'S HOME.—His first small plantation and his acres of fertile unimproved land, all to be brought under cultivation as time passes.

THE PLANT.

The banana is a tropical herbaceous plant growing at its best in its natural habitat—warm, moist, sheltered situations in the tropics, exposed neither to high winds nor low temperatures. Moderate heat, abundant moisture, and a well-drained soil are the conditions which suit it best. Some members of the genus *Musa* reproduce by seeds alone, others by both seeds and offshoots (or suckers), while others again are either entirely or almost completely sterile and are propagated by means of suckers only. These lastnamed types include most of the edible varieties.

Plate 15.
Seven year old Mont Marie plantation at Upper Currumbin.

The Roots.

A study of the banana root indicates the class of soil which suits it best. The long rambling roots, cordlike and fleshy, do not thicken and form wood with age. Although tough, they are easily damaged, whereupon they either die back or branch behind the damaged portion. Secondary roots are formed, but not to the extent of many other plants. The roots seem best adapted to free ranging through easily penetrated soil which will readily yield up an abundance of plant food. The delicate absorbing root-hairs can be seen along the section of the root just behind the root-cap. These hairs communicate with the vascular bundles which traverse the length of the root and carry the plant foods in solution up to the leaves where, through the agency of sunlight, they are elaborated into more complex substances. These latter are conveyed through other channels to the various parts of the plant to be utilised for growth and reproduction. Banana roots revel in a moist but well-drained soil, and will not tolerate stagnant water-logged conditions.

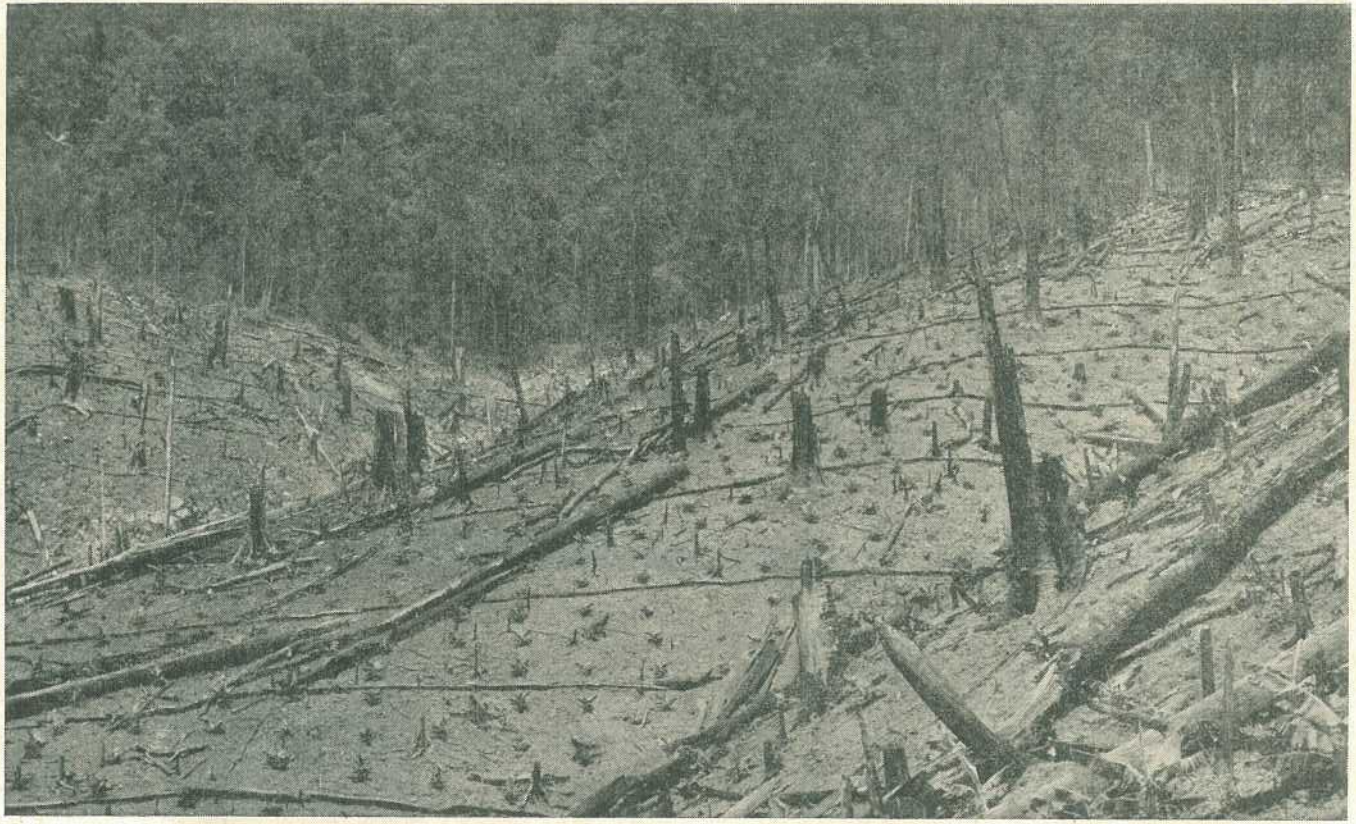


Plate 16.
A NEWLY PLANTED AREA.—Note logs placed across hillside to prevent erosion.

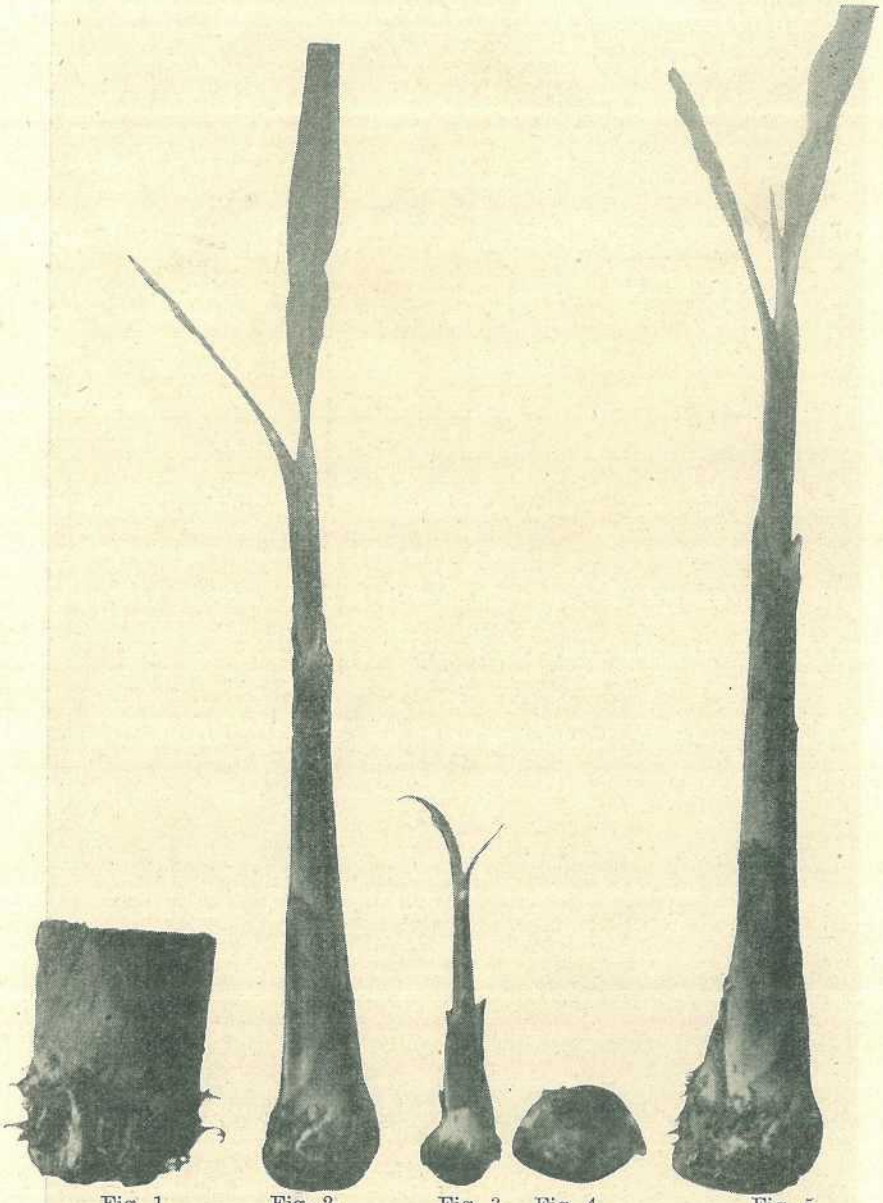


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

Plate 17.

PLANTING MATERIAL.—Fig. 1.—Butt, weight approximately 12 to 14 lb., trimmed down to 2 eyes (buds), one being more prominent than the other, if possible. Fig. 2.—Desirable type, well-grown sucker. Fig. 3.—Good type, younger sucker. Fig. 4.—Bit, trimmed down to one eye (bud). Fig. 5.—The correct method of trimming a sucker prior to planting. Note flattened base.

Under ideal conditions, the roots of the banana plant extend to a great distance. It is not uncommon to find shallow surface roots 10 feet away from the plant, whilst in a deep soil they will penetrate to a depth of 4 feet to 5 feet.

The Corm.

The true stem of the banana plant is the hard white portion of the bulb. From it arise the leaves which form the pseudo stem and whose bases form concentric circles around the growing point. From it also arises the inflorescence or flower stalk, which pushes its way into the open air through the tube formed by the base of the final leaf. From the corm also emerge the roots, whose vascular bundles can easily be traced into the ring of vascular tissue within its hard white substance. The corm is the storehouse of the plant. In it food is accumulated for the climax of the plant's life—the production of the bunch of fruit. The food supplies of the corm are also called upon to support the young suckers until such time as they have formed an individual rooting system and begun to forage on their own account. The structure of the corm is interesting, and a lot can be learned about the plant by cutting a young corm into sections. It will be seen that there are distinctly marked central and surrounding areas, between which is a ring, or more correctly what is practically a sphere, of tissue, somewhat transparent in appearance. The bundles from both roots and leaves can be traced into this tissue. The young sucker bud also arises from this ring of tissue, and several buds (eyes) can often be seen thrusting their way outward through the surrounding tissue. This shows that the young suckers are very directly connected with the food-absorbing and manufacturing organs of the plant.

The foregoing indicates why it is necessary to encourage a vigorous growth in the early stages of the plant's life and an uninterrupted continuance of the same until after the bunch has been thrown. It also suggests why surplus sucker growth should be kept down so as not to deplete the plant's own food store too seriously.

The Leaves.

The leaves have a most important function to perform in the life of the banana plant in so far that they may aptly be termed the factories in which the plant foods absorbed from the soil by the roots are elaborated and manufactured into a form suitable for use by the plant. Without the leaves the plant could not live. Similarly with damaged leaves, it becomes less strong, which fact emphasises how important it is for commercial plantations to be well sheltered from heavy winds which strip the leaves to ribbons and seriously curtail the complete exercise of the leaves' functions.

The part of the plant usually referred to as the pseudo stem or trunk is made up of the leaf-bases, which adopt a tightly-packed form to protect the younger leaves and the flower in their early stages and support them clear of the ground.

The leaf proper consists of a mid-rib and blade. It springs from the growing point of the corm, and ascends through the pipe made by the preceding leaf-base in a very beautiful roll. Observation will show that one side of the blade is longer than the other, and the longer side folds over to form a cap, thus effectively preventing any water from entering the interior of the roll and so damaging the growing point. On

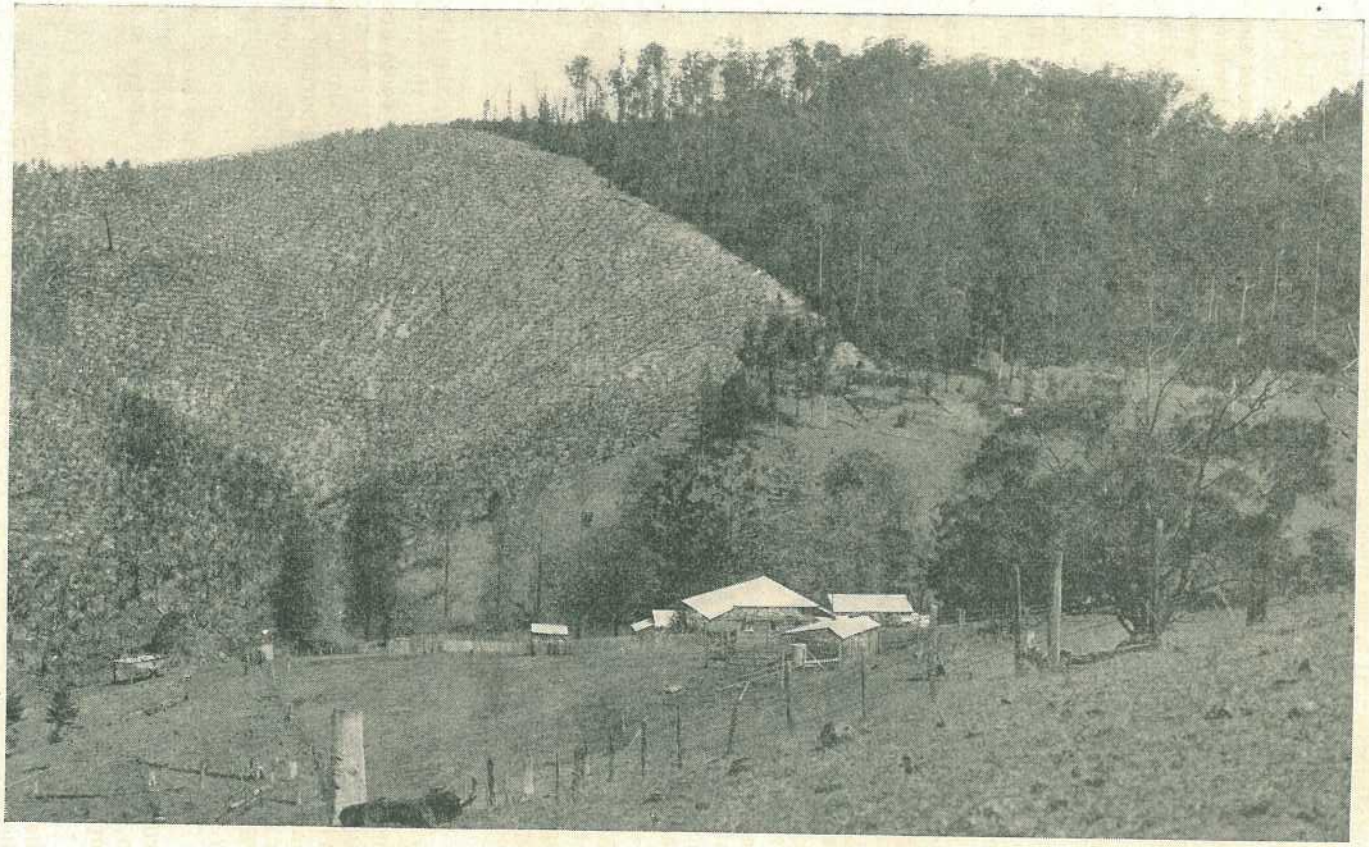


Plate 18.
Bananas and Scrub Lands, Lacey's Creek, Dayboro' District. Dairying and banana-growing makes a profitable combination.

reaching the open, the leaf gradually unfurls, whilst another leaf is pushing its way upwards. By providing the cap, above referred to, nature prevents water entering the growing point of the corm, at the same time the strong grooved petioles or leaf-stalks conduct rain and dew to the outside of the new rolled leaf following. In the emergence of the young leaves and of the bunch it seems likely that water acts as a lubricant, and greatly assists this process. It is claimed that in very dry weather when bunches become choked in the throat of the plant, the trouble can be largely overcome or even prevented by pouring water into the head of the plant. Numerous tests appear to support this claim, and all growers are familiar with the improved bunch-throw and the flush of new leaves after a good shower of rain following a dry spell.

At least the two final leaves are produced on the flower stalk, and not directly from the corm. This will be seen when the pseudo-stem of a bearing plant is carefully cut open and the leaf bases removed one by one. These two leaves are shorter than those preceding them, the final one being extremely short and having a definite tendency to hang over the flower bud, thereby protecting it from the sun. In addition to these two true leaves, the flower stalk bears one or more bracts, which soon shrivel and dry out.

Flowers and Fruit.

In the banana the male and female organs in the same flower do not function. In some flowers the male organs are degenerate, and in others the female. The flowers which form the fruits retain the pistil, whilst the flowers at the apex of the inflorescence retain the stamens. Situated between these are usually a group of degenerate flowers called neuter flowers. These are readily seen in the Cavendish, where they form short rudimentary fruits which never develop. The banana is described botanically as parthenocarpic—that is, it does not require to have the female flowers fertilized by the male to produce fruit. Fertilization is necessary to produce seeds, but seeds are seldom produced in any of the cultivated varieties. Nevertheless, an occasional seed has been reported, particularly in the Ducassas' Hybrid variety, proving that fertile pollen is produced in these individual instances. Successful crossing of the Gros Michel with other varieties has been reported from Trinidad and Jamaica, the object of such work being to endeavour to breed a new variety combining the good points of the Gros Michel with a resistance to the Panama disease possessed by some of the poorer types; such work is still in progress.

The fruit is produced in "hands" situated spirally along the bunch stalk. Climatic conditions, vigour of the plant, &c., vary the number of hands and the size of the fruits enormously within the limits of each variety. It is suggested that the length of the bunch—i.e., the number of hands—depends upon the accumulated food store and general vigour of the plant at the time the embryo flower bud is formed at the base of the pseudo-stem, whilst the size of the individual fruits (commonly known as "fingers") depends upon climatic and growing conditions subsequent to this. Thus a large bunch may produce small fingers, and under different conditions a small bunch could produce large fingers.

CHOICE OF SITE AND SOIL.

