QUEENSLAND AGRICULTURAL JOURNAL

VOL. 86 JANUARY, 1960 NO. 1

Registered at the General Post Office, Brisbane, for transmission by Post as a Newspaper

contents

COVER PICTURE: This farm water supply not only performs the vital task of providing water for thirsty livestock, but it also adds beauty to the landscape.

EDITOR: *E. T. Hockings*

PUBLISHED BY THE QUEENSLAND DEPARTMENT OF AGRICULTURE & STOCK.

SUBSCRIPTION RATES (PAYABLE TO DIRECTOR-GENERAL, DEPARTMENT OF AGRICULTURE AND STOCK, WILLIAM STREET, BRISBANE):

QUEENSLAND FARMERS, SCHOOLS AND STUDENTS—5S. A YEAR; OTHERS—£1 A YEAR.

agric plant
6899

New Year Message From The Minister For Agriculture And Stock ....

Hon. O. O. MADSEN, M.L.A.

At the beginning of a new year I join with the officers of my Department in extending greetings to all primary producers throughout Queensland.

One cannot wish farmers more than that the seasons should be beneficial and the markets favourable. The rest depends not so much on luck as it does on their own hard work and thoughtful planning. But our Department can help here, for it is our job to provide useful material with which to make the work lighter and more efficient and the planning easier and more effective.

The year has been generally favourable for agricultural and horticultural crops and sheep and cattle areas experienced normal conditions, except in some parts, especially the south-west, where drought prevailed.

Throughout Australia, rural industries thrived to such an extent that an increase of 11 per cent. was recorded in aggregate production for the financial year.

Exports of primary produce were valued at £809m., which was only £3m. lower than in the previous financial year. Prices of wool and sugar declined but earnings from meat and dairy produce showed a welcome rise. The market for canned fruits was restricted.

Once again, a lot of people have co-operated with my Department in helping to carry out work of immeasurable benefit to the producer, and it is my pleasant duty to extend to them our sincere thanks. Without this working together, our officers could not serve the agricultural and animal industries half so well as they do.

We look forward to continuance of the good spirit that leads to this side-by-side endeavour for, as most people know, this is the way many solutions to rural problems are reached.

To all on the land I extend my best wishes for a happy and successful 1960.

Otto Madsen

W. J. S. SLOAN, Director, Division of Plant Industry

Balanced Farming

Balanced farming is a system which gives first-class production, with first-class maintenance of the soil, in a way that pays. A sound soil and water conservation programme is required which co-ordinates the physical, economic and human resources of the farm.

Since conditions vary from farm to farm and from district to district, the most effective combination of practices which fits the situation of each individual farm is needed. To a large degree the onus is on each farmer to acquaint himself of the facts about improved practices and to apply those facts in the most practical manner to his own situation. To do this calls for planning—planning the seasonal operations and planning ahead for the development of the farm.

Important principles which have to be considered in drawing up a balanced farming system can be grouped under three headings: water—soil—storage of fodder.

Water is the most important factor governing farm operations in Queensland; water as soil moisture; water for humans and stock in streams, underground sources and storages.

Of over 2,500,000 acres which are under crops, only about 160,000 acres are irrigated, hence the efficient utilization of rainfall which falls on cultivated land is most important in our farming.

Most of our rainfall comes during the summer months and as you go from south to north the dominance of summer rainfall becomes even more marked. In addition to this, the rainfall is erratic and unreliable. We cannot be sure that we will get spring or early summer storms or that the summer wet season will start on time. All this adds up to the fact that it is very desirable to have the soil in such a condition that it will have a high capacity to absorb rain and retain it.

CARE OF THE SOIL

Continuous cultivation leads to a breakdown of the soil to a powdery state with a decreasing capacity to absorb rain. So the problem is to avoid that as far as possible. How can it be done?

Much good can be accomplished during the period of land preparation—even of powdery soils—by leaving the land with a rough surface for a time so that rain is trapped in a series of small pools to soak into the soil. Furthermore, rotation of crops with pastures will improve the

physical condition of the soil and hence its absorptive capacity for rain. This is due to the fact that grass roots have the power to bind soil together in granules.

The use of a pasture phase is a most important part of crop rotation. It has been recognised for a long time in the older farming areas of the world but few farmers have followed this principle systematically in Queensland. Of course, to make economic use of the pasture, it is necessary to introduce the grazing animal. There is much merit in this apart from soil improvement because cropping plus animals can create more stable farm income.

Stubble mulch farming, the system of leaving crop residues on the soil surface while preparing land for the next crop, is worth careful consideration under Queensland conditions. There is ample proof that there is much less runoff of water and better absorption when rain falls on a soil surface covered with crop residues. Crop residues left in such a manner can be a nuisance when working the land and when sowing. But stubble mulching is sound in principle and we should work towards a farming system where we can handle crop residues on the surface of cultivated land without difficulty.

It is one thing to trap rainfall in soil, it is another matter to hold it there. Soil type has a big influence on this. Clay soils have a high capacity to hold water and for that reason the use of soils for cultivation with good clay subsoils is desirable. With the subsoil well wetted by conserved rainfall, crops can draw on the available moisture in the clay and thrive even though seasonal rainfall may be low.

The secret of dry farming is the application of techniques to trap rainfall and the use of clay subsoils to hold it. To get the subsoil sufficiently wet it may be necessary to bare fallow for six months or more before crops are sown.

Weeds use soil moisture which should be reserved for crops; hence their control is important. During the fallow period and when crops are growing, weeds must be held in check.

The whole matter of soil conservation and soil improvement, and diversification of farm operations for those purposes, is one to which every farmer should give close attention.

Land, Labour, Capital

All types of production depend basically on three factors, land, labour and capital. Both labour and capital are variables but the land resources represented on farms are relatively fixed in quantity. It is in the power of the farmer to see that those resources are conserved with vigour and determination.

There are two main problems. First, to see that soil is not washed off the farm, and second, where soil erosion is not a risk, say on level arable land, to ensure that the fertility of the soil, that is, its power to produce crops, is maintained.

The application of soil conservation techniques is of primary consideration. The greatest resistance to soil erosion is provided by vegetable material on the soil surface, either dead in the form of stubble mulch to which I have already referred, or alive in the form of pasture or closely sown crops.

But reliance on this principle alone may not be enough, either because of the slope of the cultivated land, the volume of runoff water you may have to deal with or because you may have already allowed erosion to cause serious damage to the soil. In such cases, a system of mechanical structures in the form of earth banks and channels on the contour, and grassed waterways, may be required in order to control the runoff water.

Indeed the application of a system of mechanical structures may have to be the first step in checking soil erosion but the use of correct farming systems involving proper handling of crop residues and crop rotation, including pasture, grazing crops and so on, should receive increasing attention.

I have previously mentioned crop rotation incorporating a pasture phase as being very valuable from the point of view of improving the condition of soil for better absorption and retention of water. Crop rotation also has an important influence in another direction, in building up soil fertility, particularly in respect of the valuable plant nutrient, nitrogen. This can be achieved by including a leguminous plant-like lucerne or a cover crop like cowpeas in the rotation.

Legumes by virtue of bacteria located in nodules on their roots can extract nitrogen from the air which can later be utilized in building up the nitrogen resources of the soil.

So that crop rotation represents several important principles—improving the condition of the soil, building up soil fertility, and providing for the introduction of farm animals.

STORAGE OF FODDER

The third main part of a balanced farming system which needs emphasis is storage of fodder. The basic principle is a simple one—when fodder is ample, to store it for the periods of the year when rainfall is low and pasturage inadequate. No matter how we look at this question, we cannot get away from the fact that our main rains occur in the summer and we have dry periods every year.

Improved pastures, the use of grazing crops on fallowed land, the increasing acreage under irrigation, can all help, but add them all together and they still do not provide the solution to our seasonal shortages of pasturage, much less to our periodic droughts. We must face up to the problem of our seasonal and erratic rainfall in relation to our stock industries and learn to solve it economically. Storage of fodder is the obvious avenue for vigorous exploration.

Balanced farming principles cannot be applied in the same manner on all farms, but the principles are sound and each farmer has to work out the methods and system best suited to his own situation.

The sugar cane farmer has developed a successful system without requiring grazing animals. He can afford to use liberally plant nutrients as fertilizers. The same applies for the most part to fruit and vegetable growers and to tobacco farmers.

A huge area of potential farming land in Queensland lies in the 40-in.-and-below annual rainfall belt. It is in that area particularly where the complete application of all the principles of balanced farming must find full expression if we are to achieve first class production with first class maintenance of the soil in a way that pays.

Calf Birth Weights

Information has been requested on the birth weights of normal calves.

Differences occur both within breeds and according to breed, but the following weight ranges will account for the largest group within each breed:

Jersey	:	50-61 lb.
Guernsey	:	65-71 lb.
Ayrshire	:	71-78 lb.
Friesian	:	93-99 lb.
Hereford	:	68-72 lb.

In the case of the dairy breeds the lower weight is the average for females and the higher weight the average for males.

Twins and triplets are lighter than calves of the same breed born singly.

If cows are on a very low plane of nutrition during the second half of pregnancy, birth weights could be considerably below the figures given.

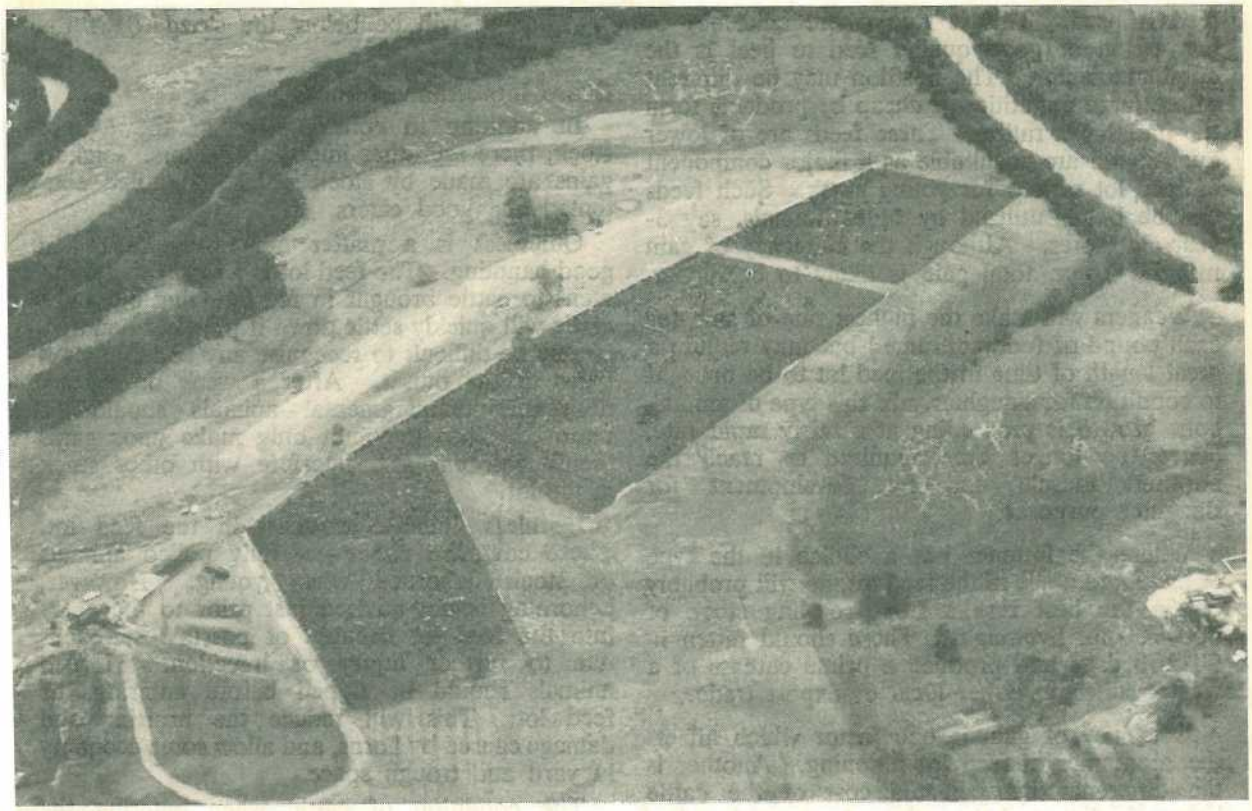


Plate 1: An 8-Pen Feed Lot Covering 6 Acres and Carrying 1,300 to 1,500 Head of Cattle. This lot feeding enterprise is conducted at Tingalpa near Brisbane by Swift Australia (Pty.) Ltd.

Lot Feeding Of Beef Cattle

By W. F. MAWSON and D. N. SUTHERLAND, Cattle Husbandry Branch.

In view of the changing emphasis brought about by higher prices for beef, it is timely to point out some principles involved in feed-lot feeding. The volume of locally-obtained knowledge is being increased steadily. This article aims to assist those producers who are contemplating a venture of this nature. At the same time it should be recognized that feed-lot fattening is in the pioneering stage in Queensland at present.

The relationship between grain prices and beef prices has never been more favourable for the production of grainfed beef cattle. There is also a likelihood of a surplus of sugar cane. In addition, interest is being shown in the possibility of (*a*) making better use of grazing crops by means of lot feeding and (*b*) the use of cheap by-products (peanut straw, cottonseed hulls, pineapple pulp) as a basis for fattening rations.

The Type of Cattle

Young stock, from weaners to 18 months of age at the beginning of feeding, are likely to yield the most economic return when high quality

feed is used. This is true where efficiency of conversion of good quality feed to beef is the dominant factor. The position may be different where large quantities of cheap by-products form the basis of a ration. These feeds are of lower quality and are unsuitable as a major component of feed lot rations for young stock. Such feeds can be better utilized by older animals, say 3-year-old stores. Although the efficiency of gain may be lower, total gain is likely to be higher.

Weaners will make the highest rate of gain for each pound of food consumed but may require a great length of time in the feed lot to be brought to condition for slaughter. In this type of animal, bone growth is proceeding at a fairly rapid rate, hence the longer time required to reach the required muscle and fat development for slaughter purposes.

Where the fattener has a choice in the type of animal to place in the feed lot, he will probably obtain the best results from yearling stock of 600–700 lb. liveweight. These should fatten in 90–100 days and produce a prime carcass of a weight suited to either local or export trade.

Efficiency of gain is one factor which affects the economics of feed lot fattening. Another is the difference between the cost of the cattle before feeding and the value of the cattle when fattened. Under some circumstances, for example, drought conditions, it is possible to buy 3-year-old bullocks at a comparatively cheap rate. These animals will be backward stores but many of them are capable of making high weight gains. These big-framed animals will handle a greater proportion of the lower quality feeds which are plentiful and cheap on occasions.

It should be recognised that beef from this type of carcass will be inferior to the younger carcass because of less "marbling" and an increased amount of external fat.

To sum up:

- Weaners utilize good quality feed most efficiently but may take a longer time to develop into slaughter animals.
- Yearlings are comparatively efficient and produce a carcass of prime quality.
- Older, big-framed cattle are sometimes available cheaply. They can use a greater proportion of low quality feed and are capable of good weight gains. Carcass quality will be below the standard of the yearlings.

Other Important Factors

In addition to consideration of the age of stock, there are other important factors. Highest gains are made by stock which are quiet, contented and good eaters.

Quietness is a matter of temperament and good handling. The feed lot is a strange environment to cattle brought in for fattening but most cattle will quickly settle down if properly handled. It may be difficult to recognise any bad-tempered types at the outset. After a week or so any noticeably temperamental animals should be removed, since they not only make poor gains themselves, but also interfere with other stock in the lot.

Hornless animals are best in the feed lot. These comprise either naturally polled animals or stock dehorned when young. However, dehorning is not advised just prior to the entry into the feed lot because of possible set-backs due to further injury or infection. Horned animals should be tipped before entering the feed lot. This will reduce the bruising and damage caused by horns, and allow some economy in yard and trough space.

The condition of cattle when entering the feed lot is probably the most important factor determining the length of time required before turn-off. This affects the number of animals turned off each year. The total number turned off each year and the profit margin on each one are important factors influencing the profitability of the enterprise. Compared with backward stores, cattle in forward condition will be turned off in a shorter time but on the other hand the margin of profit may be narrower. This can be illustrated by using hypothetical figures.

Assume that a feeding lot has a capacity of 1,000 head. Backward stores, bought at £30 a head, are turned off at 150 days and average £58 a head. Forward stores can be bought for £35 a head and turned off in about 70 days at an average price of £50 a head. Feed of good quality is used and the total annual expenses for feed, labour, and other costs are £62,500.

It should be borne in mind that feeding for high rates of gain is generally the most economic procedure. The maintenance feed requirement of animals is relatively constant and is practically the same whether an animal gains 1 lb.

a day or 3 lb. a day. Thus, more productive use is made of feed when it is used in a way which produces a high rate of gain over a short period rather than a low rate of gain over a longer period. There would seem to be no point in feed-lot feeding for a low rate of gain.

A comparison shows:

TABLE 1

—	Backward Stores		Forward Stores	
No. turned off per year	2,500		5,000	
	£	£	£	£
Sale Price	..	145,000	..	250,000
Less—				
Purchase Price	75,000		175,000	
Feed, Labour and Other Expenses ..	62,500		62,500	
		137,500		237,500
Net Profit ..		£7,500		£12,500
Profit per Head ..		£3		£2 10s.

Some form of hard-surfacing or timber platform is likely to be needed near the trough. This should extend for a distance of about 12 ft. away from the trough to avoid any bogging immediately behind the animals as they stand eating at the trough.

A plentiful water supply in suitable troughs should be always available to the stock. Shade is desirable, especially in summer.

The activity of the animals should be restricted to a reasonable extent. For example, the running of cattle on pasture in conjunction with feed lot fattening appears to have serious disadvantages in that the extra energy used in gathering pasture tends to offset the cheapness of pasture feeding.

Consideration should also be given to market requirements and seasonal variation in demand. Generally, the feed lot produces high quality beef which should command the premium price.

TABLE 2

RECOMMENDED DAILY NUTRIENT ALLOWANCES FOR BEEF CATTLE
(BASED ON AIR-DRY FEED CONTAINING 90 PER CENT. D. M.)

Body Weight	Expected Daily Gain	Daily Allowances per Animal						
		Total Feed		Digestible Protein	Total Digestible Nutrients	Calcium	Phosphorus	Carotene
		Percentage of Live-Weight	per Animal					
lb.	lb.		lb.	lb.	lb.	grams	grams	mg.
		Fattening Calves Finished as Young Yearlings						
400	Average for Period—	3·0	12	1·1	8·0	20	15	24
500	2·0 lb. daily	2·8	14	1·2	9·5	20	16	30
600		2·7	16	1·3	11·0	20	17	36
700		2·6	18	1·4	12·0	20	18	42
800		2·5	20	1·5	13·5	20	18	48
900		2·3	21	1·5	14·5	20	18	54
		Fattening Yearling Cattle						
600	Average for Period—	3·0	18	1·3	11·5	20	17	36
700	2·2 lb. daily	3·0	21	1·4	13·5	20	18	42
800		2·8	22	1·5	14·0	20	19	48
900		2·7	24	1·6	15·5	20	20	54
1000		2·6	26	1·7	17·0	20	20	60
1100		2·4	27	1·7	17·5	20	20	66
		Fattening Two-Year-Old Cattle						
800	Average for Period—	3·0	24	1·5	15·0	20	18	48
900	2·4 lb. daily	2·9	26	1·6	16·0	20	20	54
1000		2·7	27	1·7	17·0	20	20	60
1100		2·6	29	1·8	18·0	20	20	66
1200		2·4	29	1·8	18·0	20	20	72

TABLE 3

RECOMMENDED NUTRIENT CONTENT OF RATIONS*
(N.B. DRY MATTER BASIS)

Body Weight	Expected Daily Gain	Allowance as per cent. of Ration or Amount per Pound of Feed						
		Daily Feed		D.P.	T.D.N.	Calcium	Phosphorus	Carotene
		Percentage of Live-Weight	per Animal					
lb.	lb.		lb.	Per cent.	Per cent.	Per cent.	Per cent.	mg./lb.
		Fattening Calves Finished as Young Yearlings						
400	Average for Period—	2·8	11·0	10·0	74	0·41	0·31	2·2
500	2·0 lb. daily	2·5	12·5	9·6	75	0·34	0·28	2·3
600		2·3	14·0	9·0	75	0·31	0·26	2·4
700		2·3	16·0	8·7	75	0·28	0·24	2·5
800		2·2	18·0	8·3	75	0·24	0·22	2·7
900		2·1	19·0	8·0	75	0·23	0·21	2·9
		Fattening Yearling Cattle						
600	Average for Period—	2·7	16·0	8·0	72	0·28	0·23	2·2
700	2·2 lb. daily	2·7	19·0	7·8	72	0·23	0·21	2·2
800		2·5	20·0	7·6	72	0·22	0·21	2·4
900		2·4	22·0	7·5	72	0·20	0·20	2·4
1000		2·3	23·0	7·3	72	0·19	0·19	2·5
1100		2·2	24·0	7·0	72	0·18	0·18	2·7
		Fattening Two-Year-Old Cattle						
800	Average for Period—	2·7	22·0	7·0	69	0·20	0·20	2·2
900	2·4 lb. daily	2·6	23·0	7·0	69	0·19	0·19	2·3
1000		2·4	24·0	7·0	69	0·18	0·18	2·4
1100		2·4	26·0	7·0	69	0·17	0·17	2·5
1200		2·2	26·0	7·0	69	0·17	0·17	2·7

The nutrient content of rations is given on a " Dry Matter Basis " since analyses of foodstuffs in Queensland are given on a dry matter basis.

* Adapted from " Recommended Nutrient Allowances for Beef Cattle," 1950.

In addition, it can be available at a time when the seasonal price trend is at its peak. The fattener who produces a carcass of the right size and degree of fatness should have no difficulty in finding a ready market.

Yard Size

Yards should be located on high ground with a gentle slope away from the feeding area. An allowance of 80–100 sq. ft. to each animal can be used as a guide to required yard space. Stock numbers should be limited to about 150 head to each yard.

Troughs placed around the perimeter of the lot are more convenient than troughs inside the lot, whether fixed or portable. Wooden troughs should not be in contact with the ground because of rapid deterioration. Troughs with sides 18 in. high and 2 ft. wide raised 6 in. above ground level should provide enough capacity to avoid wastage. Lower sides may be needed for young animals. A 4 in. x 2 in. buffer rail should be bolted above the inside edge of the trough. Stock then place their heads through the opening beneath the buffer rail and above the top edge of the trough. Two feet of trough length is the space allowed to each animal for troughs used on the perimeter of yards.

Animal Requirements

The following tables of feed allowances for fattening young cattle are based on recommendations of the National Research Council, U.S.A. (Recommended Nutrient Allowances for Beef Cattle (1950) No. IV.). The allowances are expressed in the following terms:

Air-dry feed containing 90 per cent. dry matter, which is self-explanatory. Most air-dried feed contains about 90 per cent. dry matter.

TABLE 4

AVERAGE COMPOSITION AND DIGESTIBLE NUTRIENTS OF VARIOUS FEEDS*

Feedstuff	D.M.	D.P.	T.D.N.	Calcium		Phosphorus		Carotene
	Per cent.	Per cent.	Per cent.	Per cent.	g./lb.	Per cent.	g./lb.	mg./lb.
Hays—								
Oaten, Wheaten, Sudan grass, Jap. millet	90	3·0	50	0·20	0·9	0·20	0·9	4–8
Lucerne	90	10·0	50	1·20	5·4	0·20	0·9	9–14
Cowpea and Field pea	90	10·0	50	1·20	5·4	0·30	1·4	9–14
Soybean	88	10·0	50	1·20	5·4	0·30	1·4	3–13
Straws—								
Oat, Barley, Wheat	90	0·5	40	0·20	0·9	0·10	0·45	–
Peanut (depending on quality)	90	2·0–5·0	50	†	..	..	..	–
Green Fodders—								
Grazing Oats, Wheat, Millet, Sudan grass in growing stage	25	2·0	14	0·08	0·4	0·06	0·3	15–40
Lucerne	25	3·5	14	0·35	1·6	0·07	0·3	25–40
Cowpea or Field pea	20	2·0	12	0·25	1·1	0·05	0·2	15–40
Sugar cane	25	0·6–1·5	15	..	..	0·04	0·18	–
Silages—								
Green fodder or silage from summer crops	25–30	1·2	18	0·08	0·4	0·08	0·4	2–10
Green fodder or silage from winter crops cut at flowering	25–30	1·5	17	0·08	0·4	0·08	0·4	4–8
Grains—								
Maize	90	8	80	0·01	0·05	0·30	1·4	Yellow maize 1·2
Grain Sorghum	90	8	80	0·03	0·1	0·30	1·4	White maize 0·01–0·2
Wheat	90	8	78	0·04	0·2	0·40	1·8	White maize 0·01–0·2
Barley	90	7	77	0·05	0·2	0·35	1·6	White maize 0·01–0·2
Oats	90	8	72	0·06	0·3	0·20	0·9	White maize 0·01–0·2
Grain By-products—								
Wheat bran	90	11	63	0·09	0·40	1·00	4·5	1·2
Wheat pollard	90	11	73	0·09	0·40	0·65	3·0	–
Oat bran	90	4	52	0·07	0·30	0·45	2·0	–
Protein Rich Concentrates—								
Meat and Bone meal (Quality dependent on proportion of bone)	90	30–40	65–70	8·25	37·00	3·75	17·0	–
Peanut meal	90	37	80	0·15	0·70	0·60	2·7	(nil if obtained by solvent process) 0·1
Cottonseed meal (decorticated)	90	33	75	0·20	0·90	1·20	5·4	0·1
Linseed meal	90	26	75	0·40	1·80	0·75	3·4	(nil if obtained by solvent process) 0·1
Maize gluten	90	21	78	0·10	0·45	0·70	3·2	3·8
Coconut meal	90	17	80	0·30	1·40	0·65	3·0	–
Soybean seed	90	34	90	0·25	1·10	0·59	2·7	0·1
Urea (46% N.)	90	equivalent to 260	–	–	–	–	–	–

† Insufficient data.

