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SOME FEEDING EXPERIMENTS WITH DRIED BLOOD.

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Very considerable quantities of blood are available daily in the abattoirs and slaughterhouses of Great Britain. The blood is collected in pans or allowed to drain away into a collecting gully. In some of the smaller slaughterhouses the blood is either wasted or used for manure, as only a small amount is obtained daily. In the North of England some of the public abattoirs collect blood for the production of serum and for the manufacture of "black puddings," &c.

The quantity of blood potentially available for these purposes may be estimated from the fact that about 30 lb. are obtained when a bullock is slaughtered, and during the years before the war about 3,080,000,000 lb. of meat per year was home-killed.

In recent years several firms have placed dried blood on the market as an animal food, and considerable claims have been made as to the value of this preparation when used as part of a fattening animal's rations. A certain amount of dried blood is thus available as food for animals, and during the war the difficulty of obtaining nitrogenous foods, especially for pigs, but also for other animals, led to a number of inquiries as to its value and safety as a nitrogen-supplying form of diet. It was, therefore, considered desirable by the Food Investigation Board to institute a series of trials in which blood was the main source of nitrogen, with the object of obtaining data as to its value. The two ordinary grades of blood obtainable are (1) blood dried immediately after collection, and hence free from objectionable odours or decomposition-products; and (2) blood collected in small lots and stored before drying. The second grade is only suitable for manure, while the first is on sale as an animal food. As fresh blood can always be obtained at the larger abattoirs in quantity and dried down immediately, a constant supply is obtainable, limited only by the output from the drying plants.

Dried blood, when properly prepared, is a dry powder with little smell, a pleasant meaty taste, and a salt flavour, and is quite different from the fresh clots of blood which are sometimes fed to pigs together with such offal as the "manifolds" or third stomachs of sheep and oxen, where proximity to a slaughterhouse allows purchase in a fresh condition.

A series of experiments was, therefore, designed to test the value of dried blood as an addition to ordinary carbohydrate diets, and also to ascertain how far it could be used to supplement the deficiency of a single foodstuff unsuitable by itself, either owing to lack of nitrogen or to absence of accessory food factors.

FEEDING TRIALS.

A number of trials have been carried out by different investigators on dried blood, and the results have indicated that it possesses considerable food value when added to a mixed diet, but it was decided to restrict the experiment to the effect of blood as an addition to a carbohydrate diet. For this purpose two series of experiments were arranged:

- (1) Blood as an addition to maize meal.
- (2) Blood as an addition to wheat offals.

Some experiments on the addition of casein to maize meal are recorded in "Amer. Jour. Bio. Chem." (Vol. xxix., Part 3), maize + casein + salt mixture and maize + germ being tried against maize + salt mixture only. In these trials three animals in each lot were fed for a period of 180 days, with the following results:—

Maize + casein + salt mixture		average gain	179	lb.
Maize + germ		" "	119	"
Maize + salt mixture only		" "	12.3	"

These results indicate an extraordinarily low value for maize as a single food, and it was thought that a basal diet of maize would allow any effects of added blood to be clearly seen. It has also been stated that the addition of blood to an ordinary diet not only caused a greater increase in the live weight of blood-fed pigs than would be expected from its food value, but also that the proportion of the carcass to live weight was greater than that in animals fed in the ordinary way. It was therefore decided to follow the pigs through the slaughterhouse and to ascertain the dead-weight proportion of the animals as well as the gross increase during the course of the experiment.

Twenty-eight pigs were selected and divided into four lots of seven pigs each, each lot being arranged to average, as nearly as possible, the same total live weight. Each included two "large white," one "large black," and four cross-bred pigs, so that a fair average on such animals as are used in ordinary farming practice could be obtained.

EXPERIMENT I.

The pens of seven pigs were fed as follows:—

Lot I.	received wheat offals only.
" II.	" maize meal only.
" III.	" wheat offals and dried blood.
" IV.	" maize meal and dried blood.

In addition, each pig received $\frac{1}{2}$ oz. bone meal daily.

The amount of blood fed to each pig in Lots III. and IV. was 2 oz. per day to begin with, rising gradually to 6 oz. per pig per day, an average of 4 oz. per day; an extra 5 lb. per pen was allowed so as to bring the total to 1.25 cwt. in all for both lots of blood-fed pigs. It took two or three days before the pigs tolerated the blood, but after they became used to the mixture they took it willingly, and apparently liked the taste.