A brief examination of the main features of the banana plant and the reference to its natural home in Southern Asia gives a good indication of how best to treat it in Queensland. It is plain that, since it

requires heat, moisture and shelter, there would be no point in starting a plantation on a site subject to frost, drought, or high winds. Further, since its roots are not adapted to hard, barren or water-logged soil, it is useless to attempt to establish a plantation where these conditions are in existence. With the exception of a few isolated cases, bananas are grown commercially at a comparatively short distance from the coast in Queensland, rainfall being the chief reason for this. Precipitation decreases rapidly as one proceeds inland. Also, one must remember that

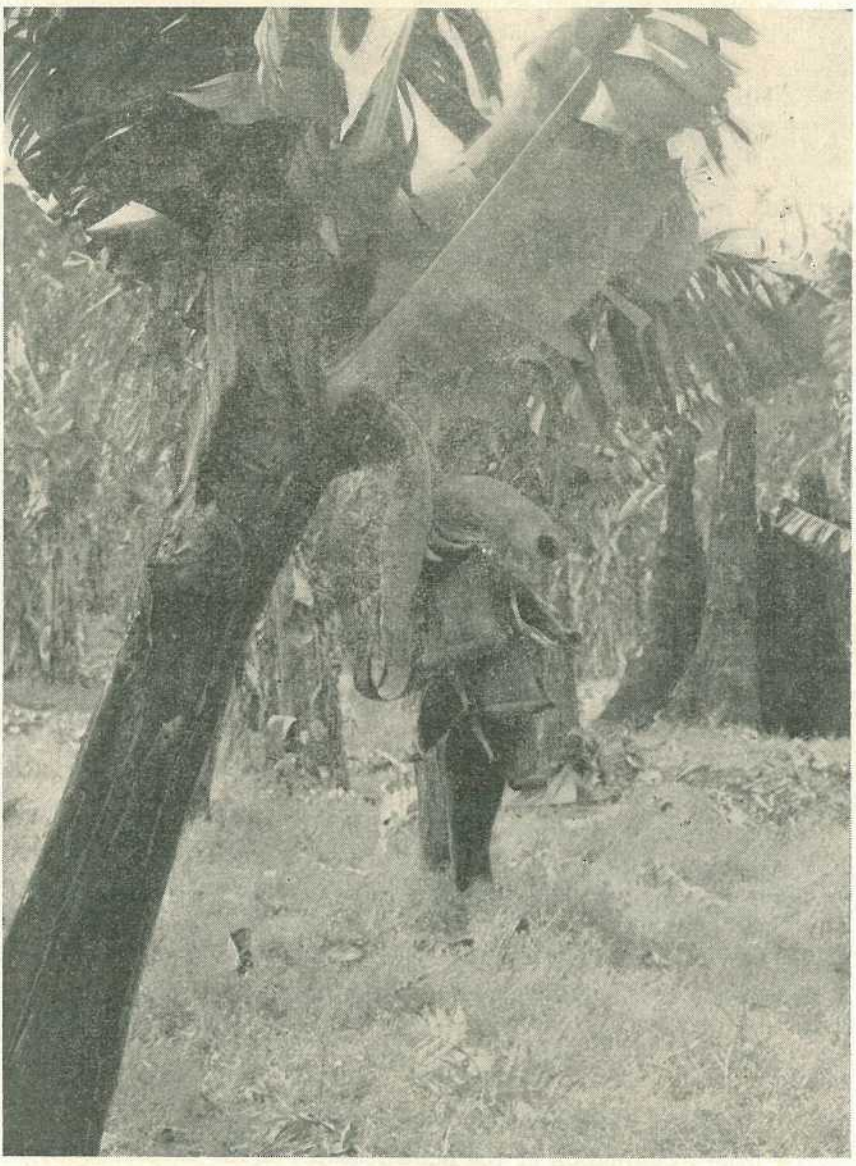


Plate 19.
Young bunch Cavendish variety.

in Queensland two divisions should be taken into account, viz., that north of Mackay and that south from Mackay to the border. Guided by these facts one must observe the following features:—In the southern section it is usually necessary to select a hillside site, because this alone supplies the requirements of freedom from frost. Such a site should be well sheltered and preferably on an east to due north slope, or where there is abundance of shelter, even a north-west slope. East to south and round to west are undesirable locations, usually being responsible for very slow growth and being too cold during the winter months. Upon occasions some fine fruit has been produced on western falls, but it is slow in maturing (in some cases up to eleven months from the time the bunch appears until it is cut), so that it is produced under definite risk right throughout. No definite altitude can be given above which bananas should not be planted, the climate in each district governing this factor. To avoid frost or the direct drift off frost-affected areas is the object, and usually from 300 to 800 feet above sea level is considered to be safe country. Land that is too steep is both difficult and expensive to work and liable to excessive erosion. Suitable level country is particularly scarce, and does not always possess good drainage. A gentle slope is therefore ideal, and when not procurable, as near to the ideal as possible should be the aim. The richer the soil, the more vigorous the growth, which fact often necessitates a careful observation of the virgin growth upon the land prior to making a selection. Good rain forest (scrub) easily comes first, particularly on basaltic slopes, but during the past twenty years such land has been utilised to such an extent that it is now almost impossible to procure a virgin area of more than a few acres south of Rockhampton. Rain forest on other types of volcanic soils is desirable, but is now almost as scarce as that on basaltic areas. Lantana country usually represents land that previously carried rain forest, had been cleared, and probably produced crops for some years, before running back into its present state. After being brushed and burnt it usually makes splendid banana land, especially where the lantana has been growing profusely for five or six years. The scarcity of suitable banana land to-day is compelling growers to seek sites in hardwood forest land that twenty years ago would have been rated as third or even fourth grade country for banana growing. Aspect, altitude, and rainfall is often quite satisfactory, but frequently the soil is most unsuitable. In selecting forest land at least 18 inches of friable surface soil is necessary, deeper if possible, and the freer the subsoil the better. Such timbers as tallowwood, bloodwood, red oak, messmate, and scrub ironbark are a fair guide to suitable forest soils, whilst white gum, red and yellow stringybark, red and grey gum, mahogany, and turpentine denote soil conditions that are unsuitable. Road access, nearness to the railway or port, and generally the suitability of regular weekly transport to local markets as well as to the principal Southern markets, and the cartage and freight in each instance, must always be taken into account. The utilisation of rich exotic pasture land suitably constituted and located is being resorted to in some instances, and although at times costly to prepare, has many points in its favour.

North of Mackay, and particularly from Cardwell to the Bloomfield River, great areas of alluvial flats are available. These areas are free from frost and, as a consequence, there is no necessity to utilise the rain forest hillsides, which are more porous and much drier after they have been cultivated for a short period. With true tropical heat and a rainfall of from 90 to 100 inches a year, banana growing becomes a different proposition, and good drainage is the one precaution to observe.

Good banana land unimproved is worth from £6 to £30 per acre, quality of soil and actual location being the governing factors.

CLEARING.

Having selected the site, the next step is to get it cleared. Naturally, the nature of the virgin growth determines the manner in which it must be cleared. Taking each class of country separately, and commencing with rain forest, or, as most Queensland growers would say, "scrub."

Rain Forest.

There are two types of scrub well known to Queensland axemen—i.e., heavy and light. The heavier the scrub, the better the rainfall, and for banana growing this is most important. Scrub is usually felled on contract, the standard price being £3 per acre. This price includes brushing (with a brush-hook) all vines and young trees having a diameter of anything up to 4 inches. Where such growth is entangled with higher growth, branches of trees, &c., a top cut is made to sever the plant 6 or 7 feet from ground level. Thus at the completion of this operation the trunks of the bigger trees are all bared of surrounding growth and easily assailed by the axemen. There is a deal of art in falling scrub, and only those possessing some years of experience can manage the task successfully. The chief object is to make all trees fall in the same direction, as logs lying side by side burn so much better than logs strewn across each other. The smaller trees are usually scarped—i.e., half cut through—and finally pushed over by one or two big trees being cut right through and being felled in the direction required. The heads of most scrub trees are more or less interwoven with vine growth, and coupled in this manner the big trees start a great weight of timber and foliage moving, and what is known as a "drive" results. It is not uncommon to witness, as the result of a good axeman's labour, an area of scrub 50 yards wide by 250 yards in length fall in similar manner to the fall in a line of dominos when the rear domino is pushed on to the one next to it, which in turn pushes the next, and so on.

All scrub timbers are known as softwoods, and as the name implies allow for the use of finely-ground tools. An all-steel heavy brush-hook and a 5 lb. axe of the "Plumb" type sharpened to razor sharpness are the tools for this work.

Scrub should be felled by the end of April and burnt off towards the end of September or the beginning of October. About noon on a hot, dry day with a gentle breeze blowing is the ideal time to fire. If, through some mischance, a poor fire occurs, heavy and expensive work follows, for a great deal of logging-up has to be done before planting. Firing scrub at the wrong time has resulted in logging-up costs in many cases amounting to £16 per acre. It is far better to wait a week or two for good weather than to attempt to burn too early. Any logs left after the fire can be cut and canted round across the hillside (see Plate 16), thus bringing about a terracing system, whereby erosion will be prevented to a very great extent.

Lantana.

The denseness of this plant when well grown is known to most Queenslanders. A 2-lb. all-steel swan-necked brush-hook (sometimes called a fern-hook) is the most suitable tool for clearing. A 32-inch long round handle is preferable to a longer one. The aim in brushing lantana

is to cut it into lengths of 3 or 4 feet, and in working over it to tramp it well down. Five pounds per acre is a fair contract price, and if the work is done properly it should carry a good fire in from six to seven weeks' time. The lantana butts (or stumps) should be grubbed with a mattock prior to planting. This partially cultivates the land and makes a thoroughly-cleared surface for planting. The intensity of the fire regulates the cost of grubbing, but usually £2 per acre is sufficient to cover this necessary expenditure.

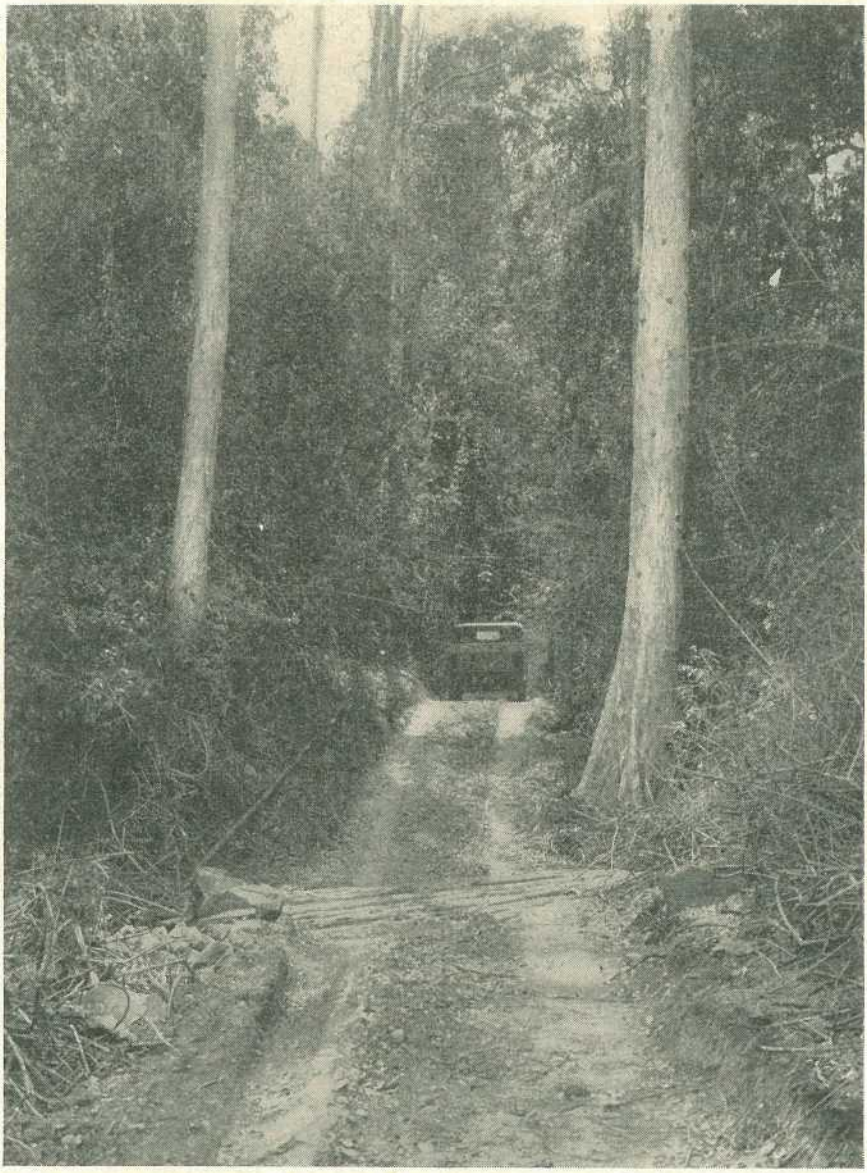


Plate 20.
GOOD BANANA LAND.—Scrub, Lacey's Creek, Dayboro' District.

Hardwood Forest.

Normally this land is more expensive to plant than either scrub or lantana country, because in addition to falling costs of from 35s. to £2 per acre, grubbing is always necessary, and the whole area should be dug up prior to planting, which is not the case with either of the former types. A start is made by cutting down the smaller trees, lopping and stacking. Small forest brush growth (bushes, &c.) should be grubbed and thrown on to these stacks, and burnt as soon as opportunity offers. Next the whole area should be dug to a depth of 8 inches, or deeper if possible, but it is difficult to get down below this depth without incurring excessive costs. A forked hoe or long-bladed mattock is favoured, the digging costs amounting to £5 or £6 per acre. Lastly, the big timber is felled, lopped and burnt. Any logs that remain unburnt are actually lying on cultivated land, and a good chipping prior to holing out sets this land up in really good shape.

Pasture Land.

Years ago valuable areas of scrub were felled, burnt, and planted under paspalum and clover, thus becoming excellent dairying land. With a carrying capacity of as high as one beast per acre this land could not return more than approximately £8 per acre per annum. Realising this, those who are banana growers as well as dairymen, sometimes decide to bring an area of this exotic grassland back into cultivation, bananas being worth so much more than £8 nett per acre per year. This land, after having been grassed for years, will generally be free from stumps, and if the gentleness of the slope will permit, a hillside plough is used to break it up. Plough across the hillside, preferably to a depth of from 3 to 4 inches, and when the moisture has dried out, harrow with a heavy harrow and burn off as much dead grass and grass roots as possible. Plough a second time, endeavouring to get down 7 or 8 inches, and harrow again. This land is then ready to fertilize and plant. If too steep to plough, grubbing by hand must be resorted to. The mattock is the most suitable tool to use, and as the clods are turned over they must be hit with the side of the mattock so as to free most of the soil from the tightly interwoven paspalum roots. Two ploughings and two harrowings are worth approximately £5, whilst to dig this land thoroughly by hand is worth up to £10 per acre.

SELECTION OF PLANTING MATERIAL.

The selection of planting material is a very important factor, and irrespective of the variety of commercial banana grown, the principles to be observed in making a selection are more or less similar. Firstly, the source of supply should be free from pests and diseases, or, failing this, as nearly so as possible. Secondly, the material should be of good quality and taken from parent plants of true type and vigorous growth with creditable production figures recorded during the existence of the plantation. Most growers have their own ideas upon the most suitable kind of planting material, and all may be right, for soil and weather conditions probably play the most important part in the successful establishment of a banana plantation.

First consider the natural offshoots or suckers. These make excellent plants provided they are strong, healthy, 1 foot to 18 inches in total length, tapering symmetrically down from the baby spear leaf to a cleanly-grown corm, the diameter of which is from 5 to 6 inches at the widest part, and which has not been damaged by removal from the parent plant. A draining spade is recommended for the removal of these plants. After digging, cut off all roots, and square the base of the corm to allow the plant to stand upright in the hole when being planted. Planted and grown under favourable conditions, this class of material will fruit in twelve months, and three months later should see the fruit harvested.

Next is the butt, which is considered the fastest-growing and best planting material to use. A butt is obtained by removing from the stool the corm and a portion of the pseudo-stem of a plant that has recently had a matured bunch cut from it, or that is carrying a bunch or is just about to produce a bunch. Trim the base of the corm off so as to leave approximately 4 inches depth of corm, and cut the pseudo-stem so as to leave about 10 inches above the corm. This makes the total length of a butt plant approximately 14 inches, and such a plant should weight from 10 lb. to 14 lb. Shave the old roots off close to the corm. Select one or two (as desired) prominent eyes (buds) and cut out the balance, which can all be definitely classified as surplus. The same tool as recommended for the removal of suckers is excellent for the removal of this class of plant also. A skilled worker will dig as many as 200 suckers per day and almost as many butts, without damaging the balance of the stool by his haste. A butt plant has the advantage of an abundance of plant food to feed the eye, which very quickly becomes a young plant. Whilst the young roots are forming, the young plant is growing, obtaining all the nourishment it requires from the parent butt. From observations made it can be definitely stated that, given equal conditions, butt plants permit production and harvesting of the fruit as much as two months earlier than either suckers or bits (mentioned below), both of which are subject to serious setbacks as a result of dry weather following planting, and always undergo a serious retarding of growth until such time as each establishes its own individual rooting system.

Bits are sections of a butt, each carrying a good healthy eye. One butt may make as many as four bits, but they should not be cut too small. The minimum size of a bit permitted to be sold is prescribed by regulation, which reads:—"A bit shall consist of a well developed undamaged 'eye' protruding not less than ½ inch above the surface of the corm to which it is attached, the eye to be not less than 1½ inches from any edge, width of surface to be at least 4 inches, and depth behind 'eye' at least 3 inches." Under excellent growing conditions this class of planting material is quite satisfactory, but is seriously affected by dry weather until such time as a root system is established. Drought conditions following immediately the planting of this class of material invariably result in the necessity for replanting a large proportion of the area.

The price of planting material varies from 15s. to 30s. per 100 plants, dug, cleaned, and bagged ready for transport.

Black Comb Disease in Fowls.

P. RUMBALL, Poultry Expert.

BLACK comb disease in poultry occurs frequently throughout the State from October to March. It usually affects laying hens, and is responsible for heavy losses to the industry either by death or decreased egg production.

Where treatment is prompt the mortality does not appear to be as extensive as when treatment has been delayed. Again, early treatment appears to assist in getting affected birds back into production much more quickly than when it has been deferred.

The first indication of the disorder is a bird's pronounced loss of appetite, followed in the course of a few hours by a darkening of the comb. In fact, it is not uncommon for 25 per cent. of the flock to have a very darkened comb within twenty-four hours of the first sign of the trouble.

In the early stages of this disease, the temperature of sick birds rises. This induces thirst. As the disease develops, little desire for water is in evidence, and as treatment for this trouble is given by means of the drinking water, the necessity for prompt action is obvious.

On further examination of the sick birds, it will be found in most cases that the crop is full, an indication of the suddenness of the attack. This condition of the crop has caused many breeders to attribute the trouble to the food and water. As the disorder advances the legs of the leghorns particularly become very much darkened in colour; and if the feathers of a bird of any breed are turned back, the skin will be found to be darker than usual. Diarrhœa has been observed in some cases, but it is not apparent in all affected flocks.

The mortality from this disorder appears to be governed largely by the general condition of the flock, and the rapidity with which treatment is applied. Where prompt measures have not been taken, losses have been as high as 20 per cent.; but where early treatment is given deaths have been as low as 1 or 2 per cent. The loss from deaths, however, is not the only important factor. Egg production has been observed to fall from 60 to 5 per cent. within six or seven days.

Treatment.—Several proprietary mixtures are used with apparently beneficial results, but in preference to deferring treatment until these mixtures are procurable, the breeder is recommended to administer Epsom salts to the birds in the drinking water at the rate of 1½ to 2 oz. to the gallon.

The pH Scale.

R. A. TAYLOR, A.A.C.I., Inspector and Examiner, Seeds, Fertilizers, Veterinary Medicines, Pest Destroyers, and Stock Foods Investigation Branch.

THE term pH is now so commonly met with by the agriculturalist that it is to his advantage to understand not merely that a pH value indicates in some way the acid, neutral or alkaline condition of his soil, but to have also some knowledge of the meaning of the value and the theory on which it is based. The following explanation, it is hoped, will assist in this direction.

Acids contain hydrogen combined in their molecules. In solution (as in the soil) the molecules of acids, alkalis, and salts break up (or dissociate) to a certain degree to form ions. The ion common to all acids and on which acid properties depend is the hydrogen ion. Now different acids containing *similar amounts of hydrogen in combination*, dissociate to different extents to give *different amounts of hydrogen ions in solution.*

Take two acids for instance—say acetic acid and hydrochloric acid. The *amounts of acid* present may be the same, and may be neutralised by the same amount of alkali, such as caustic soda, and yet the actual degree of acidity or intensity of acidity would be far greater in the case of the hydrochloric acid, because, at the same concentration, it is *dissociated into ions* to a far greater extent, and makes "available" far more hydrogen than the acetic acid.

These hydrogen ions may be considered as "free" or "active" hydrogen, and are termed *potential hydrogen*—from which the term pH is derived.

In indicating the pH or potential hydrogen, the number of litres of the solution that contain 1 gram of hydrogen ions is taken as a basis. Naturally, on account of the small size of a hydrogen ion, the numbers involved would be very great, so the logarithms of the numbers are used—that is, the number of times the figure ten must be multiplied by itself to obtain the number of litres of the solution which would contain 1 gram of hydrogen ions, is used.

For instance, if 1,000,000 (10^6) litres of solution contain 1 gram of hydrogen ions, the figure 6 is taken and the solution is said to have a pH value of 6.

The pH may thus be set down as the logarithm of the reciprocal of the hydrogen ion concentration—which may be expressed as:

$$\log. \frac{1}{CH^+}$$

The term C means concentration, and H^+ is used to indicate hydrogen ions (which are positively electrically charged).

The figures used in the pH scale range from 0 to 14; the highest figure indicates the lowest concentration (most litres to contain 1 gram of hydrogen ions) and, consequently, acid solutions are indicated by lower values than alkaline solutions.

pH7 is neutral—the pH of distilled water. As pH is a logarithmic value (based on ten) a decrease of one unit on the scale indicates an increase of ten times, and a decrease of two units indicates an increase of one hundred times the acidity. Conversely, rises in pH indicate decreases in acidity to the same extent.

Now, in summarising the practical application of the above, the pH value as applied to a particular soil may be said to be a figure in inverse ratio to the amount of hydrogen which is present in dissociated or ion form in the soil solution, and is consequently an inverse index of the true acidity. *It should not be confused with the amount of acids present in the soil* as indicated by titration against an alkali, as only portion of these acids are dissociated into ions, and, consequently, they may be said to have much of their power not available.