Feedstuff	D.M.	D.P.	T.D.N.	Calcium		Phosphorus		Carotene
	Per cent.	Per cent.	Per cent.	Per cent.	g./lb.	Per cent.	g./lb.	mg./lb.
Miscellaneous—								
Cottonseed hulls ..	90	..	44	0·13	0·59	0·06	0·27	–
Corn cobs (ground) ..	90	..	46	0·11	0·50	0·04	0·18	–
Corn stalks, shanks and tassels (dried).. ..	83	0·8	41	0·32	1·48	0·23	1·00	–
Peanut hulls	92	1·6	19	0·25	1·10	0·06	0·27	–
Pineapple pulp	15	0·13	10	..	..	..	..	3·6
Molasses	75	–	60	1·00	4·5	0·89	4·00	–
Cow's whole milk (3·9 % Butter fat)	13	3·2	18	0·12	0·5	0·09	0·40	0·4
Skim milk	9·5	3·4	8·7	0·13	0·59	0·10	0·45	–

* These data have been compiled mainly from the following sources :—
Morrison, F. B., " Feeds and Feeding " 22nd edition ;
Schneider, B. H., " Feeds of the World " ;
National Research Council "Nutrient Requirements of Beef Cattle No. IV., 1958" ;
Analyses by Agricultural Chemist and Bio-chemist of Queensland Department of Agriculture and Stock.

Digestible Protein in Pounds: Digestible protein is abbreviated to D.P., and the D.P. content of a feed is expressed as a percentage of the dry matter in the feed unless otherwise specified.

Total Digestible Nutrients in Pounds: The abbreviation is T.D.N. and is a measure of the gross energy value of a feedstuff. T.D.N. are expressed as a percentage of the dry matter in the feed, unless otherwise specified.

Calcium (Ca) or Lime is a mineral expressed in grams or as a percentage of the dry matter. Ca comprises approximately five-sevenths of CaO (quicklime).

Phosphorus (P) is a mineral, expressed similarly to calcium. P comprises approximately three-sevenths of P_2O_5 (phosphoric acid).

Carotene is the precursor of vitamin A and is expressed as mg. or mg. per pound of feed.

These represent the components which require consideration in making up a ration. For practical purposes all other requirements will normally be contained within adequate quantities of the components listed.

It should be recognised that the given compositions of feeds are averages only. Considerable variation either way is likely to be found. In plant material, the protein and mineral content, in particular, are highest when the plant is growing. The protein content falls steeply after flowering and the phosphorus content is concentrated in the seed. The carotene is contained in the green parts of the plant and diminishes when material is stored. An example from the table will illustrate these points, using oats and converting the figures to a dry matter basis.

TABLE 5

—	D.P.	Phosphorus	Carotene
	Per cent.	g./lb.	mg./lb.
Oats in growing stage	8·0	1·2	60–160
Oaten hay	3·3	1·0	4–8
Oaten straw.. ..	0·55	0·50	Nil

Some variation in the composition of different varieties of plants is found and, in addition to stage of growth, other causes of variation are soil fertility and fertilizer application. Hay quality is determined by the quality of the plant, the stage of cutting, the method of making and weather conditions during the making process.

In the case of waste products such as peanut hulls, peanut straw and maize stalks, a proportion of kernels or grain will be present. Caution is therefore required in compounding rations containing this type of product owing to the variation in composition of different lots.

Grains should be coarsely ground, crushed or rolled before feeding to ensure a high rate of digestibility. Lucerne hay can be fed as hay or chaffed ($\frac{1}{2}$ in.–1 in. cut) or roughly milled, according to convenience. Coarser hays, such as sudan grass, should preferably be chaffed or milled.

The various components of a ration should be thoroughly mixed before being offered to the stock.

All feed should be free from mould, decomposed material or foreign matter. Particular precautions are necessary against pieces of wire or nails and poison baits which may have been set for rodents. Rejected feed should be removed from the feed trough.

The decision whether to provide salt is one for personal choice. If included in the total ration, ½ lb. coarse salt to 100 lb. feed (90 per cent. D.M.) is ample. An alternative method is to provide salt blocks in the feed trough or separate trough.

Compounding Rations

In addition to consideration of the class of animals, their appetite and T.D.N. limits, and the nutritive value of feedstuffs, other important practical aspects are the minimum and maximum quantities of any one type of feed and the minimum and maximum roughage intake of animals.

Nutrient Requirements of Beef Cattle Number IV. (1958) states among other things that "the minimum requirement for roughage is 0·5 to 0·8 lb. for each 100 lb. liveweight in fattening cattle. Bloat and digestive disorders are likely to occur if cattle do not receive this quantity when fully fed on grain.

"Feed intake is limited (1) by the bulk-handling capacity of the intestinal tract and (2) by the daily T.D.N. intake of cattle. Concentrate-to-roughage ratios falling between the range of 30:70 to 70:30 have been shown experimentally to be satisfactory in promoting liveweight gains in growing and fattening cattle. Sometimes as much as 80 per cent. concentrates are included in fattening rations."

In grain growing districts in Queensland, the aim will be to use the maximum quantities of grain, since it will be the cheaper commodity. At other localities, the objective may be to utilize as much as possible of low quality by-products or surplus plant material.

Limited local experience to date indicates that the American feeding standards quoted can be used with a reasonable degree of confidence. However, it is essential that more information be obtained on feed intake and rates of gain under our conditions. The use of cattle weighing scales is necessary in this respect. Further, the weighing of stock at regular intervals to record the rate of gain is essential for checking on rations, adjusting rations and in sorting out the occasional animal which just doesn't respond to feed lot conditions. Such stock are "wasters" and should be removed for slaughter.

Since the margin for profit may be small it it necessary that a strict and continuing check be kept on all aspects of the enterprise. Scales are thus a necessary item of equipment.

The following is an example of a suitable ration. The animals are yearlings weighing 600 lb. and fed for a high rate of gain.

The daily requirement is 18 lb. air-dried feed, 1·3 lb. digestible protein, 11·5 lb. T.D.N., 20 g. calcium, 17 g. phosphorus and 36 mg. carotene.

Grain sorghum (D.P. 8; T.D.N. 80) and lucerne hay (D.P. 10; T.D.N. 50) are available.

TABLE 6

—	Feed	D.P.	T.D.N.	Calcium	Phosphorus	Carotene
	lb.	lb.	lb.	g.	g.	mg.
Crushed grain sorghum..	12	0·96	9·6	1·2	16·8	0·12
Lucerne hay	6	0·60	3·0	32·4	5·4	60·0
Totals..	18	1·56	12·6	33·6	22·2	60·12

This ration is ample in every respect and above-average gains could be expected.

When maximum use is to be made of grain and it comprises 80 per cent. of the ration, the figures are:—

TABLE 7

—	Feed	D.P.	T.D.N.	Calcium	Phosphorus	Carotene
	lb.	lb.	lb.	g.	g.	mg.
Grain sorghum ..	14·5	1·16	11·6	1·5	20·3	0·15
Lucerne hay	3·5	0·35	1·75	18·9	4·9	35·0
Totals ..	18·0	1·51	13·25	20·4	25·2	35·15

This ration is generous in T.D.N. but is only just adequate in calcium and carotene. Since the lucerne hay is the principal source of these components, it would necessarily need to be of good quality when used in such a ration.

Only experienced feeders should attempt a mixture incorporating such a high proportion of grain.

Getting Animals on to Feed

Sudden changes in the composition of a ration should be avoided. Such changes can result in digestive upsets with consequent loss of weight and loss of appetite.

When stock are brought in to the feed lot they should be brought on to full rations in stages. For the first few days they should be offered hay only—medium quality lucerne hay being most suitable for this purpose. As the

stock settle down, the hay is gradually replaced by a quantity of the standard ration. Under normal conditions stock should be safely on full feed in about two weeks from entering the feed lot.

In the matter of feeding for best results, there is no substitute for the observation and interest of the feeder. He should always keep a close watch on stock for any sign of digestive upset and remove the cause at once.

Figures from a Local Trial

The following information has been obtained in a feed lot project and gives an indication of the relative feed consumption and liveweight gains which are being obtained.

Type of animal	Yearling Hereford steers
Initial weight	573 lb.
Final weight	842 lb.
Gain	269 (93 days)
Average gain/head/day ..	2·9 lb.
Average food consumption per animal daily	12.8 lb. crushed barley 6·5 lb. lucerne hay
Lb. feed per lb. live weight gain	4½ lb. grain 2¼ lb. hay
Lb. feed per lb. carcass gain (estimated)	7½ lb. grain 3¾ lb. hay
Feed cost	Barley—£18 13s.—ton Lucerne hay—£6
Feed cost per 100 lb. estimated carcass gain	£7 3s. 3d.

This ration consisted of grain 2 parts and lucerne hay 1 part. Based on the quantities of grain and hay used and the weight gain obtained, the following table gives the *feed cost* of producing 100 lb. of carcass weight at varying feed prices:

TABLE 8

FEED COST OF PRODUCING 100 LB. CARCASS BEEF IN SHILLINGS AND PENCE WHEN FEED COSTS ARE—

Grain Cost per Ton	Lucerne Hay Cost per Ton			
	£5	£10	£15	£20
	s. d.	s. d.	s. d.	s. d.
£5	49 8	66 5	83 1	99 10
£10	82 7	99 4	116 0	132 9
£15	115 6	132 3	148 11	165 8
£20	148 5	165 2	181 10	198 7

Two examples are given of the ways in which the tables can be used. If feed is bought, it can be used to read off what the feed will cost in terms of 100 lb. carcass gain. For example, if grain costs £15 a ton and hay £10 a ton, the cost is 132s. 3d. per 100 lb. carcass gain.

On the other hand, if a producer considers he can afford to spend 120s. per 100 lb. carcass gain on the cost of feedstuff he can read off the prices per ton of feed which will keep within that limit.

Fatteners require an accurate knowledge of when stock are fit for slaughter. It is wise to inspect carcasses of stock sent for slaughter in order to gauge when animals are "finished." As animals become fat, more feed is required for each pound of weight gain. Thus feeding beyond the required degree of finish is wasteful.

Profit and Loss Factors

The possible avenues of income from feed lot fattening are:

(1) An increase in weight of animals.

(2) An increase in value per 100 lb. carcass weight.

(3) Sideline income from pigs and the sale of farmyard manure.

(4) In the long term, an advantage in the preservation of farm fertility.

The items of cost in addition to the stock, are:

(1) Feed costs.

(2) Labour costs.

(3) Running costs of machinery.

(4) Veterinary fees.

(5) Repairs to buildings, plant and equipment.

(6) Depreciation on buildings, plant and equipment.

(7) Interest on capital investment.

(8) In a large feed-lot in the metropolitan area, rental of the land may be considerable.

In the early stages of feed lot fattening, it is likely to be a sideline or joint enterprise with grain growing and perhaps cattle raising. Buildings, tractors and equipment, in addition to labour already available on the property, may be utilized in the lot feeding project and thus tend to increase the overall efficiency of property operations.

How Milk And Cream Transport Is Organised In Queensland

By E. B. Rice, Director of Dairying

Queensland's system of controlled road transport of milk and cream from farms to dairy factories is described.

The Queensland system, which is unique in any country, is implemented by statutory power under certain provisions of the Dairy Produce Act. The objectives of the legislation are to avoid uneconomic competition by factories for suppliers, to assist quality improvement by ensuring that generally supplies are consigned to the closest factory, and to discourage improper grading by factories as a means of attracting supplies from farms which are geographically in the territory of another factory.

Competition between factories for cream supplies in the early 1930's resulted in instances where farmers who lived farther away from a factory were paying lower cartage costs than nearer suppliers. A malpractice had also become introduced in the industry whereby some factories subsidized cartage costs of supplies which were geographically in the territory of a neighbouring factory.

In 1934, a section was inserted in the Dairy Produce Acts to prohibit a factory from subsidizing any part of the cost of cartage of milk or cream.

Then in 1935, the Minister for Agriculture and Stock convened a conference of representatives of dairy industry organizations to consider the desirability of legislating for control of the transport of cream to butter factories. The conference passed a resolution affirming the principle of dairy factory associations being given legal authority to control the transport of cream along the roadways. A subcommittee comprising five factory representatives and one Government officer was appointed to devise ways and means of putting this principle into operation.

As a consequence of the subcommittee's report, the Dairy Produce Act was amended in 1935 to provide for the organized control of transport of cream supplies to butter factories by the gazettal of cream routes and the licensing of cream carriers.

Statutory control of transport from farms was at first limited to cream supplies for butter factories, but in 1938 the Act was further amended to extend the system of control to milk supplies for factories.

Essentials of the System

The essential features of the legislation provide for roads, or portions of roads, to be included in milk or cream routes which are published in the *Government Gazette*. Factories are empowered to call for and accept tenders for

the cartage of milk or cream on these routes. Subject to the carrier's equipment complying with the requirements under the Act as regards construction and covering, the Minister may issue a licence if he approves of the terms and conditions of an agreement entered into between the carrier and the factory.

There is no obligation on a factory to apply for the gazettal of milk or cream routes. However, if it does not, carriers on notified routes to a neighbouring factory could not be prevented from encroaching in its territory to take supplies to that factory, but carriers to the first-mentioned factory could not travel on the routes notified to the neighbouring factory.

A farmer is not prevented from conveying the milk or cream produced on his own farm to a factory along any roads which are on a notified milk or cream route, but he cannot carry the milk or cream of any other person. This may appear to be arbitrary, but a regular and satisfactory service can only be provided by a carrier if he is protected against farmers conveying their neighbour's produce to a factory. A committee is appointed to assist in the administration of the system.

Notification of Routes

Notified routes are of two kinds—cream routes and milk routes—and these must not be confused. Notification of cream routes is authorised by section 16B of the Dairy Produce Acts and of milk routes by section 16C. The provisions of each section are identical, excepting that the word "cream" is used in the former and "milk" in the latter.

It should be made clear that milk may be picked up by other than the licensed cream carrier on a notified cream route, or cream by other than the licensed milk carrier on a notified milk route. If a factory receives milk and cream from suppliers on any route, it would, therefore, require to have such route notified separately as a milk route and a cream route.

The Minister may, on the recommendation of a factory owner, or of the transport committee, notify any roads or portion of a road as a cream or milk route. He may also refuse to accept such recommendation or accept only a part.

Routes may be notified either specifically or generally. By specifically is meant the cream or milk picked up must be carried to the factory specified. When a route is notified generally it is notified to a railway station or loading point and from there the produce can be forwarded to any factory which the dairy farmer desires. Briefly, as a general guide, if cream is not delivered direct to a factory by the carrier the route is notified generally and if delivered direct to a factory that factory is specified in the notice.

Carrier's Agreement and Licence

Tenders must be called by a factory owner before entering into an agreement with a carrier for the cartage of milk or cream on a notified route and the agreement is limited to a maximum period of five years. Thus, it cannot be renewed without the necessity for tenders having to be invited. The object of the limitation of the term of the agreement is to eliminate a fictitious goodwill from the sale of a milk or cream carrying business.

The regulation does not specify the manner in which tenders are to be called, but generally dairy associations advertise in a newspaper circulating in the district. When calling tenders, an association usually inserts a clause that the lowest or any tender may not necessarily be accepted. This ensures that it is not obliged to engage the lowest tenderer if it feels he is not capable of giving satisfactory or continuous service.

The price payable by the farmer for the cartage of his produce to the factory is naturally of some concern to him. The interest of both the suppliers and the previous contractor can be safeguarded if it appears that a tenderer submitting a somewhat lower tender price is, in the opinion of the factory owner, not likely to provide a satisfactory service or be acceptable to the farmers on the route. As there are often local factors involved which require consideration by the factory board of directors in the light of its own knowledge of local conditions, they should be in the best position to decide on which tender should be accepted.

In general practice, if there is likely to be any doubt about the satisfaction of the farmers on a route with the tenderer, or conditions of the tender, the matter is usually referred by the association to the suppliers on the route. A

meeting is convened in a convenient place in order to obtain their views for guidance on the decision to be made by the Association. Before acceptance of a tender, some associations confer with a small committee (say three) appointed by farmers on the route.

The matter of whether the cartage is to be on the basis of a flat rate per gallon irrespective of distance of farms from factories, or variable rates according to distances of the farms from the factories, is one for the Association to decide before calling tenders.

It is necessary for Ministerial approval to be obtained before the issue by the factory owner of a licence to a carrier and the licence is countersigned by the Minister. Associations therefore have to submit the agreement to the Department for approval. Until a licence is issued, the agreement has not the force of law, and the power for the licence to be countersigned by the Minister gives him the right to determine whether the agreement can be approved and a licence issued.

Carrier's Obligations

The obligations of a carrier are set out in a form of agreement which is entered into between the carrier and the factory owner. He is required to pick up at the contracted price all milk or cream of a supplier on or adjacent to the notified milk or cream route, as the case may be, for which he is licensed, and return the empty cans from the factory to the point at which he loaded them when full. Upon obtaining an order in writing from the farmer and handing it to the factory owner, the latter is empowered to deduct cartage costs from the supplier's monthly pay cheque for milk or cream supplied to the factory.

The number of deliveries of cream to be made weekly is prescribed in the contract, and the factory owner is empowered to state the time of day when the delivery is to be made at the factory.

The vehicle used by the carrier must comply with the provisions of the Dairy Produce Acts as regards construction, cleanliness and protection of the quality of milk or cream during transit.

During the time the truck is being used for carrying milk or cream, nothing which may taint or contaminate dairy products is permitted to be conveyed on the truck. Animals, fertilizers, hides, skins or other malodourous things may not be carried at any time on a vehicle used for carting milk or cream. However, some carriers provide a false bottom and sides for use on the truck when carting such goods, and provided the vehicle is well cleaned before being used again for carrying milk or cream, no objection is raised.

A trailer may not be used by the carrier unless the conditions of its use are approved by an inspector. The carrier cannot dispose of his business without the consent of the factory owner and the Minister, and the factory owner must certify that the price to be paid by the purchaser is fair and reasonable; no goodwill is allowable.

The licensed carrier is protected against encroachment on his route by any other carrier, as it is an offence for any person to pick up and convey cream on a notified cream route or milk on a notified milk route unless he has a licence for that route. It is not sufficient that he has a licence for another route.

It is pointed out that it is not an offence for an unlicensed cream carrier to travel over a road on a notified route provided he does not pick up cream supplies thereon; it is often necessary for a carrier to travel a road (particularly when converging on the factory) which is not on his route in order to get to the factory.

It is an offence for a licensed carrier to pick up and convey cream or milk other than cream or milk consigned to the factory specified on his licence or to convey cream or milk to a factory or loading point other than that specified on his licence.

Supplier's Position

The factory owner is bound to pay to a supplier the whole of the price payable for milk or cream supplied to the factory owner unless the supplier authorises the payment in whole or in part of such price to some other person, or unless the law authorises payment other than to the supplier. The factory owner, therefore, without authority from the supplier, cannot deduct the cost of cartage of milk or cream received from the supplier. A clause of the form of agreement provides for the carrier to obtain from the farmer for passing on to the factory a written authority for deductions for cartage. If a farmer refuses to sign such an authority form, the carrier is not

obliged to convey the produce as the farmer must pay for the service provided. On the other hand, the carrier is not entitled to payment if a supplier does not utilize the service, but conveys his own milk or cream to the factory, or sends it by railway.

A farmer who does not wish to use the service provided by the carrier may convey the produce from his own farm along the notified route, but he is not permitted to carry the produce of any other supplier. However, where any farms are not situated on a notified route the owners may organize a community service amongst themselves.

This is done in some places where farmers arrange a "feeder" service from their area to a point on a notified route where the cream is then taken on to the factory by a licensed carrier.

Transport Committee

The Act gives complete authority to the Minister in all matters affecting transport of milk and cream. Provision is made for a committee of three to be appointed to report and make recommendations to him. The committee is empowered to co-opt the services of any dairy inspector.

The Minister may refer any dispute which arises in connection with milk or cream transport to the committee. However, the policy is for the committee to investigate and report on disputes between associations, but a dairy association is expected to arbitrate in any dispute which is purely of a domestic character and does not involve any other association.

The Department usually requires any request for an investigation to be submitted in writing, and any improper practices which are alleged to have been adopted by the association, or other grounds for inquiry, to be specifically indicated. If the issue or transfer of a carrier's licence is involved, action is withheld pending the result of the investigation.

Cancellation of Licence

The agreement provides for its termination by either the factory owner or carrier giving the other three months' notice of intention to do so. It also provides for cancellation by the factory owner if a carrier defaults in the performance and observance of the conditions of the agreement. In this case, there is no need for the factory to give three months' notice, and it may cancel the agreement in as short a time as it decides.

The latter provision may be invoked by a factory if a serious situation arises which necessitates prompt action to cancel the agreement, while the three months' notice may be availed of if the circumstances do not justify such an urgent course of action.

Variations in Costs

There is a clause in the agreement which permits a variation in the cartage costs during its currency in accordance with a rise or fall in certain costs of operating the service. The items which are taken into account for the determining of any such increase or decrease are petrol, oil, wages, tyres and vehicle registration fees. These are readily ascertainable costs over which the carrier has no control. Costs of maintenance and depreciation of vehicle are not included in the items. They are dependent on the condition of the vehicle, care exercised in its use, roads and other factors which cannot be specifically determined on a uniform basis through the State. Moreover, these two costs should be estimated and allowed for by the carrier at the time of tendering for a milk or cream cartage contract.

Points of Pick Up

The agreement which a carrier enters into with a dairy association deals with the picking up of milk or cream on or adjacent to the route. According to the Act, the road is on the notified route. There is thus no obligation for a carrier to pick up supplies from a dairy shed, and if such a service is given it is purely a matter for mutual arrangement between the carrier and the farmer, as is also any increased charge for the privilege of dairy pickup. Some associations and carriers insist that the farmer should provide grids in lieu of gates to gain access to the dairy shed and a reasonably trafficable farm road, if milk or cream is picked up at a dairy shed.

Owing to the possibility of a vehicle becoming bogged in wet weather on the farm road between the roadside gate and the dairy shed, carriers often do not enter the farm to pick up cream in wet weather even if such a service is given during dry

weather. Arrangements are made for the farmer to take the cream to the roadside during such times.

The picking up of milk or cream at dairies is an established custom in some districts, especially where the farms are large and the dairies an appreciable distance from the roadside. With the increasing use of refrigeration on farms it would be a retrograde step not to keep milk or cream in the refrigerator as long as practicable before being picked up by the carrier for transport to the factory. Therefore, the Cream Transport Committee has taken the attitude that a roadside or dairy pick-up is really a matter to be determined locally in the light of the circumstances pertaining to each case. However, a cream or milk carrier cannot be compelled to enter private property.

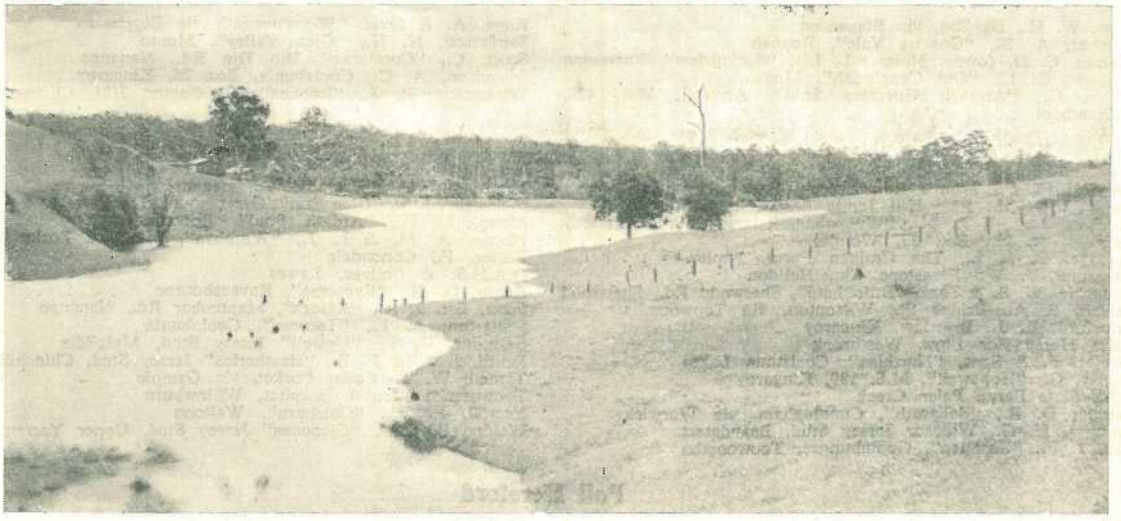
As dairy associations take delivery of the farmer's produce only at the factory, they are not liable for any loss or damage to milk or cream by a carrier while in transit from the farms to the factory. A milk or cream carrier is not a common carrier and unless there is negligence on his part he cannot be held responsible for any such loss or damage. The risk is, therefore, the supplier's own.

Wholehearted Acceptance

Though there may be an impression by one who has not had experience of the Queensland system that it interferes with the liberty of the individual, avoids competition "which is the soul of business", and could lead to inefficiency on the part of the companies by virtue of the protection of their supply areas, the system is wholeheartedly accepted by the dairy industry of the State. It is beneficial to the suppliers, for any unnecessary duplication of transport services can only be at the expense of the producer.

A cardinal point in the Departmental policy is that a route can only be protected for a factory provided that the price it pays to the suppliers is equivalent to that of a neighbouring factory. If this is not so and the suppliers on any route or part of a route by a substantial majority request inclusion on a route notified to a neighbouring company which pays a higher price for milk or cream, the request is normally acceded to.

WATER HARVESTING AT COOROY



It is not generally realised that Australia is the driest of all the continents. Water run-off to the ocean from all Australian streams has been estimated at merely half the flow of the Mississippi in the U.S.A. Water harvesting will become more important as our State develops. Mr. T. Quinn, Cooroy, has faith in the future of water harvesting and irrigated improved pastures. His 6,000,000 gal. dam is being used to spray irrigate eight acres of pasture sown in April–May, 1959.