The blood used was a mixture of equal parts of blood supplied by two different firms. The two samples were rather different in composition, as shown by the following analyses:—

		Percentages.	
		A	B
Water ..		7.27	8.30
Ash ..		8.60	3.63
Protein (N $\times$ 6.25)		50.00	82.78

It will be seen that the samples varied considerably in composition, as A was whole blood while B was partly clot from serum production. Both, however, were well dried, free from smell, and finely divided.

Each lot of pigs received altogether 1.25 cwt. of blood during the eleven weeks of the experiment, and the corresponding pen had a weight of maize and offal added to make up an equal total weight of ration. During the last fortnight but one the pigs in Lot IV. received 28 lb. more maize than those in Lot II. and 112 lb. more during the last fortnight, as it was obvious that they were needing an extra

ration. In the other cases, however, the total weights of food given were similar. Lot II. occasionally refused food, and 37 lb. of maize in all were weighed back and carried on to the next meal, when an equal amount was deducted from the weight of food fed at that meal.

During the experiment the ration was fixed by the maximum which could be fed to the control pens. In both diets the blood-fed pigs were much livelier and more hungry than the controls, and had the former been on an *ad lib.* diet they would have taken much more food than the controls.

It was originally hoped to keep the nitrogen ratio constant by substituting pure starch for some of the maize and offal in the blood-fed lots, but this was found to be impossible in practice, owing to the difficulty in obtaining starch in sufficient quantity, and it is not in accordance with farming practice to use pure nitrogen-free starches for farm animals. The object of the experiment was to demonstrate the use or value of blood as an addition to ordinary agricultural foods.

	Maize Meal.	Wheat Offal.
Water	12.81	12.62
Ash	1.12	4.53
Protein (= N $\times$ 6.25)	9.37	14.30
Fibre	0.60	9.60
Fats	3.26	4.16
Carbohydrates	72.84	55.99

These were supplied through the ordinary channels; the maize was of good quality, well-ground and in good condition, but the offals were of somewhat inferior quality, especially in comparison with pre-war standards. Different bags varied somewhat in appearance, so that three were kept in use at a time and the ration made up by mixing the contents to ensure as far as possible an even quality from day to day.

The pigs were weighed at weekly intervals, and after eleven weeks feeding gave the following total results:—

Lot.	Weight at start.	Weight at finish.	Gain on Loss (—).	Value of Gain on Loss (—).
	lb.	lb.	lb.	£ s. d.
I.	381 $\frac{3}{4}$	600	218 $\frac{1}{2}$	11 7 0
II.	409 $\frac{1}{4}$	406	—3 $\frac{3}{4}$	—0 3 0
III.	402 $\frac{1}{4}$	686	283 $\frac{3}{4}$	14 18 0
IV.	415 $\frac{1}{4}$	623	207 $\frac{3}{4}$	10 18 0

The pigs in Lot II. showed very little appetite, and after a week or two took their ration of plain maize meal only with reluctance and when pressed by hunger. As will be seen from the table, they put on no weight and rather fell off in condition, so that it was not considered advisable to continue the diet. Lots I. and III. were continued on their diet until they weighed about 1 cwt. (porker), so that it would be ascertained whether the use of blood gave a greater proportion of carcass to live weight than wheat offals only.

Lot. No.	Live weight.	Carcass weight.	Plucks.	Entrails.
	lb.	lb.	lb.	lb.
I.—(i.)	120	80	4	17
I.—(ii.)	136 $\frac{1}{2}$	88	6	14
I.—(iii.)	120 $\frac{1}{2}$	81	5	14
I.—(iv.)	120	84	4	12
III.—(i.)	131	85	6	18
III.—(ii.)	138	93	6	15 $\frac{1}{2}$
III.—(iii.)	115	78	4	14
III.—(iv.)	108	71	4	16
III.—(vii.)	119	94	5	13
IV.—(i.)	125 $\frac{1}{2}$	88	4	13
IV.—(v.)	121	83	4	11
IV.—(vi.)	124	79	5	14

EXPERIMENT II.

It was then thought that the addition of a small amount of fresh vegetable food, such as is often given to pigs on farms, might possibly affect the general metabolism of the animals. The pigs in Lot II. were divided into two pens, and one pen received a single kohlrabi plant per pig per day, in addition to the diet, for another period of four weeks. The results are shown in the following table. The same procedure was adopted with the pigs in Lots I., III., and IV., where two of the pigs not intended for slaughter were given kohlrabi and tried against two on a continuation of the experimental diet.