As a guide to the interpretation of values, the following table is given :—

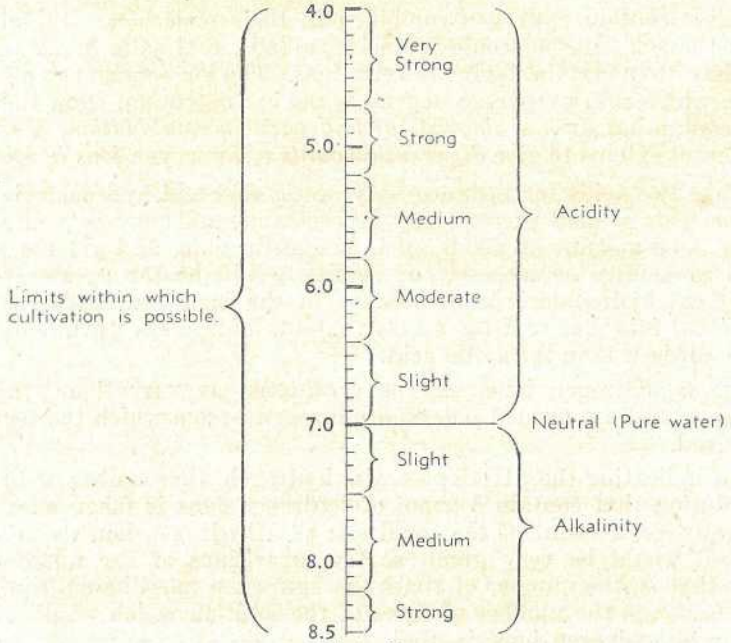


Plate 21.

From the above, it will be seen that only a small portion of the scale is used in actual practice.

ANIMAL MANURE ON DAIRY FARMS.

On the dairy farm, cow dung accumulates both in the holding yards and in the grazing paddocks. Periodically, the manure about the yards is collected and usually distributed on cultivation areas as a fertilizer. Cow manure contains a moderate amount of fertilizing materials which come originally from the pasture area, and, to use the manure on crops to be sent away from the farm is virtually "robbing the pastures to keep up the fertility of the ploughed fields."

Far more serious, however, is the neglect of many dairy farmers to make good use of the manure left in the grazing paddocks by the stock. A dropping allowed to lie undisturbed, in addition to losing much of its fertilizing value to the air, promotes in that particular spot a rank growth of grass, which stock find distasteful. If full advantage is to be taken of the fertilizing value of the manure, the droppings must be spread more uniformily over the paddock before they become hard. Distribution can be carried out by means of a special pasture harrow, or by running an ordinary peg harrow over the area, and about which several lengths of barbed wire are loosely coiled. A weatherboard or similar type of timber drag is quite satisfactory, but its use on wet dung in dry weather should be avoided in order to prevent the fouling of the pasture by extensive smearing.

—*C. W. Winders.*

The Scrub Tick.

OF the many species of ticks which may attack domestic animals in Queensland, the scrub or bottle tick is one of the most important. An unfed female tick has yellow mouth parts and legs and a greyish abdomen. When engorged with blood, the abdomen becomes reddish and, at this stage, the female may measure up to three-quarters of an inch in length. The male is uniformly yellowish and never grows more than about one-fifth of an inch in length.

The scrub tick is found among the scrubs of the eastern coast where normally it lives on bandicoots and other marsupials. It does little harm among its native hosts, but should any domestic animal be attacked, it may develop a paralysis which is frequently fatal. Dogs, cats, and sheep are most susceptible, but in the case of cattle and horses only young animals are, as a rule, affected.

Rather peculiarly, only the female ticks can cause paralysis and the males are practically harmless. Furthermore, the disease becomes apparent only after the females have been attached for at least four days. The females are then nearly fully engorged, and the paralysis is thought to be caused by a poison which is secreted by the tick at about this time and injected into the animal. Should the tick be discovered and removed after feeding for only one, two, or three days, little harm will be done. Most cases of paralysis are seen in the spring, when, after remaining quiescent during the winter, the ticks become active again.

Dogs running in scrub tick country may be protected if given every six or seven days, either a dusting with derris powder or a wash in a derris infusion. This infusion is made by soaking 2 oz. of derris powder in a gallon of water overnight and next morning adding sufficient soap to make a good lather. When being treated, the animal should also be examined for ticks in places which may not be accessible to the derris—such as inside the ears and between the toes.

For animals suffering from paralysis, a vaccine which is manufactured by the Commonwealth Serum Laboratory, Melbourne, is said to give good results. The use of a 2 per cent. solution of trypan blue is also claimed to be very effective. But no matter what remedy is tried, the more advanced the paralysis the more difficult it is to effect an improvement.

—*Dr. F. H. S. Roberts.*

TO SUBSCRIBERS.

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

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

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

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

Size of Breeding Sows.

SIZE is an important feature in breeding pigs, yet some breeders do not give it sufficient consideration.

One of the chief objectives in pig raising is to get pigs to marketable weights in the shortest possible time. To obtain the desired rapid development and still have a finished pig with a light covering of fat, it is necessary to breed from pigs which are big within their class. That is to say, pork type breeding stock—such as Middle Whites—should be big animals of their category if their progeny are to grow quickly to porker weights. Bacon type breeding stock—such as Large Whites—also should be big of their type if their progeny are to develop similarly to baconer weights. The extreme bacon type of breeding stock could, of course, be used to produce fast growing porkers, but such porkers, under normal feeding conditions, would not be sufficiently mature to give good carcases at porker weights. Breeding pigs should be big within their type.

Size is inherited in pigs as it is in horses, and trying to grow a small type pig into an extreme bacon type is like trying to make a pony into a draught horse.

Observations lead to the belief that size within a breed is frequently lost through mating stock before they are sufficiently grown.

A large breeding sow, provided she is not too fat and clumsy, is more likely to produce a litter of large pigs and to be able to suckle them better than a smaller sow, under similar conditions.

Records of a large number of breeding sows show that sows which are mated when between nine and twelve months old are more productive throughout their breeding career than sows mated earlier or later.

Under Queensland conditions, it is common to see sows mated at five to six months old when they are barely bacon weight, but this practice does not give the sows a chance to develop and become productive mothers.

The best recommendation is to mate sows when they are about nine months old, or when they have reached a live weight of approximately 250 lb. In cases where sows are mated when very young, either by accident or design, they might be given a chance to develop by withholding them from service for some weeks after their first litter has been weaned.

—*L. A. Downey.*

PASTURES FOR PIGS.

Although young pigs will not grow rapidly if given only bulky foods—such as pasture—because of the limited capacity of their digestive tract, approximately one-third of their diet may consist of good pasture. In the case of dry sows, four-fifths of the diet may be provided as pasture.

Pasture, being relatively cheap fodder, should be used to the greatest economic capacity in pig feeding. Not only does grazing provide pigs with cheap food, but it provides a measure of insurance against deficiencies of minerals and vitamins which are likely to occur when pigs are intensively housed and hand-fed.

Pigs require a relatively high proportion of protein in their food, and they are unable to cope with large amounts of fibre; it is, therefore, desirable to graze pigs on pasture or forage crops when they are young and succulent.

Annual forage crops have the advantage of yielding large quantities of green feed in a short time; also, the practice of ploughing and planting pig paddocks twice a year is a satisfactory method of providing sanitation and control of parasites in the piggery. However, some permanent pasture is usually desirable in the piggery, but it should be stocked lightly and given frequent rests to preserve the stand and to prevent fouling of the paddock.

Wherever it can be grown, lucerne provides the best permanent pasture for pigs, but to prevent the pigs from rooting and spoiling the lucerne plants their snouts should be either cut or ringed. When lucerne cannot be used Kikuyu grass is a very good substitute. Kikuyu has the advantage of being able to withstand severe grazing and rooting, and will quickly recover from drastic treatment by the pigs. It is a palatable and nutritious grass, and will thrive under a wide range of climatic and soil conditions.

—*L. A. Downey.*

CASTRATION OF PIGS.

Male pigs must be castrated while they are very young, so that they may be fit for slaughter on attainment of the correct weights. The age recommended for the operation is six weeks, or two weeks before they are weaned.

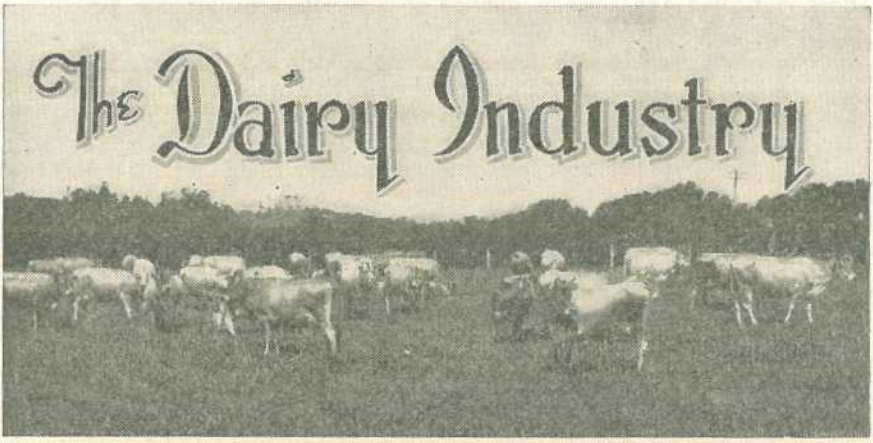
As many beginners do not know how to perform the simple operation of castration, the Department of Agriculture and Stock has made available, free of cost, a very useful and well illustrated pamphlet—"Castration of Pigs"—which gives detailed instructions in convenient form and in everyday language.

Demonstrations may be arranged, on application, in the course of the instructors' itineraries, either at gatherings where facilities exist for performing the operation, or at a slaughter-yard where young pigs are available. In the latter case it is preferable to demonstrate on a pig carrying more age—say, up to four months—and which can be killed and dressed beforehand. Demonstrating on a dressed porker simplifies procedure, and enables the instructor to explain it without the inconvenience of handling a live pig.

That a better knowledge of the operation of castration is essential is emphasised frequently by bacon factory officials, meat exporters, and slaughtering inspectors, who often come across carcases of male pigs which have been castrated improperly. Partial, if not total, condemnation of the hindquarters—the result of abscess formation, the formation of tumours in the scrotum, callous or improperly healed tissue, or some other abnormality—is the inevitable result.

Castration should be performed during cool dry weather and before flies—blowflies in particular—became numerous. Absolute cleanliness in all details, proper equipment, healthy growing pigs, and a correct knowledge of the job are necessary for success in the performance of the operation.

—*E. J. Shelton.*



Trade in Bobby Calves.

IF a substantial and lasting success in the development of a trade in veal is to be achieved, the greatest care must be given to methods of feeding, and the condition in which calves are marketed. The trade has already been of immense value to the dairy farmer, for hitherto it has been the practice on many farms of limited carrying capacity to kill all calves at birth.

Some farmers, unfortunately, have made a practice of sending calves to the meatworks as soon as they are born, and that accounts for the high percentage of condemnations, of which the principal cause is immaturity. This loss could be avoided by keeping the calves on the farm for at least ten days.

The milk of a newly-calved cow is fed to pigs and poultry, and therefore is not wasted, but it should be borne in mind that this milk would show a better return if fed to the new-born calf than if fed to pigs. The value of this milk is often not so much as a weight increaser as a preventer of weight loss. This is true of the larger breeds. With the smaller breeds its value is, of course, primarily for growth.

The law provides for a dressed weight of not less than 40 lb., and an age of not less than fourteen days.

Condemned calves are a direct loss to the farmer, and they also involve the meatworks in loss on account of wasted effort and loss of time.

Mature veal is a wholesome food article, while immature veal, which has a laxative effect on the consumer, is not allowed on the market for consumption.

This loss, due to immature calves, can be avoided if the calf is fed for a few days on its mother's milk. The calf should weigh 80 lb. or more before being sent to the meatworks. This live weight will give a dressed carcase of approximately 40 lb.

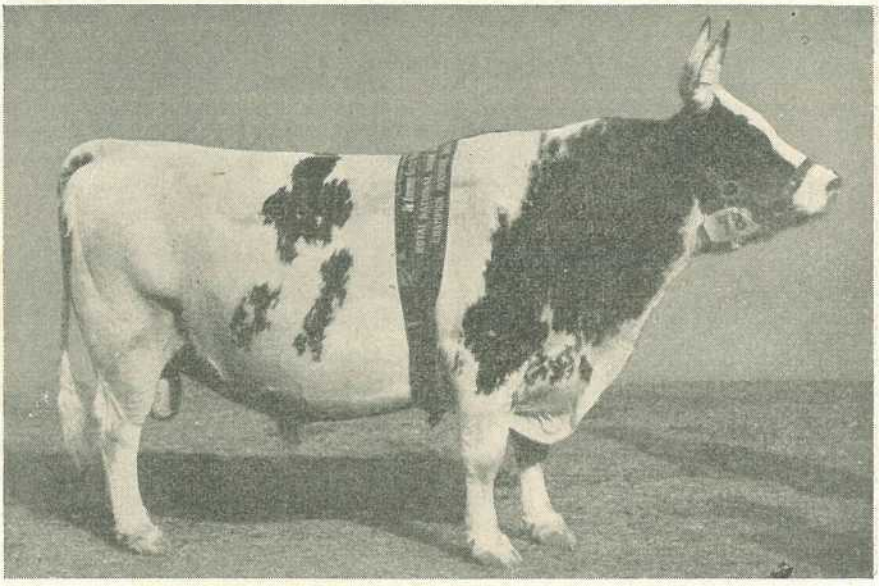


Plate 22.
MYOLA BONNIE BOY, the 1937 Brisbane Show Champion Ayrshire bull; the property of G. Norgaard.

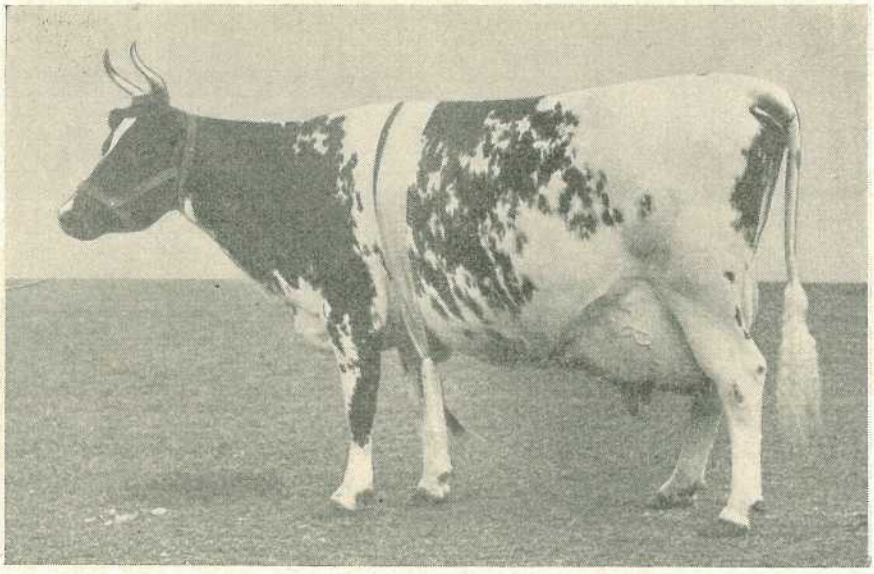


Plate 23.
FAIRVIEW LADY BESS, Champion Ayrshire cow at the 1937 Brisbane Show; owned by R. M. Anderson.

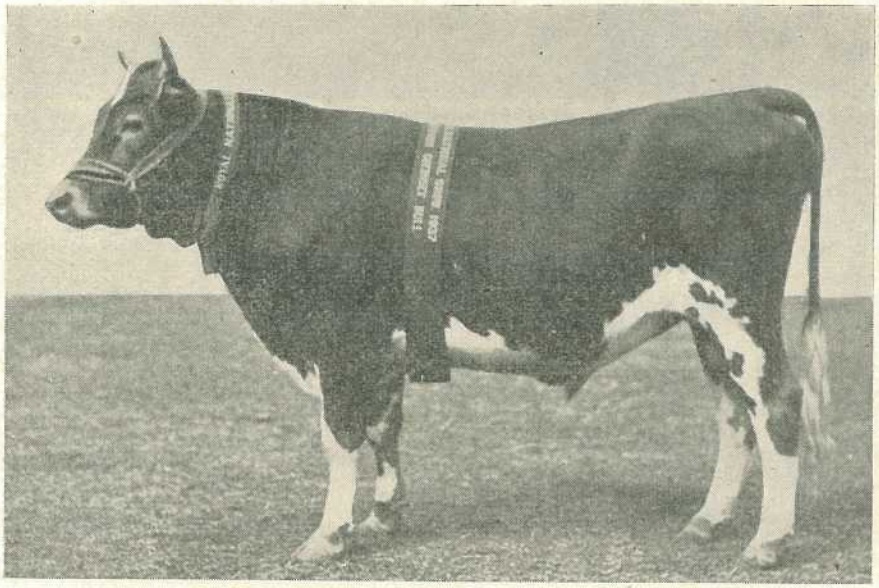


Plate 24.
VERMONT FAIRY'S REGENT, the Champion Guernsey bull at the last Brisbane Show; owned by Stimpson's Ltd.

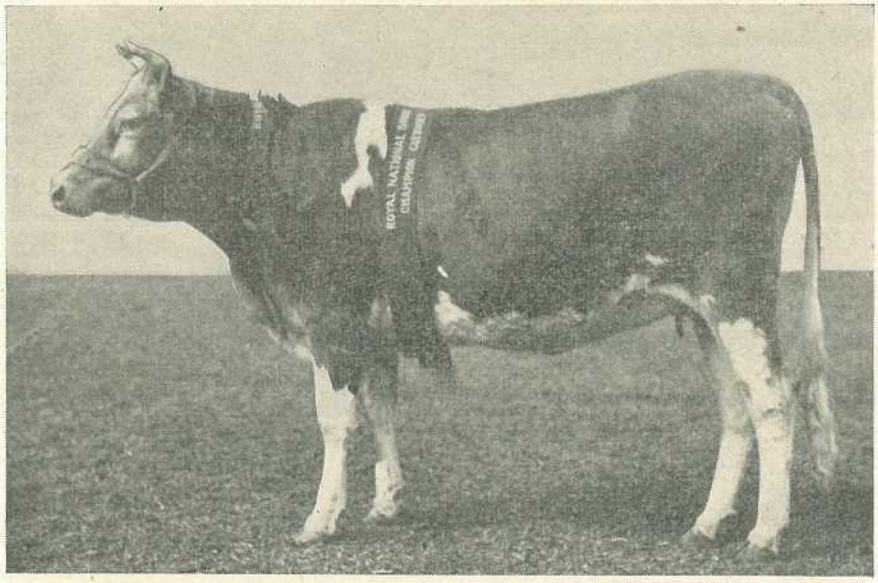


Plate 25.
WARRAWONG WAVON, the 1937 Brisbane Show Champion Guernsey cow; the property of Stimpson's Ltd.

ECONOMY IN DAIRY PRODUCTION.

A measure of economy which involves the dairy farmer in very little extra work is to increase production by systematic herd testing and culling, and breeding only from the best producers.

Far too many herds include cows whose production falls far below average, and the dairy would be run far more economically if these cows were fattened for the butcher. They belong to the "boarder" class, and usually consume more fodder than a heavy producer. Too many animals of this class impair the efficiency of the farm.

No matter how close a watch is kept, it is almost impossible to pick the lowest producers without systematic testing over the whole lactation period. If the farmer is prepared to do this himself well and good, but he requires to have an accurate knowledge of testing and the principles involved in calculating results.

The Department of Agriculture and Stock offers a herd-testing service which involves the dairyman in no monetary expenditure whatsoever. In other States and countries up to 6s. per cow is paid for a similar service. Surely it is impossible to believe that dairy farmers in other parts pay for something that is valueless.

In Queensland many dairymen have availed themselves of the services offered, and the results achieved by those who have tested and culled over a number of years have proved that it is well worth while. Nevertheless, there are very many more who could do so to their own advantage.