Tuberculosis-Free Cattle Herds

(As at 1st January, 1960)

Aberdeen Angus

Crothers, G. H. & H. J., "Moorenbah", Dirranbandi
Elliott, A. G., "Ooraine", Dirranbandi
Mayne, W. H. C., "Gibraltar", Texas

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D., "Wamba", Chinchilla
Dennis, L. R., Diamondvale A.I.S. Stud, Mundubbera
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
Evans, E. G., Lauraven A.I.S. Stud, Maleny
Green, D. B., Deloraine A.I.S. Stud, Fairdale
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K., Greenmount
Henschell, W., "Yarranvale", Yarranlea
H. M. State Farm, Numinbah
Littleton, H. V., "Wongalea", Hillview, Crow's Nest
Marquardt, A. C. & C. R., "Cedar Valley", Wondai
Mears, G. S. & E., "Morden", M. S. 755 Toogoolawah
Moore, S. R., "Sunnyside", West Wooroolin
Neale, D. G., "Groveley", Greenmount
O'Sullivan, Con., "Navillus", Greenmount
Phillips, J. & Sons, "Sunny View", Benair, Kingaroy
Power, M. F., "Barfield", Kapaldo
Queensland Agricultural High School & College, Lawes
Radel, R. R: & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm," Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae" A.I.S. Stud, Kingaroy
Scott, W. & A. G., "Walena" A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros., "Valera", Pittsworth
Sullivan, D., "Bantry", Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H., "Alfavale", Nanango
Webster, A. H., "Millievale", Sabine, via Oakey
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

Dudgeon, C. E. R., Marionville Ayrshire Stud, Landsborough
Dunn, T. F., "Alanbank", Gleneagle
Goddard, B., Inverell, Mt. Tyson, via Oakey
Holmes, L., "Benbecula", Yarranlea
Mathie, E. & Son, "Ainslie", Maleny
Scott, J. N., "Auchen Eden", Camp Mountain
Zerner, G. F. H., "Pineville", Pie Creek, Box 5, Post Office, Gympie

Friesian

Behrendorff, E. C., Inavale Friesian Stud, M.S. 786, Boonah
Macdonald, S. E. G., "Freshfields", Marburg
Naumann, C. H., "Yarrabine", Yarraman
Pender, D. J., Lytton Road, Lindum
Stumer, A. O., Brigalow, Boonah

Guernsey

Doss, W. H., Degilbo, via Biggenden
Fletcher, A. B., "Cossart Vale", Boonah
Holmes, C. D. (owner Holmes L. L.), "Springview", Yarraman
Johnson, G. L., "Old Cannindah", Monto
Miller, G., "Armagh Guernsey Stud", Armagh, M.S. 428, Grantham
Ruge, A. & Sons, "Woowoonga", via Biggenden
Sanderson, N. H., "Glen Valley", Monto
Scott, C., "Coralgrae", Din Din Rd., Nanango
Swendson, A. C., Coolabunia, Box 26, Kingaroy
Wissemann, R. J., "Robnea", Headington Hill, Clifton

Jersey

Beckingham, C., Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. N., Box 23, Wondai
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Cramb, S. A., Bridge St., Wilsonton, via Toowoomba
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, Westbrook
Fowler, P. & Sons, "Northlea", Coalstoun Lakes
Harley, G., "Hopewell", M.S. 189, Kingaroy
H.M. State Farm, Palen Creek
Hutton, D. R., "Bellgrath", Cunningham, via Warwick
Johnson, H. G., Windsor Jersey Stud, Beaudesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba
Matthews, E. A., "Yarradale", Yarraman
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
Meier, L. E., "Ardath Stud", Boonah
Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
Porter, F., Conondale
Q.A.H.S. & College, Lawes
Ralph, G. H., "Ryecome", Ravensbourne
Scott, Est. J. A., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell" Jersey Stud, Mulgildie
Smith, J. A. & E. E., "Heatherlea" Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden" Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
Maller, W., "Bore View", Pickanjinnie
Maller, W., "Bore View", Gowrie Junction
McCamley, E. W. G., "Eulogie Park", Dululu
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi

Preparing Downs Lambs For Market

By C. R. Smith,
Senior Adviser, Sheep and Wool.

Darling Downs fat lamb breeders have some special problems which are dealt with in this article:

The nutritional needs of breeding ewes vary according to the different stages of their breeding cycle.

After their lambs are weaned, their demands are low. They are again low in early pregnancy. Between these two periods, for a space of time occupying three weeks before mating and for three weeks after rams are joined, they require a "flushing" diet. Then, in late pregnancy, for seven weeks or so before lambing, and after the birth of the lamb, to ensure a high milk supply during eight weeks of lactation, their food demands are high.

The following table gives some idea of the quantitative food requirements of big-framed breeding ewes at varying stages of the normal breeding programme:

In an effort to meet these varying food needs of the ewe, Darling Downs fat lamb farmers are faced with some particular problems of management. Irregular rainfalls and periodical droughts make fat lamb raising a more hazardous undertaking than in southern States.

Fat lamb production on the Darling Downs is invariably associated with some agricultural activity, of which grain growing is commonest. Sheep, because of their gregarious habits, their roving and foraging ability, and their natural manuring and compacting of agricultural soil country, form an admirable complement to grain growing. They graze and rid cultivated country of many unwanted weeds. Their natural excretions aid soil fertility, and the grain and crops on which they feed help to carry them over periods when natural pastures are inadequate even for maintenance.

TABLE 1

FEED REQUIREMENTS OF BREEDING EWES TO ENSURE EARLY MARKETED LAMBS

—	Food Units per Week	Equivalent amount of High Quality Lucerne per Head per Week lb.	Equivalent amount of Grain Sorghum per Head per Week lb.
Ewes, after weaning lambs, with condition being dropped prior to "flushing"	7	17·5	9·3
Ewes, being "flushed" for 3 weeks prior to mating, and 3 weeks after mating; preferably on green, lush feed	10	25	13·3
Ewes, after rams are removed; during first three months of pregnancy..	7	17·5	9·3
Ewes, during last seven weeks of pregnancy ..	*Built-up from* 8 to 16	*Build-up from* 20 lb. to 40 lb.	*Build-up from* 10·6 lb. to 21·3 lb.
Ewes during lactation for approx. 8 weeks ..	16	40	21·3
When lambs are weaned ewes revert to ..	7	17·5	9·3

Plate 1
Turnips Grown for Sheep Food in the Warwick District.

Crop feeding and grain can be used to supply them with food to satisfy the varying demands of their bodies during breeding programmes, and to aid the periods of rapid growth in lambs destined for early marketing.

Crop Feeding Ewes and Lambs

Crop feeding is the main method of fattening lambs on Downs farms.

Winter-grown crops suitable for sheep requirements are generally more readily grown under Downs conditions than are summer crops of the type that provide short grazing suitable for sheep. To make crops available to ewes at lamb drop, and lambs during rearing, mating of rams with ewes is mainly carried out in November-December. Oats, rape, and turnips are sown in February, and these provide feed for the lambing that occurs in April and May. (See Plates 1 and 2.)

In some seasons, avid feeding of lambs on lush crops can cause scouring, and, in severe cases, may result in loss of bodily condition. To minimize this drawback, dry feed such as hammermilled hay and oat grain, or similar cereals, is provided.

These roughages can be fed in self-feeders.

To avoid the ewes getting an unfair share, and the lambs little or none, creep feeding is a practice that is becoming increasingly used on Downs farms.

Methods of Creep Feeding

For creep feeding, cereal hay and grain is hammermilled through a 1-in. screen. A ringlock netting and iron picket temporary yard is erected in a paddock adjacent to the sheep paddock, round and including a gate. A self-feeder which is kept filled with chaff and grain is placed in this enclosure, and ewes and lambs are given access to this. Lambs soon become acquainted with the gate entrance and the feed in the feeder. When lambs are about two months old, the gate is taken away, and a hardwood creep structure put in its place. (See Plate 3.)

The creep structure is strongly made from 3 in. by 1 in. hardwood, with the upright battens adjustable.

A second feeder is provided for the ewes outside the creep. This has the feeding height suitable for ewes, but out of reach of lambs. The lambs have access to their own feeder in the creep and the ewes remain contented.

Early weaning

Winter rain on the Downs is not always reliable enough to provide crops adequate to ensure a prolonged lactation for ewes rearing fat lambs. Often ewes have very little milk by September, and unless lambs are weaned and put on the best feed, there is insufficient feed to "finish" them for market, as well as to feed the ewes.

The ewes benefit from the weaning because it enables the sheepman to reduce their food intake temporarily.

With condition so reduced, an improvement in the ewes' feed is more easily obtained to give the flushing effect at joining. Flushing, particularly on green feed, increases the lambing percentage by increasing the number of ova shed. This results in more multiple lambings.

If the ewes were still fat from crop feeding at this time, flushing would be less effective.

This point has long been recognised in New Zealand fat lamb husbandry as of fundamental importance, and results in a time programme being adhered to to ensure that preparation of ewes for next mating is not hampered by delayed weaning.

The importance of adhering to early weaning practices to allow the ewe to be prepared for the next joining was also stressed in results from fat lamb trials in New South Wales.

Grain Chaff Supplement

On Darling Downs farms under seasonal conditions where the crops have deteriorated rapidly, and are sparse by September, it is advisable to provide the weaned lambs with a supplement of

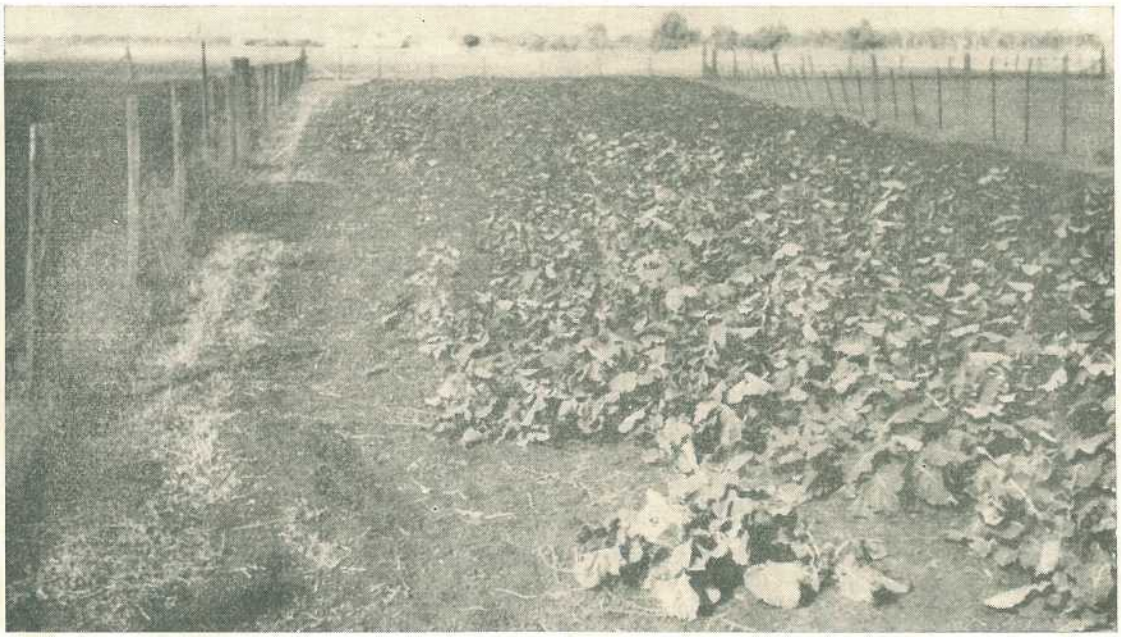


Plate 2
A Crop of Rape in the Warwick District.

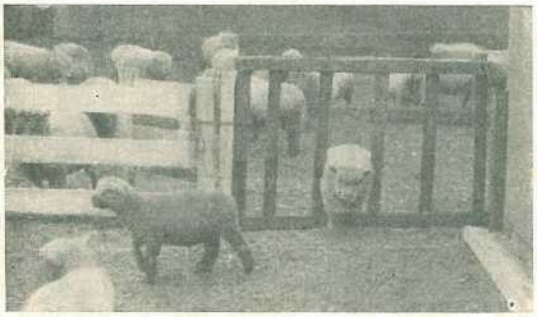


Plate 3
Lamb Using Creep on a Darling Downs Fat Lamb Farm.

grain and chaff—equal parts by weight. Lambs, already acquainted with supplementary feeding when with their mothers, will take readily to the feeders, especially if a few ewes are left with them for company.

Isolate Ewes at Weaning

At weaning, the main body of ewes should be taken as far away from the weaned lambs as possible.

The isolation from the main body of mothers prevents the ewes and lambs endeavouring to make renewed contact with one another, as they would try to do if only a fence divided them. It also lessens the amount of prolonged calling of ewes to lambs, and lambs to mothers, that causes a good deal of distraction generally, and a failure of the mob to settle down within a reasonable time.

Banana Planting Material

Growers who desire to sell planting material of Lady Finger or Sugar bananas during the 1960 planting season, which commences on August 1, 1960, are reminded by the Banana Industry Protection Board that permits to remove planting material of those varieties are granted only when the source of supply is an approved plantation.

To qualify for approval, a plantation must be well managed, free from Panama and Bunchy Top Diseases and the plant type must be up to recognised commercial standards. Two inspections of each nominated plantation will be made by officers of the Department of Agriculture and Stock.

The first inspection must be carried out some time between March 1 and May 31. Any plantation which is not inspected during that period will not be eligible for approval. Growers who may desire to sell planting material of the varieties named should therefore make application to the Board early enough to ensure that the first inspection can be carried out within the appointed period.

The second inspection will be carried out in the spring when applications to remove planting material are received.

Application forms may be obtained from the district officers of the Department of Agriculture and Stock, and the completed forms should be lodged with the Board's agents as early as possible and not later than March 31, 1960.

A Service to Countrymen

They Saved Farms from Being Washed into the Sea

By E. T. HOCKINGS,
Editor of Publications.

Today, by calling on the technical advice of soil conservation officers, farmers are able to halt soil erosion—and so keep their land productive, profitable and in good heart.

SOIL conservation officers and farmers, by a perfect example of teamwork, have shown how, each year, we can save millions of tons of soil from being washed into the ocean. This is good farming soil; growing the produce that feeds our increasing families; soil that is now silting and damaging our roads and choking our ports; soil that must never be lost to the sea from which there is no return.

In our State of Queensland, the soil erosion story is one of determined action in the face of a growing threat.

It began about 20 years ago, at a time when the farmer who suffered damage to his land through soil erosion stood like one helpless in the face of insurmountable difficulty. In most instances he did not even know what was happening to his precious soil; he was blissfully unaware of the insidious drifting away of the top layers, which, if not arrested, would surely result in the abandonment of his productive acres.

The Department of Agriculture and Stock had for some time been conscious of the pressing need for a soil conservation service to farmers. But it was not able to establish such a service until 1947. By then, about 1,000,000 acres of eroded land required urgent remedial treatment. At the same time, new land was being broken up at the rate of 100,000 acres a year, most of it highly erodible black soil in areas of irregular rainfall.

The First Twenty

To make matters worse, farmers showed little interest in the problem; few indeed had any knowledge of it. Only about 20 farmers were applying conservation measures at that time. They had been encouraged to do so by a few keen Department advisory officers, who as early as 1935 saw the menace of soil erosion and set out to fight it.

Research Pays Off

A start has been made on soil conservation research, and in 1959 a method was developed for the cheap and effective stabilization of the numerous gullied drainage lines on the Darling Downs. The method involves the planting of kikuyu grass in July when runoff is normally low. Bitumenous emulsion is used as a growth stimulant and to bind the straw and netting cover which is utilized to provide temporary protection.

These men started the work but then the war intervened and further action was postponed.

In these early days, no staff was trained to apply soil conservation principles; no academic training was available in the colleges and universities. Moreover, Queensland's erosion problems appeared to be much more difficult to resolve than those of most other States.

In the first place, annual rainfall is higher (up to 180 in. a year at Tully) and includes a high proportion of intense summer storms and protracted monsoonal rains; secondly, soils used for

cultivation are predominantly clays which at times have a very low infiltration or absorption rate.

These are the soils that grow winter crops on moisture stored through long fallows.

Any fallowed soil will erode if exposed to heavy rains, but with clay soils under a long fallow there is an additional hazard. When dry they have a high capacity for absorbing moisture and they retain it well. But when wet, they are unable to take in more than a minimum amount of rain—and runoff is consequently greater.

Demonstration Areas

So the Department appointed and trained staff, progressing from one officer in 1947 to a team of 24 in 1959. In this time, 20 demonstration areas were established in the main agricultural districts to show farmers what could be done with properly applied soil conservation measures and to allow them to judge the merit of the work.

These measures fall into two broad categories: (1) the construction of earthworks to provide for the controlled interception and disposal of surplus runoff; (2) the application of land use practices designed to protect the soil, to improve the intake of rain and to maintain soil fertility.

24 Men On Important Work

Of the 24 officers now engaged in soil conservation work, 15 are located in the Darling Downs region. Of these, two are engaged on drafting activities, two on research, and 11 on extension work in five centres. Six officers are in the Burnett area, five are stationed at Kingaroy, one at Murgon. These are virtually all engaged on extension work. One officer is at Emerald to assist in the development of these new lands on a sound soil conservation basis, and one is at Atherton to deal with the needs of the northern area. All these officers are under the control of the Chief Soil Conservationist, Mr. J. E. Ladewig.

As more and more farmers began to seek help from this soil conservation service, legislation was passed in 1951 including provision for the setting up of an advisory and co-ordinating committee on soil conservation.

This was to co-ordinate the actions of the various government departments and to advise on broad soil conservation needs.

From the beginning, all work had been based on a farm plan, which set out the soil conservation needs of each farm and enabled the planned development of programmes. After a few years it was plain that co-ordination of water disposal could not be achieved without simultaneously planning the conservation needs of all farms within a common drainage area.

So the group, or catchment planning, approach was developed, and these days few farms are planned as single units. Farmers now know in advance how their plans will dovetail with those of their neighbours and so a community attack is launched on the common enemy.

Preliminary plans on a scale of 10 chains to an inch have been developed for 1,500,000 acres in the Darling Downs and Burnett regions. Of this area, catchment soil conservation plans have so far been developed for areas aggregating 200,000 acres. The remarkable increase in the development of group planning is indicated by the fact that conservation plans will be completed for a further 250,000 acres in the one year 1959-60.

Conservation on 2,180 Farms

A decentralised extension (or advisory) service to farmers has been set up in most of the main agricultural areas. A great deal of work has been done by the soil conservation team and there are now 2,180 farms in Queensland applying conservation measures.

Protective earthworks have been installed on 77,000 acres of cultivated land. Of this, 16,500 acres were protected in 1958-59, an increase of 30 per cent. on the previous year.

In the South Burnett, where group activity is strongest, three farmer soil conservation groups have been established to ensure co-ordinated action within 12 catchment areas. Co-operating with this move, two local authorities in the area have formed their own sub-committees to attend to soil conservation matters.

The State Advisory Committee recognises the need for co-ordinated approaches and has set up district soil conservation committees in the Darling Downs, South Burnett, and Atherton districts.

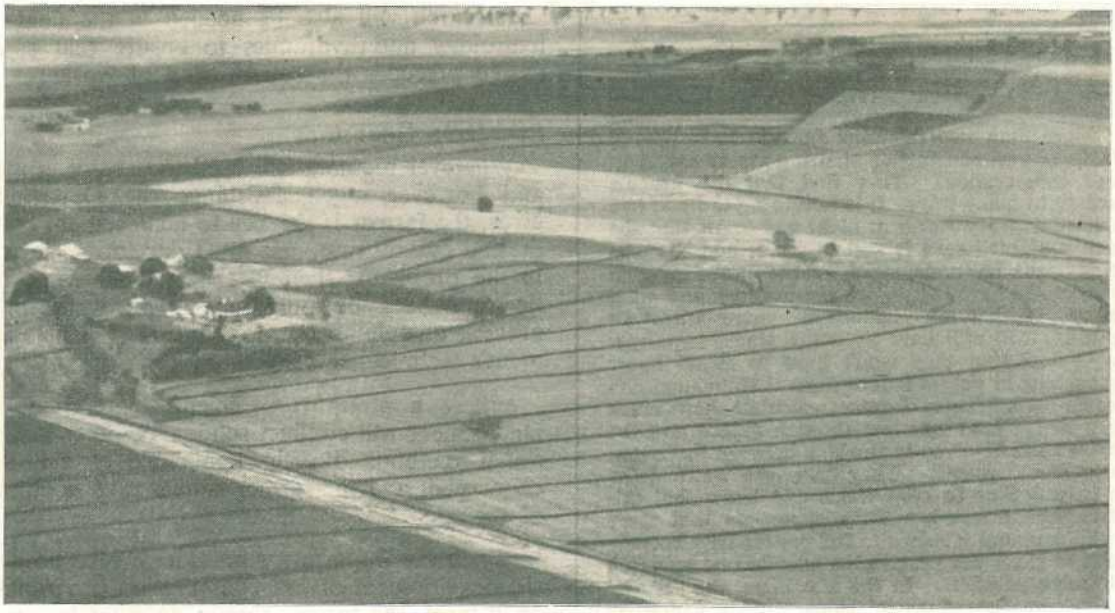


Plate 1
An Aerial View of Soil Conservation Measures on the Darling Downs

These district committees have representation from government departments and local authorities and thus provide the final step in the complete co-ordination of soil conservation group plans.

The Job Ahead

At the present time, 1,100,000 acres urgently require protective earthworks, and about 20 years is the minimum time that can reasonably be allocated to the job of bringing the situation under control.

This means that contour banks and associated earthworks need to be applied to 55,000 acres of eroded land each year, but it does not allow for treatment of at least part of the new lands being broken up for cultivation at the rate of about 100,000 acres a year.

The aim, therefore, must be to reach a rate of control of about 80,000 acres a year.

To meet such an objective will require herculean effort and, while the Government is doing a great deal and will continue to expand its technical services, it seems certain that this technical aid will have to be supplemented from other sources if the job is to be done in the time available.

Farmers must, therefore, proffer a measure of self-help by doing those things which are within their technical capabilities.

We Must Have Co-ordinated Plans

The most important service which the Department can give is the development of co-ordinated soil conservation plans since this task calls for technical skill and liaison in planning which cannot be provided by any other authority. Here the object is to develop plans for 10,000,000 acres in the State within 20 years. This would involve 80,000 man-days of technical time. The application of these plans in the field will involve 200,000 man-days for surveying sites for structures.

It seems unlikely that the Government can provide both services to the desired extent but in the case of the 200,000 man-days required for surveying work, the farmer can take a useful part.

The implementation of work on a group basis as agricultural drainage projects under the Local Government Acts might enable the objective to be reached. In this method the plan is drawn up by Departmental officers, provision is made for financial assistance by way of Treasury or debenture loans, and facilities are provided for survey,

Two Thousand Have Found the Answer

More than two thousand farmers have proved to their own satisfaction that it pays to invest in soil conservation. They find that the benefits accrue in many ways. It is reassuring to lie in bed during a heavy storm at night and know that the newly planted seed is still in place, and that the fields will be undamaged in the morning; that they won't have to re-work the paddock and plant again, or that the paddock of young wheat or peanuts will still have as many plants tomorrow as today; that they won't have to spend hours ploughing-in gullies before normal cultivation can commence. These farmers calculate how much productive land was lost through gullies and the extra costs involved in working between those that cannot be crossed. They have also watched the steady decline in crop yields and know that this has been arrested. They appreciate that there will be no quick return to full productivity because this requires the progressive adoption of balanced farming parctices. In the meantime, the security and immediate financial gains provide a positive incentive.

construction and supervision, the whole being done on a contract basis, under the direction of the local authority.

There is also another side to the control of soil erosion that is receiving attention by the Department. It is expected that research into land use problems by the technical officers dealing with crops and pastures will provide the lead for a change from the present unstable agricultural pattern to one in which a more balanced farming will prevail.

In this direction it will need to be remembered that if we applied principles of improved land use as quickly as we seize upon a newly released variety of wheat, a new grass, or a new weedicide the soil erosion problem would not loom so dangerously as it does.

Research will also be needed in the fields of hydrology and hydraulics to ensure that sound design precedes the construction of works.

Self-Help Important

Whatever methods are used to control erosion, and however much assistance the Department gives, the farmer is the key to achievement of the desired control rate. He must develop an interest in the problems; then in the control work; and finally should be prepared to do whatever is possible complementary to the work of the Department's technical services.

Where a group is sufficiently interested, the Department will conduct schools or other instructional methods directly applicable to the area concerned, and the farmer should take advantage of them.

When the Department provides a blue print for the development of soil conservation programmes on a farm, the farmer should do what he can to carry on from there.

On the construction side, he can help a lot, for experience has shown that the farm dozer unit can quite capably handle most soil construction jobs. Indeed, hundreds of them are now doing so throughout the State.

So, it will only be through concerted effort on the part of soil conservation officers, departmental technical officers, and the farmer himself, that the objective of control of the whole State's soil erosion problems will be finally reached. While the result cannot, perhaps, be measured in terms of money immediately gained, it is obvious that the amount of money saved will be past estimation.

And if a spur to further effort be required, a mental picture of the State in 20 years' time without soil conservation, ravaged and horribly eroded as it would be, should suffice.

Common Weeds of Farm and Pasture

by S. L. Everist, B.Sc., Government Botanist.

A handbook that contains brief descriptions of about 110 of the common weeds of Queensland with notes on their distribution and control.

Price to Queensland farmers . . . . . 5s.

To others . . . . . 7s. 6d.

Available from Department of Agriculture and Stock, Brisbane.

pasture and crop

Don't Machine-pick Empire Cotton.—Plant the cotton variety Empire only if you intend to have your crop picked by hand. If your crop is to be machine-picked, grow Miller 43–9–0 or New Mexico Acala.

Machine-harvested Empire cotton gives low-grade lint at the ginneries. But when picked by hand, this variety produces top grade lint and gains premium payments.

Empire cotton has a long staple and fine fibres. When it's machine-picked, these fibres tend to hold more leaf and trash than the shorter fibres of Miller, for example. The difficulty of removing this trash and the breaking of fibres during the cleaning process cause Empire cotton to be down-graded. When improved ginning and cleaning machinery is installed at the Rockhampton ginnery, it should be possible to lift the grades of machine-harvested Empire cotton.

—I. J. L. WOOD,
Adviser in Agriculture.

Our Best Pasture Legume.—It has taken a long time to break the unfortunate habit of regarding lucerne as a specialist hay crop.

Nowadays, of course, we know that lucerne is a fodder plant of many uses, and one of extreme value in almost any pasture.

We know that it doesn't need the long and expensive seed bed preparation usually given for hay stands.

It can be established at low and economical seeding rates, with or without associated pasture grasses. Mixed with grasses, of course, the risk of bloat is minimized.

Even in drought, many farmers have found the short pick it gives then absolutely invaluable in raising the digestibility of their dry native pastures.

Lucerne is a pasture plant worth growing. It is the summer legume so many graziers have been looking for, for so long.

—J. L. GROOM,
Senior Agronomist.

Read Label On Weedkillers.—Read the label carefully before you mix up a chemical weedkiller, and you'll avoid a lot of costly mistakes. Labels on tins or packets of chemical weedkiller are put there for the farmer's protection. In Queensland, the labels are required to carry full directions for use. In addition, it is an offence for a manufacturer's label to make false claims about the efficiency of the preparation.

Chemical weedkillers are classified into selective and non-selective groups. A selective weedkiller, used at the correct strength, will kill certain types of plants but be harmless to others. Choose the particular chemical to which the weed is susceptible and the crop is tolerant. For example, PCP can be used to control weeds and grasses in pineapples; 2,4-D or MCPA can be used in cereal crops; and CMU or Dinoc to control weeds in onions.

Non-selective weedkillers will destroy all plant life and should not be used in crops. Arsenic and the chlorates are examples of this group.

In using chemical weedkillers, first make sure the preparation is safe for the crop. If it is poisonous, treat it as such and don't risk your life or endanger your stock. Be sure to use the correct chemical for the job and at the right strength. All this information is on the label.

—N. D. IRWIN,
Standards Branch.

Emery Wheels on the Farm.—Nowadays, an emery wheel is an essential part of any well-equipped farm workshop. Although useful, it can also be extremely dangerous and misuse can cause serious accidents leading to loss of sight and even of life. To prevent eye injuries, always wear goggles when grinding.

To reduce the possibility of a wheel bursting, make sure that it is correctly mounted so as to eliminate vibration, that it is kept true, and that it never exceeds the speed recommended by the manufacturer.

To prevent jamming, adjust the feed rest to reduce to a minimum the clearance between it and the wheel.

Finally, always keep the pressure on the wheel below that which would reduce its speed.

—C. G. WRAGGE,
Agricultural Engineer.

Scrub Tick Paralysis In A Crow

by P. D. RANBY, Veterinary Officer.

This is a female scrub tick (*Ixodes holocyclus*) removed from a fledgeling crow. The fledgeling was found by a farmer early one morning on a dairy property in the Numinbah Valley.

About noon on the same day, the crow was seen to be weak in the legs and soon became paralysed. The partially engorged tick was then seen attached to the bird's head, just above the base of the beak.

The crow died in the evening as a result of tick paralysis.

Since the scrub tick must be attached for several days before producing paralysis in animals, it seems likely that this tick attached itself to the crow fledgeling in the nest.

This farmer had reported earlier that he had paralysis cases in his calves over the last month. Five of the six affected calves died in two to three days. One or two ticks were seen on each calf. The calves were allowed to wander through scrub. It is likely, therefore, that these were also cases of tick paralysis. The owner was advised to run the calves on cleared land, away from the scrub.

The scrub tick is normally harboured by bandicoots. The larval ticks climb foliage and

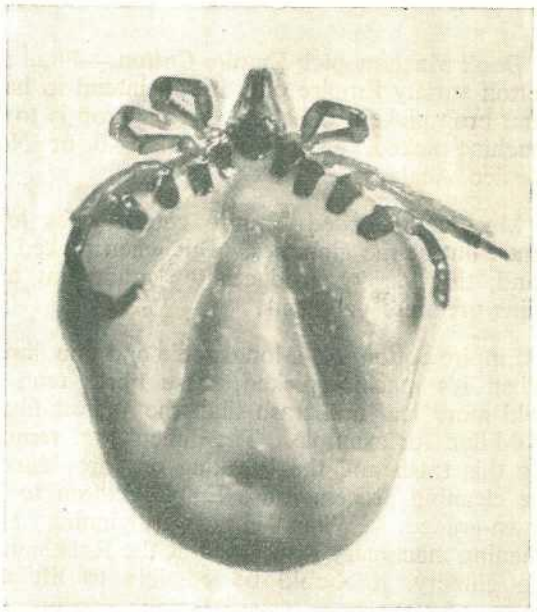


Plate 1
A Photographically Enlarged Female Scrub Tick

are picked up by passing animals, including man. The scrub ticks are most troublesome in bush areas where bandicoots abound. They are favoured by warm, humid conditions. This tick may be recognized by its long mouth parts (see Plate 1).

Tick paralysis due to the scrub tick is not uncommon in dogs and cats in certain areas. Occasional cases are reported in calves and foals. The cattle tick (*Boophilus microplus*) which is common on cattle in Queensland does not cause paralysis.

Septicaemic Cholera in Poultry

By P. D. RANBY, Veterinary Officer.

Outbreaks of septicaemic cholera in poultry can be halted by treatment with suitable antibiotics.

Septicaemic cholera produces a severe sickness in poultry caused by a virulent form of the cholera bacillus (*Pasteurella septica*). Outbreaks are more common in ducks and geese; duck cholera can be a hazard in rearing ducklings. The disease is much less common in fowls, pheasants and turkeys but where outbreaks do occur, death-losses can be high.

Among other birds, natural outbreaks occur in pigeons and waterfowl. Small birds such as sparrows and finches can be readily infected by experimental means, but it is not known whether natural outbreaks occur in these species.

It is the virulent form of the cholera bacillus which enters the bloodstream, where it rapidly multiplies to produce a blood infection or septicaemia. This produces the severe sickness and rapid deaths.

Milder strains of the organism are much more common in fowls than the virulent type, however, being associated with respiratory disease and swollen wattles.

This low virulent type can also be found in the upper respiratory tract of apparently normal fowls.

Does Not Persist

Fortunately, the septicaemic form of fowl cholera does not persist from year to year on affected farms. Instead, the disease "fizzles out" in one or two years. The reason for this is not clear, but there are two possibilities:

(*a*) That the virulent form of the cholera bacillus is unable to survive for very long either in infected birds or on the ground. As a result, the infection tends to disappear once all birds have been affected.

(*b*) That the virulent type of organism reverts back to the milder type. This is supported by the finding that types of intermediate virulence occur some time after a severe outbreak, and the fact that the carrier rate was high in the next season's birds even with few signs of the disease.

How Outbreaks Start

Overseas, outbreaks have started after the introduction of "carrier" fowls and the feeding of uncooked poultry offal. However, the origin of many of the outbreaks in fowls cannot be explained. In ducks and geese the situation is rather different in that "carriers" of the virulent organism are relatively more frequent than in fowls.

Severe outbreaks with large numbers of deaths around lakes have been observed in waterfowl in the U.S.A. Since all exudates from affected birds are infectious, rapid spread by contaminated water would occur. In Holland, an outbreak in geese was traced to affected waterfowl using the same ponds, while an outbreak in chickens followed the feeding of offal from a wild duck.

The possible importance of wild birds in spreading infection to fowls should be kept in mind until we know whether natural outbreaks occur among them.

Eggs are probably not a source of infection to hatching chickens even though the cholera bacillus has been isolated from eggs. Infections in young chickens and ducklings are rare.

Symptoms Severe

Outbreaks of both duck and fowl cholera have been observed in southern Queensland.

Thus in an outbreak in ducks at Brookfield in early 1959, six out of nine ducklings (two months old) died, while several adult ducks also

succumbed. Affected ducks became weak in the legs and had difficulty in walking. Death would follow in a few hours.

In fowls, septicaemic cholera causes rapid deaths, especially early in the epidemic, As the outbreak continues, many affected birds survive longer—for one or two days—and usually develop a watery diarrhoea. Recently recovered birds may show the localized forms of infection. An epidemic may last for two or three weeks. Birds of any age except young chickens are affected in natural outbreaks.

Case History

The following outbreaks in fowls in the Brisbane area in September, 1956, are of interest:

The owner reported that he had a severe sickness in a pen of 250 cross-bred cockerels 12 to 14 weeks old. A number of sick and dead birds were present at the time of the visit (see Plate 1), while a nearby incinerator revealed the charred remains of many more.

Plate 1

A Case of Septicaemic Cholera in a 12-week-old Cross-bred Chicken. This bird was still in good condition and had been affected only a few hours. Note the extreme depression.

The trouble had been present for a week and about 25 dead birds had been removed from the pen. About 20 per cent. of the flock were affected by a watery diarrhoea and usually these cases had lost weight. Other affected birds would die in good condition in three or four hours.

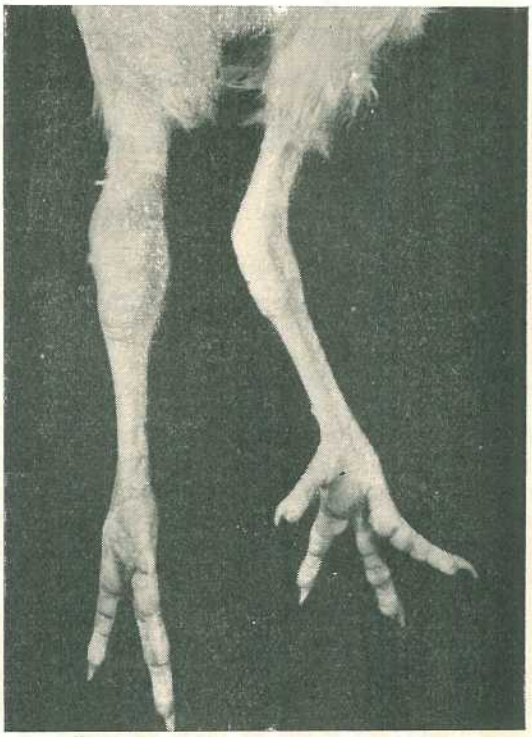


Plate 2

Septicaemic Cholera. Note the swelling around the left hock-joint and up the leg. A small proportion of such cases were seen in this cholera outbreak.

Odd cases showed swellings on the legs—on the feet and hock joints as shown in Plate 2. Towards the end of the epidemic, occasional cases showed a peculiar nervous disorder as seen in Plate 3. About 3 per cent. were thus affected and showed a periodic swaying and twisting of the head with a tendency to squat. It is uncertain whether these symptoms were a direct effect of the septicaemic cholera.

Infection spread to a pen of mixed birds 3 to 4 months old but not to older fowls on the farm.

Treatment with oxytetracycline (Terramycin) in the drinking water produced a definite improvement in the birds in two days and the disease had waned by the end of the second week.

Relapse After Dubbing

Two weeks later, a flare-up of the disease occurred after the owner had dubbed 200 of the cockerels (removed the comb and wattles).

Plate 3

Nervous Symptoms Following an Attack of Septicaemic Cholera. The cockerel was swaying its head from side to side and would twist it to the ground. About 3 per cent. of such cases were seen at the end of the outbreak.

Twelve of the cockerels died within a few days of dubbing while the remaining birds appeared very dejected. Severe swellings were present on the sides of the birds' faces and in the cut wattles, while the combs appeared black. These swellings contained a dryish pus. Undoubtedly the dubbing operation had caused the relapse. Only a few cases of "wattle disease" were seen in the undubbed birds and these were much less severe.

Be Sure It's Cholera

Whenever severe sickness, diarrhoea and rapid deaths occur in poultry over one month old, the septicaemic form of cholera should be suspected. However, the disease can be confused with several others—chick nephritis (uraemia), staphylococcal infection and perhaps bluecomb. These can be readily sorted out with veterinary assistance.

Post-mortem findings in acute cholera show variable bleeding points in the heart wall, internal membranes and abdominal fat. The liver of some cases (especially in ducks) is congested and shows haemorrhages under its capsule or there may be grey areas of dead tissue. Other variable signs of septicaemia may also occur. In cases that die rapidly, internal changes may be few or absent. Thus several birds should be opened for examination.

The presence of cholera can be readily confirmed by testing for the presence of the causative bacteria in the various organs.

Treatment

Outbreaks of septicaemic cholera can be halted by treatment with suitable antibiotics. Sulphonamide drugs may also be used but are not so effective. Where antibiotic injections are used, advice may be sought from the Department of Agriculture and Stock.

Procaine Penicillin—Inject procaine penicillin into the breast muscle in 1 millilitre of clean water at a dose of about 20,000 units to each bird.

If the outbreak of cholera is severe, the injection will need to be repeated in 48 hours, or alternatively, treatment continued with a suitable medicament in the drinking water.

Procaine penicillin is fairly cheap (about one-fifth of a penny per bird).

Streptomycin—Streptomycin is injected in the same way as penicillin and is about equal in value.

Minimum dose-rates are:

Chickens half to three-quarter grown (9 to 14 weeks old): 100 milligrams.

Chickens three-quarter grown or more (over 14 weeks old): 150 milligrams.

Again, in severe outbreaks, the injection may need to be repeated or treatment continued with a suitable medicament in the drinking water.

Cost of 100 milligram dose of streptomycin is about 3d.

Terramycin and Aureomycin—These are supplied in the drinking water for 5 to 7 days as directed by the manufacturer. They are slower in action than antibiotics given by injection.

These antibiotics are more effective by injection but are not available in the injectable form at a price economic to use.

Sulphonamide Drugs—Supply in the drinking water as directed. Less effective than the other treatments and a little expensive for adult birds. Sulphonamide drugs are often available on poultry farms for immediate use.

Other Points to Watch

If possible, clean out the litter and replace it with clean litter while the birds are being treated. In the case of ducklings, it may be easy to shift them to new ground.

Brucellosis-Tested Swine Herds

(As at 1st January, 1960)

Berkshire

Clarke, E. J., Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
James, I. M. (Mrs.), "Kenmore" Stud, Cambooya
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
O'Brien & Hichey, J., "Kildurham" Stud, Jandowae East
Orange, L. P., "Hillview", Flagstone Creek
Pfrunder, P. L., Pozieres
Potter, A. J., "Woodlands", Inglewood
"Tayfield" Stud, Taylor
Q.A.H.S. & College, Lawes
Regional Experimental Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smythe, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florida" Stud, Kalbar
Thomas & Sons, F., "Rosevale" Stud, Laravale
Traves, G., "Wynwood" Stud, Oakey
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr.), W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Butcher, Dr. B. J. & Parnwell, A. J., Plunkett, via Tamborine
Clark, L. D., Greens Creek, Gympie
Duncan, C. P., "Hillview", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J., "Delvue" Stud, Cawdor
Garawin Stud Farm Pty. Ltd., 657 Sandgate Rd., Clayfield
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguilar
Heading, J. A., "Highfields", Murgon
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajea" Stud, Cabarlah
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley
Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
Palmer, A., "Remlap", Greenmount
Pampling, G., Watch Box Rd., Goomeri
Postle, R., "Yaralla" Stud, Pittsworth
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Regional Experimental Station, Biloela
Robinson, O. R. & O. J., "Linvale", Argoon, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Tansey" Stud, via Goomeri
Stewart, L., Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnow, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Coller, R. H., Tallegalla, via Rosewood
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L., "Hillbanside", Bahr Scrub, Beenleigh
Kajewski, W., "Glenroy" Stud, Glencoe
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Wellcamp
Regional Experimental Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephen, T., "Withcott" Stud, Helidon
Thomas & Sons, F., "Rosevale" Stud, Laravale
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

Ashwell, J., "Green Hill", Felton South
Cooper, G. J., Neumgua
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Rd., Kuraby
Kruger & Sons, "Greyhurst" Stud, Goombungee
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara
"Wattledale" Stud, 432 Beenleigh Rd., Sunnybank

Large Black

Pointon, E., Goomburra

Landrace

Grayson, D. G., Killarney
Neilsen, L. R., "Sunny Hill", Ascot, via Greenmount

Quality Is Essential In Barley

By W. T. KELSO, Senior Cereal Chemist, and D. P. LAPIDGE, Marketing Officer.

Always a quality market, the barley market is at present undoubtedly the most discriminating of all the grain markets. This is quite understandable in view of the varied uses to which the grain is put. This article outlines these uses and the quality factors which are required to meet them.

Out of last season's production of barley in Queensland, amounting to 180,000 tons, local malsters accounted for less than 3,000 tons, whilst domestic stock feed and the interstate trade accounted for some 27,000 tons and seed requirements a little over 6,000 tons. The remaining 144,000 tons or 80 per cent. of the total crop was exported to overseas countries.

By far the greater part of the Queensland crop is now of the 2-row Prior variety. This variety, which was only introduced here a few years ago, has rapidly replaced the previous 2-row Chevalier, which was grown in earlier years. A small area of some 25,000 acres or 10 per cent. of the total is planted to 6-row Cape barley. This is mainly used locally for stock feed, although small quantities are also exported.

Production Areas

Barley is grown in the wheat-producing areas as a winter crop. The Darling Downs is by far the major producing area but the Burnett and Western Downs also contribute significant quantities, whilst smaller areas are grown in other districts, including the Central Queensland Highlands, Dawson-Callide, Inglewood, Lower Dawson, Maranoa, South-West Downs and coastal valleys east of the Downs.

Planting time varies according to soil moisture conditions but usually ranges from May to August, with May and June generally preferred if soil conditions are satisfactory. In view of the fact that only one 2-row variety is grown extensively at present the question of early or late varieties does not enter into the planting programme. In a normal season the main crop matures between mid-October and mid-November but the harvesting of later crops extends beyond this period.

Current Export Picture

The local market still remains important, particularly the stock feed market, which is capable of marked expansion in times of drought or of failure of the wheat, maize or grain sorghum crops. However, it is apparent that, with 80 per cent. of the crop destined for overseas markets, the main concentration of effort in the field of marketing must be on meeting the demands of overseas buyers. It is to this end, therefore, that most of the present work on handling, marketing, and research is being directed.

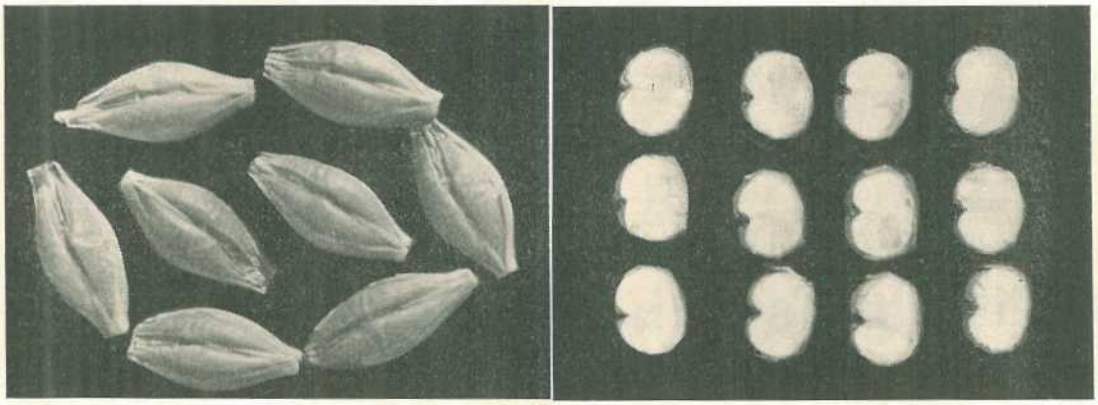


Plate 1
Malting Barley and (at right) Malting Barley in Cross Section.

It is also on these markets that the question of quality is crucial.

In considering export markets it must be borne in mind that exports from Queensland form only a small proportion of world trade in barley. The most recent figures put world trade at around 6,500,000 tons, of which last year we supplied only 144,000 tons. Our main competitors on the world's markets are Canada, United States of America, South Australia, France and the Argentine. Other countries, particularly Iraq and Syria, also provide competition, mostly on the feed market. Our main buyers are Japan, the United Kingdom and the European Continent, with other markets in Africa, the Middle East and at times South-East Asia coming in for smaller quantities. The importance of the Japanese and United Kingdom-Continent markets is illustrated by the fact that last year Japan took 78,000 tons of Queensland milling barley whilst the U.K.-Continent took 34,000 tons of malting and distilling and some 30,000 tons of feed.

With large crops in the hands of competing exporters and with the present tendency of normal importing countries to expand domestic production and reduce imports, these markets are highly competitive. Importers in most years are now able to pick and choose and do not hesitate to do so.

With this rather uncertain background, there is no guarantee of an assured market in any one country for a specific quantity of barley from year to year, and the exporter who is able to offer the quality most suitable to the buyer is usually the successful one. So far, Queensland has done well in securing markets for the entire exportable surplus. In order to maintain and expand those markets, however, it is essential that even more attention be paid to meeting the buyers' requirements as closely as possible.

Quality Requirements

Broadly speaking, barley can be classified into four categories in accordance with the use to which it is to be put. These categories are malting, distilling, milling and stock feed.

It should be emphasised that the relative market values of malting, distilling, and milling barleys are dependent to quite a large extent on the supply and demand for each type, and this can change markedly from year to year. However, all three categories normally attract a fairly substantial margin over and above the feed price.

This margin may range as high as £7 a ton and sometimes more in the case of good quality malting barley when this in short supply. Margins of £3 to £5 a ton are quite common for both malting and distilling barleys.

Returns from milling barleys are influenced mainly by the supply position in Japan and by shipping freights, but the advantage at ports here in Queensland over the export feed price often ranges from £2 a ton upwards. At times, however, the export price for this barley may be little above the feed price.

It will be seen, therefore, that quality pays in two ways. Firstly, it enables the crop to be sold more readily and secondly it results in a much higher return to the farmer.

Malting, distilling and milling barleys have fairly specific requirements as their ideals, as far as quality is concerned. The fourth category, feed, usually consists more or less of all barley of merchantable quality which will not pass muster for the other three grades and need not be dealt with at any length.

Naturally barleys coming within each of the first three categories cover quite a range as far as quality is concerned, but perhaps the best method of delineating them is to describe the ideal requirements of each.

Firstly, all three categories have a number of desirable features in common. These are :—

(1) Regular size, shape and colour.
(2) High bushel weight.
(3) High 1,000 kernel weight.
(4) A minimum of unsound or broken grains.
(5) A high standard of purity (that is, freedom from foreign matter of all sorts).

After meeting these conditions, however, the requirements diverge, quite considerably in the case of the malting and milling grades, and the desirable features of each grade are given in the following paragraphs—

Malting—The malting grade is perhaps the most exacting of all and has less latitude than the others. In order to ensure a high extract of good quality malt the grain must adhere to a complex chemical requirement.

Firstly, the grain must be capable of germinating quickly and evenly. This calls for a viable grain, with sound undamaged kernels. Dead and damaged kernels may give rise to mould development in the malting process and result in a poor quality extract. Germination should be at least 95 per cent.

On germination the proteins and the starch are modified and, this is an important point when the grain becomes malt, the brewer must be assured of an economic amount of water-extractable material. In order to achieve this, the grain must be high in starch and low in protein. A protein content of 9 per cent. or less at 13½ per cent. moisture (10·3 per cent. moisture-free) is generally sought, although maltsters will, of course, go above this level if sufficient grain of lower protein is not available. However, when the grain exceeds 10 per cent. protein (11½ per cent. moisture-free) maltsters look upon it with disfavour.

Apart from the physical characteristics mentioned earlier as being common to all quality barley, malting barley should consist of very plump grain with a thin, finely wrinkled skin and should have a white, mealy appearance when cut. This latter appearance denotes a low protein content.

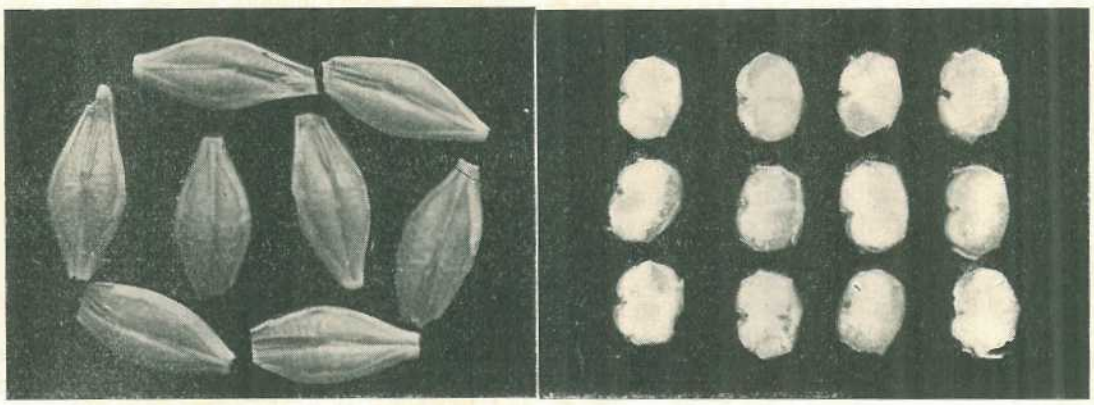


Plate 2
Distilling Barley and Cross Section.

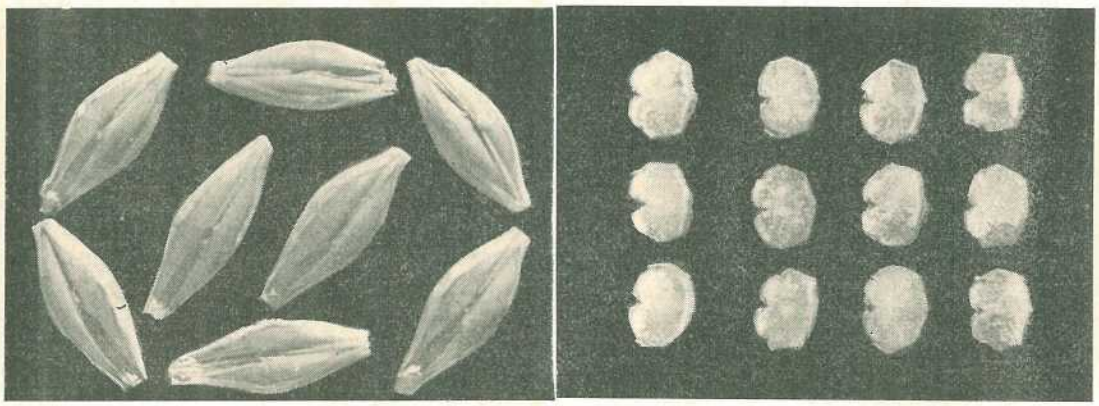


Plate 3
Milling Barley and Cross Section.

Plate 1 shows several grains of high grade malting barley enlarged to show the plumpness and fine wrinkling of the skin and (at right) the same grain in cross section, clearly illustrating the white mealy appearance. The protein content of this sample was 8·8 per cent. whilst the 1,000 kernel weight was 49·7 grams and the bushel weight 56 lb.