To obtain this service it is only necessary to make application to the Department. Sample bottles in a box are sent to the farmer, and all he has to do is to weigh each cow's milk and place a sample in a bottle, as directed. Then, if the factory he supplies is co-operating with the Department, he forwards the box of bottles containing the samples to that factory. Otherwise he may send his samples direct to the Department of Agriculture and Stock, which pays the rail freight.

The testing is done five times at intervals of, approximately, sixty days, and at the end of the period the farmer receives a complete return showing the relative value of each cow under test. It must be remembered that the object of testing is not so much to find out the best cows in the herd as to find out the worst and least profitable.

Testing is only half the job, and the Department depends on the good sense of the farmer to see that he does not keep feeding unprofitable cows indefinitely. Testing is of no value in raising the standard of production of the herd unless the low producers are culled regularly.

It is a poor farm that cannot afford to dispose of the two least profitable cows each year. Remember the first loss is the least. The longer the "boarders" are kept the more expensive they become. They eat the feed of a good milker and much time is wasted, frequently, in rearing their calves, which turn out no better producers than the dams.

SOME CAUSES OF STERILITY.

In each year, with careful management, the proportion of calves dropped should approach 100 per cent.; but on many dairy farms, perhaps the number of calves dropped ordinarily would not approximate 80 per cent: Hence, about one-fifth of the progeny is lost.

Apart from disease, the most common causes of sterility are protracted periods of semi-starvation, and the other extreme of overfeeding. The latter cause usually occurs among cattle prepared for the show ring. But with show cattle, the trouble may be overcome by making the animals work hard for their living, by turning them into a paddock where feed is short, and where they have to walk long distances to grass and water.

When starvation is the cause, the remedy is obvious. Failure to make provision for the hard times, which always come along, leads to loss through cows not breeding regularly, involving the loss of the calf, the production of the cow, and often the cow herself.

The provision of stacks of hay in favourable seasons, and keeping them in reserve until required may make all the difference between profit and loss.

The breeding animal should be of adult age, neither under nor over fed, and should have moderate exercise.

The common practice of allowing the bull to run with the cows is not a desirable one. With the bull kept under control he is able to serve many more cows, and the time of cows coming in may be so arranged, that they will calve when feed should be available, in normal seasons, and when butter fat is not usually at its lowest price.

—*W. Dixon.*

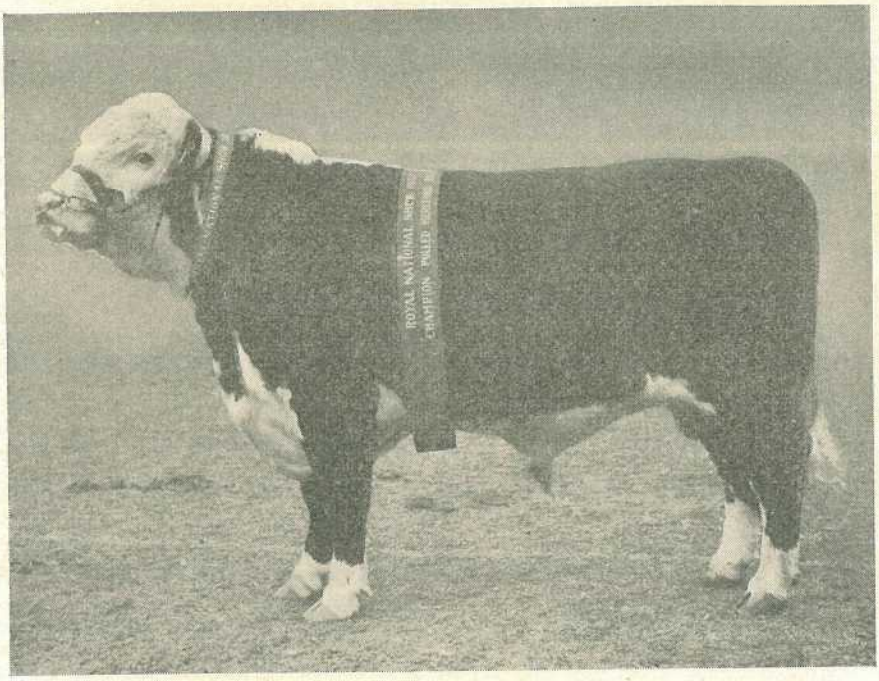


Plate 26.
BONNY BLANCHARD LXII., Champion Polled Hereford bull at the 1937 Brisbane Show; the property of Barton and Elliott Pastoral Co.

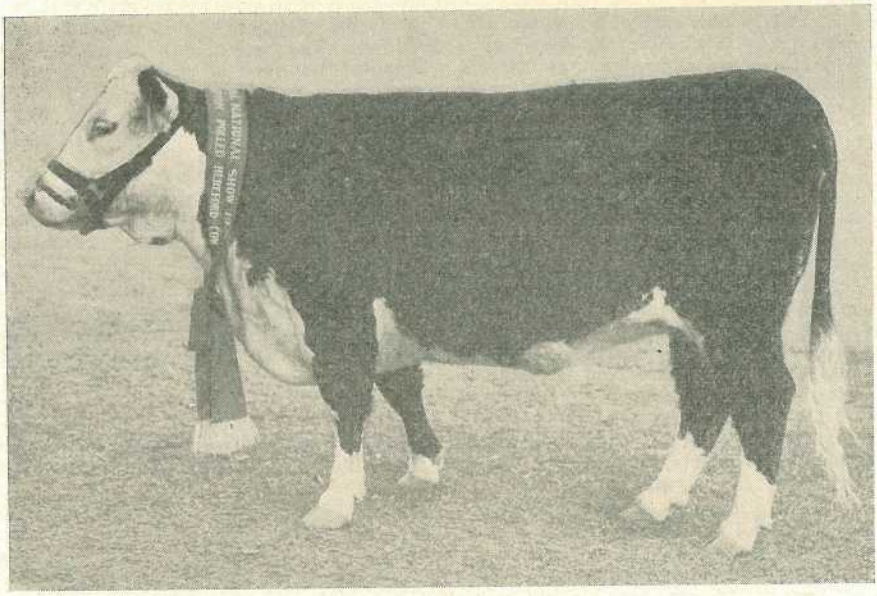


Plate 27.
TREVANNA ADVENTURESS, Champion Polled Hereford cow at the 1937 Brisbane Show; owned by S. A. Plant.

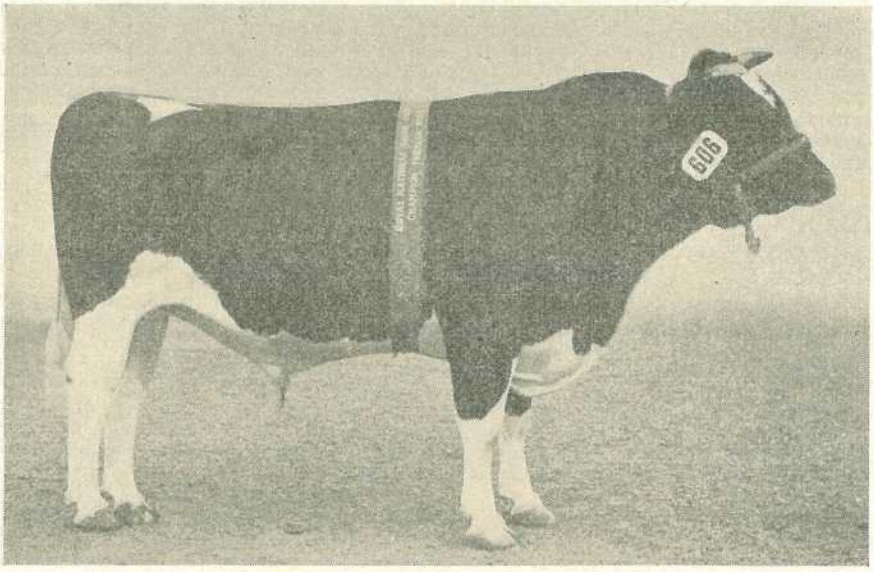


Plate 28.
TENT HILL STARLING'S ACTUARY, Champion Friesian bull at the last Brisbane Show; the property of W. H. Grams.

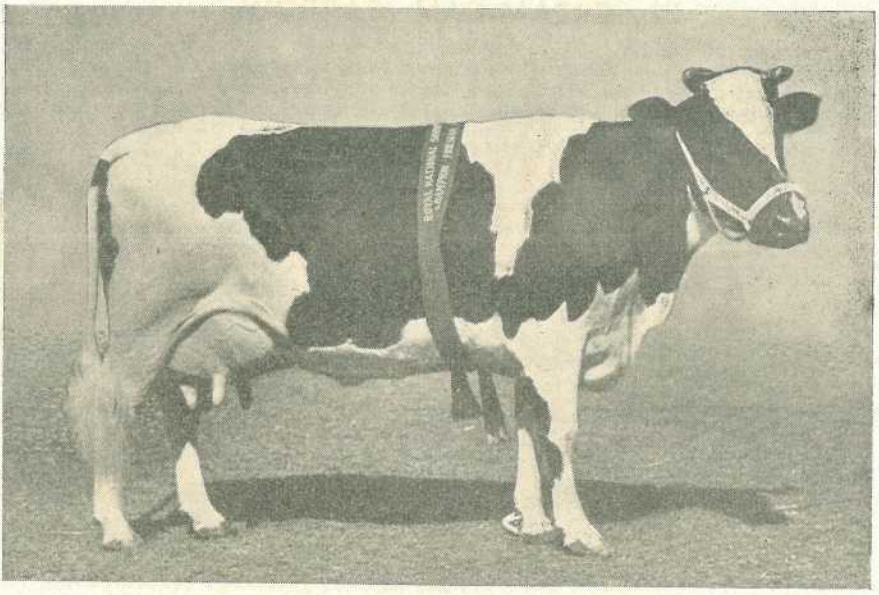


Plate 29.
GLENDALOUGH CORNDALE, Champion Friesian cow at the 1937 Brisbane Show; owned by Hickey and Sons Ltd.

WHAT IS PASTEURISATION?

Although the term pasteurisation is very commonly used nowadays, there perhaps are many who do not know its origin and meaning. Actually it dates back to 1860-1864 when Louis Pasteur, the famous French scientist, conducted experiments on "diseases" in wine and beer, and found that heating for a short period at a temperature of 140 deg. F. was sufficient to prevent abnormal fermentations and the souring of these beverages. This process of heating liquids to check the growth of undesirable microbes was extended to other industries, and was given the name pasteurisation in honour of Pasteur, who had first employed it.

To-day it is best known through its application to the dairying industry. The pasteurisation of milk simply means that the milk is heated to a temperature of 145 deg. F. for thirty minutes and then cooled as quickly as possible to 50 deg. F. or lower. Cream in the butter factories is heated to 185 deg. F. for a few seconds, and then cooled rapidly to 40 deg. F.

Pasteurisation aims, firstly, at making milk and milk products safe, by destroying any disease germs that may be present; and, secondly, at improving the keeping quality of butter and cheese made from milk and cream so treated. It, however, has its limitations. It cannot perform miracles, such as improving the grade of cream from second to choice, or eliminating strong weed taints. Most dairy farmers are now aware of this and know that the production of choice quality cream depends on the care and attention given at the farm, and that the pasteurisation process is beneficial in that a butter of choice quality can be manufactured to withstand long periods of cold storage.

—*O. St. J. Kent.*

CREAM-CAN BARROW.

A very substantial and useful cream-can barrow can be made from 14-feet lengths of 1-inch iron piping. The diagram with measurements and details should be sufficient guide to its manufacture, except that the piping should be filled with dry sand before heating and bending around a circular post or piece of wood. The

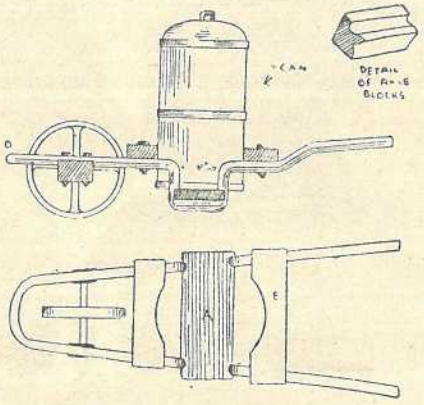


Plate 30.

barrow is very light and efficient. The front piece of wood (E) is not bolted tight, but the hooks are left loose so that the wood can be shifted when lifting the can in. A frame can be made and bolted on and the barrow used for carting bags of grain.—"Cream Can," in "The Primary Producer" (W. Aus.).

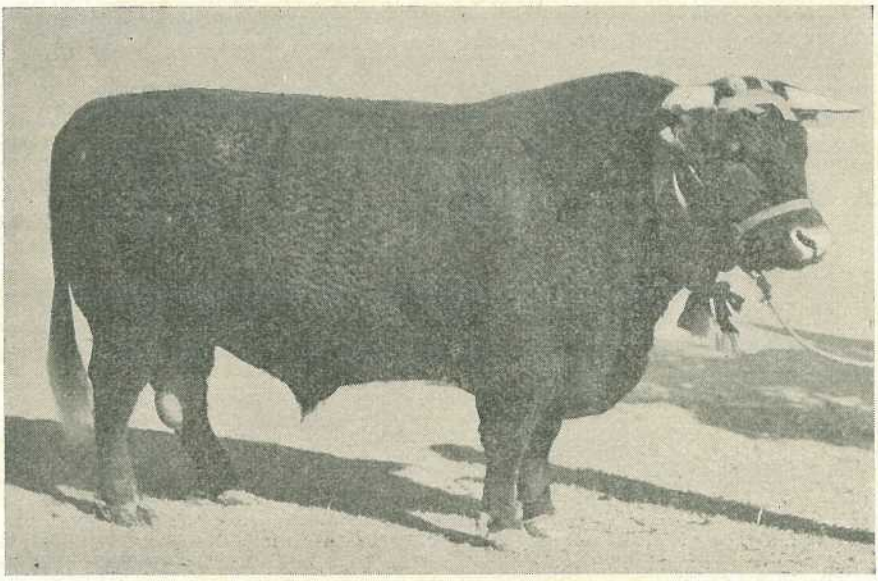


Plate 31.
HAVILAH COURT BRIDEGROOM, Champion Devon bull at the 1937 Brisbane Show; the property of R. A. Howell.

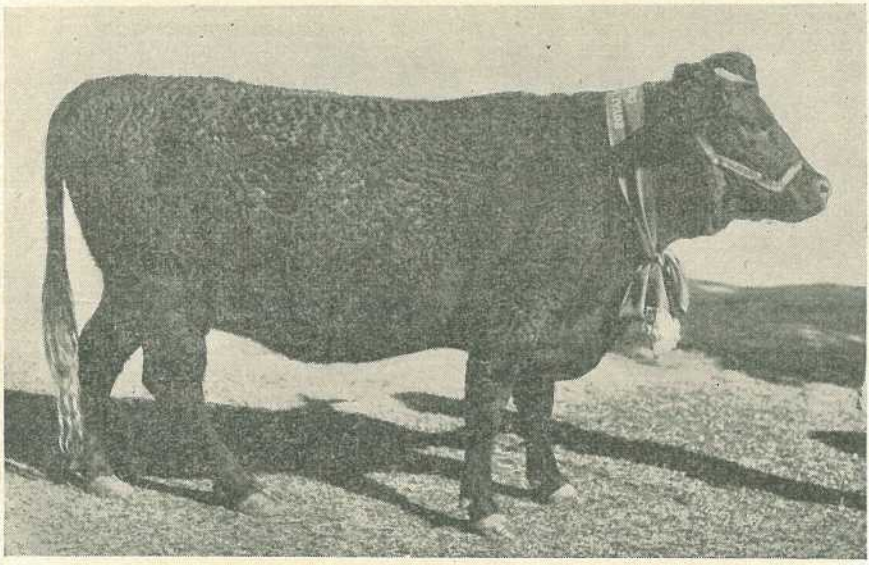


Plate 32.
DEVONCOURT CONTERRA, Champion Devon cow at the last Brisbane Show; owned by R. A. Howell.

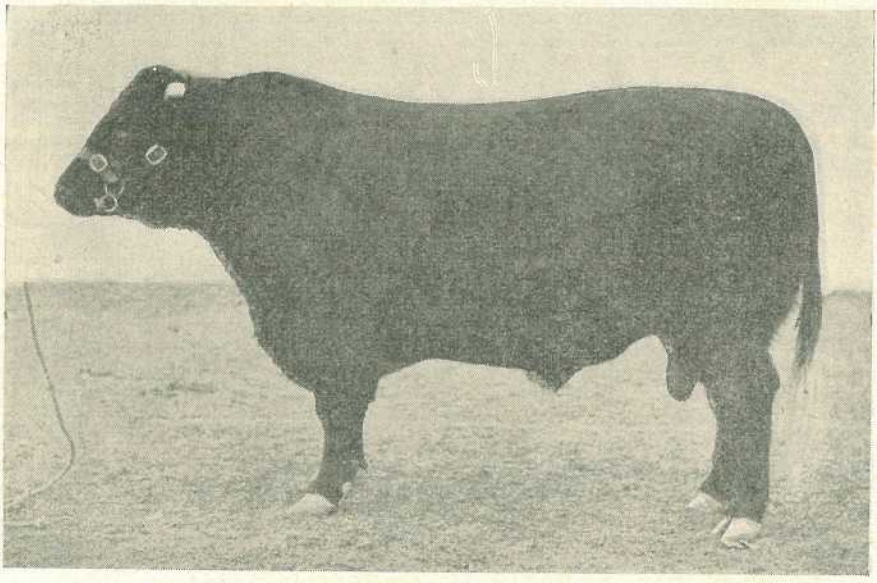


Plate 33.
TURANVILLE BREASTPLATE, Champion Shorthorn bull at the last Brisbane Show; the property of the Turanville Estate.

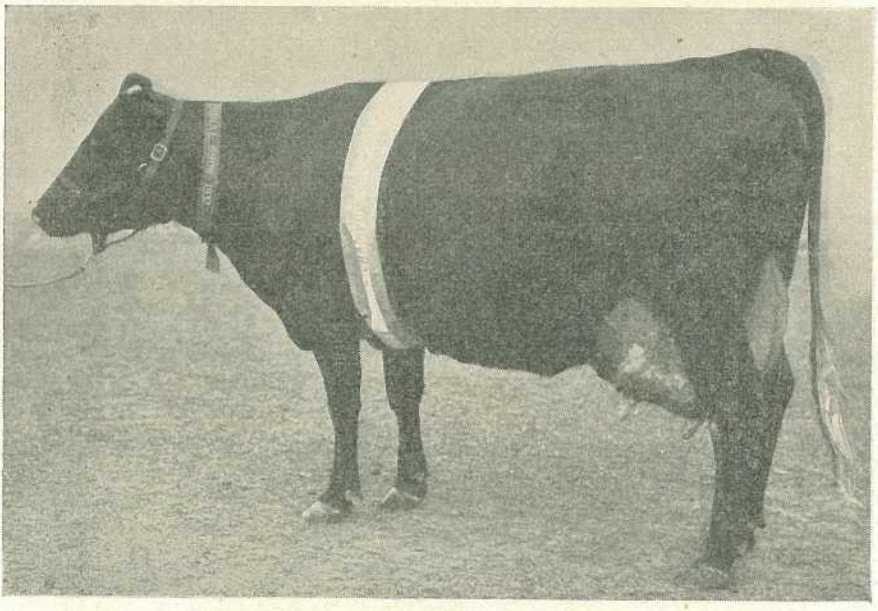
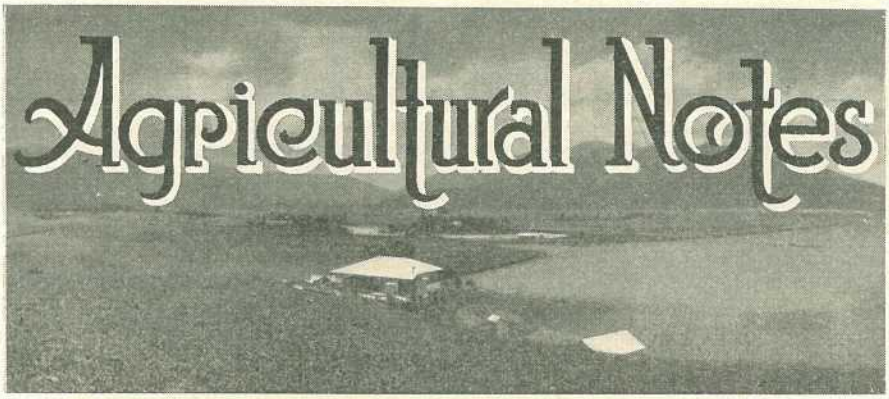


Plate 34.
ALFA VALE MODEL, Champion Butter-fat Cow, Brisbane Show, 1937; the property of W. H. Thompson.



Rotation of Crops.

H. W. BALL, Experimentalist.

ROTATION of crops has been recognised in all countries as necessary in most systems of farming, if the fertility and physical condition of the soil are to be maintained at a level that will allow of satisfactory yields being obtained. Apparently, each crop requires some particular combination of plant foods, and by growing the same crop season after season on the same soil a depletion of the main plant foods required by that crop results, thus lowering seriously the capacity of the soil to produce satisfactory yields of that particular crop. By growing a proper combination of crops in rotation, this condition is largely avoided, and the productivity of the soil maintained, and even improved.

The system of rotation to practise varies naturally with the climatic conditions, the crops that can be grown profitably, and the economic conditions of a country.

Broadly, it has been accepted that a farming system should be based on the principle that most of the crops produced should be consumed by farm animals and "marketed on the hoof." Many crop rotations practised in different parts of the world, therefore, include a continuation of crops, which are either grazed off by stock or are harvested for fodder, the resultant manure being spread over the land and ploughed in for the next crop. Where such a system is practised, the bulk of the plant food consumed by the growing crop is thus returned to the land, and, in addition, the organic matter ploughed under maintains the soil in sound physical condition. In the industries where stock raising cannot be combined profitably, it becomes necessary to practise rotations whereby nitrogen, the growth-producing plant food, is replenished. Throughout the wetter districts this is accomplished by growing nitrogen-developing crops—such as cowpea, soybean, clovers, and plants for ploughing under as green manure. Investigations have shown that such green manuring has a marked effect on the yields of following crops. For instance, average yields of 15 bushels of maize per acre where maize followed maize have been improved to 50 bushel crops by the growing and ploughing under of a legume between crops of maize.

In districts of light summer rainfall, however, green manuring has not proved so beneficial, as the drier conditions do not allow of sufficiently rapid decomposition to make supplies of nitrogen available for the following crop. The practice of long fallowing has, therefore, been developed, particularly in wheat growing countries. Where the crop is cut and threshed, ploughing is done as early as possible afterwards, and the land left in a rough state to absorb all subsequent rains. Where the crop is stripped the remaining straw is burned before ploughing, otherwise the body of dry material turned under would not rot in time to allow of the formation of a compact seed-bed. In addition, there would be a reduced supply of nitrate nitrogen available, due to the soil bacteria being unable to decompose such a body of dry material.

Crop rotation has received little attention in Queensland because of the natural fertility of the farming lands, which have been under cultivation for only a comparatively short period. Climatic conditions also have favoured the cultivation of a particular crop within a well-defined area, so that the obvious tendency is to specialise. Specialisation has, in consequence, resulted in crops—such as wheat, cotton, peanuts and arrowroot—being restricted to districts which have proved suitable for their successful production. This practice has often led to neglect of alternative crops. However, in spite of the climatic and economic conditions favouring one crop farming, the need for a more diversified system is already apparent on many of the soils of old cultivations, where the tendency to specialise in one crop has resulted in decreased fertility and impaired physcial condition of the soil, with a consequent reduction in the yields obtained.

The weed problem has also become acute, and in districts such as the Eastern Darling Downs, wild oats and similar weed pests have seriously diminished returns in recent years, disclosing the need for a planned rotation which includes the growth of crops for sheep feed, and row crops which necessitate inter-row cultivation.

The system of rotation practised will naturally be limited to those crops which can be utilised profitably, but in districts where dairying and sheep raising are engaged in, no difficulty should be met with in planning a suitable rotation. Where wheat is the main crop, it may be necessary to include it often in the rotation system, either in consecutive or alternate years. A four-year rotation, taking this factor into consideration, is suggested hereunder, not as an ideal plan, but in order to permit of half the cultivation area being cropped to wheat each year—

1st year—Wheat.
2nd year—Land summer fallowed and sown to oats and vetches for grazing.
3rd year—Wheat.
4th year—Land summer fallowed and sown to annual types of winter grasses and legumes, to be followed by wheat the next autumn.

This plan does not cover the growing of summer crops (fodder and hay), as the change over from winter to summer crops is inconvenient. Besides, it is preferable to include such crops in a separate rotation in respect of the lighter rainfall lands.

With prices for grain crops remaining more or less static, dairying and general live stock farming will assume greater importance, necessitating the cultivation of a variety of crops for effective maintenance.

Although a four or five-year rotation would be preferable in relation to soil fertility and crop yield, it is realised that no one rotation can be suitable for every farm or every locality, for soil, climate, area under cultivation, and marketing conditions must all be taken into consideration.

In Queensland cotton areas, for instance, it has been found highly desirable to grow cotton in rotation with grassland, for better yields are obtained, the quality is generally improved, and the cost of cultivation is lowered through the decreased weed growth. The quality of the grass is also maintained at a higher level than is the case in long established grassland. Detailed experimental work to determine the most economic rotations for the varying soil and climatic conditions prevailing in Queensland is therefore a profitable field for research.

Whatever plan of rotation is followed, it is most important to include prominently hay, silage, and fodder crops, for it is preferable to have too much feed rather than too many live stock.

In the chief wheat-growing areas of the Southern States of Australia, the rotation is wheat, oats for grain or hay, and bare fallow; although there is now a tendency to include grazing crops in order to prevent the eventual depletion of humus in the soil, and thus necessitate the ploughing in of green manure crops.

Where silage, fodder, and hay crops for dairying only are considered, the position is simplified, for the coastal lands utilised for dairying will usually produce satisfactory crops of maize, sorghum, millet, cowpea, lucerne, and the winter cereals in average seasons. Crops such as maize for grain, potatoes, pumpkins, and arrowroot—where climatic conditions are suitable—can be included to meet individual requirements, provided that sufficient attention is given to thorough cultivation. In favoured districts, or where irrigation is practised, both summer and winter crops can be grown in succession, but unless fertilizer is applied such a system will rapidly deplete the fertility of the land. By selecting suitable early-maturing varieties, a sufficiently long interval between harvesting and the sowing of the next crop can be obtained to permit of adequate cultivation for succeeding crops.

For maximum returns, the fertilizers required for each crop and particular soil type, must also be applied in addition to any rotational system. Undoubtedly, the rotation of crops reduces the fertilizer bill, in that it makes the fertilizer more efficient. Every farmer, therefore, is recommended to study this subject very carefully and evolve a plan whereby his whole farm is brought under a rotational scheme that will enable him to obtain the maximum benefit from the crops he grows.

To summarise: The advantages of a rotational system are self-evident in the larger crops obtained, greater economy in the use of artificial fertilizer, the addition of nitrogen to the soil by the use of leguminous crops, the addition of humus resulting in an improved physical condition of the soil, the control of weed growth, the decreased injury resulting from pests and diseases, decreased effect of market fluctuations because of the variety of crops raised, better distribution of labour throughout the year, and the greater numbers of stock carried where diversified farming is practised.

In the final analysis, the best rotation system is the one that pays best, but the returns can only be determined accurately over a series of years.

The Maize Trap Crop for the Control of Corn Ear Worm in Cotton.

W. J. S. SLOAN, B.Sc.Agr., Assistant Research Officer.

OF the many plants selected by the corn ear worm on which to breed, maize is the most attractive. The maize trap crop system attempts to utilise this preference for protecting cotton crops against severe corn ear worm attack. In this system, maize is planted in regularly spaced blocks through the cotton field at intervals during the season.

During the past cotton season, a farm of 36 acres at Biloela was planted according to this system to examine the possibilities of its general use. An additional feature was the treatment of the maize with a solution of the following formula:—1 lb. lead arsenate, 1 gallon molasses and 1 gallon water, in an endeavour to destroy larval populations of the corn ear worm bred on the maize.

The experimental field was so arranged that a space was left for four rows of maize between every 96 rows of cotton at the time of planting. Three weeks after the cotton was planted, two rows of maize were sown and three weeks later the remaining two maize rows were planted. As each maize planting came into tassel and ear, it was treated once with the poisoned molasses solution. The solution was flipped onto the maize with a whitewash brush from a half kerosene tin bucket at the rate of about twenty gallons per acre of maize.

The season was a mediocre one, but the yield from the protected field, which included approximately 1⅓ acres of maize, was fifty-six bales containing 24,413 lb. of clean seed cotton. The cost of materials used was £1 3s. 10d. Labour was not an important factor, as only two days were required to treat the maize.

The use of a maize trap crop which is swabbed at the silking stage possesses many attractive features, but at the same time it has certain disadvantages.

The system is cheap and not laborious; it requires no expensive machinery and the time to apply the swabbing solution is easy to estimate.

On the other hand, it may not be possible to plant maize regularly, because of inadequate soil moisture and even if the maize does germinate, sufficient rain may not be received later on to advance its growth.

In contrast to dusting, this method aims solely at the control of the corn ear worm. With dusting, some degree of control of other pests, such as the rough boll worm and various leaf eaters, may also be obtained.

The use of a maize trap crop for the control of corn ear worm in the cotton crop is not a new idea. In practice, however, attempts to exploit the method in Queensland have generally been unsuccessful owing to the frequent failure of one or more plantings and to the hesitancy of the farmer to cut the maize before it matures in order to minimise corn ear worm infestation in the more important cotton crop. The use of a swabbing mixture may permit the harvesting of the maize for grain without reducing the efficiency of the trap crop for the control of the corn ear worm. The stalks, however, cannot be fed to stock owing to the risk of poisoning. The past year's work is sufficiently promising to justify a considerable extension of the experimental work on trap crops in the current season.

A Home-made Hay Press.

IN response to numerous requests, the following notes on the construction of a home-made hay press which appeared in a back number of the Journal are reprinted:—

In the hay press represented in the accompanying sketch the rollers (A) and wheels (B) are made from well-seasoned round posts. The bed is made of five 5 in. by 4 in. hardwood beams set on two 8 in. by

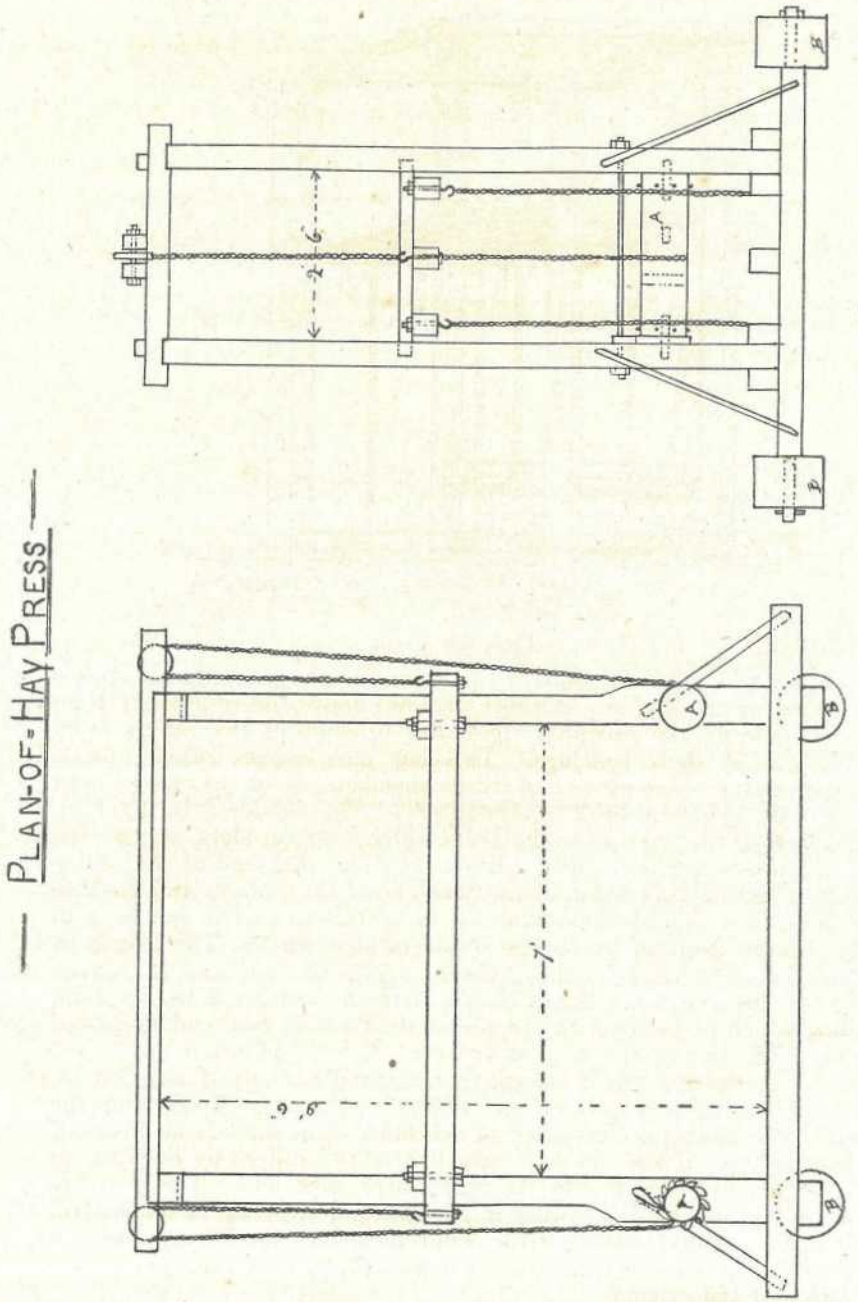


Plate 35.
Home-made Hay Press at the Queensland Agricultural College.

4 in. hardwood crosspieces. The uprights start at 8 in. by 4 in. and at a height of about 2 ft. are reduced to 5 in. by 4 in. Each upright is stayed in two directions with iron stays attached to the bed. At the top, 5 in. by 4 in. crosspieces hold the uprights, while above these are three members running the length of the press; the two outside pieces are 3 in. by 2 in., the centre piece 8 in. by 4 in. The latter is slotted at either end, and carries two 6-in. pulley wheels. The winding rollers (A) are set about 16 in. above the bed, and each has a ratchet wheel at one end. The rollers have two square holes through them set at

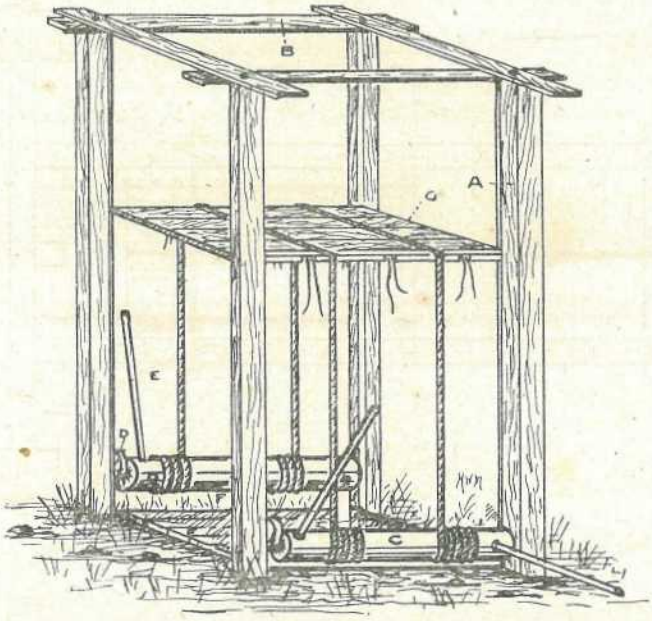


Plate 36.

right angles and near the centre; these are for the insertion of spokes for winding up the chains. A short distance above the rollers are 1 in. iron bars holding the uprights rigid and preventing the rollers from jumping out of their bearings. This bar also carries ratchet pawl. The floating top is composed of three members, 5 in. by 4 in., held together with two 4 in. by 2 in. crosspieces. The outside 5 in. by 4 in. are attached to the crosspieces by bolts which work in slots, so that the width of the floating top can be adjusted. From each end of the centre member of the floating top a chain passes over the pulleys and back to the rollers (A). This enables the top to be raised, and it can be held in any desired position by means of the ratchet wheels. The length of the bales is controlled by nailing chocks across the bed and the under side of the floating top. These chocks hold in position 3 in. by 2 in. uprights, which fit between the beams of the floating top, and so do not interfere with its movement up and down. Having adjusted the size of the bales, the floating top is raised, the required amount of hay put in, then the floating top is released and settles on the hay. To develop the pressure, four chains are attached to the ends of the outside members of the floating top. These are now attached to the rollers by hooking on to pins which are driven into the roller near each end. The pressure chains are wound round the roller in the opposite direction to the central lifting chain, so that on using the winding spokes the lifting chain is unwound as the pressure chains are wound up. It only remains to wire the bales and trim them.

Walnut Culture.

C. SCHINDLER, B.Sc.Agr., Fruit Inspector.

IN the Killarney district, near Warwick, some walnut trees are growing vigorously, each bearing an annual crop of about 80 lb. of nuts. Some of them are growing on deep basaltic soil, while others are rooted in deep black alluvial soil on the banks of Spring Creek and the Condamine River. There is room for further plantings of walnuts, especially along the river banks, and as the trees require very little care once they are established, it is suggested that owners of suitable land should consider the advisability of planting them instead of the willows usually grown in such situations.

Productivity of Walnuts.

All the sound walnuts now produced in the Killarney district from seedling trees of several types command a ready sale at a shilling a pound. The average yield over a number of years approximates 80 lb. of nuts. Selected varieties cared for properly would probably yield much more.

Walnuts of most varieties bear profitable crops in from six to ten years, and continue bearing for many years. Trees at least thirty-seven years old on the basaltic soil in the high lands near Killarney are still bearing profitable crops. Some trees growing near the banks of Spring Creek are at least twenty years old. Californian groves forty-five years old are still among the most profitable in the world, and experience there indicates that widely-spaced trees will live longer than trees planted closely together.

Climatic and Soil Requirements.

Low frosty sites should be avoided, as even light frosts will destroy during the flowering period much of the potential crop. This risk may possibly be reduced by planting late-flowering varieties. Frost also causes considerable injury to young shoot and leaf growth. Hot, dry weather during the summer may cause injury to the nuts.

The best walnut-growing areas in California have a long growing season free from frosts, low daily temperature range, a maximum temperature rarely above 100 degrees, and moderate winter temperatures and high humidity (especially in summer).

The best walnut-growing soil is a well-drained, deep, medium heavy silt loam, containing an abundance of organic matter. Light sandy soils produce slow-growing, stunted, poor-yielding trees, with nuts very susceptible to sunburning. Heavy clay soils, and soils with heavy clay subsoils, are unsuitable. Good drainage is essential. An abundant supply of water throughout the year also is necessary; therefore, a high rainfall is required, unless the trees are growing near a watercourse.

Plate 37.

A Walnut grove gives generous shade and shelter on a highland farm near Killarney.

Varieties.

The nuts from the trees growing at Killarney are of two varieties, Placentia and Franquette. Characteristics of the Placentia are: Fairly smooth, oval; not very well sealed; kernel, smooth; plump, and light-coloured; shell thin, but strong. The shell of these nuts separates very easily from the edible portion, and this should be of particular value for confectionery purposes. Franquette blooms very late in the season; nut reasonably large, elongated and somewhat pointed; fairly smooth; shell thin and well-sealed; light-coloured kernel.

Two varieties which have been introduced into Australia recently are Freshford Gem and Wilson's Wonder. The latter bears a very large nut, and is claimed to be a very precocious and heavy cropper. Freshford Gem gives 10 oz. of kernel per lb. of nuts, against Wilson's Wonder 7-8 oz., and it is said to be one of the finest flavoured nuts known.

Seedling trees may take fifteen years or more to bear, and show considerable variations in type. Consequently, the planting of budded or grafted trees of proved satisfactory varieties only is recommended.

Walnut flowers are unisexual, flowers of both sexes being borne on the same tree. In some cases, young trees bear female flowers years before the male flowers appear, and even where both kinds of flowers are present they are not always ripe at the same time. Hence, in order to get maximum production as early as possible, interplanting of several varieties (including at least one which produces male flowers when quite young) is necessary.

Propagation.