Distilling—The requirements for distilling are virtually the same as those for malting, and low protein is sought, but there is generally somewhat more latitude as far as our overseas buyers are concerned on the question of maximum protein. Queensland barleys of around 10 per cent. protein (11½ per cent. moisture-free) have been freely accepted by overseas distillers in recent years and some sales of grain have been made for this purpose even around 11·0 per cent. protein (12·7 per cent. moisture-free), although this must be regarded as rather too high to be generally acceptable.

Plate 2 shows grains, whole and in cross section, of a type suitable for distilling. It will be seen from Plate 2 that the skin is not quite so thin or finely wrinkled as the grain shown in Plate 1, whilst the cross section photograph shows a more vitreous (glassy) appearance denoting a higher protein content. The protein content of this sample was a little over 10 per cent., the 1,000 kernel weight 42·0 grams, and the bushel weight 57½ lb.

Milling—Milling grain is quite different in its chemical requirements from either malting or distilling. Firstly, germination is not important since the grain is used for human consumption and is not malted. Damage to the grain should still be at a minimum as a high proportion of broken or cracked grains results in milling loss. A small amount of tipping or skinning of the grain is acceptable.

It is in the protein content that the requirements differ most markedly from malting barley. Here the reverse—a high protein—is required. A protein content of 11·0 per cent. (12·7 per cent. moisture-free) and higher is much sought after.

In appearance the grain looks harder and tends to a smooth rather than a wrinkled skin.

Plate 3 shows milling barley, whole and in cross section, and the smooth skin and vitreous appearance of the grain are apparent. The protein content of this sample was 13·6 per cent., the 1,000 kernel weight 43·6 grams, and the bushel weight 57 lb.

Feed—The main requirement of the feed grade is that it should not contain any prohibited seeds or other matter which might be injurious to stock. However, under the Agricultural Standards (Stock Food) Regulations, maximum limits are imposed in relation to the presence of weed seeds, other grains and foreign matter. Generally feed grain tends to be thinner and less even than the other categories and it is usually characterised by low bushel and 1,000 kernel weights. Plate 4 shows this grain with

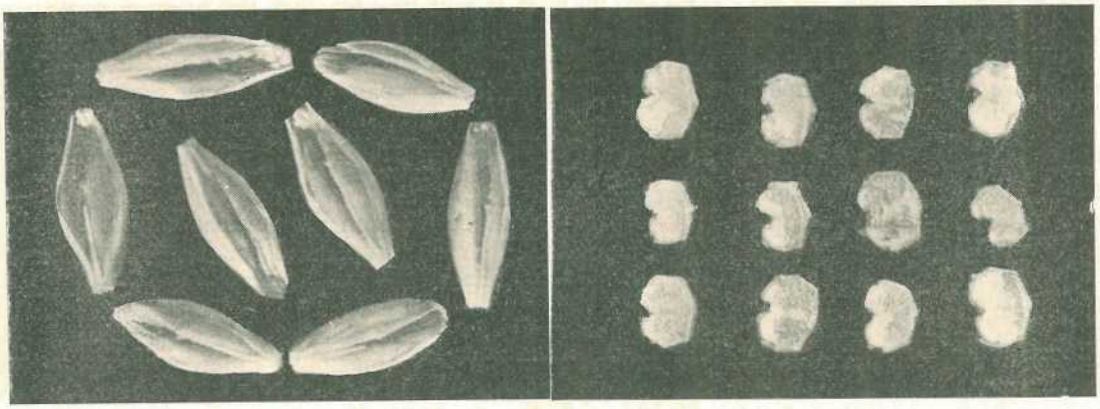


Plate 4

Feed Barley and Cross Section.

a protein content of 13·1 per cent., 1,000 kernel weight of 40·0 grams and a bushel weight of 53¼ lb.

Factors Affecting Quality

The main factors affecting barley quality are—

1. The variety
2. Climate, season and time of planting
3. Soil fertility
4. Cleanliness in cultivation
5. Harvesting methods

The variety Prior, which is extensively grown at present, is a good all-round variety under Queensland conditions. When environment is suitable it produces a good, low protein, malting barley. In a different environment, particularly on soils of high fertility, it is also capable of producing a very high protein grain which is eminently suitable for milling.

Its growing properties are generally suitable for Queensland conditions, and it has a satisfactory straw and threshes out well, if care is exercised in harvesting.

Under favourable seasonal conditions the variety produces a fairly large, plump grain which is an advantage for malting, milling and distilling.

Barley is extensively grown throughout the world, particularly in temperate climates, which are for the most part favourable for the production of grain of high malting quality. Under Queensland's variable climatic conditions the quality outturn of the harvest is always a little uncertain. Attention to those aspects of cultivation, harvesting and handling which affect quality will at least ensure that the maximum quantities of quality grain will be available in any season.

Soil fertility in the main producing areas is generally high, but is sufficiently varied to enable the production of barley of each of the three desired qualities. This factor, if understood and properly used, should enable us to take full advantage of the various markets for the different qualities of grain. The section dealing with chemical surveys outlines the steps which are now being taken to ensure that this advantage may be exploited.

The desirability of cleanliness in cultivation is common to all grain crops, but nowhere is it more important than in the case of barley. Samples containing more than a minimum of weed seeds and other foreign matter are unacceptable in the quality grades and must be sold as feed.

Harvesting methods are important, particularly in the case of malting and distilling barley. As indicated earlier, grain which has been badly skinned, cracked or broken will not germinate and consequently is unsaleable for these purposes. Careful adjustment of harvesting machinery and attention to harvesting speed will largely eliminate these troubles, which are a constant source of heavy loss to farmers. Excessive harvesting speed should be avoided wherever possible.

Plate 5 shows in enlarged size some of the main types of damage caused by faulty harvesting. A grain which has been well harvested is shown in the centre for comparison.

Chemical Surveys

In order to obtain accurate information on the quality of the Queensland crop and to provide data on the range and average of protein which may be expected in the various production areas, a chemical survey of the 1958 harvest has been undertaken. Samples drawn by the Barley Marketing Board have been analysed at the Agriculture Department's Chemical Laboratory and the preliminary results of this analysis are set out in the following paragraphs and tables. Plate 6 shows the areas and depots covered by the survey and indicates the average protein for each depot.

A major feature which is brought out by this analysis is the wide range in the protein content at many depots and the lack of any major differences for the season in the relative levels of average protein, as between the five districts used in the analysis.

Table 1 shows, in summary form, the protein ranges and district average protein of barley for the 1958 harvest, compared with the district average protein of wheat for the same harvest and for a longer term average.

TABLE 1

PROTEIN RANGE AND DISTRICT AVERAGE PROTEIN OF BARLEY 1958 HARVEST, COMPARED WITH DISTRICT AVERAGE PROTEIN OF WHEAT 1958 HARVEST AND 1950–1955 HARVESTS

District	Barley 1958 Harvest		Wheat	
	Range in Samples Tested	District Average	District Average 1958 Harvest	District Average 1950–55 Harvests
	Per cent.	Per cent.	Per cent.	Per cent.
1. Dalby	8·2–13·4	10·5	12·8	12·6
2. North Downs and Upper Central Downs	8·4–13·7	10·6	12·6	12·3
3. Lower Central Downs ..	8·7–13·6	10·8	12·7	11·9
4. Upper Southern Downs ..	7·5–14·1	10·2	12·3	11·6
5. Lower Southern Downs ..	8·9–11·8	10·9	12·5	11·5

It will be seen that the average protein content of barley for the 1958 harvest shows no great variation as between districts. Only 0·7 per cent. separates the Upper Southern Downs, which recorded the lowest average, from the Lower Southern Downs, which recorded the highest average.

A comparison with wheat protein figures for the 1958 harvest and the longer term 1950-55 average, however, indicates that this situation is somewhat abnormal. Wheat protein figures for 1958 also showed little variation as between districts, the maximum difference being only 0·5 per cent. However, the normal picture as shown by the 1950-55 averages is for a difference in average wheat protein of more than 1 per cent., with the highest level in the Dalby district ranging down to the lowest level on the Lower Southern Downs. It seems reasonable to expect that barley protein levels might on the average follow a similar pattern.

The position in regard to individual depots is somewhat different and these show quite substantial variations in depot average protein. Despite the known high overall level of protein content for this 1958 crop the average of depots such as Aubigny (9·6 per cent.), Allora (9·5 per cent.) and Goomburra (9.4 per cent.) is relatively low, whilst Millmerran (12·2 per cent.) is very high.

Of the 32 depots for which analyses were carried out 1 had an average protein of between 9 and 9·4 per cent., 2 between 9·5 and 9·9 per

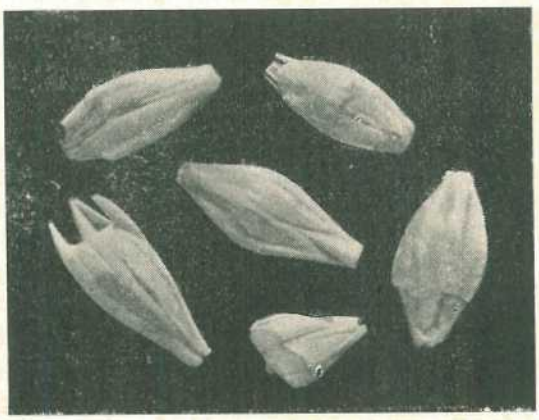


Plate 5

Main Types of Damage Caused by Faulty Harvesting.

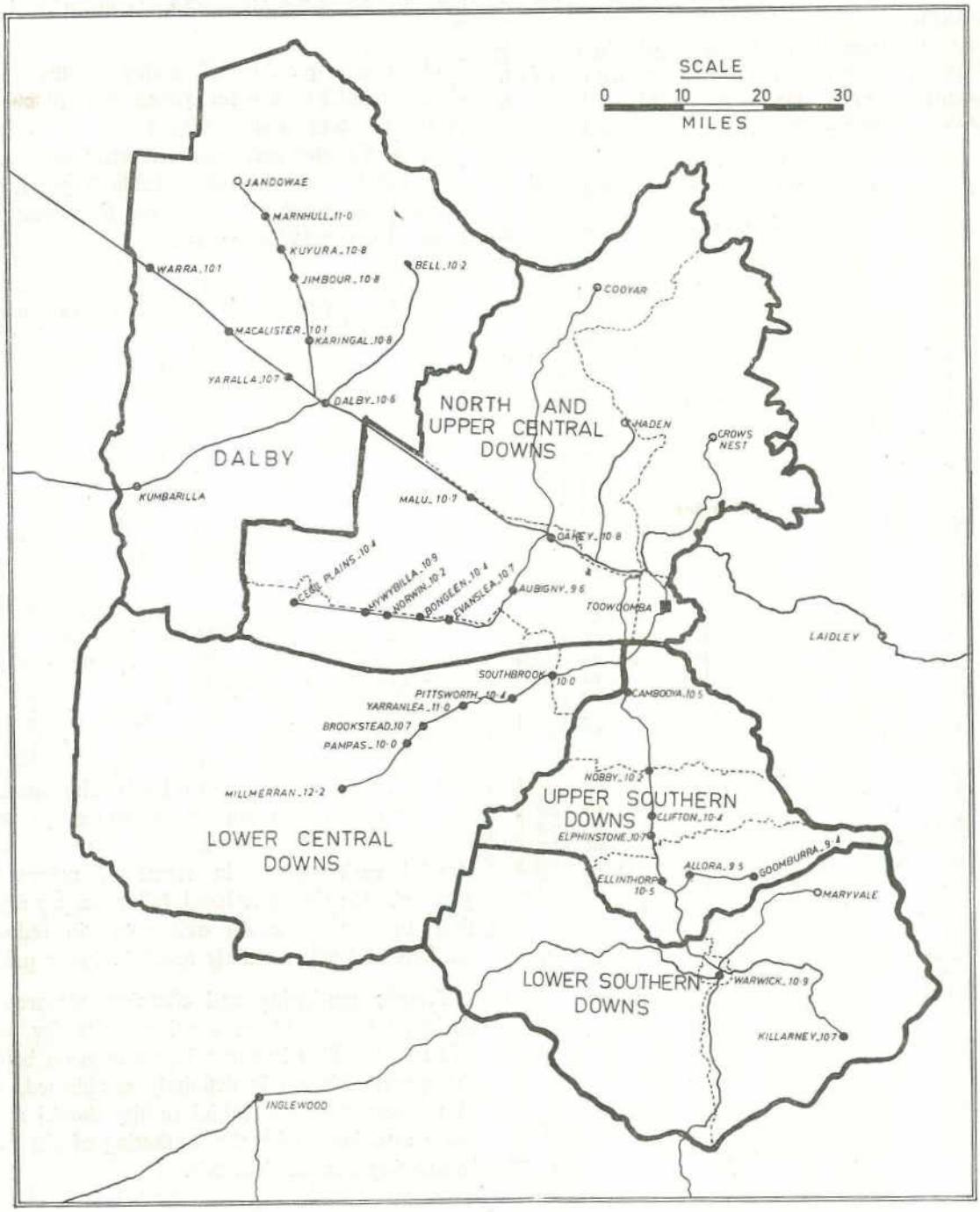


Plate 6

Barley Areas and Depots, Showing the Average Protein for Each Depot.

cent., 11 between 10 and 10·4 per cent., 15 between 10·5 and 10·9 per cent., and 3 over 11 per cent.

At the same time, 15 or nearly half of the 32 depots recorded some samples with protein content below 9 per cent., whilst 15 depots showed a maximum of over 12 per cent.

TABLE 2

PROTEIN CONTENT (N x 6·25 AT 13·5 PER CENT. WATER) 1958 HARVEST

AVERAGE PROTEIN CONTENT AND PROTEIN RANGE RECORDED BY DISTRICTS AND DEPOTS

District and Depot	Average Protein	Protein Range*
	Per cent.	Per cent.
1. *Dalby—*		
Bell	10·2	8·5–13·4
Dalby	10·6	8·7–13·0
Jimbour	10·8	10·0–11·8
Karingal	10·8	9·4–11·4
Kuyura	10·8	8·6–10·8
Macalister	10·1	8·2–11·2
Marnhull	11·0	11·6–12·9
Warra	10·1	9·8–13·1
Yaralla	10·7	Not available
2. *North Downs and Upper Central Downs—*		
Aubigny	9·6	8·8–11·1
Bongeen	10·4	10·8–13·7
Cecil Plains	10·4	8·8–10·6
Evanslea	10·7	Not available
Malu	10·7	10·4–13·5
Mywybilla	10·9	9·8–13·1
Norwin	10·2	8·4–12·6
Oakey	10·8	9·7–13·1
3. *Lower Central Downs—*		
Brookstead	10·7	9·1–11·8
Millmerran	12·2	8·8–13·6
Pampas	10·0	8·9–12·3
Pittsworth	10·4	8·7–12·7
Southbrook	10·0	Not available
Yarranlea	11·0	9·1–11·7
4. *Upper Southern Downs—*		
Allora	9·5	7·5–9·5
Cambooya	10·5	9·4–14·1
Clifton	10·4	8·3–13·2
Ellinthorp	10·5	9·1–11·8
Elphinstone	10·7	Not available
Goomburra	9·4	8·1–9·2
Nobby	10·2	8·7–12·3
5. *Lower Southern Downs—*		
Killarney	10·7	8·9–9·7
Warwick	10·9	10·6–11·8

* Range given by analysis of five growers' samples from each depot.

A detailed listing of average protein contents and protein ranges by depots is given in Table 2.

Since the question of barley quality is so closely related to protein content it is of interest to see the total and relative effects of the production of barley and wheat, in terms of removal of nitrogen from the soil. Table 3 provides a comparison between such losses for wheat and barley for the 1958 harvest.

TABLE 3

REMOVAL OF NITROGEN FROM SOIL IN THE FORM OF GRAIN FOR BARLEY AND WHEAT DURING THE 1958 HARVEST

District	Nitrogen loss in lb./acre	
	Barley	Wheat
1. Dalby	33·0	36·6
2. North Downs and Upper Central Downs	33·4	34·8
3. Lower Central Downs	31·4	31·3
4. Upper Southern Downs	28·0	27·1
5. Lower Southern Downs	24·8	24·4

Barley has now become an important crop in Queensland. With the 1958 crop worth nearly £4,000,000 and export income from the crop amounting to £3,500,000, big financial gains are possible even from small increases in the price.

Any efforts directed toward providing markets with grain of a quality best suited to their individual requirements are likely to reap a substantial cash reward in terms of returns to growers. On the other hand, failure to pay attention to quality could well result in reduced markets and will certainly result in lower prices.

Present marketing and chemical research is designed to provide a starting point for such efforts. It will, of course, be some years before the quality picture is definitely established, but in the meantime the initial results should assist those associated with the marketing of the crop in meeting market demands.

A Low Cost Refrigerator For Milk Or Cream

By D. C. KEATING, Dairy Adviser

This refrigerator was designed to reduce the capital outlay of milk producers who have to store milk overnight on their farms.

Cooling of milk and cream on the farm can be the answer to a farmer's quality problems thereby increasing the financial returns for his product. The consistent high quality obtained in milk stored in an underground concrete refrigerator cabinet on the property of Mr. P. St. Ledger of Bonna, near Bundaberg, has proved the value of cold temperature storage.

Farm trials on milk refrigeration commenced by the Department in 1958 and reported in the *Queensland Agricultural Journal* in February, 1959, have shown that an "in-tank" refrigerator unit can be used with success in a farm-built cabinet or tank. The cost of the complete unit is considerably lower than commercial dairy cabinet-type refrigerator units.

As market milk is collected only once daily in this area, refrigeration is the only means whereby milk held overnight can be guaranteed to meet the quality requirements for the market milk trade.

This unit was constructed and ready for use in February, 1958. Although the operation is similar to the in-tank units, the refrigeration plant resembles that used in immersion-type units. Storage space for four 10 gal. cans was provided in this cabinet.

Layout

The cooling cabinet is situated in the milk room adjacent to the wall separating the milking shed from the milk room. This layout permits

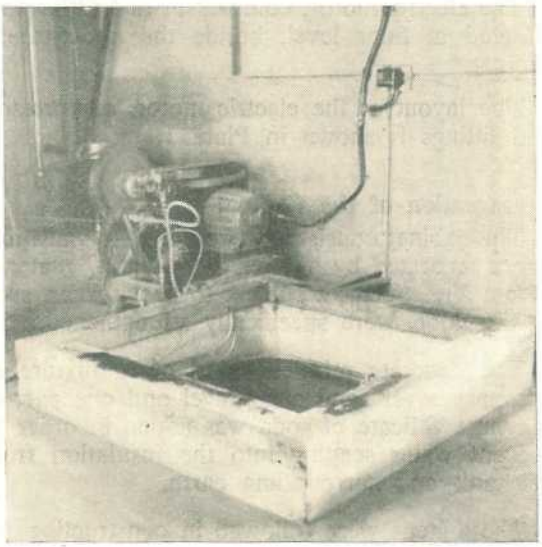


Plate 1

Refrigeration Unit and Concrete Tank for "In-Tank" Cooling of Milk. Note the positioning of the copper cooling coil around the walls of the pit.

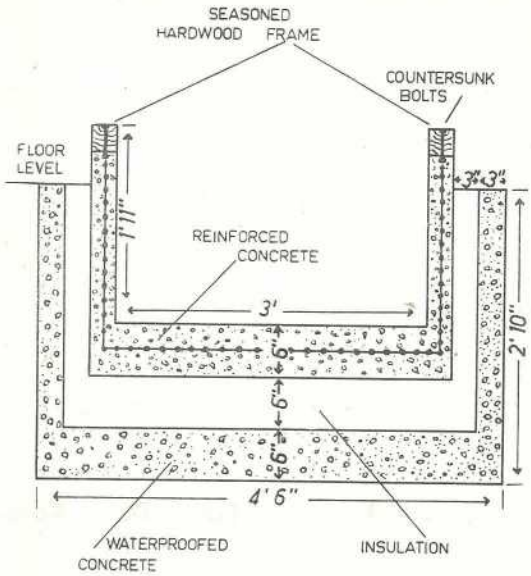


Plate 2

Elevation Plan of Underground Tank, Showing Inner and Outer Concrete Cabinets with Separating Insulation Material.

pulley blocks and track to be installed to carry the milk outside the door to a waiting vehicle.

The electric motor, compressor and fittings are situated at floor level, beside the underground cabinet.

The layout of the electric motor, compressor, and fittings is shown in Plate 1.

Construction of the Cabinet

The cabinet consists of two concrete walls and floors separated by a layer of insulating material (Plate 2). Surfaces subject to heavy wear, such as the floor, were specifically strengthened.

The concrete mix consisted of a mixture of five parts river sand and gravel and one part of cement. Silicate of soda was added in order to prevent water seeping into the insulation from the tank and surrounding earth.

These steps were followed in constructing the unit:

(1) A hole 2 ft. 10 in. deep and 4 ft. 6 in. was excavated through the existing concrete floor and underlying earth.

(2) A layer of 6 in. concrete was poured on to the floor of this hole. Vertical boxing of pine was then placed on top of this cement floor. This boxing was squared off and a space of 3 in. allowed between the box and earth sides of the hole.

(3) Concrete was then poured into this space and tamped. Particular attention was given to tamping against the sides of the box to give a smooth and more watertight finish. This space was filled to within 1 in. of the dairy floor level, left rough and allowed to set. The boxing was removed when the cement hardened. To enable this boxing to be removed easily, two sides were sawn through with level cuts and held in place with pine strips. When the pine strips were removed, two sides folded inwards and were removed. The other two sides could then be easily removed from the hardened wall.

(4) Six inches of insulating material were then laid on the floor of this concrete well. The insulation used was a mixture of sawdust saturated with tar and some granulated cork obtained from a dismantled hot water tank at the Bundaberg Butter Factory.

(5) The inner walls and floor of the cabinet were laid in one piece, with ¼-in. iron rods as reinforcement.

The outside boxing for this inner wall was placed in position to allow a 3-in. space between the inner and outer walls. The boxing was squared off and braced to the floor.

The reinforcement rods were bent into a U shape to lie down one side, along the bottom and up the other side. These provided vertical rod reinforcement on all sides and a squared pattern on the floor bottom. Other rods circled the uprights horizontally and were tied in position with tie wire. The reinforcement, when completed, resembled a steel crate of 4 in. mesh open at the top. The reinforcement was supported 3 in. above the insulation on the floor and 1½ in. from each side of the wall boxing.

(6) Six inches of concrete were laid on the floor and smooth-finished with a slight slope to one corner. The inner box was then placed into position and squared off at 3 in. from the outer box on all sides. Both these boxings extended 3 in. above floor level.

(7) Concrete was poured between these boxings, ensuring that the cement packed tightly about the reinforcement. The cement was brought to the top of the boxings and smooth finished. Eight ½ in. bolts were set in the top of this wall, two bolts projecting 4 in. upwards on each side.

(8) When the concrete was firm but still green, all boxings were removed. The inner surfaces of the wall were scratched to provide a rough surface for plastering. The spaces between the inner and outer walls were filled with insulation to within 2 in. of floor level and tightly rammed. The space above this insulation and the outer wall was then sealed with concrete and smooth-finished at floor level.

(9) A plaster mixture of two and a half parts of $\frac{1}{16}$-in. screened sand and one part of cement was then used to provide a smooth surface on the exposed sides of the inner wall.

(10) A frame of 4 in. x 2½ in. seasoned hardwood was bolted to the top of the inner wall. The corners of this frame were half-checked. A lid was constructed of ⅝ in. bondwood on a beech frame to prevent warping. Heavy insulation in the lid was not provided. Cold air tends to fall to the lower stratas and loss of refrigeration due to convection is not great in the upper portions of the cabinet. This lid was painted with a gloss finish paint as protection against damage by condensation.

Costs

(a) Cabinet

Costs to construct this cabinet were:

	£	s.	d.
1½ cubic yards sand and gravel	1	15	0
Lid	5	0	0
5 bags cement @ 14s.	3	10	0
Silicate of soda		12	0
Reinforcement	3	6	0
Hardwood frame		16	0
Labour and boxing	12	0	0
Total	26	19	0

This cost represents a cash outlay, and does not include the farmer's labour charges during construction. This cash outlay could be reduced if a producer were able to provide the sand and gravel. Further, good quality seasoned hardwood timber can be found on most farms and with suitable dressing could be used.

To reduce the time required for plastering, it is possible to construct boxings with smooth lining (for example, three-ply well braced) and use sand with gravel not larger than ¼ in. With good pouring and tamping, a smooth inner surface would be obtained and no plastering required.

In some instances reinforcement rods can be purchased second-hand. Business houses in towns often receive crockery packed in iron rod crates of 3 in. mesh. These can be purchased for £1 and are excellent reinforcement for the inner wall and so reduce the cost of reinforcement.

(b) Refrigeration

Costs of refrigeration plant were:

	£	s.	d.
1 h.p. electric motor and starter	36	10	0
½ h.p. compressor (reconditioned)	65	0	0
Copper coil, valve and legs	39	2	2
Thermostat	5	12	0
Milk cooler and hoses	27	0	0
½-inch water pump	9	0	0
Pulleys, belts and fittings	4	18	1
Electrical installation	5	0	0
Refrigeration installation	9	10	0
Total	201	12	3

The compressor used was of ½ h.p. rating and purchased as a reconditioned unit. This was available from an ice cream company who were changing over to sealed units in commercial refrigeration plants. The equivalent price for new equipment embracing a similar compressor, copper coil and hand valves, electric drive, thermostat is £160.

It would be difficult to reduce this cost where motive power is electricity. Where a milking machine fuel engine is used, the motor, thermostat and electrical installation would not be required.

Where electricity is available, this equipment is necessary for efficient operation.

It is considered that some reduction could be made in the amount of copper coil used. In this unit, the copper coil encircles the cabinet, but

this could be reduced by having the coil against an end and across the centre of the cabinet. Cans would then be stored on either side of the copper tubing across the centre.

The thermostat controls the working of the refrigerator plant, and, in this case, the motor cuts in and applies refrigeration when the temperature of the water rises to 37 deg F. and cuts out when the temperature is reduced to 35 deg. F.

(*c*) *Operating Costs*

Unfortunately, this plant is not connected to a separate meter to obtain accurate costs of power. However, it has been estimated from observations of running time that this cost would approximate £6 10s. a quarter. Both night and morning milk are cooled, which would tend to increase this running cost. Total cooling and storage costs obtained in the Departmental tests were of the order of ½d. to ¾d. a gallon.

During 17 months' operation, from February, 1958, to July, 1959, no maintenance costs have been incurred by this plant. Milk quality results during this period were good, only one sample of milk decolouring the methylene blue test in less than four hours. A summary of temperature recordings taken during summer months showed—

Milk in Holding Vat	Milk off Cooler	Milk on arrival at Factory
91°F	50°F	45°F

CHANGING THE WATER

Sufficient water should be used in the cabinet to reach to the shoulders of the cans of milk. This is necessary to ensure optimum transfer of refrigeration. This water requires regular changing, to avoid contamination of the milk.

To change the water, disconnect the delivery hose from the cooler, start the water pump and pump the water to waste by way of the dairy drain.

A small amount of soda ash could be added to the water to reduce acidity and thus minimise rusting on the outsides of the cans. However, there is no evidence of rusting on cans in the existing cabinet and it is thought that the cement walls and floor have supplied sufficient salts to reduce acidity in the water.

While appreciating the high costs involved in electrical refrigeration equipment installation, the entire unit compares favourably with refrigerators at present on the market.

The feature of this unit is the low cost of the cement underground cabinet, which would be very suitable for adaption to in-tank cooling.

Acknowledgement is made to Mr. St. Ledger for his co-operation, and Mr. E. G. Parsloe, Manager, Port Curtis Co-operative Dairy Association, Bundaberg, for his guidance and asistance in the construction of the cabinet.

Watch for Leptospirosis

Be on guard to detect outbreaks of calf redwater or leptospirosis from now until the end of the wet season. Outbreaks of this usually fatal bacterial disease are most frequent in the wet season, although they can occur at any time.

Cows also become infected, but not so severely as calves. Leptospirosis is highly infective and is transmitted by contact between calves, inhalation or simply through skin abrasions. The disease can be transmitted to man. Pigs or carrier calves are the chief source of infection.

Calves with the disease quickly become fevered, drip saliva from their mouths and breathe heavily. The appetite disappears and if the animals live long enough, anaemia and jaundice follow. Immediate treatment with antibiotics can give good results, but it's better to have your calves vaccinated. The cost is about 2s. a calf.

—*R. JOHNSON, Veterinary Officer.*

stock and station

Little Danger In Treated Fence Posts.—There's little danger of cattle being poisoned through licking or chewing fence posts treated with any of the common preservatives. But it would be dangerous to let stock have access to stacks of freshly treated timber or to ground contaminated with run-off from treated posts.

The practice of using chemically-treated saplings instead of heartwood for fence posts is growing, both in Australia and overseas. Studies in New Zealand on the risk of stock poisoning from treated posts showed that the danger is negligible when creosote, PCP or special arsenical preservatives are used. Arsenical compounds for preserving fence posts are not ordinary weed-killers or dip preparations which are extremely toxic to cattle.

The New Zealand experiments showed that it would be impossible for cattle to chew and swallow sufficient treated wood to cause poisoning.

—D. N. SUTHERLAND,
Director of Cattle Husbandry.

Buy Hay Now?—Throughout the State many pastures are rapidly reaching maturity. This means a steep drop in quality and productivity. Unless autumn weather conditions are more favourable than usual we are likely to face a long period of poor quality pasture before the spring rain.

Should you consider that your fodder reserves are not sufficient there is still time to remedy the matter if you have access to lucerne-growing districts. Hay is available cheaply if you act now.

The lucerne hay to which I refer is not prime quality, being rather grassy, but it's a valuable feed at the current price of about £8 a ton. Avoid mouldy hay and purchase only hay that is properly cured.

Lucerne hay is probably the most useful of all conserved fodders for cattle. In baled form it is easy to handle and store. It is readily transported over a property and can be fed out on clean ground if necessary. Further, you are bringing fertility on to your property.

For dairy cattle 10 tons of lucerne hay will maintain a 20-cow herd for 3 months. That is about 3 cwt. of hay for each cow for one month.

In the case of beef cattle, 1½ cwt. for each cow monthly is a worthwhile supplement to dry pasture. For beef weaners a 10-ton truck of hay would supply enough supplementary feed for 200–250 head for a month.

—W. F. MAWSON,
Senior Adviser in Cattle Husbandry.

Precautions For Sheepmen.—Some problems in sheep areas of the State that intensify with the season's change are: Bush fire risk; increasing water evaporation; wind and storm danger to windmills, homesteads and buildings; possibility of flood rains.

Adequate fire ploughing, preparation of fire-fighting equipment, stock and fence insurance all need full consideration.

The increasing water evaporation could call for extension of suction piping in excavated tanks, and regular patrolling of open waters to carry out early rescue of bogged sheep.

Checking and tightening any looseness in windmill structures, and repairs to weak spots on roofs will put you ahead of wind squalls.

To keep ahead of flood danger, move sheep from river channels and frontages; put flood gates in order, and lift or drop netting, to allow the passage of debris, branches, and rubbish. Rations, drenches, insecticides, and materials should be in adequate supply to allow for periods of possible flood isolation.

—R. B. YOUNG,
Senior Adviser, Sheep and Wool.

Mange Cuts Pig Profits.—Mangy pigs are unprofitable; they grow more slowly than healthy ones and will even lose weight if you don't treat them.

Mange outbreaks are common in Queensland piggeries. You'll recognise the disease fairly readily as the pigs rub constantly, their skins become dry and scaly and the hair may fall out. If you suspect mange in your piggery, ask your local adviser in pig raising to take skin scrapings for examination.

Mange can be cured quickly if you start treatment before the pigs become badly affected. Use a BHC spray or dip containing 0.22 per cent. of the gamma isomer, and wet each pig thoroughly, including the head. Then crowd the pigs together in a small pen for a few minutes so that the preparation will be rubbed into their skins. Repeat the treatment at 10-day intervals until the mange is cured.

—T. ABELL,
Senior Adviser, Pig Branch.

New Facts On Debeaking.—Debeaking fowls to curb feather picking and cannibalism and to reduce food wastage is a practice that seems to be here to stay. It's like dehorning cattle to stop goring and to obtain the most efficient use of forage.

New information on debeaking has come from trials at the Rocklea Animal Husbandry Research Farm.

Growth rates showed that it did not matter greatly whether fowls were debeaked at day old or week old. Another trial compared the merits of an electric debeaking machine and a pair of nail clippers. It was found that the nail clippers were quite satisfactory and quick. There appeared to be no advantage in block debeaking, that is removing parts of both beaks. Block debeaking was slower than single debeaking and did not result in any greater saving in food.

—F. N. J. MILNE,
Senior Poultry Husbandry Officer.

Keep Your Pigs Cool In Summer

There is no doubt that pigs are more contented and grow faster in temperatures between 60 and 75 deg. When summer temperatures stay up much beyond 7 deg., pigs quickly react in a manner costly to the farmer—they stop growing.

Pigs kept in temperatures of 90 deg. or over make little or no growth.

Unfortunately that is not the only effect hot weather has on our pigs. Experiments have shown that, where it took only 4 lb. of feed to produce 1 lb. of liveweight gain in baconers kept at 60 deg., nearly three times as much feed was required for 1 lb. of gain at just under 90 deg. in experiments.

For many pig farmers in the hotter parts of Queensland this is a very likely source of both waste of feed and loss of profit. The obvious prevention is to keep your pigs cool in summer.

Why not start by checking the temperature in your pig sheds? All you need do is fasten a thermometer inside on a wall, about 2 ft. from the floor. Protect it so the pigs can't damage it. Then note the temperature at intervals during a hot day.

If you find that the shed temperature exceeds 80 deg. for some hours, you would be wise to alter the shed so it will be cooler.

—T. ABELL, Senior Adviser, Pig Branch.

How Immunization Works

By G. C. Simmons, Senior Bacteriologist.

In this article the artificial means of obtaining immunity from infectious disease is discussed.

The greatest contribution made to human welfare by the science of microbiology is the germ theory of disease. This theory not only made clear the spread and occurrence of many diseases but also led the way to the understanding of one particular aspect of disease which had been noted for centuries. This was the immunity that followed after an attack and subsequent recovery from infection.

As each infectious disease is caused by a specific micro-organism, so past generations had recognised that immunity was also specific. For instance, a child is immune to mumps following an attack of that disease but is still susceptible to other diseases such as measles. This specificity or distinctness is very important when vaccination is under consideration.

The period of immunity following recovery from an infectious disease varies greatly. It may last a week or so, or it may last a lifetime. Usually, immunity gradually decreases with time so that eventually the animal may be susceptible and suffer another illness, which is often less severe than the first one.

Why not more Vaccines?

Theoretically, it should be possible to immunize against all infectious diseases. Why then are so few vaccines used?

Two main reasons are the difficulty in preparing suitable vaccines and the poor economic gain from using the vaccine.

The first point is one on which research workers are continually working, for loss from some important diseases such as staphylococcal mastitis would be greatly reduced if efficient vaccines were available.

The second reason requires explanation in more detail. For a vaccine to be of value, the cost of the vaccine and its application must be recouped in increased production by preventing wastage from lowered production and mortality. Seldom can one foresee which animals will become affected, therefore in veterinary medicine it is the rule rather than exception to vaccinate all animals in a herd or flock.

However, many diseases occur sporadically, that is, only one or two animals in a herd may become infected over a year or so. To prevent these sporadic cases, whole herd vaccinations would be necessary, possible at quite frequent intervals. In this case, the actual cost of vaccination may be greater than the loss from death or lowered production.

Vaccination of very valuable animals only may be warranted in some cases.

The cost of a vaccine includes not only the actual cost of producing the vaccine but also the research and development necessary to bring it to a state for production. There must, therefore, be a large demand before manufacturers will consider making a vaccine, for then initial developmental costs can be spread over a large number of doses. Hence no immunizing agents are available for diseases that are rare or sporadic.

Another point is that closely related pathogens may cause similar diseases, for example, Salmonella cause salmonellosis, but different

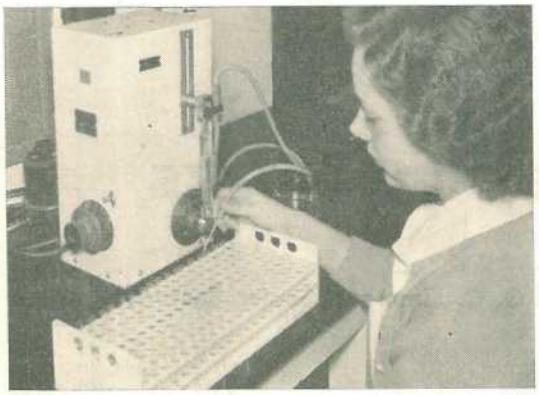


Plate 1

Pipetting Serum at the Department of Agriculture and Stock's microbiological laboratory at Yeerongpilly.

strains may differ just enough for immunity to one species not to be effective against a different species. There are now, for instance, over 300 recognised species of Salmonella. The cost of preparing a vaccine to cover a range such as this would be prohibitive. Sometimes, however, only a few strains may cause a majority of infections in an area and a vaccine can be made to include these main species. Another point to consider is whether the vaccine will be of value in future years. Some micro-organisms, particularly viruses, have the ability to change their characteristics so that immunity from their attack may be upset.

ARTIFICIAL IMMUNIZATION

Some animals have an innate resistance to infectious diseases but most animals must obtain immunity. This may be done naturally or artificially.

There are two ways in which immunity may be artificially produced—by injecting antiserum which gives what is called "passive" immunity or by immunization with a vaccine to produce what is called "active" immunity. Both antisera and vaccines are relatively fragile products made by highly skilled microbiologists. Their use should be on the advice of veterinarians who have knowledge of their value and are trained to carry out administration of them in the correct and approved manner.

Antiserum is used to give temporary protection when an animal has been exposed to infection. It is often used also to treat existing infections but as its action is against the pathogen or its products, antiserum will only be of value if it is used early in the disease before irreparable damage has been done to the animal's body tissues. This is one reason why early advice should be sought in any disease.

Antiserum is prepared by bleeding an animal recovered from a natural infection or by "actively" immunizing a normal, healthy animal artificially. When tests show that the blood serum of the immunized animal has sufficient numbers of protective substances known as antibodies, a large volume of serum is collected, sterilized, a preservative added and potency determined. It is then dispensed into suitable-size doses.

Antiserum is used in several diseases of veterinary medicine such as canine distemper. It is also important in preventing tetanus in animals accidentally wounded or following surgical technique such as castration.

Although each disease may have its own characteristic variety of immunity, there are two basic types of vaccines used. The vaccine may be living or it may be dead.

Living Immunizing Agents

Living vaccines are used particularly for virus diseases but even in this field, experience of the now famous Salk poliomyelitis vaccine has shown that *dead* viral vaccines may become more widely used.

Living vaccines may contain fully virulent organisms or may be made from strains which have been weakened so that they are no longer capable of producing severe disease.

One example of a fully virulent vaccine is contagious pustular dermatitis vaccine used to immunize sheep against scabby mouth. The application of this vaccine inside the thigh of a lamb produces an infection which does no harm but immunizes the lamb against more important infection on lips and muzzle. It is obvious that particular care should be taken in the use of such vaccines to prevent undue spread of the disease and that living vaccines of this type should only be used in areas where the disease is firmly established.

An example of an attenuated or weakened type of living vaccine is *Brucella abortus* St. 19 vaccine (Strain 19) which is so successful against contagious abortion of cattle. Here again, care should

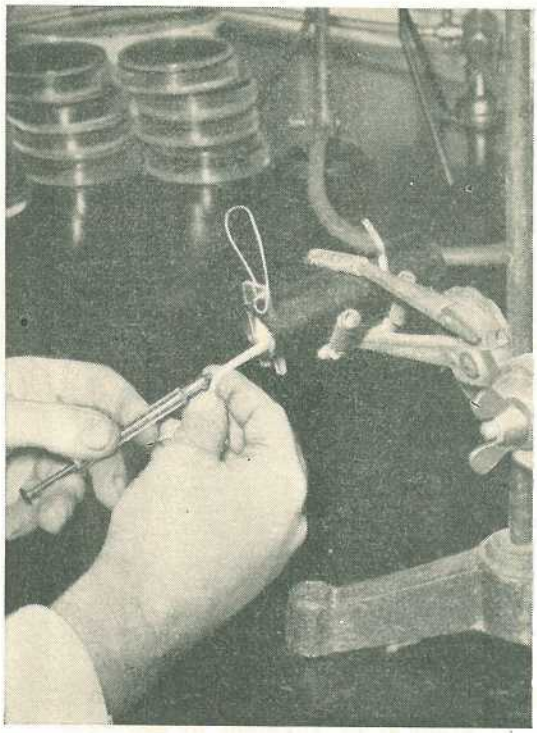


Plate 2
Carrying Out an Intravenous Injection of a Mouse.

be taken in handling the vaccine so that it is not scattered about and also to ensure that rough treatment does not kill the living organisms before use.

Dead Immunizing Agents

Dead immunizing agents are to be preferred, for there is no risk of spread of infection and a preserving agent can be added to keep the vaccine in a satisfactory condition.

The vaccine may consist of the cells of the micro-organism and its growth product or it may consist of the growth products only. Streptococcal vaccines for strangles in horses are carefully killed cultures of streptococci known to cause this disease, whereas tetanus vaccine, known as tetanus toxoid, contains the poison or toxin which is produced by the tetanus bacillus, but rendered non-toxic (not poisonous) by appropriate chemical treatment.

Step to Eradication

Immunizing agents can be used either for single animals or on a whole herd or flock basis. It is the latter use that is important in the control of infectious disease. Almost without exception, immunizing agents that are now marketed and sold as registered veterinary medicines will be effective if used correctly.

Progressive thought on animal disease must include the aim of eventual eradication. Sometimes this is impossible under existing circumstances and hygiene and immunization are the only means of control. However, with some diseases, eradication would be possible if concerted effort is made. In each eradication campaign, vaccination may play an essential part in the initial stage.

Strain 19 vaccine for contagious abortion when used for a number of years in a herd should eventually produce a resistant herd with few, if any, carriers of *Brucella abortus*. If cattle in whole areas can be immunized, eventually it may be possible to so decrease infection that vaccination may be stopped and a policy of eradication adopted. Vaccines will not eradicate a disease, but if handled intelligently may be used in the eventual realization of this most desirable goal.

Use Weedicides In Moist Soil

Pre-emergence weedicides are always more effective when applied to moist soil than when the soil is dry. In very dry weather, it's better to put off spraying until there's been some rain.

In any case, the more water you use in spraying, the better your chances of getting good weed control. PCP, CMU and similar preparations have to be taken into the soil to kill the weeds as they germinate.

To cover the soil completely, 100 gallons an acre is the minimum quantity you should put on. In fact, it's much better to put on 200 gallons for the sake of getting good penetration into the soil. When using the bigger quantity of water, the amount of weedicide need not be increased.

—J. L. GROOM, Senior Agronomist.

Eliminating Abortions And Stillbirths In Pigs

By K. B. HALE,
Veterinary Officer.

MUCH stress has been placed on pig losses occurring between birth and weaning. However, losses before or at birth are very important and can lead to great economic loss. You can eliminate this problem by attention to disease control and husbandry methods. This article deals with the major causes of abortions and stillbirths, and shows how they can be recognised and treated.

THE main causes of abortions and stillbirths in pigs are :

(1) Infectious disease.

(2) Dietary deficiences.

The most common infections causing abortions and stillbirths are:

(*a*) Swine brucellosis.

(*b*) Leptospirosis.

These two diseases are important not only in your pigs, but you can be infected with both of them yourself.

SWINE BRUCELLOSIS

Swine brucellosis was first described in Queensland in 1936 but undoubtedly was present some years before that. Since that date, the disease has been found in all the major pig raising areas of the State.

However, although the disease is State-wide, its incidence is very low. An example of this can be gathered from the fact that in 1957, of 1,743 samples submitted to the agglutination test, involving over 150 herds from all parts of Queensland, only six herds were found to be infected.

The disease in individual herds can, however, be very important, and is one which farmers cannot afford to neglect. Careful investigation has shown that it can reduce the average number of weaners to a sow to less than four piglets.

Swine brucellosis is caused by a germ *Brucella suis* related to, but distinct from, the germ *Brucella abortus* which causes contagious abortion in cattle.

Infection is contracted from contamination of food and water or by service. Since the germ is found in the urine, dung, aborted piglets, as well as membranes and discharge from infected pigs, it can be seen how easy food and water supplies can be heavily contaminated.

However, in spite of this, infection at service is the more important means of spread. The practice of lending boars or taking in sows for service cannot be too strongly condemned on these grounds alone.

Suckers can contract the disease from drinking the milk of infected sows. Most of these suckers throw off the infection but a few will harbour it.

Symptoms of Brucellosis

After infection, the germ is carried by means of the blood stream to all parts of the body, producing lesions where they become localized.

In the boar, this localization usually affects the testicles and seminal vesicles (internal sex organs). Therefore, swelling of one or both testicles in the boar leads one to suspect brucellosis. Because of the damage done to these organs, sterility of the boar may follow.

In sows, the organ where localization occurs is the uterus (womb). In pregnant sows, because each foetus is enclosed in a separate membrane all the piglets are not equally affected.

If the sow carries the piglets full time, some may be born alive and die shortly afterwards, some are fully developed and born dead while others are undeveloped. A very common feature is that new-born suckers die off in large numbers within a day or two of farrowing.

Often, however, abortion occurs early in pregnancy and since the sow eats the aborted material it may not be noticed. The only noticeable symptoms then are an unexpected return to service with or without a whitish discharge from the vagina which mats the bristles of the tail.

Briefly, therefore, symptoms suggestive of brucellosis are:—

(1) In boars—a swollen testicle.

(2) In sows—abortion, sudden return for service or birth of dead or weak piglets.

(3) Infertility which may be accompanied by a whitish discharge in the sow.

How Can You Check?

A laboratory test on blood samples helps to provide a check or diagnosis. Your veterinary officer or stock inspector can take the necessary samples quite easily.

About an ounce of blood is taken from the suspected animal. This sample is taken by firmly securing the pig with a nose rope and then puncturing the vein which runs along the undersurface of the tail. This is done with a sharp-pointed blade. The sample is allowed to clot and the serum (clear fluid) poured into a sterile bottle. This serum is forwarded to the laboratory.

Another site used is the ear vein. The pig is secured as before and the large vein at the base of the ear is severed with a sharp blade. Care must be taken that the ear is thoroughly clean and dry before this procedure, otherwise the sample may be worthless.

Bleeding from the tail is must more satisfactory once the simple technique has been mastered.

The test relies on the fact that in the serum of infected animals are substances called agglutinins, which react on a special substance made from the brucella bacteria to form clumps which collect in the bottom of the test tube. This clumping is called agglutinating and the test is known as an agglutination test.

There are some limitations to this test which may be summarized as follows:

(1) A few weeks after a pig contracts brucellosis its blood gives a positive reaction to the test. Most animals continue to give a positive reaction as long as infection remains in their bodies but in some the reaction becomes weaker (and so under suspicion) and later even negative although still infected. Sometimes, infected animals remain positive for only a short time (weeks or months).

(2) A suspicious reaction may be (*a*) an infected animal whose reaction is increasing from negative to positive, (*b*) an infected animal whose reaction is decreasing from positive to negative, (*c*) an uninfected animal.

(3) Therefore, a negative reaction in an infected herd is not definite evidence of freedom from the disease because—(*a*) the animal may only be recently infected, (*b*) the animal's reaction may be decreasing.

However, the test is very valuable in establishing infection on a herd basis. In *any* herd a positive reaction is definite evidence of infection.

Having once established the presence of the disease, this test is also useful in eradicating it. It has proved effective in this State and throughout the world.

Another way of establishing presence of the disease is to forward an aborted piglet to the laboratory for culturing the germ.

How is the Disease Controlled?

No effective treatment or vaccine for swine brucellosis has been found. However, it is possible and practical and desirable to eradicate the disease both from the economic point of view and your own health's sake.

The procedure recommended is one of quarantine, sanitation and blood testing. The procedure is outlined:

(1) Test all breeding sows and boars.

(2) Select weaners from negative sows with a good breeding history and isolate on clean ground at weaning time. Keep these in strict isolation.

(3) Sell all the old stock for slaughter as soon as marketable because of the risk of their carrying the disease to the isolated stock.

(4) Re-bleed the weaner replacements at weaning and subsequent regular intervals. Cull any reactors.

When selecting the isolation site, choose a clean pasture away from and receiving no drainage from the infected pens. If pens previously occupied by infected stock are used, clean with disinfectant (for example 5 per cent. lysol), expose to the sun and leave vacant for two months.

Protecting Brucellosis-free Herds

Introduction of infected stock must be guarded against.

1. Buy replacements from a brucellosis-tested herd.

2. Isolate and test any animal not certified.

3. Don't lend boars or take in sows for service.

This Department has a scheme whereby swine herds may be listed as brucellosis-tested herds. This scheme, begun in 1950, provides for the testing of stud herds until such times as they have passed two consecutive tests, 90 days apart, without any positive reactors being found. After this, re-tests are done annually.

Any introduced animal must come from a tested herd or the animal must be isolated and have two clean tests not less than 30 days apart before being allowed with the herd. When the herd has passed the prescribed tests, it is added to the list of tested herds and published in the *Queensland Agricultural Journal* each month. At present there are 96 such herds and the number is increasing. Much significance is placed on this certification and most agricultural shows will only accept exhibits from brucellosis-tested herds.

If you are a stud breeder, contact your local Department office with a view to having a tested herd. The work in testing is done free by Departmental officers.

LEPTOSPIROSIS

Leptospirosis is a highly infectious disease caused by a group of germs called *Leptospira*. The ones involved in abortions and stillbirths of pigs are *Leptospira Pomona* and *Leptospira hyos*. *Leptospira pomona,* by far the commoner of the two, is of special interest for Queenslanders in that it was first isolated in 1939 from samples taken from a human subject at Pomona, near Gympie. Since then it has been found to be world-wide in distribution.

In 1948, work performed by officers of the Department of Agriculture and Stock incriminated leptospirosal organisms as the cause of a severe, highly fatal, red-water of calves and isolated the germ from pigs on farms where the outbreaks in calves occurred. Circumstantial evidence pointed to leptospirosis as a potent cause of abortions and stillbirths in pigs. This led to experiments being performed at the Animal Research Institute, Yeerongpilly, in 1954. These experiments proved that leptospirosis can be a cause of abortions in swine.

Since these experiments, abortions due to leptospirosis have been seen throughout the State. It is much more common than brucellosis but because it shows no apparent symptoms in non-pregnant sows, little infertility and, except in recently infected herds, only sporadic abortions, its presence in a swine herd may go unheeded for a considerable time.

Pigs have been shown to pass large numbers of *Leptospira* in their urine for up to six months after infection. Although these are readily killed by sunlight they will survive in moist places.

Infection can therefore take place by contamination of food and water with infected urine, through infection of cuts and abrasions while wallowing, as well as by direct contact with infected urine. It may sometimes be introduced to a clean piggery by the urine of infected cattle.

Symptoms

When the disease is introduced to a previously free herd, there is little or no visible sign of ill-health. However, if pregnant sows become infected they may abort. Usually, if many pregnant sows are present an abortion "storm" is experienced (that is, nearly all the pregnant sows abort in a short period of time).

Due to the long duration of *Leptospira* in pigs, the disease could persist indefinitely in a piggery. After the initial abortion "storm," most pigs, therefore, become infected early in life and the economic loss may then be confined to sporadic abortions in sows that retain the infection into their first pregnancy.

Whether abortion or stillbirths occur depends on whether the sow is infected early or late in pregnancy. Infection during early and mid-pregnancy leads to abortion and poor survival of piglets, but in very late pregnancy little or no ill effects are seen, at least in that litter.

There is little permanent effect on subsequent breeding. Sows aborting due to leptospirosis, when re-mated, usually conceive to first service and produce normal litters.

The disease apparently has no effect on the boar.

The aborted piglets present a bloated, water-logged appearance.

Diagnosis

In diagnosis, again we rely on a blood test somewhat similar to the test for brucellosis previously mentioned. Since sows must be infected while pregnant for abortion to occur, a positive reactor may have a normal litter or if she aborts the fact that she reacts may not necessarily mean that the abortion is due to leptospirosis.

Despite this limitation, it is considered that where a high incidence of reactors is found in a herd where abortion is occurring, then leptospiral abortion can be suspected.

However, if the incidence is high, but sows recently aborting are negative, then a diagnosis of leptospiral abortion may not be justified. It is therefore necessary to correlate reactions with the histories of the individual sows.