The Californian black walnut (*Juglans hindsii*) as a stock is more vigorous than the seedling English walnut, and is resistant to armillaria root rot. Several hybrids of other species of walnuts are also used; at East Malling, these are multiplied by layering. The stock is grown for one year and grafted just below the surface of the ground in early spring, using a whip graft. The walnut can also be budded, using either the ordinary method or the flute-bud.

Plate 38.
Walnut trees on uplands near Killarney at least thirty-seven years old.

Nuts to be used for seed should be gathered as soon as they have fallen from the tree, and stratified till planting time (about the middle of July). If this is not done, walnut seed may be soaked in water for a week before planting to hasten germination.

Planting and Care of Young Trees.

For a mature orchard, trees 60 feet apart each way, planted on the square system, have given the highest production per acre, but up to the age of about fourteen years the trees need not be more than 30 feet apart. At this age the trees can be thinned out, and the remaining trees allowed to grow to their full size. Alternatively, the trees can be planted 60 feet apart in the first place, and can be intercropped with suitable quick-maturing trees or vegetables.

The growing of a few trees of each of the three most promising varieties (Freshford Gem, Wilson's Wonder, and Franquette), rather than the use of one variety only, is advisable, as these varieties have not been compared under Queensland conditions. In any case, the use of several varieties will probably increase the crop on account of better pollination.

Trees should be planted in well-prepared land in August or September. The usual care in planting and watering should be bestowed on the young trees.

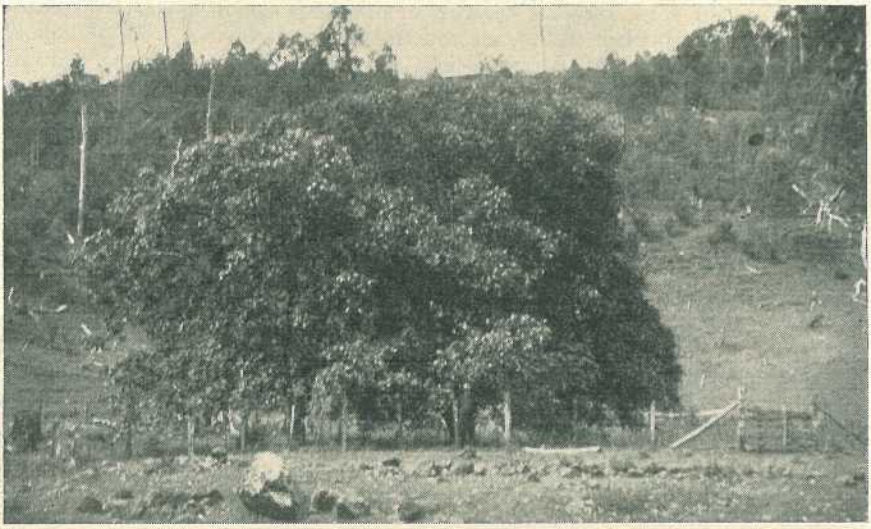


Plate 39.
A grove of Walnut trees on a bank of a brook near Killarney, twenty years old.

Pruning.

The object of pruning is to make a sturdy vase-shaped tree. At the time of planting, the one-year-old "whip" is cut back to about five feet from the ground. Trees thus planted will frequently start to grow first from the lower buds, and will send out shoots along their entire length. When the lower lateral buds have made a growth of from four to six inches, it is advisable to pinch off the growing tips, which will have the effect of forcing the growth into the upper shoots which are to form eventually framework of the tree. For a few years after planting, crossing limbs should be cut out and the most vigorous shoots topped to form a well-balanced tree. Afterwards, the only pruning necessary is the removal of crossing and broken limbs. The fruiting limbs should not be headed back, as this will promote a rapid growth of water shoots near the ends; any limbs which are not wanted should be cut out entirely. All pruning cuts should be made carefully, and large wounds painted with weatherproof paint, for walnut wood decays very easily.

Cultivation.

The space between the trees may be cropped, taking care not to check their growth. Cultivation in a similar way to other orchard trees is recommended, but the mature trees producing good crops in the Killarney district receive no such attention.

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APPLE LITTLE LEAF.

The disease of apple trees known as little leaf has become fairly widespread in the Stanthorpe district in recent years. It causes considerable losses both from the cessation of growth of affected leaders and their lowered productivity. No adequate explanation of the cause of the trouble has yet been made, but fortunately there is evidence that the disease may be controlled by the application of zinc. The beneficial response following the use of zinc has recently been demonstrated at Stanthorpe.

The best method for the application of zinc is still in doubt, as is also the period for which one application will protect the tree, and extensive experiments to elucidate these and other points are being carried out. In the meantime, a consideration of the serious effect on the trees of even one year's delay in the application of control measures would warrant orchardists applying the method which has shown the best commercial results to date. This is the application of a zinc lime spray to the trees when in full leaf. The zinc lime spray is made up by dissolving 8 lb. commercial zinc sulphate in about 70 gallons of water and adding 4 lb. hydrated lime dissolved in 4 gallons of water while stirring. The mixture is then made up to 80 gallons and is ready for use.

The zinc has given good results when used on trees which had one or more leaders affected with little leaf, but were otherwise making good growth. Small leaves occur on many trees which are non-vigorous, owing to poverty of soil or from other causes. Some of these have a superficial resemblance to those affected with little leaf. It is, of course, not anticipated that the zinc lime spray will benefit trees other than those definitely affected with the little leaf disease.

The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

DECEMBER has been noticeable for the great fluctuations in prices. The market for stone fruits and tomatoes has moved up and down on many occasions. This should show growers how it is almost impossible to forecast prices for these fruits in advance. The large carry over of old seasons apples has had a most depressing effect on apple prices. This will also effect the new season's crop to some extent.

Bananas have eased in price with the usual holiday drop in Melbourne. The rain has continued almost to the holidays, giving promise of heavy crops in the coming season. The following were the ruling market prices during the last week of the month of December:—

TROPICAL FRUITS.

Bananas—Cavendish.

Brisbane.—Nines and eights, 10s. to 13s. 6d. Sevens, 6s. to 12s. Sixes, 5s. 6d. to 10s. 6d. Smalls, 4s. to 7s.

Sydney.—Nines and eights, 12s. to 16s. Sevens, 10s. to 12s. Sixes, 8s. to 10s.

Melbourne.—Nines and eights, 8s. to 12s. Sevens, 7s. to 9s. Sixes, 6s. to 8s.

Adelaide.—Nines and eights, 16s. to 20s. per case.

Lady's Finger.

Brisbane.—5½d. to 10d. per dozen.

Cavendish.

Brisbane.—2¼d. to 6¾d. per dozen.

Pineapples.

Brisbane.—Smoothleaf, 5s. to 7s. per case; 1s. 6d. to 5s. per dozen. Ripley, 6s. to 8s. per case; 1s. 6d. to 5s. per dozen.

Sydney.—12s. to 16s.

Melbourne.—10s. to 14s.

Adelaide.—15s. to 17s.

Growers are again reminded that with less rain and more dry weather the conditions governing the colour of the fruit are changing. Care must be taken in selection for long distance markets. With the high incidence of Soft Rot (Water Blister) cutting the fruit from the plant is recommended for all markets.

Papaws.

Brisbane.—Yarwun, 7s. to 9s. per tropical case; Gunalda, 4s. to 5s. per bushel; local, 1s. 6d. to 3s. 6d.

Sydney.—6s. to 14s. per tropical case.

Melbourne.—12s. to 16s. per tropical case.

Hot weather is now being experienced in Melbourne and Sydney. Papaws should not be sent to these markets showing too much colour.

Mangoes.

Brisbane.—3s. to 5s. per bushel; fancy varieties higher.

Melbourne.—8s. to 10s. per bushel.

Only fancy varieties are saleable in Sydney and Melbourne, where there is a keen demand for good fruit.

CITRUS FRUITS.

Oranges.

Brisbane.—9s. to 12s. New South Wales Valencias.

Grape Fruit.

Sydney.—6s. to 10s.

Melbourne.—5s. to 13s. per bushel.

Lemons.

Brisbane.—Gayndah, 12s. to 16s.; locals, 7s. to 11s. per bushel.

Sydney.—2s. to 6s. per bushel.

DECIDUOUS FRUITS.

Apples.

Brisbane.—Yates, 5s. to 8s. 6d.; Granny Smith, 5s. to 9s. old seasons; William's Favourite, 3s. to 5s.; Gravenstien, 4s. to 8s.; Stanthorpe Cookers, 3s. to 5s.

Sydney.—New Season's Cookers, 2s. to 8s.

Old season's apples are having a detrimental effect on the new season's fruit. This fruit in most cases should have been out of cold storage weeks ago.

Pears.

Brisbane.—Stanthorpe Clapps, 4s. to 6s. per bushel case.

Peaches.

Brisbane.—1s. to 2s. per half-bushel.

A few special higher.

Nectarines.

Brisbane.—3s. to 5s. per half-bushel.

Plums.

Brisbane.—Angelinas, 3s. to 5s.; Santa Rosa, 2s. to 4s.

Apricots.

Brisbane.—3s. to 4s. per half-bushel.

Sydney.—8s. to 10s. per half-bushel.

OTHER FRUITS.

Grapes.

Brisbane.—Local grapes—Chouch, 2d. per lb.; Black Hamburg, 2d. to 2½d.; Cominya, 3s. to 4s. per half-bushel; Roma Muscats, 5s. to 7s. per half-bushel.

Tomatoes.

Brisbane.—Local, ripe, 2s. to 5s.; local, green, 1s. 6s. to 4s.; Stanthorpe, coloured, 3s. to 8s.; others, 3s. to 5s.

Passion Fruit.

Brisbane.—First grade, 3s. to 5s.; second, 2s. 6d. to 4s.

Sydney.—2s. to 8s. per half-bushel.

Melbourne.—6s. to 10s. per half-bushel.

MISCELLANEOUS—VEGETABLES, ETC.

Watermelons—Small, 1s. to 4s.; large, 6s. to 8s. per dozen.

Rockmelons—1s. to 4s. per dozen.

Cucumbers—2s. 6d. to 4s. per bushel.

Pumpkins—2s. to 3s. per bag.

Marrows—6d. to 1s. 6d. per dozen.

Lettuce—1s. to 2s. 6d. per dozen.

Cabbages—7s. to 10s.; inferior lower.

Beans—1s. to 2s. per bag.

Peas—3s. to 4s. per sugar bag.

Chocos—6d. to 9d. per dozen.

SOUTHERN FRUITS.

New South Wales Cherries—5s. to 8s. per tray.

THE CAPE GOOSEBERRY.

Actually, the Cape gooseberry is not a true gooseberry, being of the same family as the tomato, potato, and tobacco. This fact suggests immediately the class of soil it requires and what would be a suitable location for its growth.

The Cape gooseberry is best propagated from seed, 1 oz. being sufficient to plant an acre. Sow the seed is a carefully prepared seedbed in the same way as tomato seed is sown. Cover the seed to a depth of half an inch, using a rich loam, with a fair percentage of dry horse manure, if possible. Keep the bed moist, but shading is not necessary under normal conditions. The young seedlings grow rapidly, and should be ready to transplant in, approximately, eight weeks from sowing. Harden the plants off by reducing the watering gradually prior to removing the plants, but give the bed a thorough soaking immediately before lifting the young plants.

Plant in a well cultivated field in rows 4 feet by 4 feet apart. Water the plants at the time of planting. If land requires fertilizing, apply as a top dressing 1 part of sulphate of ammonia to 2 parts of superphosphate. A small amount of sulphate of potash applied just before the fruit appears is an advantage.

Harvesting may commence approximately three months after transplanting. The season lasts two to two and a-half months, regulated to a large degree by the season of the year. A fair crop would be about 3,000 lb. of fruit per acre, although much heavier yields have been recorded from time to time.

The market price ranges from 4d. to 7d. a lb. locally. The demand for this fruit is good, with little chance of a glutted market. The fruit is sold as fresh fruit, or for jam or preserves.

The chief troubles affecting the Cape gooseberry are downy mildew (control by spraying with the Bordeaux mixture 4-4-50); and soft, brown scale (control by spraying with white oil 1 in 56). Annual planting is recommended, but, if pruned back, the plants do quite well for two seasons.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society and Ayrshire Cattle Society, production charts for which were compiled during the month of November, 1937 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
MATURE COW (STANDARD 350 LB.)				
Valera Sheila	M. C. and A. M. Sullivan, Pittsworth	9,938·86	465·045	Royalist of Strathdhui
SENIOR, 4 YEARS (STANDARD 330 LB.)				
Valera Sally	M. C. and A. M. Sullivan, Pittsworth	12,322·77	438·915	Blacklands Daphne's Boy
SENIOR, 2 YEARS (STANDARD 250 LB.)				
Flower 12th of Sunnyside	P. Moore, Wooroolin	8,025·25	270·906	Cosey Camp Rupert
AYRSHIRE.				
MATURE COW (STANDARD 350 LB.)				
Fairview Lady Bess	R. M. Anderson, Southbrook	12,457·14	452·494	Longlands Bonnie Willie II.
SENIOR, 3 YEARS (STANDARD 290 LB.)				
Myola Lady Jean (197 days)	R. M. Anderson, Southbrook	7,617·76	321·838	Fairview Combination

The Tropics and Man

Hot Climates and Reproduction.

DOUGLAS H. K. LEE, M.Sc., M.B., B.S., D.T.M., Professor of Physiology, University of Queensland.

Second Series: No. 6.

THIS question is one that must arouse universal interest amongst tropical dwellers, and concerning which there has been considerable discussion. I shall try to summarise for you here the probable balance of opinion upon this problem and to indicate the way in which future policy should be bent in this regard.

Balance of Opinion.

One finds the most emphatic statements made by medical men, nurses, and others that maturity occurs at a definitely earlier age in the tropics, particularly in girls. On the other hand, nearly every careful investigation that has been made upon a statistical basis has failed to reveal any significant difference in this direction. The age of maturity is notoriously variable, and it would appear to be very easy to note and remember those cases which fit in with a preconceived idea, and to forget those cases which do not agree. In any case, it would not seem to be a matter of great moment to Europeans as our social system delimits the age of marriage.

There is no adequate evidence so far as I am aware to show that fertility is reduced by residence in tropical climates, except through some non-climatic factor such as disease. It is true that the fertility of numerous native races is declining, but this is not, of course, attributable to climate, as the climate has remained unchanged while the fertility has declined. The exact cause of this decline is difficult to fix; in some way or other, it seems to be associated with the advent of European civilisation, though even this is not conceded by some investigators.

Hot climates have never been shown to have any effect upon the processes of pregnancy. Inasmuch as the crippling diseases of scarlet fever and rheumatism are less common and less severe in the tropics, benefit may accrue, although in malarious areas other diseases take their place. Medicinal dosage with quinine has apparently little or no effect upon childbirth.

The Mother.

As I have stated, the mother has nothing directly to fear from hot climates as affecting a normal pregnancy. If there is any abnormality the position may be a little altered. If the fatiguing effects are increased by any complication, then they will be somewhat more acutely felt and come on somewhat more readily than in temperate climates. From this point of view there may be a greater strain upon bodily and mental stamina, and greater nursing care may be required. It is naturally the case, also, that greater attention has to be paid to ensuring bodily comforts and adequate rest in hot climates. These are all measures suggested by common sense, and, for the most part, easily carried out.

I admit that they are not carried out to the extent that they should be, and would plead for a very much greater consideration of the mother, but there is no insuperable difficulty in their way.

Childbirth in hot climates is said to be a definitely easier process than in temperate countries. This belief is firmly held in Malaya by both mother and doctor. Owing to the higher temperature and the natural tendency to greater relaxation, things are made a good deal easier. I should not be at all surprised if this were really the case, although I know of no adequate investigation of the matter. There is the other side of the picture, of course, that cases of insufficient muscular contraction (inertia) may be more common, but this is usually amenable to treatment.

It may be thought that the isolation from medical attention so frequently found in the tropics would be a drawback. Even in the days of real isolation, however, the materal mortality in country districts was well below that of the cities, as though absence of infectious germs more than compensated for lack of medical attention. In these days of high-speed transport, and particularly as a result of the splendid work of the Inland Mission and Bush Nursing Association, the drawbacks arising from isolation are being rapidly reduced, and the natural advantages of country life being given even further scope.

As regards the period of feeding, here again there is a greater need for consideration of the mother. Her nutritional reserves are being continuously called upon, and, in view of the generally increased stress of hot weather, more consideration must be given to maintaining these reserves and avoiding unnecessary demands upon her. For the nursing mother it is even more important to ensure a plentiful supply of fluid than for other tropical dwellers. Inasmuch as the likelihood of lime and phosphate containing foods being deficient is especially marked in Queensland, every care should be taken to see that these are given in sufficient quantities. Of these foods, milk and cheese are amongst the most important.

The Infant.

Owing to the easier birth process injuries to the infant are less likely to occur. The increasing medical and nursing facilities in the "outback" are removing many of the disadvantages and dangers of isolation. There is no evidence that hot climates directly affect the health of the newly-born infant.

The first twelve months of the baby's life is usually regarded as a special period and termed "infancy," as distinct from childhood which succeeds the first twelve months. During this period the infant is exposed to certain trials and dangers which are much reduced at later times. The death rate is usually greater in these months.

Although there are certain definite trials, such as prickly heat, and dangers, such as gastro-enteritis (summer diarrhœa) occurring in the tropics, the infantile mortality rate for Queensland is no higher than that for the Commonwealth as a whole. Climate, by itself, has no deleterious influence upon the infant death rate. A number of the trials that are introduced by tropical residence can be considerably lessened by careful attention. Loose and light clothing, frequent bathing, generous powdering, all help considerably to minimise that universal

bugbear to both mothers and babies, prickly heat. The careful cleaning and sterlising of all infant food and feeding utensils and the continuance of breast feeding, as long as possible, are powerful weapons against infection. These safeguards must be combined with, and cannot replace, an insistence upon the highest domestic and personal hygiene, with its continued suppression of the fly menace and mosquito nuisance.

Social and Economic Questions.

These are very important and must not be omitted from any practical consideration of such problems as these.

Early marriage is a feature in many isolated communities, and this tendency might easily be reinforced by a tropical climate. On the other hand, marriage is inevitably bound up with economic considerations. We have here several forces at work whose strengths are constantly changing. The whole social background is far from stable and solutions are often sought to-day which would have been socially suicidal even twenty years ago. In this era of flux, it is very unwise to judge or to predict what will be the ultimate outcome. Whatever suggestions are put forward, we must always try to judge them from the viewpoint of the race as a whole and not from the narrow interests of a small group. Even if we find that the good of the race conflicts with our accepted ideas of social conduct, we must be prepared to face the problem. These are questions which can only be solved slowly, although that must not be made an excuse for refusing to face them. Undue haste may be disastrous; the world has suffered often enough from a hot-headed severing of the Gordian knot.

CATTLE FATTENING.

There are thousands of acres of well-grassed land in South-Eastern Queensland on which fattening of bought store cattle is practised. These cattle are usually animals which fatten into "heavies." Older stock can "handle" roughage much better than yearlings, and it takes less time and trouble to get them ready for market; but, in general, they do not give as good a net return as "baby beef."

The reasons are:—

(1) Buying of stores is a more speculative business and the outlay greater.

(2) Disease, drought, and other retarding influences make the money loss, if any, greater.

(3) The trade does not favour "heavies."

(4) Although the relative cost per 100 lb. is higher with the "young stuff," more can be bought for the same money.

(5) The young animal lays on both flesh and fat—i.e., it fattens while it grows.

(6) The trade pays more for the finished carcase.

(7) There is *always* a market for well finished lightweights.

There are certain requisites for turning off baby beeves the year round:—

(1) On the part of the buyer, a sound knowledge of what "good doers" look like;

(2) On the property—well-planned subdivision, improved pastures, cultivation, and fodder conservation.

Improvements require a considerable outlay of capital, but in all cases where management has been sound the returns have made it well worth while.

It should always be remembered that the improvements are permanent, and that they enhance the value of the property.

The Apiary

DURING this month there is rather a lull in brood rearing activities, and some districts may experience a pollen shortage. When this occurs egg laying is curtailed and the colony rapidly dwindles in numbers. Experiments have recently been conducted by a Southern research worker for the purpose of finding pollen substitutes when natural pollen is not available in sufficient quantities to meet the needs of the bees. As a result of this work the following substances have been recommended for trial on a commercial scale:—(1) Cotton-seed meal, either alone or mixed with bran; (2) dried milk mixed with sufficient bran to prevent it caking in the open, and with about one part of cocoa to twenty parts of the other mixture; (3) cotton-seed meal to which is added one part of dried milk to ten of the meal. This Department recommends a trial of the above substitutes and would like to hear from bee-keepers who have tried them out on a commercial scale.