Urine samples are another aid to diagnosing the presence of leptospirosis in the herd. Urine should be preserved with a few drops of formalin before forwarding to the laboratory, where it is examined microscopically.

Aborted foetuses and piglets are useful for confirming the diagnosis, as the germs may be found in the liver, kidney, and body fluids.

Control and Treatment

Control rests in a combination of vaccination and treatment. The precise use of these two methods will depend on the size of the herd, and the number of reactors.

In a large herd where the infection rate is high, vaccination of non-reactors, maiden sows and introduced stock, coupled with isolation of these animals from known infected stock will control the disease.

In smaller herds or herds with few reactors, vaccination of animals negative to the test and treatment of infected stock with streptomycin at the rate of 1 gram per 100 lb. will eliminate the disease.

In infected sows advanced in pregnancy, treatment may not have a great deal of effect in preventing abortion, but it will eliminate the sow as a carrier and thereby protect the rest of the herd.

Other Dangers of Leptospirosis

As stated before, this disease causes a severe fatal disease in calves. Since pigs will pass the germ in their urine for a considerable time after infection, the danger of running calves with pigs or in the drainage from pig sties cannot be over-emphasised.

Brucellosis and Leptospirosis in Man

Both these diseases are infectious to man. Brucellosis causes a chronic fever called undulant fever. Leptospirosis causes a severe, painful fever (*Leptospira pomona* was first isolated from

a dairy farmer). It is important, therefore, not only to control these diseases for economic reasons but also for your own health's sake.

NON-INFECTIOUS DISORDERS

Factors in this group which influence the number of stillbirths which occur include: Litter size, age of the sow, and dietary deficiency. Dietary deficiency includes deficiencies in calcium, protein, and vitamin A.

We will deal with these in order:

1. *Litter size*—As a general rule, there is a higher incidence of stillbirths in piglets in very large and very small litters than within the middle range (4 to 12).

2. *Age of the Sow*—Stillbirths increase in proportion with increasing age, sows over three years of age may have up to 14 per cent. stillborn piglets.

To overcome this, cull old sows.

3. *Calcium Deficiency*—This increases the percentage of stillbirths but before the percentage reaches 50 per cent. obvious signs of calcium deficiency are seen in the sow.

To overcome this, add bonemeal to the ration.

4. *Protein Deficiency*—Protein deficiency has more effect on fertility than on stillbirths. The symptoms seen are those of malnutrition. The sows are poor and those piglets born are very small and some may be mummified.

Correct by balancing the ration to provide protein with meatmeal, and so on.

5. *Vitamin A Deficiency*—The results of a lack of vitamin A are (1) abortions due to degeneration of the attachment of the piglets in the uterus and (2) where abortion does not occur, piglets are born weak and deformed, the most common deformity being abnormal eyes and deformed legs.

The affected sows will show signs of vitamin A deficiency, namely, cloudiness of the eye, thickening eyelids and loss of hair.

Green feeds are a rich source of vitamin A. Therefore, good grazing will overcome this disorder. Failing this, feed some proprietary vitamin A supplement at the correct rate.

Department Will Help

Brucellosis, leptospirosis and several dietary disorders can cause abortions and stillbirths in pigs.

All these can be overcome. In the case of brucellosis, by disposal of positive reactors to the blood test, leptospirosis by vaccination and treatment, dietary disorders by correct feeding.

Officers of the Department of Agriculture and Stock will help you should abortions and stillbirths hit your herd.

Erosion Problem With Contour Banks

Over 2,000 Queensland farmers can listen to the wet season's downpours drumming on their roofs without fear that their land will be washed away. These men have taken the first steps in combating erosion by providing grassed waterways for the safe disposal of runoff water from their properties and have constructed contour banks to intercept runoff on their cultivated lands. Recently, when 11 inches of rain fell in 12 hours near Jandowae, soil was lost to plough depth on many fallowed fields not protected by contour banks. Adjacent contoured fields stood the test and little or no damage was recorded on these properties. Although contour banks aren't the whole answer to the erosion problem they do prevent the serious scouring so often seen on unprotected sloping cultivated lands during the wet season. It isn't too late to do something about protecting your fields so contact your nearest soil conservationist now.

—J. E. LADEWIG, Chief Soil Conservationist.

Desucker Your Bananas One Of These Ways

By F. W. BERRILL, Horticulturist.

Several methods of desuckering bananas are used in Queensland and others are practised in various overseas countries. Recent investigations at the Maroochy Experiment Station indicate that kerosene treatment of the cut sucker or, alternatively, removal of the growing point with a special gouge are both satisfactory.

Many years ago, it was generally accepted that the banana required a highly fertile soil with good moisture-holding capacity. These conditions were usually satisfied by plantations established on newly cleared scrub land, preferably on slopes where there was little danger from frost. As a general rule, fertilizer was not applied and all suckers were permitted to develop. This meant that frequently three or more good bunches would be cut from the one stool over a comparatively short period.

At the present time, however, most commercial plantations are on replant land or on new land of relatively low fertility. Usually, the soil is naturally deficient in plant foods and has only a limited capacity for holding moisture. Except in areas where irrigation facilities are available, something must be done to balance production per acre with soil reserves of nutrients and moisture; otherwise the bunches must necessarily be reduced in size. In practice, this is achieved by reducing the number of plants within each stool to a workable level—in other words, by desuckering.

What is Desuckering?

Desuckering is simply the removal of surplus suckers from a stool or their destruction. The method which is adopted should be relatively simple. At the same time it should be sufficiently effective to ensure that the sucker destroyed or removed is not likely to shoot again.

Probably no method of desuckering is entirely satisfactory from the point of view of complete eradication, coupled with simplicity and speed. Nevertheless, kerosene treatment and gouging have proved outstanding in the Maroochy trial.

With Kerosene

In the kerosene method of desuckering, the sucker is cut off close to ground level with a sharp knife and the centre of the remaining basal portion is gouged out to a depth of about half an inch with the point of a knife. A small quantity of lighting kerosene (about half a teaspoonful) is then poured into the central cavity.

The kerosene may be carried in almost any type of container. One is a bottle with a cork through which passes a short length of copper or glass tubing; the delivery of the liquid can be fairly accurately controlled with this device. Another is a pressure-type oil can.

This method of desuckering is very effective under most conditions. The number of suckers which shoot again after treatment is very low, provided you don't attempt to kill small "peepers" which are only one or two inches above ground level. With these, it is virtually impossible to gouge out the centre and, in any case, the growing point is usually well below ground level so that the kerosene may not reach it. A poor kill often results.

When using kerosene, avoid treating suckers which arise on the corm above ground level and have no root system. These suckers are entirely dependent on the parent plant and the kerosene may move back into the sap stream and injure it. The best method of handling these suckers is to cut them off level with the parent corm.

It is sometimes claimed that, during periods of active growth, the flow of sap at the cut

Plate 1

Mons Mari Banana. Typical bunch on a well-managed plantation where desuckering is practised.

surface is so great that the applied kerosene floats off, spills over the sides of the sucker butt and burns the young roots. However, a considerable volume of kerosene must be applied before any root damage can occur, because the soil in close contact with the sucker absorbs the liquid as fast as it spills over. In any case, even in a vigorously growing sucker, there is always a delay of a few seconds after cutting before the sap flows in sufficient quantity to fill the central cavity. If the kerosene is applied quickly, therefore, it has every chance of coming into direct contact with the plant tissues. It is advisable, of course, to increase the dosage slightly under these conditions.

Power kerosene is sometimes used as a substitute for lighting kerosene. However, the change does not increase the efficiency of the treatment and the power kerosene is somewhat more unpleasant to handle.

Plate 2

Banana Plants with Young Suckers. Where desuckering is practised, suckers should never reach a height of more than 3 ft. Note bottle with kerosene used by operator (foreground).

Another variation from standard practice is the use of an injector to place the lighting kerosene at the centre of the sucker without cutting off the head of the plant. This method appears to be equally effective. It is, moreover, much faster and less laborious. However, the injection method tends to complicate the situation when followers are being set for the next crop. Since injected suckers show no obvious symptoms of treatment for a few days, it is very easy to double-treat some and miss others or to inject suckers which were to be retained as followers.

With the Gouge

Many desuckering methods involving cutting or gouging have been evolved in various overseas countries, and some are quite widely used in Australia. Probably the most common is the use of the desuckering gouge.

This tool consists essentially of a narrow, curved "blade" about 15 in. long and 1½ to 2 in. wide, tapering to a point about half an inch across, and sharpened on both edges. It is generally fitted with a handle of any convenient shape.

The gouge is inserted into the sucker in an almost vertical position, and by giving one complete turn the growing point of the sucker is removed leaving an inverted cone-shaped cavity.

This method of desuckering was widely used many years ago. However, the exposed corm tissue provides a very good breeding ground for the banana weevil borer and most growers prefer to use the kerosene treatment. With the good control of weevil borer now obtained with insecticides, interest in the gouging method of desuckering has increased, but it is probably little faster than the kerosene method and the amount of regrowth is greater. This is particularly so in the case of very small suckers.

Other Methods

Another method of removing suckers involves the use of a desuckering bar. This is essentially a small crowbar with an enlarged blade. It is a satisfactory tool for removing suckers required as planting material but owing to the inevitable root damage to the parent stool, the use of a bar cannot be advocated in commercial plantations. Desuckering by means of the mattock has the same defect.

In some overseas countries, the suckers are cut at ground level without any further treatment. This procedure, though very fast and simple, is complicated by very considerable regrowth and can hardly be recommended in commercial plantations where efficient use of labour is an important consideration.

You will realise that the choice of a desuckering method lies mainly between one of the kerosene treatments and the desuckering gouge. The final decision between these two will be influenced by the particular plantation and the relative skill of the grower himself in applying either method.

Plate 3

Disorder in the Plantation. A legacy of erratic and inefficient desuckering. Plants are out of position; they lack vigour and are unlikely to produce good bunches.

Queensland Fauna Sanctuaries

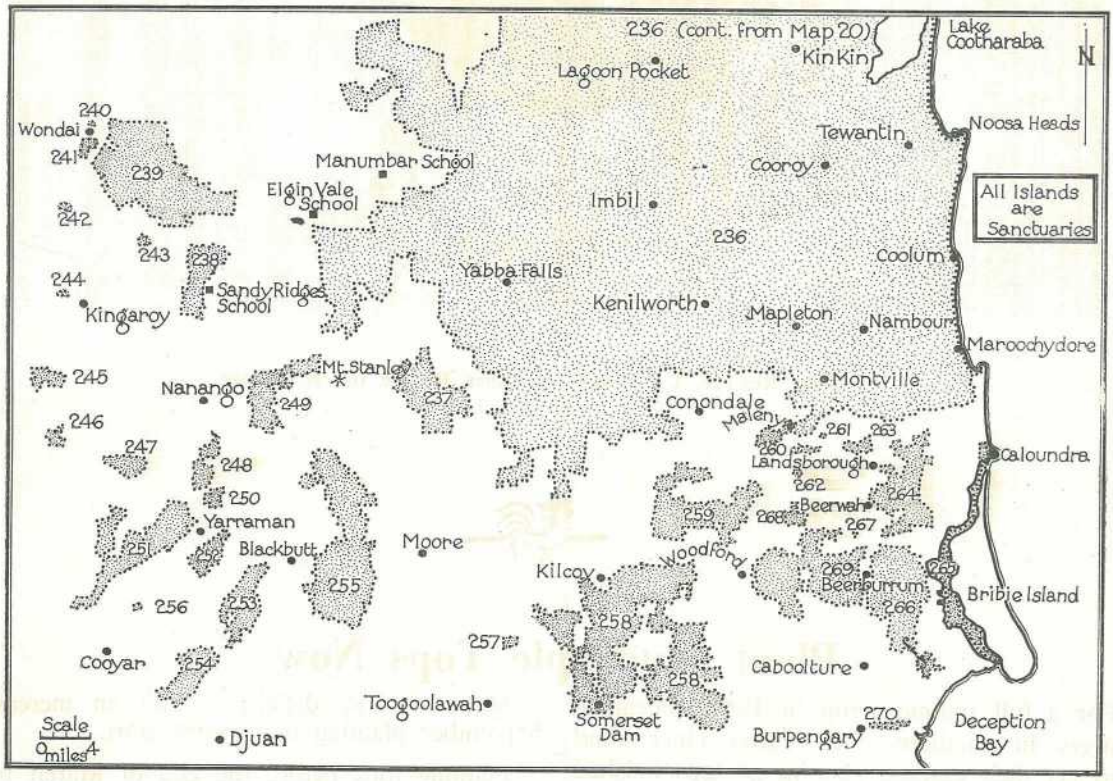
By C. ROFF, Fauna Officer.

The following is an index of the sanctuaries outlined in Map 21.

SANCTUARY INDEX

Index No.	Sanctuary	Area in Acres
237	State Forest Reserve 343, Parish of Monsildale, via Mount Stanley	16,200
238	Area on left bank of Barker Creek via Kingaroy, Broadwater Camping and Water Reserve 354, via Kingaroy	8,100
239	"Wattle Camp" via Wondai	3,987
	Property at Johnstown, via Wondai	1,351
	State Forest Reserve 12, Parishes of Cherbourg and Charlestown, via Kingaroy	31,219
	Property at Johnstown, via Wondai	1,286
240	Property at Wondai	71
241	State Forest Reserve 535, Parish of McEuen, Wondai	1,020
242	Camping and Water Reserve 15, Wooroolin	326
243	State Forest Reserve 536, Parish of Charlestown, via Kingaroy	657
244	Mount Wooroolin Parks Reserve, Kingaroy	158
245	Stuart River, via Boonenne	2,252
246	State Forest Reserve 117, Parish of Kunioon, via Goodger	1,128
247	State Forest Reserve 118, Parish of Tarong, via Brooklands	3,050
248	State Forest Reserves 465, 466 and part of 289, Parishes of Cooyar, Avoca and Yarraman	1,820
249	State Forest Reserves 149, 299 and 456, Parishes of Avoca and Coolabunia, via Nanango	7,830
250	State Forest Reserve 316, Parish of Cooyar, via Yarraman	900
251	State Forest Reserves 120 and 289, Parishes of Tarong, Taromeo, Cooyar and Neumana, via Yarraman	22,860
252	State Forest Reserves 140, 379 and 470, Parish of Cooyar, via Yarraman	4,422
253	State Forest Reserve 257, Parishes of Cooyar and Emu Creek, via Cooyar	8,800
254	State Forest Reserve 258, Parishes of Djuan, Cooyar and Emu Creek, via Cooyar	8,340
255	State Forest Reserves 52, 283, 452, 480, 485 and 549, Parishes of Colinton, Emu Creek and Taromeo, via Blackbutt	5,311
256	"The Palms," National Park Reserve 586, Parish of Cooyar, via Cooyar	30
257	Deer Reserve, Cressbrook (Balance in Index No. 258)	737
258	Deer Reserve, Cressbrook	12,200
	Stanley River Catchment, Somerset	40,320
	"Koolawan," Mount Byron, via Esk	560
	Neurum Creek Reserve, Neurum	87
	State Forest Reserves 458, 637, 893, 1,152, Parishes of Byron, Neara, Kilcoy and Cressbrook, via Somerset	22,570
259	State Forest Reserves 322 and 370, Parishes of Durundur, Kilcoy and Conondale, via Woodford	18,660
260	Timber Reserve 311, Parish of Durundur, via Crohamhurst	1,000
261	"High Tor," Maleny	83
262	State Forest Reserve 753, Parish of Durundur, via Crohamhurst	124
263	State Forest Reserve 291, Parish of Bribie, via Landsborough	880
	National Park Reserve 295, Parish of Bribie, via Landsborough	342
264	State Forest Reserves 108, 160, 442, 561 and 611, Parishes of Bribie and Beerwah, via Beerwah	13,395
265	Township of Caloundra	1,280
	Pumice Stone Channel, near Bribie Island	15,692

Index No.	Sanctuary	Area in Acres
266	State Forest Reserves 611, 674 and 700, Parishes of Beerwah, Canning and Toorbul, via Beerburrum	27,974
267	" Ngungun," National Park Reserve 127, Parish of Beerwah, via Glasshouse Mountains	120
268	State Forest Reserve 313, Parish of Durundur, via Peachester	1,790
269	" Tibrogargan," National Park Reserve 233, Parish of Beerwah, via Glasshouse Mountains	720
	" Coonowrin," National Park Reserve 749, Parish of Beerwah, via Glasshouse Mountains	280
	" Beerwah," National Park Reserve 750, Parish of Beerwah, via Glasshouse Mountains	320
	State Forest Reserves 60, 173, 589, 638, 666, 699, Parishes of Beerwah, Durundur, Canning and Waraba, via Beerburrum, Woodford and D' Aguilar	25,901
270	Burpengary Creek Picnic Area, Burpengary	15
	Property at Burpengary	392



Map 21

Map Showing Sanctuaries in Part of Fauna District No. 1. The sanctuary boundaries (as at December 31, 1957) are delineated by dotted lines enclosing the stippled areas.

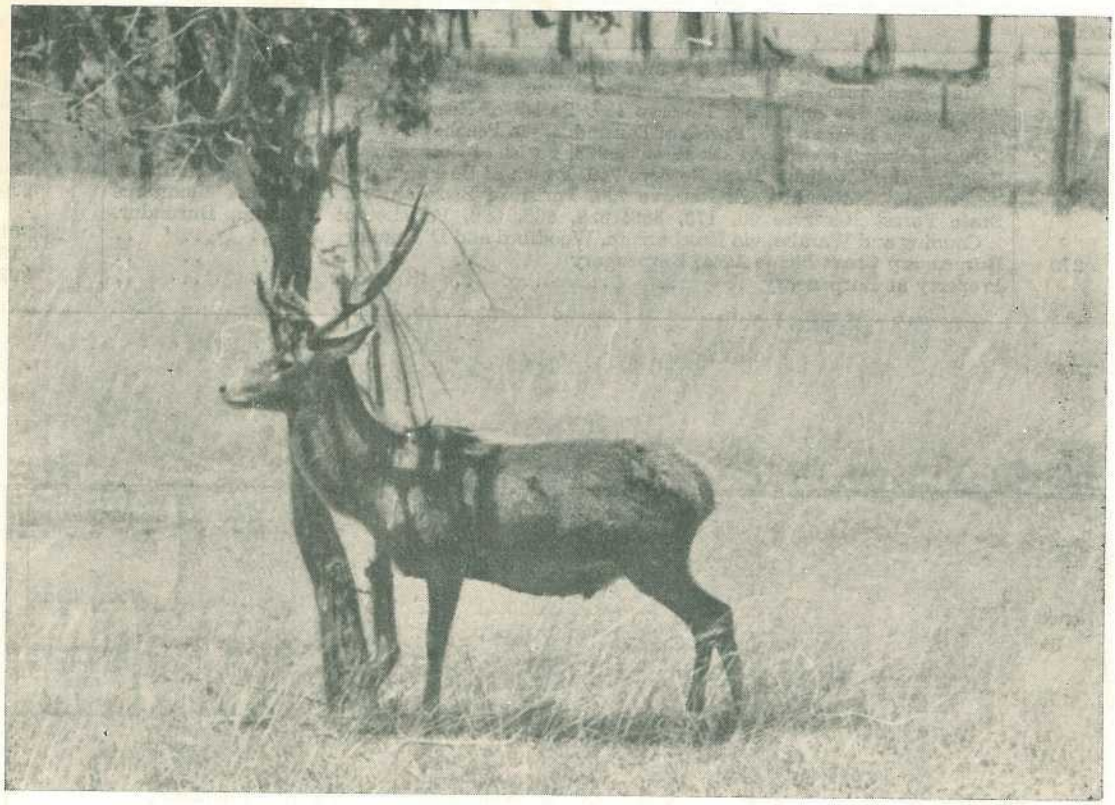


Plate 9
The Deer Reserve, Cressbrook, Provides Refuge for Red Deer
(*Cervus elephas* L.)

Plant Pineapple Tops Now

For a full summer crop in 1962, pineapple growers in southern and central Queensland must get their autumn planting of tops finished by the end of March this year. Late planting reduces yields and lowers fruit quality.

You risk an off-schedule crop if planting is put off until April. If, by the end of March, you haven't filled the area assigned to an autumn planting of tops, round off the block there and then.

Make up any deficiency with an increased September planting of forward slips.

Planting tops before the end of March presents some problems. This is partly because the work comes at a time when the grower is already busy, and partly because the wet season makes it difficult to get the land in the right condition for planting. But the job can be done if you make the most of the dry spells between the rains.

—*K. KING, Senior Horticulture Adviser.*

Laying A Concrete Floor For Domestic Use

By H. WOODINGS, Silo Construction Officer.

These notes explain the construction of concrete floors of bathrooms, laundries, water closets, small verandas, and so on.

THE most suitable foundation for concrete slab floors is sand, rock, or soil containing a high percentage of sand and silt, but soils with a clay content not exceeding 30 per cent. should be satisfactory. Unsuitable soil types are those which contain a high percentage of clay.

Flat or nearly flat sites are most suitable. Where it is necessary to excavate, the filling should nowhere exceed 9 in. in thickness. Low-lying sites, where the water is present in the ground, are unsatisfactory.

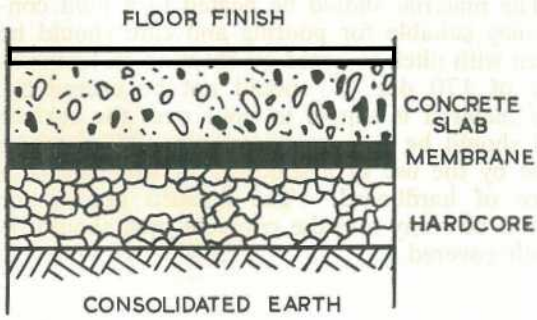


Plate 1

Membrane Placed on Top of the Hardcore Fill or the Consolidated Earth Under the Structural Slab.

Preparing the Site

The site should be cleared of the immediate top soil and vegetable matter which is likely to attract vermin and white ants.

Filling should always be clean, hard material. Clay filling should be avoided because of its liability to movement. Where filling over 3 in. in depth is necessary, the material should be consolidated in two or three separate layers none of which is over 3 in. thick.

For structual reasons, it is advisable that no particular depressions should be left in the finished ground surface.

Damp Proofing

Every possible effort should be made to keep the upper surface of the finished slab continually dry.

Moisture may rise in the concrete slabs in one or more of three ways—

(1) Simple water pressure.
(2) Because of capillary action.
(3) In the form of water vapour.

The capillary rise of moisture may be simply avoided by the placing of a layer of hardcore (stone or similar material) beneath the concrete

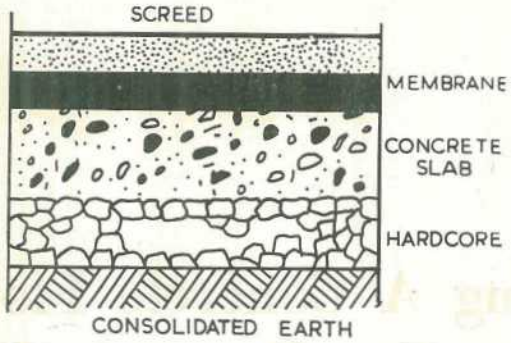


Plate 2

Membrane Placed on Top of the Structural Slab and Under a Concrete or Mortar Screed.

slab. Where hardcore is used, it should be clean and of the one grading about $\frac{3}{4}$ in. and a minimum thickness of 4 in. This hardcore should never be covered with sand or earth.

Where a membrane is used to prevent the rise of moisture it may be placed as in Plate 1 or Plate 2.

The depth of the hardcore should be a minimum of 4 in. and the depth of the concrete slab 3 in.

Screed

Irrespective of the type of finish for the slab, it is usually necessary to provide a screed of cement mortar or concrete to level and smooth the surface. The minimum thickness of the screed should be—

1. On a bituminous or asphalt membrane 2 in.
2. As a finish applied to the concrete slab before this has hardened .. $\frac{3}{4}$ in.
3. As a finish applied to freshly hardened concrete .. .. 1 in.
4. As a finish applied to old concrete .. $1\frac{1}{2}$ in.

Preparing for the Screed

On a bituminous surface, no particular preparation is necessary only a thorough sweeping of the surface of the membrane. Another method is a sprinkling of sand over the membrane surface to assist adhesion of the screed.

Where the screed is placed immediately after the base slab is laid and before it has hardened, the slab surface should be cleaned of scum and foreign matter.

Once the concrete has hardened, it is necessary to clean it and expose a fresh surface. This may be done by roughening with a pick.

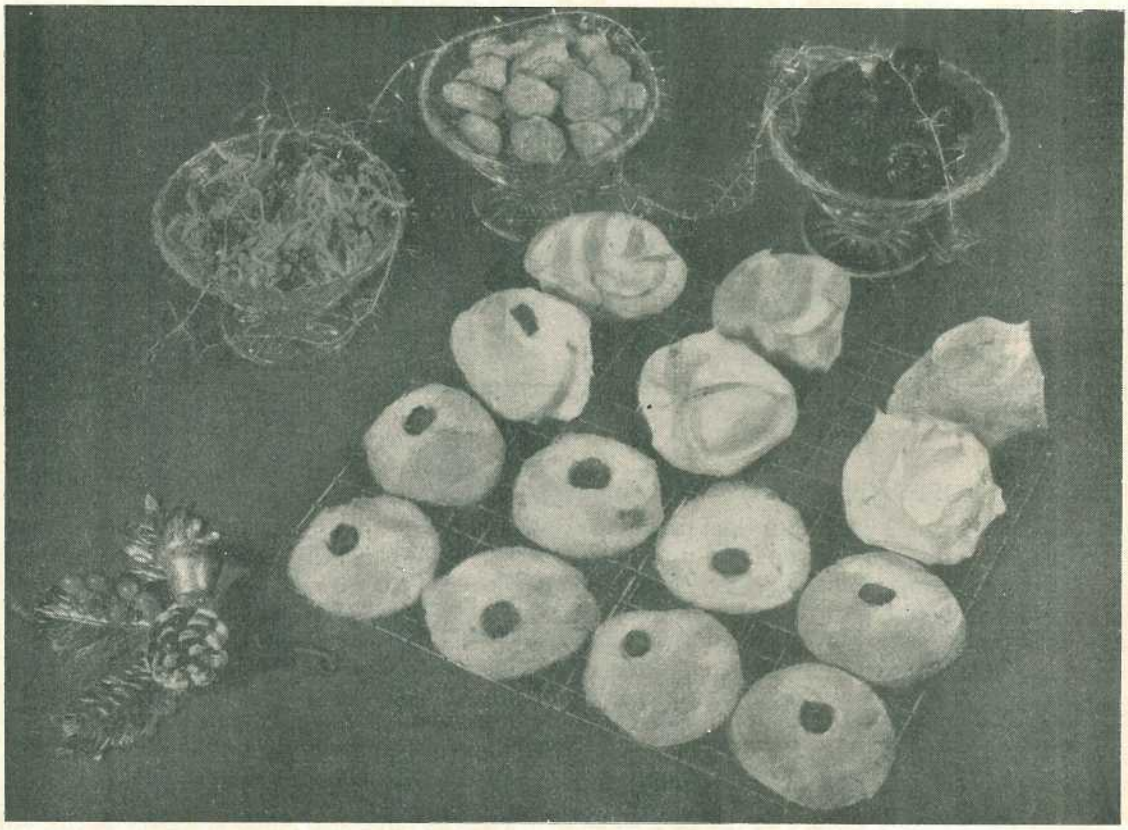
After the surface has been brushed, it should be flooded with water and kept wet for about 24 hours. Immediately before screeding, all free water should be mopped up and a grout of neat cement, or a mortar consisting of one part cement to one part sand, washed over the surface. The thickness of the grout or mortar should not exceed $\frac{1}{16}$ in. and the screed must be applied before the grout or mortar has dried.