At this period high temperatures usually occur and the comfort of the bees should be considered. If a hot spell of weather comes on and the hives are exposed to the sun, new combs, especially if placed near the sides, will sometimes melt. A well-painted hive is cooler than one not painted, and a shade board would be useful. Temporary protection can also be given with bags or bushes spread on top of the hives.

If a heavy flow is on and the weather very hot, the bees will often "hang out" on the outside of the hive. For those using loose bottom boards the provision of extra ventilation may be effected by raising the hive slightly from the bottom board by means of thin wedges at the entrance. Should the bottom board be fixed, then the covers may be slightly raised to provide extra ventilation. Should the hive, however, be full of honey another super must be provided for additional storage room; these measures will usually induce the bees to commence work again. If any extracting is done in very hot weather the wet sticky combs should not be returned direct to the hive, but stacked on top. They will all be found cleaned up and dry by the next morning, when they may be replaced inside the hive.

PERIOD OF GESTATION OF DOMESTIC ANIMALS AND OF INCUBATION OF POULTRY.

Animals.	Shortest period.	Average or usual period.	Longest period.
	Days.	Days.	Days.
Mare	315	345	360
Ass	365	380	391
Cow	242	285	313
Buffalo	290	310	330
Ewe	145	150	160
Goat	148	155	165
Sow	109	115	143
Bitch	55	60	63
Cat	48	50	56
Rabbit	25	30	35
Hen	19	21	23
Duck	28	30	32
Goose	27	30	33
Pigeon	18	20	21

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.

" Purple Tails."

C.E.O. (Theodore)—

Your specimen is *Trichinium semilanatum*, a very common native plant of the amaranth family, *Amarantaceæ*. The only local name we have heard given to it is "purple tails." It is quite common on the plains of Central Queensland and is generally regarded as an excellent fodder. We have not heard of it before as a weed of cultivation.

" Live Leaf."

G.W.V. (Willowburn)—

The specimen is *Bryophyllum calycinum*, the "live leaf" or "liveforever," a succulent plant very widely spread over the subtropical regions of the world. Its native country is not known for certain. It is naturalised in many parts of Queensland, particularly around Marburg. A characteristic of the plant is that the leaves, if laid on the ground, form young plants in the angles of the crenations.

Cat's Head Burr (" Saucy Jack ").

Inquirer (Boonah)—

Your specimen is *Emex australis*, the cat's head burr, a native of South Africa and sometimes known as Cape spinach. In South Australia, it is a very bad weed, and is most frequently known as "Saucy Jack." It is not known to possess any poisonous or harmful properties. It has been naturalised in Queensland for some considerable time, but does not seem to have spread here to the extent that it has in the Southern States. It is, however, an exceedingly bad weed in some places, particularly about townships, and every effort should be made to destroy it as soon as it makes its appearance.

Willow Primrose. Milky Cotton Bush.

W.A.K. (Clermont)—

1. *Jussiaea suffruticosa*, the willow primrose. This plant has been suspected of causing trouble among horses once or twice in Queensland, but we have no definite information about it. As far as is known, most members of the family are quite harmless.
2. *Asclepias curassavica*, redhead or milky cotton bush. This plant is a native of the West Indies, but is now spread widely in most warm countries. It is common in Queensland, particularly in coastal districts. It is poisonous to stock, but is rarely eaten in sufficient quantities to cause trouble.

Foam Bark. Scrub Box.

L.T. (Jimboomba)—I am in receipt of several specimens from you. They have been determined as follows:—

1. *Jagera pseudorhus*, foam bark. During the time of the war, the bark of this tree was used as a substitute for quillaja bark for heading beers and soft drinks, but the tree is of very sparse distribution, and the supply was irregular. So far as we know it is not being collected at the present time.
2. *Tristania conferta*, scrub box or brush box. This tree is a native of Queensland and New South Wales. It is planted frequently as a street tree about Southern cities. Nurserymen down there mostly stock it under the name of *Lophostemon australe*. When properly pruned it makes a very shapely and umbrageous head.

General Notes

Staff Changes and Appointments.

Messrs. F. J. Manuell (Brisbane), A. C. P. Nurcombe (Brisbane), W. J. White (Kingaroy), and E. Widdup (Mundubbera), Assistant Graders (Senior), Cotton Section, have been appointed Graders, Cotton Section, Department of Agriculture and Stock.

Messrs. L. A. Burgess (Brisbane), Analyst, and L. E. Nichols (Toowoomba), Assistant to Dairy Bacteriologist, have been appointed Dairy Technologist and Assistant to Dairy Technologist, respectively, Dairy Research Laboratory, Department of Agriculture and Stock.

Mr. J. E. Maher (Ipswich) has been appointed an inspector under the Diseases in Stock Act, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock.

Mr. F. Angus (Fairymead, Bundaberg) has been appointed an honorary ranger under the Animals and Birds Acts, and Mr. J. Waters (Dunwich) has been appointed an honorary ranger under both the Animals and Birds Acts and the Native Plants Protection Act.

Constable F. L. Marsh, the officer in charge of police at Springsure, has been appointed also an inspector under the Brands Acts.

Mr. R. Letters, Rochedale, has been appointed an inspector under the Diseases in Plants Acts, Department of Agriculture and Stock, Brisbane.

Messrs. C. Caswell, E. R. Hollamby, and W. J. Park, slaughtering inspectors, have been transferred from Ipswich to the Oxley Bacon Factory, from Toowoomba to Maryborough, and from the Zillmere Bacon Factory to the Willowburn Bacon Factory (Toowoomba), respectively.

The appointment of Mr. M. Moloney as Acting Inspector of Stock at Meandarra has been cancelled, and the Officer in Charge of Police at Glenmorgan has been appointed Acting Inspector of Stock, Brands, and Slaughtering.

Messrs. J. R. Canty and A. Canty, Inspectors of Stock, have been appointed also inspectors under the Diseases in Poultry Act.

Constables D. Nichol (Dalveen) and A. R. Devantier (Einasleigh) have been appointed also inspectors under the Slaughtering Act.

Mr. J. G. Brooks (Cairns) has been appointed an honorary ranger under the Animals and Birds Acts and the Native Plants Protection Act.

Mr. D. L. McBryde, assistant technologist, Bureau of Sugar Experiment Stations, has been appointed chemist in charge, Sugar Experiment Station, Mackay.

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

Mr. W. H. Bechtel, Instructor in Agriculture, from Atherton to Brisbane.
Mr. A. Hamilton, Instructor in Agriculture, from Mareeba to Atherton.
Mr. E. W. Baird, Field Assistant, from Mareeba to Atherton.
Mr. R. C. Cannon, Instructor in Agriculture, from Dimbulah to Mareeba.
Mr. B. Dunbavand, Inspector of Stock, Slaughtering, and Dairies, from Ingham to Rockhampton.
Mr. A. H. Canty, Inspector of Stock, Slaughtering, and Dairies, from Brisbane to Ingham.

Mr. G. Courtney, Medical Superintendent, Palm Island, has been appointed an honorary ranger under the Animals and Birds Acts and the Native Plants Protection Act.

Constable R. J. Bradfield (Windorah) has been appointed also an inspector under the Slaughtering Act.

Commercial Cane Sugar.

The regulation under the Regulation of Sugar Cane Prices Acts dealing with the determination of commercial cane sugar in cane has been amended and revised, and has received the approval of the Executive Council.

Rural Topics

The Corriedale.

The qualities of the Corriedale as a general utility sheep are not sufficiently appreciated in Queensland. The Corriedale was founded on the Lincoln-Merino cross, from which was evolved this distinct breed which possesses the most valuable characteristics of the best type of dual purpose crossbred. That is to say that when the Corriedale ewe is joined with a Downs ram the breed produces a fleece of high quality as well as a lamb of outstanding merit.

In Queensland, a tendency to produce a sheep too fine in the fleece has been observed in some Corriedale studs. It should be recognised, however, that this tendency, if allowed to persist, will eventually defeat the object for which the Corriedale was evolved.

The Farmers' Feathered Friends—A Plea.

At this time of the year, when birds are nesting, an earnest appeal is made to all to become interested actively in the preservation of wild bird life. The value of birds in our rural economy is incalculable. It has been well said that the service that birds render in protecting forest trees "is more nearly indispensable to man than any other benefit they confer on him. Were the natural enemies of forest insects annihilated, every tree would be threatened with destruction, and man would be powerless to prevent the calamity. He might make shift to save some orchard or shade trees; he might find means to raise some garden crops; but the protection of all the trees would be beyond his powers. Yet this herculean task ordinarily is accomplished as a matter of course by birds and other insectivorous creatures without trouble or expense to man."

During the recent grasshopper plague, many thousands of starlings were to be seen feeding upon the insects, but starlings were not alone in their assault upon the common enemy. Every insectivorous bird fed to satiety on the hoppers. The indiscriminate shooting of bush birds has, therefore, nothing to commend it from any point of view.

Fortunately, very few native birds are not protected legally, but even the despised crow is a friendly ally in the continuous war against insect pests. Crows eat grasshoppers and it takes a lot of hoppers to fill the craw of a crow. The crow also is an energetic scavenger. It eats carrion and maggots. From maggots come blowflies, and the loss to Australian woolgrowers caused by blowfly infestation runs into millions of pounds annually.

Improvements on the Grazing Selection.

Improvements on newly-acquired sheep lands are important from two points of view. Firstly, their place in economic management, and, secondly, the necessity of avoiding the making of improvements likely to over-capitalise the property. A horse paddock is a prime necessity, and should be sufficiently large to run working horses and house milking cows.

If the lie of the land allows it, the horse paddock should be situated as near as possible to the centre of the property. The advantage of this will be found when the selection is stocked. The shorter distances to ride will be appreciated by both man and beast. The fencing should be sheep-proof, and the paddock cleared of unnecessary timber. Fencing the boundary is the next important job. The nature of this fence depends on the conditions under which the land has been selected. It may be that rabbit netting has been specified, and a dog-proof fence may be necessary. In any case, the boundary fence should be the best of its kind. If an addition to the natural water supply is necessary, this should be attended to at once. In this connection, the selector would be well advised to observe the methods adopted in the district. Bores, wells, and surface tanks all have their advantages, according to local circumstances. If the country is naturally watered, the subdivsion fences should be so planned, as far as practicable, that permanent water will be in every paddock. Substantial yards—preferably of post and rail construction—are necessary at the homestead. The yards may be used for both horses and cows. A sheltered calf pen should be attached. If conditions make it necessary, judicious ringbarking is the next job. Consideration should, however, be given to the reservation of tree belts for shade and shelter.

A woolshed and drafting yards on a small property should be close together and conveniently situated. The homestead, and its lay-out, is important, but its cost should be in keeping with the capital value of the holding.

Orchard Notes

FEBRUARY.

THE COASTAL DISTRICTS.

FEBRUARY in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand. Where green cropping is not practised it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth of weeds provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkept, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot, as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smooth-leaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well-filled and not partly developed. If the fruit is over-ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month, and, in respect to the latter, it is very important to see no fly-infested fruit is allowed to lie on the ground but that it is gathered regularly and destroyed.

Strawberries may be planted towards the end of the month, and, if early ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertilizer, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

THE marketing of later varieties of peaches and plums and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice in these notes for the two previous months with regard to handling, grading, packing, and marketing is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a way that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codling moth.

If there is a slightest indication of danger, a further spraying will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts winemaking will be in progress. Here again care is necessary, as the better the condition in which the fruit can be brought to the press the better the prospect of producing a high-class wine.

Where necessary and possible citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

BOOKS REVIEWED.

"THE STUDY OF THE SOIL IN THE FIELD," by G. R. Clarke, B.Sc., M.A. (Milford, Oxford University Press).

An honest and very successful effort to elucidate those important aspects of pedology, which the soil worker, engrossed with his "post-mortem" examinations, fails only too often to regard in their true perspective. The author has not confined himself to merely indicating the general principles of field soil studies, but has given actual working details, and in this respect Part II. is invaluable to the man on the job. One could wish that the work had not been restricted to a mere 140 pages, for the author could undoubtedly ably demonstrate many more practical points which would be of immense interest to the student.

—*E. H. Gurney.*

"CANNING PRACTICE AND CONTROL," by Osman Jones and T. W. Jones (Chapman and Hall, London, 1937).

The change in living habits which has been ushered in by the general adoption of motor transport is clearly reflected in the modified dietary of the urban dweller. Large joints which allowed of "carry-over" have been replaced by the smaller, leaner, and tenderer cuts from young animals; a greater variety of meats, fruits, and vegetables are obtainable, while farinaceous foods and confections are almost without number.

Apart from improvement in transport, the greatest factor responsible for this change is the advance in food processing technique. To meet the exacting demands which competition, stimulated by the newer knowledge of nutrition, has engendered in the dominant peoples of the world, only the best is good enough. This means careful production of raw materials, rigid selection, scientific processing, accurate control, and scrupulous cleanliness. The farther a country is from its markets the greater the care necessary. In no field is this strict attention to detail more important than in that of canning.

This has been the guiding principle in "Canning Practice and Control," by Osman Jones and T. W. Jones. Both authors are well known—the former as Chief Chemist of C. and T. Harris (Calne) Ltd. and Chairman, Advisory Panel, British Food Manufacturers' Research Association; and the latter as Editor of "Food" and "The Industrial Chemist."

The book is well provided with photographs, and an excellent bibliography ends each chapter. The duties of the chemist and his relation to successful plant operation are clearly defined. Chapters on examination of materials and a general outline of the microbiology of canning will be found most useful by all food-processing factories. A note on the value of air-conditioning with reference to health and efficiency of employees should be of more than passing interest to boards of management.

This book fills a very real gap in the literature on modern food-processing, and it should find a place in the manager's office as well as on the food chemist's shelf.

Farm Notes

FEBRUARY.

REFERENCE was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River) wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed-bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description, suitable for coastal districts and localities where early frosts are not expected, are Sudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the Setaria family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to Planters' Friend (so-called Imphee) and saccaline.

In most agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of 1 pint of formalin (40 per cent. strength) to 15 gallons should be made up and heated to 125 degrees Fahr. The potatoes should then be immersed in the solution for about two and a-half minutes. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish Blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible conistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig-raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

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 IMPORTANCE OF MILK.

IT is well sometimes to remember that Australia is only a small part of the world, and that Queensland is only a small part of Australia. It is possible that Queenslanders may have something to learn from what is being said and done in other parts of the world regarding milk. On this question

The League of Nations

speaks with no uncertain voice. "The value of milk is unique. It is indispensable. More than any other food it contains the elements essential for life and growth. It has no satisfactory substitute, and is itself the nearest approach we possess to a complete food. In our opinion one of the most important practical steps that can be taken to raise the standard of health of the growing generation is to arrange for the free or cheap distribution of safe milk to children of school or pre-school age. The health of the child is the kernal of the nutritional problem. The damage done by faulty feeding in the pre-natal period, in childhood, and in adolescence cannot be repaired in later life."

Great Britain.

In our motherland great efforts have recently been made to promote the consumption of milk by children. No fewer than 2,500,000 of school children have been supplied with cheap milk, and another 400,000 with free milk during the year 1936. Large quantities of milk have also been issued to expectant or nursing mothers and to children below school age. Notwithstanding all this, the British Minister of Health recently

issued a strongly worded memorandum to all local authorities urging them to increase and liberalise their provision of milk to the last two classes.

South Australia.

Let us now come nearer home. In 1930, after the onset of the financial depression, a large number of families in Adelaide were living on Government rations. These rations contained a liberal provision of milk for children and expectant or nursing mothers. For seven years this has continued, and at present each mother receives 1½ pints of fresh milk daily, each child up to six years one pint, from six to thirteen years half a pint. A striking improvement in the health of the children followed. It became indeed better than it had been before the depression.

Even more striking has been the reduction in the infant mortality of South Australia. In all the Australian States this mortality in the first year of life has been considerably reduced, largely through the work of infant welfare centres or baby clinics, but this reduction hitherto has not been much in the first month of life. Babies are seldom brought to the clinics before they are three or four weeks old. There has been a large decrease in the number of deaths in the eleven months that follow the first month. The death rate during the first month is due to antenatal causes, which are responsible in Queensland and Brisbane for nearly three-fourths of the mortality in the first year.

If we compare Queensland, which has the next lowest infant mortality, with South Australia, we find that the eleven months mortality of both is nearly equal, but rather less in Queensland; but this advantage is more than counter-balanced by the much lower first month mortality in South Australia. Comparing Brisbane with Adelaide both mortalities are lower in the latter. The difference in the eleven months mortality is small, but that in the first month mortality is considerable. Of every 100 newborns nearly as many die in Brisbane during their first month as in Adelaide during their first year. The first month mortality depends almost wholly on the health of the mother. This again depends very much on how she is nourished, and more particularly on her taking a sufficient quantity of milk daily.

All Australians who are interested in the saving of infant life should very seriously consider the example set by South Australia.

THE ROMANCE OF TREES.

Tree pictures that live in the memory! Can we share them with others whose feelings are similarly stirred by living portraits in Nature's greatest handiwork? Pictures etched against a clear sky with tracery of limb and leaf and flower sublimely fashioned—in colour and form and soft green foliage.

Trees are the noblest of all Nature's creative works. They symbolise our own lives so closely; trials and tribulations resemble our own; early training and fashioning are mutually so important.

But trees are more than all this, as many of us know who have seen the splendid autumn foliage of Liquidambars, the unique flowers of Tulip Trees (Liriodendrons), the spontaneous display of the Cape chestnuts, the soft beauty of Jacarandas, and the blaze of splendour that is the Poinciana Rex.

Others who have warmed themselves at the fiery autumn glow of scarlet which is the Pin Oak or bathed in the beauty of the Turkey oak with its ruby red tones, or been entranced with the dazzling grace and softness of the Silver Birch, know well what the changing glory of the seasons means to us—in the language of the trees.

Autumn is perhaps the most enchanting of all, for then the deciduous trees are radiant in many tones. They certainly go to rest with colours flying when stern old winter is ushered grudgingly in.

Spires of Molten Gold.

Then the spires of molten gold—the poplars—vie with the golden ash—also in golden tones—and the elms, resplendent in rich yellow and the box elders for a place on the stage. Japanese maples—most delicate of all in foliage—are radiant in scarlet tones both during spring and autumn. Their summer coating is a soft verdant green. Even the ruby red of the ordinary pear trees are something to arouse admiration in late autumn.

These, however, are only part-time stories of the beauty of trees. Many other phases of their splendour could be told.

See the bronzy tint of the soft Cryptomerias during the winter and the fairy-like effect of snow along the pendulous branches of the Deodars. See the lovely Pawlownia or Blue Bell Tree—at present in full bloom at Cootamundra. It is only then we begin to understand the "Romance of our Trees."

A few other impressions to flash across the memory-screen are:—Early springtime foliage of elms and oaks; the silky oaks in a blaze of orange; Moreton Bay chestnuts robed in saffron; and weeping willows seen in relief against early winter sunlight.

English Tree Pictures.

Now for some of the tree pictures! It was during the war years, when those of us who were fortunate enough to be in England during springtime saw its real beauty. The war could not stop nature's pageant from unfolding itself. A few of us made the trip to Bushey Park to see the horse-chestnuts of the famous avenue in bloom. A mile of them! It was a sight to remain in the mind of every beauty lover for life. The long racemes of whitish flowers with a creamy centre, like giant candles held aloft, and the trees like candelabra against the hand-like foliage, their soft green flowers stand out in relief. Perhaps it was the massed beauty which counted. We were spellbound.

From here to an avenue of copper beech trees down in Sussex was another treat. To see these beech trees with the rich coppery tint accentuated in bright sunlight was to understand what trees mean to England. The home country is noted for its lawns and trees. No other European nation can quite equal England in these respects—leafy trees particularly.

Perhaps pride of place can be given in our own land to the poplars of Tumut, the oaks and elms in Machattie Park, Bathurst, and Mount Wilson's famous trees, not forgetting the glorious blue gums which grow naturally there. I would not like to decide between these.