Applying Hot Pitch or Bitumen

Dust is usually the main cause of bitumen not covering well. Thorough brushing and the application of a cold brushed primer will, however, bring dry surfaces to a proper condition to receive the hot layer. Both bitumen and pitch can tolerate slight dampness of the surface to which they are applied and, if they are to be used as sandwich layers in the depth of a structural floor, the base concrete layer should, in dry weather, be ready to receive them within about three days after placing.

The coverage on a primed and smooth surface should be 6–7 gal. for every 100 sq. ft. of floor area.

The material should be heated to a fluid consistency suitable for pouring and care should be taken with pitch to avoid overheating (a temperature of 170 deg. C. should not be exceeded). The material is simple to pour over the surface and should be encouraged to run. This can be done by the use of a squeegee or the edge of a piece of hardboard. The finished appearance should be shiny and the concrete area should be totally covered.



Extras For The Holiday Season

From the JUDITH MAY KITCHEN, directed by RUBY BORROWDALE, for the Butter Marketing Board.

EVERY wise housewife knows that the Christmas dinner is the Meal of the Year but she also knows that the holiday season calls for any number of snacks, suppers and picnic lunches.

Visitors must be catered for, the late supper is an essential part of holiday catering and the picnic baskets must be well supplied with savouries, cakes, cookies and pies.

So start your cooking early and have handy a good supply of savoury shells to help with the quick snack for visiting friends and relations. Biscuits, small cakes and tarts can be stored for instant service whilst puddings can be held ready for heating when the moment arrives.

This way you will find and enjoy a more leisurely approach to holiday time with all its joy and pleasure. Here are a few tested recipes that may help to inspire the country cook :

SNOW-CAPPED PRUNES

Forty dessert prunes, 12 glace or maraschino cherries (well-drained), ½ cup chopped walnuts, 2 egg whites, ⅛ teaspoon salt, ½ cup castor sugar and ½ teaspoon vanilla. Rinse the prunes and

place in a colander or steamer over boiling water. Cover and steam 10 min. Cool then slit and remove stones. Chop prunes and cherries roughly; add the nuts. With damp fingers, shape this fruit-nut mixture into 24 small balls. Beat egg whites and salt with rotary beater until fluffy and thick but not dry. Add sugar slowly and continue beating until a very thick mixture is formed. Add vanilla. Coat each fruit ball completely with meringue. Lift with fork on to buttered scone tray. Garnish each with half a cherry if you wish. Bake in a very slow oven (275 deg.F.) from 40 to 60 min. until firm and dry but not coloured. Cool on the tray and remove with a spatula.

MERINGUE PUFFS (illustrated)

Beat the whites of 2 eggs until thick and fluffy adding a pinch of cream of tartar and a pinch of salt during the beating. Beat until very thick then fold in one-third cup pure icing sugar. Have ready as great a variety of chopped fruits and nuts as you can manage—pitted dates, pieces of preserved ginger, quarters of dried figs, pieces of crystallised pineapple, halves of walnuts and whole blanched almonds. With a fork, dip in and coat each piece of fruit and nut completely with meringue and place on trays, lined with buttered parchment paper or aluminium foil. Bake in a slow-moderate oven (325 deg.F.) about 40 min. or until completely dried and a pale biscuit colour. These dainty, little home-made sweets are perfect for serving with after-dinner coffee.

DROP BUTTER COOKIES (illustrated)

Four ounzes butter, 1 cup castor sugar, yolks 3 eggs, ½ teaspoon vanilla essence, 3 drops lemon essence, ¼ cup milk or orange juice, 2 cups self-raising flour, ¼ teaspoon salt. Sift flour and salt. Cream butter; add sugar, egg yolks and flavourings. Beat until light and fluffy. Add some of the flour, then the liquid and blend evenly. Gradually blend in remaining flour. Drop batter by the teaspoonful, about 2in. apart on buttered baking trays. Decorate if you wish with nuts, fruits or coconut. Bake in moderate oven (375 deg.F.) about 15 min. or until golden coloured. Cool on cake racks. Makes about 4 dozen.

REAL CHOCOLATE COOKIES

Follow the drop butter cookies recipe and add 1 packet of semisweet chocolate bits to the sifted flour and salt.

ALMOND PASTRY (for little fruit pies or tarts)

Five ounces butter, 2 cups plain flour, ½ teaspoon salt, ½ cup blanched and very finely chopped almonds, 1 tablespoon sugar and from 3 to 4 tablespoons milk. Dissolve the sugar in the milk. Sift flour and salt into bowl. Add the butter and rub it in finely. Stir in the almonds. Moisten with just enough of the sugar and milk to make a very firm dough. Roll to a little less than ⅛in. in thickness and cut into circles with fluted cutters. Cut some 4 in. circles and some 2 to 3 in. Prick surfaces. Fit the smaller circles over the backs of small patty pans and the larger ones over inverted pie pans. Bake in hot oven (400 deg.F) about 10 minutes, or until crisp and golden. Remove carefully from pans and when cold store in biscuit tins. These can be filled with fresh or canned fruits, ice cream and whipped cream. The smaller ones with lemon cheese.

PEACH ALMOND TARTS

Use the large size Almond Pastry Shells. Melt ¾ cup tart red jelly (apple, quince or red currant) over hot water. Put 1 tablespoon of the jelly into each tart shell. Top with half a fresh or canned peach, cut side down. Pour over the remaining jelly and chill. At serving time, top with sweetened whipped cream. Garnish with toasted and blanched almond halves.

TINTED COCONUT

For a special cake or creamy dessert topping you may want to tint dessicated coconut a pale pastel colour. Just place coconut in a glass jar (do not more than half fill the jar). Sprinkle a few drops of diluted food (icing) colouring over the coconut. Cover the jar with lid and shake vigorously until the coconut is evenly coloured.

BOILED RAISIN CAKE

One cup seeded raisins, 2 cups water, 1 cup sugar, 4 oz. (½ cup) butter, 1 beaten egg, ¼ teaspoon salt, 1 teaspoon ground cloves, 1 teaspoon baking soda, ½ teaspoon vanilla, 2 cups

plain flour, ½ teaspoon baking powder. Place raisins and water in saucepan and boil until 1 cup juice remains—strain juice off raisins, cool then add the soda. Cream butter and sugar, add beaten egg. Sift flour, salt, spice and baking powder. Mix dry ingredients and raisin juice alternately into creamed mixture. Beat smooth. Add raisins. Bake in a paper-lined 7 or 8 in. fruit cake pan in moderate oven (350 deg.F.) about 45 min. Cool in the pan on a rack.

TRIFLE

Any kind of plain butter sponge layers cut into strips and spread generously with jam (strawberry or raspberry). Place one quarter of cake and jam strips criss-cross in glass serving dish and cover completely with chilled custard. The cake can be sprinkled lightly with brandy or sweet sherry if you wish. Repeat layers until cake and custard are used, ending with custard. Cover and chill overnight, or at least 8 hours before serving. Top with whipped cream and sprinkle with chopped nuts. Serve with squares of red and green jelly. Set jellies in square pans and then cut with knife dipped in hot water.

Note: You will need 2 pints of custard sauce for a large trifle.

A few shillings may save you pounds

Read the QUEENSLAND AGRICULTURAL JOURNAL

It's written for Queenslanders

Subscription for Queensland Producers, 5s. a year (10s. for two years, etc.)
To receive the Journal regularly, fill in below and send, with subscription, to:
The Director-General, Department of Agriculture and Stock, Brisbane.

NAME.....
Surname first in BLOCK LETTERS. State whether Mr., Mrs., or Miss and if Senior or Junior. Please give full Christian Names.

ADDRESS.....

.....

OCCUPATION.....

SIGNATURE.....

I enclose.....being the subscription

for.....years.

N.B. Indicate whether this is a new subscription or a renewal. (Cross out the one which does not apply.)

RENEWAL

NEW SUBSCRIBER

FOR OFFICIAL USE ONLY

Pass this on to a friend.

bucket and bail

What a Sire Survey Is.—When a dairy sire is surveyed, a comparison is made of the production records of all the bull's daughters in the herd with those of the other animals in the same herd. The yields used for the comparison must have been produced in the same season.

The results of the comparison indicate whether or not the bull's daughters are yielding more or less than the other cows in the herd under the same conditions.

As it would be unfair to compare the yields of 2-year-old animals with that of five-year-olds, it is necessary to bring the records to a common level. The usual practice is to bring all production to maturity equivalent. That is, to estimate from a younger animal's yield how much she will produce when she is a mature cow. For this purpose, maturity equivalent or age correction factors are used. To obtain factors suitable for Queensland conditions, tens of thousands of production records have been used and average factors compiled.

Under this system, a reliable estimation of a bull's value can be obtained, provided all cows in the herd are tested and all the bull's daughters in milk on the farm are also recorded.

Anyone who is interested in the performances of his bull should apply for a survey. This can be done through his local Dairy Office or by writing to the Department of Agriculture and Stock, Brisbane.

—S. E. PEGG,
Chief Adviser, Herd Recording Section.

Trouble-free Milk Refrigeration.—A check on the mechanical efficiency of your dairy refrigerator can save you pounds.

Trouble-free refrigeration means that no milk is rejected at the factory through faulty cooling. And the difference between milk and second grade cream is 17s. 6d. for every 10 gal. of 4 per cent. butterfat milk rejected.

A dairy refrigerator is such a reliable piece of equipment that it's easy to take it for granted. But to give efficient service it must be properly cared for. Have it overhauled by a qualified refrigeration mechanic. He will check the gas supply and top it up if necessary. He'll also look for oil and gas leaks and loose or worn belts, and will check the running conditions generally. Don't wait for trouble; get in first by having a mechanic check your refrigerator.

—J. ARMITT, Dairy Officer.

Boiling Water Kills Dairy Bacteria.—Boiling water is the answer to thermoduric, or heat-resisting, bacteria in milk. These bacteria, which can withstand the pasteurising temperature, impair the keeping quality of milk.

But boiling water will kill thermoduric bacteria. In combatting heat-resisting bacteria, your first step is to make sure that the water in your dairy boiler is actually boiling when you go to sterilize your equipment. Then your care is to see that this heat is not lost before the near-boiling water can do its job.

If you use a set-in copper, don't ladle out the boiling water with a dipper as this loses heat. Dip out the boiling water in bulk. Where an electric boiler is used, hold the container as close to the tap as possible. If you have a steam sterilizer, fit a silencer to the steam hose so you can be sure the water actually boils.

—R. I. HUNTER, Dairy Officer.

Queen's Dressmaker Prefers Wool To Any Other Fabric

By FREDA IRVING

"I PREFER wool to any other fabric," declared the Queen's dressmaker, Hardy Amies, during his recent visit to Australia. And this despite the fact that he was travelling on a British cotton promotions tour!

This tall, suave member of London's big ten in haute coutoure, does not base his predeliction for wool on any sentimental bonds-of-empire feeling, nor with any patriotic eye to the economics of any particular member of the British Commonwealth of Nations, but on sheer experienced appreciation of the worth of wool, to a designer in his class.

Proving his appreciation of this worth, Mr. Amies estimates that he uses pure wool for at least 75 per cent. of his coutoure work which travels throughout the world.

Mostly, he uses English woven materials, which he regards as tops as regards quality, but sometimes he uses French woven woollens . . . "occasionally they better the English clothes when it comes to design," he explained.

Australian Fabrics

So far, he has not used any Australian woven fabrics, but now that he has seen some, is definitely interested to do so.

Stating his reasons for considering wool the best of all possible fabrics, this hard-headed business man said:

"Wool is admirable when it as light a weight as 8 or 9 ounces, and adventurously interesting when it is 24 ounces."

"I know of no material which lends itself to surface treatment so well . . . it can be smooth as a baby and as fluffy as a blanket, which helps make for infinite variety in its handling."

"I like its feeling of being alive, and I like, too, the way it responds as well to the iron as it does to the scissors."

"Apart from these obvious facts about wool, which should commend it to any designer, there are my own personal reasons for my preference for pure woollen fabrics," continued Mr. Amies.

Best for Day Clothes

"I like best to make day clothes, and for these, wool is undoubtedly the best fabric in the world. Then, on the whole, I prefer muted colours to very bright ones, and wool takes this type of colouring perfectly. Also, I like subtle mixtures of colours such as you get only in woollen check weaves. Then too, I like plain fabrics to show subtlety of weaves, and here again you get these better in wool than in anything else."

"Do I ever use synthetic fabrics? . . . Not if I can help it. They're all right in their place I suppose, but frankly I can't see where it is."

"No, no one should ever buy synthetics if they can help it," he declared emphatically.

"If someone came in and said I'll give you £1,000 to make me a nylon frock, I suppose I'd make it, human nature being what it is. But I'd certainly never use a synthetic of my own free will," he added firmly.

All this from a man who's quite obviously motivated by no particular leaning to the welfare of the woollen industry, but simply by the hard business core fact that, to use his own words:—

"Wool is good, wool is right, wool is the best cloth I know, so I use it. I couldn't care less if it came from Timbuctoo, the Arctic or Australia. It suits my needs and it suits my suits."

And if anyone should know his fabrics, Mr. Hardy Amies should.

Today he has one of the top London haute coutoure, retail-off-the-peg and wholesale fashion businesses in London, plus representatives in New York, Montreal and Toronto.

Topping off his panegyric on the wonders of wool, the good-looking and slightly-superciliious-on-any-subject-but-wool-Mr. Amies, told a neat story in its further favour . . .

It is about a salesgirl in the Nieman Marcus mighty store in America, who was serving an elderly and obviously very wealthy customer. She plied her with nylon, she plied her with rayon, she plied her with every synthetic under the sun, until, in extreme exasperation, the elderly lady stated her case:

"Young woman, I live in an air-conditioned house. I travel only in my air-conditioned Cadillac. I shop only in air-conditioned stores. Stop showing me this rubbish. What I want is WOOL."

Stop and Listen

"Have you heard the one about the man who . . . ." will guarantee you a listening audience amongst men. "What I think about the price of wheat is . . . ." will start a number of small dynamos operating in the minds of the audience. They may miss all that is said afterwards in an effort to prepare their own contributions. As soon as you've stopped talking you're left standing. Obviously no one appreciated your point of view—in fact, although they'd heard they hadn't listened.

Not everybody expresses himself clearly. If you are trying hard to get the gist of what's being said, you will ask questions to be sure you *understand* what the other person is saying. Then is the time to debate the issue.

How many times do we interrupt the other fellow with our own views before being clear what he was saying?

Do we try to analyse what is being said to see whether it is fact or merely opinion? We must listen in order to see if the speaker substantiates what he says—proves he is talking facts.

Put These In Your Pipe And Smoke Them!

Here are some suggestions to improve your listening:

(1) Make a decision to increase your skill—and it is a skill—as a listener.

It seems almost impossible to keep quiet sometimes when the other fellow is obviously talking tripe (you think!).

(2) Concentrate on what he is trying to convey—not your opinion of it.

(3) Assume the other fellow is intelligent and has thought about the subject. Seek to prove this by questioning, NOT to prove he is an idiot. Argument frequently develops through lack of sympathy.

(4) Know your own prejudices—don't be fooled by them; others may not be. If you are going to disagree, it's wise to have a good basis for your opinion. Unless you listen to what the other fellow says you may miss the big weakness in your own case.

Brain v. Mouth

Listening is made more difficult by the fact that the brain can work faster than the other fellow's mouth. Day-dreaming the time in between requires the least concentration; preparing the next barrage seems worthwhile as it will inflate our ego a bit more; but listening intently to someone else in order to understand him requires much more concentration.

It has its rewards—try it!

—J. R. M. WOLFE,
Extension Training and Research Officer.

orchard and garden

When to Fertilize Bananas.—The number of fruit in a banana bunch is decided long before the bunch emerges and is visible. Flowers are initiated about 4 months after planting and are laid down in the corm below ground level.

Only a strong, healthy plant can be expected to bear a good bunch. Early vigour and growth are dependent on the amount of food available and, of course, the suitability of growing conditions. In turn, bunch size and fruit numbers are determined by this early vigour and growth.

Obviously, the first 3 or 4 months are the critical period when plant foods must be adequate.

The banana is a gross feeder and heavy fertilizer usage is normally essential. Three applications of a 8-10-8, 9-8-7, or similar mixture are usual.

First, after planting, about 1½ lb. is applied to each stool site and worked into the soil. Two months later, 1½ to 2 lb. is given to each plant—applied in a wide band about 12in. away from the base. A third application of 2 lb., two months after the second, completes the programme.

The young plant will thus receive ample supplies of nutrient within 4 months of planting, ensuring a sound basis for bunch growth and development.

—D. DOWDLES,
Adviser in Horticulture.

Grade Your Pineapple Plants.—Graded planting material reduces costs of harvesting, increases yields and spreads the pineapple crop.

When returns are below normal, only the efficient pineapple grower can hope to make a reasonable living out of the crop. One worthwhile practice is the use of graded planting material. It guarantees a uniform stand of well-grown plants. All types of planting material are graded by weight. With tops and slips, two grades are sufficient but with suckers which vary considerably in size, three grades are needed. The job is done on or near land which has been prepared for planting and provides an opportunity for discarding damaged or sub-standard material before planting begins. Each grade of planting material is established in its own section of the new area.

Where non-graded planting material is used, the smaller plants are shaded by their larger and more vigorous neighbours. Fertilizer is wasted on these small plants which are unlikely to mature their fruit, and the uneven crop is difficult to handle at harvesting.

When graded planting material is used, the several sections of the new area reach the "forcing" stage in succession over a period of several weeks. The harvesting period is similarly spread and this makes picking easy. Each section is harvested in two or three picks. By contrast, several picks are needed in areas grown from

non-graded planting material. The reduction in labour costs of harvesting in graded material is substantial.

In periods of high prices for primary products, cultural refinements can be omitted and the farm will still show a profit. At the present time, the pineapple grower must get the best out of his crop. The use of graded planting material is therefore essential.

—K. KING,
Senior Adviser in Horticulture.

Transplanting Passionfruit.—A little care, both before and after transplanting, goes a long way towards ensuring the success of new passionfruit plantings.

The seedlings should be root-wrenched in the nursery bed about a fortnight before transplanting. This is done by pushing a spade down between the plants to sever the main roots at a depth of 6 to 8in. Root-wrenching should be followed by a heavy watering.

The nursery bed should be given a good watering a day or so before the seedlings are transplanted. In transplanting, spread out the roots of the young plants evenly and at a downward angle of 45 deg. The young vines may be set at the same depth as they were in the nursery. It is an advantage, however, to establish grafted passion vines with the graft union well above ground.

—J. McG. WILLS,
Senior Adviser in Horticulture.

What Should My Baby Weigh?

So many mothers anxiously ask this question that it is easy to see that most gauge a baby's progress by weight gain only. Actually much more than gain of weight is necessary for a healthy baby. By giving a child nothing but carbohydrate foods you can have adequate if not excessive weight gain, but baby will not be healthy; in fact, he will be very unhealthy, prone to infection, and his fat limbs will be extremely soft.

A healthy baby, on the other hand, will have more resistance to infections and his limbs will feel firm. Protein is necessary for strong healthy babies and milk gives this to growing infants. This is why milk is the staple food in the diet until at least 2 years of age. If baby does not like milk, you should endeavour to replace it by high protein foods such as eggs, cheese, and meat.

Over emphasis must not be placed on weekly weight gains. One week 8 or 9 oz. may be gained and the following week there may be no gain, or only 1-2 oz. This must not worry the mother unduly. She must be prepared for this kind of happening. Weight gain from 1 month to the next is of more importance than from week to week.

The saying that baby should double his birth weight at 5 months, triple it at 1 year, and quadruple it at 2 years, is well known, but this applies only to the baby who is approximately 7½ lb. at birth—that is the average weight of a newly-born babe. A tiny baby who weighs 2-3 lb. at birth should do much better than this and a large baby 10-12 lb. cannot be expected to do nearly as well—in fact he may only double his weight at 1 year.

It is wise therefore to let doctor or sister decide if baby is progressing well. Another point that cannot be overemphasised is that comparison must not be made between your children. When children reach school age you can readily see that their bodily shape and personalities vary. This really applies from birth, but many mothers expect each of their babies to behave in exactly the same way; to put on exactly the same amount of weight; to enjoy exactly the same foods and to sleep for exactly the same length of time. In fairness to the baby no such comparison should be made. Remember each child is an individual and must be treated as such.

Any further matters of this, and other matters connected with children, may be obtained by communication personally with the Maternal and Child Welfare Bureau, 184 St. Paul's Terrace, Brisbane, or by addressing letters "Baby Clinic," Brisbane.

—Department of Health and Home Affairs.

More about the secretary

By J. PARK, State Organiser, Junior Farmers' Organisation.

IT is the secretary's job to deal with correspondence. If the secretary is prompt, reliable and polite she can earn praise for herself and a splendid reputation for the club.

All letters, except those which finish a correspondence, should receive an answer. Not to answer when written to is as rude as not to answer when spoken to.

Some delay in answering mail is inevitable, especially when the subject matter of the letter has to be referred to the club executive or considered by the general meeting. However, where delay is likely, the correspondent should receive an acknowledgement advising that the letter will be considered and a full reply furnished in due course.

Make sure there is no oversight in this; nothing is more irritating, and nothing kills interest more quickly, than having one's letters ignored.

Keep Copies of Letters

It is most desirable that copies of all letters written should be kept. This is a simple matter if the secretary uses a typewriter. If the letters are hand-written then a letter-book should be used with carbon copies being kept. The best copies are produced if a ball-point pen is used over good quality carbon paper.

When quantities of letters are written a despatch book should be kept in which the mailing is recorded. This record will substantiate claims for money for postage stamps.

Filing

In-coming and out-going letters must be filed.

To file a letter is to put it with others of a similar kind in a place where it can be found. This is much more difficult than it sounds, because there are several systems of filing, and most secretaries select one or a combination of them to suit their particular circumstances. Things go smoothly until the office of secretary changes hands, then confusion reigns until the new secretary rearranges things.

It is impossible to have a filing system that saves time and worry unless every letter deals with one subject only. It is always worth while writing two letters to the same person (one envelope and stamp will do), if there are two unrelated subjects to write about.

Writing a Letter

We forget so soon the lessons in letter-writing which we received at school, and it may not be inopportune to run through some of the rules once again.

The address to which an answer is to be sent should be written clearly and in full at the top of each letter, together with the date the letter is written. Dates are of the greatest importance, and if they are incorrectly or incompletely given they can cause much confusion and inconvenience.

Always check the day of the week with the date of the month, and make sure that they tally.

If someone is invited to attend a function on Wednesday, 21st January, and upon checking he finds that the 21st is a Thursday, he is in an awkward position. Secretaries would be wise to avoid the use of such phrases as "the second week in the month," because its meaning is uncertain if the month starts in the middle of a week.

The use of the words "instant," "ultimo" and "proximo" with reference to dates is unnecessary and is better avoided.

A letter that begins with "Dear Sir" usually ends with "Yours faithfully," not "Yours sincerely," which is better reserved for more personal letters. Never put into a letter words which cannot be read aloud at a meeting, and avoid the use of slang.

If our signature is difficult to read or spell we should print our name clearly below the signature, not forgetting to add the Mr., Miss or Mrs. to indicate the sex of the writer.

Words can be awkward things and our ease of handling them will determine our success as a letter writer. If you find that the words come easily, take care that your sentences don't become ungainly. Short sentences are much more easily managed than long ones.

Write down what you want to say in simple everyday words, then go through it again, tidying it up and simplifying the sentences.

Until the secretary has become fluent enough to turn out really readable letters at the first attempt, they should be written more than once. A draft or first attempt, should certainly be made of any important letter, and the final version should be checked before it is put in the envelope. Make very sure that you sign the letter, and that you put it in the correct envelope.

Check to ensure that the address on the envelope is complete and readable, and that you have fixed on it the correct postage stamp.

Lust For Power Tools

Accidents do happen with electrical power tools, and in the majority of cases the cause has been traced to defective insulation together with lack of effective earthing.

Such occurrences cannot be blamed on the tools, but are due to negligence of the user or owner. What happens is that, unknown to the operator, the earthing conductor incorporated in the flexible cord attached to a faulty appliance breaks, allowing the exposed metal to become "alive," yet not blowing the protecting fuse.

This could happen frequently to many electrical tools which are used under tough conditions, but does not, because wise owners ensure that the tools are maintained regularly by a certificated electrician.

Similarly, wise owners make certain that their equipment is operated ONLY from a three-pin power point which is properly earthed. The employment of such safety methods assures them of controlled power.

An electrical fatality involves a train of factors: the earthing must fail; protective equipment remain inoperative, the victim must usually be in contact with earth; the shock current must traverse the chest; it must be large enough and last long enough to cause fibrillation or respiratory paralysis, and lastly, all these things must occur when there is nobody near to render immediate assistance.

—State Electricity Commission.