Graceful Jacarandas.

I have not had the pleasure of seeing Grafton's Jacaranda Avenue, otherwise it should have the premier place in such pictures—coloured photography has assured me of its glory. But to atone for that omission somewhat, there is a boyhood recollection of Jacaranda trees in the city of Gympie, in Queensland. The residential part of the town is built on a ring of hills, in the central hollow of which is the business section. During late springtime a sublime picture is presented of great splashes of mauve, plentifully besprinkled throughout the green of the trees. These are the jacarandas: trees of beauty and grace.

I have seen many flame trees whose scarlet glory remains etched on my memory, but perhaps the one that is clearest is a magnificent specimen at Gosford. Standing in the police sergeant's residence, it is a beacon to be picked out for miles around when in bloom.

One day at Lindfield I was attracted by a gorgeous mass of purple, which on investigation proved to be Bauhinia purpurea. It was just below the post office—the finest specimen tree I have seen. Its memory remains. A lovely little row of these trees at Point Clare seen since confirms early impressions of bauhinias.

There was an enchanting little Liquidambar tree at Fauleonbridge in Mrs. Robinson's garden, which surpassed anything I have since seen for richness of autumn foliage. It was shapely and graceful, too. During one mellow late autumn, free from winds, that tree was a dream-picture.

Along the Gilmore Valley.

Then there was that never-to-be-forgotten year when I drove down Gilmore Valley, near Tumut, in the late autumn. All along the creek the willows—basket and weeping—were shedding their foliage and the dancing sunlight streamed through, lighting up the stems and twigs and yellow leaves with a golden filigree. The poplars and elms and osage-orange trees, too, were silhouetted with gold—against the light—in a mauvy blue atmosphere.

But, perhaps, it is because in the final analysis I am really Australian that the memory of a shapely swamp gum in Blackheath Park is not effaced by any exotic trees. Like a grey phantom in the mountain mist its delicacy of pattern is seen on summer days when the "mist comes up." It has everything that constitutes tree-beauty—graceful form, satiny-grey trunk, and picturesque marking, and is emblematic of our country—hard at times, but irresistible in its attraction.

Those glorious "gums" in Bundanoon's gullies follow it closely—Messmates, Yellow Box, and False Messmates. Shapely, grand, and majestic are these three respectively—but soft and restful to city visitors. With them can be bracketed Queensland's lemon-scented gum (*Eucalyptus citriodora*) for warm climates. A tree full of grace and a poem of beauty—and a fit companion to the Silver Birch—the "Lady of the Woods."

"Waratah" in the "*Sydney Morning Herald.*"

IN THE FARM KITCHEN.

FOR THE AFTERNOON "SMOKO."

Cut-and-come-again Cake.

12 oz. flour
½ teaspoon salt
¼ lb. chopped raisins
¼ chopped candied peel
7 oz. butter
Grated rind 1 lemon
3 teaspoons baking powder
8 oz. castor sugar
¼ lb. cleaned currants
2 beaten eggs
1½ gills milk
Strained juice of 1 lemon

Sift flour with salt and baking powder. Rub in the butter. Add the raisins, then the peel and currants. Mix well. Add sugar and lemon rind, then the beaten eggs diluted with the milk. Beat till well mixed. Stir in lemon juice. Bake in a greased cake tin lined with two layers of buttered paper in a moderate oven for one and a-half hours.

To Vary this Cake.—Add 1 teaspoon mixed spice, ¼ teaspoon ground cloves or grated nutmeg, and substitute 3 oz. chopped shelled walnuts for the currants.

Add 2 tablespoons treacle, ½ oz. carraway seed, and 3 oz. chopped dried apricots.

Add 2 oz. ground almonds, substitute ground rice for half the flour, and add cherries and chopped preserved ginger instead of raisins and currants.

Slab Gingerbread.

½ lb. flour
2 oz. butter
1 beaten egg
½ teaspoon baking soda
½ teaspoon ground ginger
4 oz. castor sugar
2 oz. golden syrup
2 oz. treacle
1 teaspoon ground cinnamon
½ teaspoon mixed spice

Milk to moisten.

Grease a baking tin. Heat the butter, syrup and treacle slowly in a saucepan until the butter is dissolved. On no account bring to the boil. Stir in the egg. Sift the flour with the spices, soda and salt into a basin. Add the treacle mixture and enough milk to make a thick batter. Pour into a buttered tin. Bake in a moderate over (350 deg. F.) for about thirty minutes.

To Vary this Cake.—Add ¼ lb. chopped walnuts to mixture.

Add 2 oz. chopped preserved ginger and 2 oz. finely chopped stoned raisins.

Add 4 tablespoons orange or ginger marmalade to batter, but lessen sugar to 2 oz.

Spice Cake.

¼ lb. butter
2 beaten eggs
¾ lb. chopped stoned dates
Pinch of salt
½ teaspoon grated nutmeg
¾ gill cold water or coffee
6 oz. light brown sugar
6 oz. flour
3 teaspoons baking powder
½ teaspoon ground cinnamon
½ teaspoon ground cloves

Sift the flour, salt, baking powder, and spices into a basin. Add the remainder of ingredients. Beat hard for five minutes. Bake in a greased loaf tin for three-quartrs of an hour in a rather hot oven. Cool on a wire rack. Spread with sifted icing sugar, flavoured to taste with rum or vanilla essence.

To Vary this Cake.—Add 2 oz. chopped candied peel and 1 oz. ground almonds.

Marble Cake.

8 oz. flour
Pinch of salt
2 small beaten eggs
½ oz. cocoa
5 oz. butter
5 oz. castor sugar
½ gill milk

Brush a cake tin, 6 inches in diameter, with butter. Sift the flour into a basin with the cocoa and salt. Rub the butter into the flour with your finger-tips. Stir in the sugar. Make a well in the centre. Mix with the beaten egg and the milk. When well blended, place half the mixture into another basin. Add the cocoa and a few drops of vanilla essence. Place a layer of the white mixture in the bottom of the tin. Cover with the cocoa mixture, then with the remainder of the white mixture. If preferred, place alternate tablespoonfuls of the mixture into the tin from the beginning. Bake in a moderate over for about three-quarters of an hour. Cool on a wire tray.

IN THE FARM GARDEN.

The best of soil is not too good for most vegetables. The situation of the farm garden should be open and sunny. Good drainage and deep and thorough cultivation also are necessary.

In good soil, most vegetables grow easily. The ground should be deeply dug, at least 12 to 15 inches, and broken up well. Keep the top spit of soil on the top, and do not bring the subsoil to the surface in the digging.

Leaf crops, such as lettuce and spinach (or silver beet), require generous preparation with animal refuse to provide humus.

An additional sprinkling of a handful of sulphate of ammonia to the square yard is also recommended. Keep the nitrate of soda for use when the plants are growing. It should be used immediately, or its value may be lost. Blood and bone is an excellent fertilizer to use for leaf vegetables, during preparation, especially in light sandy soils.

Tomatoes do not require very rich soil. A small quantity of cow manure and a light sprinkling of a mixture of superphosphate (two parts) and potash (one part), turned into the soil, about four or five inches deep, is sufficient. It is better to apply a further surface mulching as the flowers appear than to encourage too much leaf and soft growth at the early stages. Tomatoes which are overfed when young often drop the flowers, and are a prey to fungus diseases.

Beans, in spite of popular ideas, do best in a good rich bed, but the animal manure used must not be too fresh. A further addition of the fertilizer recommended for tomatoes will help them to yield well. Lettuce do best if planted no more than 7 inches apart in the rows, and they should be watered generously. Silver beet in the same rich quality beds, in good sunlight, maintains a succession over the whole summer if treated generously.

Dig a bed deeply for beetroot and break it up finely. A warm sunny aspect is best. Give a generous ration of blood and bone where the rows are to be sown, and just turn it in. Sow the seed after soaking it all night, and cover with ¼ inch of fine soil. Water it well. Thin out the resulting seedlings carefully to 7 inches apart, and maintain the watering and cultivation throughout the growing period. Beet must be grown quickly to be at their best.

A bed each of parsnips and carrots is also advisable. These beds must be dug deeply, as for beet, and a mixture of superphosphate and potash (2 and 1) dug in at the rate of a double handful to a square yard. Put it down low. Sow the seed of both these useful crops in rows about 9 inches apart. Sow thickly and cover the seed with nearly an inch of sandy or finely broken soil and press firmly. Water well. Thin out parsnips if too thick, but make the thinning of the carrots a useful one, by utilising the "culls" for soups. The secret of getting parsnip seed to germinate well is to have it very fresh. Old seed is poor seed. No animal manure must be used in preparation for these root crops, or the roots may fork. A bed which had been well manured for a previous crop is often most satisfactory.

Cucumbers, melons, pumpkins, and squash are most easily grown on slightly raised mounds each about 3 feet in diameter. Any manuring that is required should be done on the mounds only. Preparing the whole area which the plant is to cover is sheer waste.

Give a generous ration of old manure, super., and potash, and dig it in well. For cucumbers dig deeply, and make the ground rich. Sow half a dozen seeds on each hill, and retain only two of the pumpkin, melon, or squash, and three of the cucumbers on each, if all germinate. Apple cucumbers are best for home use. Water them well while young.

ABSTRACTS AND REVIEWS.

PRODUCTION OF HERBAGE PLANT SEEDS.

We have received from the Imperial Bureau of Plant Genetics: Herbage Plants the following series of bulletins dealing with the production and collection of seeds of grasses and other pasture plants in various countries:—

Bulletin No. 19—Production of Grass Seed;

Bulletin No. 20—Insects and other Pests Injurious to the Production of Seed in Herbage and Forage Crops;

Bulletin No. 21—The Influence of Climatic Conditions on Type Composition;

Bulletin No. 22—Technique of Grass Seed Production at the Welsh Plant Breeding Station;

Bulletin No. 23—Production of Legume Seed;

Bulletin No. 24—Collection of Native Grass Seed in the Great Plains, U.S.A.

While the bulletins deal chiefly with temperate-area plants—such as perennial ryegrass, cocksfoot, bent grasses, fescues, and red clover—which are not grown for seed purposes in Queensland, information of interest to local farmers is given in connection with seed production of lucerne and of various North American native grasses.

In the United States of America over 80 per cent. of the total seed production of lucerne is in arid and semi-arid regions. The crop is grown under irrigation in the 5-10 inch rainfall areas, dependence elsewhere being placed upon the seasonal rainfall. The method of harvesting with the ordinary mower followed by a rake is condemned as wasteful. A mower with a side delivery buncher or windrow attachment, or the self-rake reaper, is recommended. Threshing direct from the windrow is advisable. The lucerne huller is a very efficient machine, and the grain thresher with lucerne seed screens and recleaning attachments also is satisfactory. The Verification service of the United States Department of Agriculture and the Certification systems of State Crop Improvement Associations provide valuable safeguards to the purchaser of lucerne seed.

The work of the United States Soil Conservation Service in collecting seeds of native grasses for use in connection with the artificial reseeding of pasture lands is of considerable interest to Queensland pastoralists. Seeds of grasses closely related botanically to our blue grasses and of very similar habit have been harvested in huge quantities by means of specially-built power strippers. "These stripper units consist of a rotating spike-tooth cylinder driven by chain and sprocket from the rear wheel of a car chassis. Appropriate changes are made in the steering apparatus to permit driving the car in reverse, the hopper and cylinder units being placed on what would normally be the back of the car chassis." The power stripper is claimed to work satisfactorily on fairly rough country and on grasses of varying height, and 25 acres can be harvested in one day. Over 80,000 lb. of seed of two grasses resembling our blue grasses were collected during 1936. The ordinary combine has been used with considerable success in collecting seed of other grasses resembling wheat in habit.

—*C.W.W.*

Plate 40.

A YOUNG FARMERS' FIELD DAY GATHERING.—Members of the Ravensbourne Local Producers' Association, with the Head Teacher and members of the Ravensbourne State School Project Club assembled at the Queensland Agricultural High School and College, where principles of the science and practice of agriculture and animal husbandry were interestingly demonstrated.

[*Photo.*: *Donald Findlay.*

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1937 AND 1936, FOR COMPARISON.

Divisions and stations.	Average Rainfall.		Total Rainfall.		Divisions and stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of years' records.	Nov., 1937.	Nov., 1936.		Nov.	No. of years' records.	Nov., 1937.	Nov., 1936.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	2·37	36	6·38	0·37	Clermont ..	2·01	66	1·64	0·16
Cairns	3·90	55	2·42	0·94	Gindie	2·13	38	4·90	0·53
Cardwell	4·17	65	4·34	2·50	Springsure ..	2·17	68	5·19	0·10
Cooktown ..	2·52	61	1·27	1·91					
Herberton ..	2·58	51	3·81	0·36					
Ingham	3·81	45	3·52	0·99					
Innisfail	6·24	56	13·66	1·47					
Mossman Mill ..	4·35	24	7·90	4·28	*Darling Downs.*				
Townsville ..	1·89	66	1·93	2·48	Dalby	2·76	67	7·58	0·78
Central Coast.					Emu Vale ..	2·68	41	4·89	1·67
					Hermitage ..	2·58	31	..	1·17
Ayr	1·74	50	4·28	0·12	Jimbour ..	2·55	49	3·92	0·78
Bowen	1·27	66	0·75	Nil	Miles	2·60	52	4·80	1·36
Charters Towers ..	1·43	55	2·45	0·82	Stanthorpe ..	2·71	64	5·11	1·24
Mackay	3·08	66	4·33	0·38	Toowoomba ..	3·30	65	5·02	1·59
Proserpine ..	2·87	34	4·14	0·29	Warwick ..	2·62	72	3·43	1·66
St. Lawrence ..	2·40	66	2·16	1·04					
South Coast.									
Biggenden ..	2·77	38	1·94	0·86	*Maranoa.*				
Bundaberg ..	2·71	54	1·71	3·34					
Brisbane	3·75	85	7·94	1·35	Roma	2·18	63	1·78	1·50
Caboolture ..	3·51	50	10·81	2·41					
Childers	2·77	42	1·47	1·74					
Crohamhurst ..	4·50	44	11·24	2·60					
Esk	3·24	50	3·63	2·27					
Gayndah	2·94	66	4·08	0·99					
Gympie	3·24	67	6·34	2·25	*State Farms, &c.*				
Kilkivan	2·58	58	3·60	2·50					
Maryborough ..	3·21	66	3·97	2·09	Bungeworgorai ..	2·53	22	..	1·03
Nambour	4·02	41	13·49	2·48	Gatton College ..	2·79	38	3·34	3·00
Nanango	2·74	55	4·62	1·81	Kairi	2·42	21	..	..
Rockhampton ..	2·43	66	3·01	2·46	Mackay Sugar Experiment Station	2·80	40	2·35	0·35
Woodford ..	3·26	50	6·26	2·05					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—NOVEMBER, 1937.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure, Mean 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	29·86	84	75	89	16, 20, 23, 18	69	17	127	4
Herberton	..	84	61	92	7	51	17	381	10
Rockhampton	29·95	89	68	99	15	64	11	301	9
Brisbane	30·02	79	64	101	16	58	11	794	17
Darling Downs.									
Dalby	29·99	82	60	98	15	53	10, 11, 23	758	10
Stanthorpe	..	74	55	92	14	48	11	511	14
Toowoomba	..	76	58	96	15	52	11, 26	501	15
Mid-Interior.									
Georgetown	29·86	98	72	105	17	65	12	170	4
Longreach	29·86	99	71	109	15	64	12, 25, 27	157	3
Mitchell	29·95	90	64	105	14	54	22	59	5
Western.									
Burketown	29·83	97	76	105	9	71	27	187	6
Boulia	29·82	100	72	109	14	67	4, 18	36	2
Thargomindah	29·88	93	71	110	14	58	17	5	1

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	January. 1938.		February. 1938.		Jan. 1938.	Feb. 1938.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	5·1	6·50	5·25	6·47	4·19	5·46
2	5·2	6·50	5·26	6·46	5·9	6·42
3	5·2	6·50	5·27	6·46	6·5	7·37
4	5·3	6·51	5·28	6·45	6·59	8·32
5	5·3	6·51	5·28	6·44	7·51	9·29
6	5·4	6·51	5·28	6·44	8·46	10·28
7	5·5	6·51	5·29	6·43	9·41	11·28
						p.m.
8	5·5	6·52	5·30	6·42	10·36	12·36
9	5·6	6·52	5·30	6·42	11·33	1·40
					p.m.	
10	5·7	6·52	5·31	6·41	12·23	2·36
11	5·8	6·52	5·32	6·40	1·36	3·35
12	5·9	6·51	5·32	6·39	2·43	4·28
13	5·9	6·51	5·33	6·39	3·48	5·18
14	5·10	6·51	5·34	6·38	4·51	6·1
15	5·11	6·51	5·34	6·37	5·51	6·42
16	5·12	6·50	5·35	6·37	6·41	7·21
17	5·13	6·50	5·36	6·36	7·27	7·58
18	5·13	6·50	5·36	6·35	8·9	8·35
19	5·14	6·50	5·37	6·34	8·49	9·14
20	5·15	6·50	5·38	6·33	9·29	9·55
21	5·16	6·49	5·38	6·32	10·5	10·36
22	5·17	6·49	5·39	6·31	10·47	11·20
23	5·18	6·49	5·40	6·30	11·18	..
						a.m.
24	5·19	6·49	5·41	6·29	11·58	12·7
25	5·19	6·48	5·42	6·28	..	12·56
					a.m.	
26	5·20	6·48	5·43	6·27	12·39	1·50
27	5·21	6·48	5·44	6·26	1·24	2·39
28	5·22	6·48	5·45	6·25	2·13	3·38
29	5·23	6·47			3·4	
30	5·24	6·47			3·57	
31	5·25	6·47			4·52	

MOONRISE.

Phases of the Moon, Occultations, &c.

2nd Jan.	●	New Moon	4 58	a.m.
10th ,,	☽	First Quarter	12 13	a.m.
16th ,,	○	Full Moon	3 53	p.m.
23rd ,,	☾	Last Quarter	6 9	p.m.

Perigee, 15th January, at 12 noon
Apogee, 27th January, at 4.0 p.m.

Mars is fast travelling towards Saturn, and will pass the slowly moving planet on 2nd February.

Mercury, in Sagittarius, will attain its greatest distance west of the Sun on the 20th January, rising 1 hour 47 minutes before it.

On the 29th Jupiter will set with the Sun, and after some weeks become a morning star.

Mercury rises at 4.46 a.m., 15 minutes before the Sun, and sets at 6.25 p.m., 25 minutes before it on the 1st; on the 15th it rises at 3.31 a.m., 1 hour 40 minutes before the Sun, and sets at 5.11 p.m., 1 hour 40 minutes before it.

Venus rises at 4.25 a.m., 36 minutes before the Sun, and sets at 6.16 p.m., 34 minutes before it on the 1st; on the 15th it rises at 4.48 a.m., 23 minutes before the Sun, and sets at 6.34 p.m., 17 minutes before it.

Mars rises at 9.26 a.m. and sets at 10.17 p.m. on the 1st; on the 15th it rises at 9.20 a.m. and sets at 9.50 p.m.

Jupiter rises at 6.53 a.m. and sets at 8.21 p.m. on the 1st, on the 15th it rises at 6.5 a.m. and sets at 7.37 p.m.

Saturn rises at 11.5 a.m. and sets at 11.22 p.m. on the 1st; on the 15th it rises at 10.13 a.m. and sets at 10.29 p.m.

At this time of the year the northern constellations in or near the milky way are seen to greatest advantage. Withal, it will be worth more than a casual glance to compare the colours of the most prominent among the stars. In Orion Alpha Orion's, or Betelgeuse, with Beta, or Rigel; Alpha, it will be seen, is of a deeper and richer tone than any other orange-tinted star while Beta will show glints of bright-blue.—Aldebaran in the V-shaped group and below it Capella near the northern horizon, Castor and Pollux and Procyon in the north-east are ruddy-hued, orange or gleaming-white, while Sirius scintillates like a diamond in all colours.

8th Feb.	☽	First Quarter	10 33	a.m.
15th ,,	○	Full Moon	3 14	a.m.
22nd ,,	☾	Last Quarter	2 24	p.m.

Perigee, 12th February, at 4.0 p.m.
Apogee, 24th February, at 11. 0 a.m.

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

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

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