				Weight at start.		Weight at finish.		Gain or loss (—),
				lb.		lb.		lb.
Lot I.—								
A.	no kohlrabi	..	..	153	..	199	..	46
B.	kohlrabi ..	..	..	156½	..	212½	..	56
Lot II.—								
A.	no kohlrabi	..	..	173½	..	160	..	13½
B.	kohlrabi ..	..	..	176½	..	191	..	14½
Lot III.—								
A.	no kohlrabi	..	..	185	..	240	..	55
B.	kohlrabi ..	..	..	186½	..	238	..	51½
Lot IV.—								
A.	no kohlrabi	..	..	134½	..	105½	..	1
B.	kohlrabi ..	..	..	115	..	153½	..	35

The experiment was then discontinued. The kohlrabi-fed pigs in Lot II., receiving maize meal, improved considerably in health, became lively, and took their food with much greater relish. The control pigs on maize meal alone still refused their food and made a slight loss in weight.

In Lot IV. the pigs receiving no kohlrabi did not increase in weight, but were quite lively and in fair general condition. The seventh pig in Lot II. was taken out of the second part of the experiment as he had injured his leg against the feeding-trough. He was placed by himself and given an *ad lib.* ration of fresh mangolds in addition to maize. In three weeks he had doubled his weight from 35½ lb. to 84 lb. During the period of feeding with kohlrabi the maize-fed pigs were given an *ad lib.* diet, but they did not take more than they had done during the course of the first experiment.

CONCLUSIONS.

The results obtained indicate that the addition of blood to an ordinary farm ration of wheat offals may cause a very considerable gain in weight compared with the results obtained from a farm diet of offals only, while the addition of blood to plain maize meal may give an increase equal to the results obtained from feeding offals only. The results obtained on maize meal alone compare exactly with those obtained by the American observers who undertook the experimental work of feeding maize to pigs as a comparison with maize + casein.

The addition of a small quantity of fresh vegetables to the diet showed a very considerable gain as against an ordinary ration, but their use appeared to be unnecessary when a full diet of wheat offal plus blood was fed. It is, however, recognised that this part of the experiment is tentative only and requires a further trial with at least seven pigs in each lot before any definite conclusions can be arrived at.

The results are recorded, as the pigs were in such a suitable condition (*i.e.*, used to the diet) after eleven weeks of experiment as to justify the trial even on two or three animals.

The cost of dried blood is fairly high, but it must be remembered that only a few oz. should be fed daily, or an excess of nitrogen in the diet would result, and this is undesirable. In these trials the total cost of the blood was as follows:—

1.25 cwt. blood per pen at 18s. 6d. per cwt. = 23s. 1d. per pen for Expt. I.

20 lb. blood per pig at 18s. 6d. per cwt. = 3s 4d. per pig for Expt. I.

The thanks of the writer are due to the Food Investigation Board, who provided the costs of the experiment, and to Professor T. B. Wood and Professor Hopkins of the Animal Nutrition Institute, Cambridge University, for permission to use their laboratories and Nutrition Station and also for much assistance and advice.

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WHAT SILAGE IS AND HOW TO FEED IT.

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INTRODUCTION.

If we are not to forget the lessons of the recent drought, we are forced to recognise fodder conservation as a matter of prime importance.

Fodder conservation is necessary if we are to place our live-stock industry on a sound basis, and if we are to prevent those periodic set-backs caused by droughts—set-backs which adversely affect, not only the stockman, but also the whole of our people.

We hear much talk of water conservation for irrigation purposes. Certainly, why not the storage of our rainfall in good seasons or in the rainy part of the year for use in dry seasons or in the dry part of the year? But we must remember that the sites for such water conservation are not numerous and the area that may be served is comparatively restricted.

But if the conservation of water is advisable, how much more important is it to aim at fodder conservation? In good seasons, crops and natural grasses and herbage are produced in abundance and over a wide and extended range of country. Fodder conservation, unlike water conservation, is not restricted to selected sites and localised areas. It can be practised throughout the length and breadth of the land. Fodder conservation may not be so spectacular as water conservation and irrigation, but it undoubtedly has greater possibilities with respect to our live-stock industry. If this is so, one might ask why fodder conservation is not advocated more persistently and practised more systematically. Is it due to inadequate financial support, or through lack of initiative, or because of ignorance—probably a combination of the three, with finance as the chief cause.

WHAT SILAGE IS.

There are several reasons why silage is of special importance with reference to this matter of fodder conservation.

First.—Conservation in the form of silage is by far the cheapest method. The silage is an excellent feed for beef stock and sheep, but because silage is a succulent feed it is almost a necessity for it to form part of the ration for dairy stock. With discretion, silage can be fed to horses.

Second.—Any green plants can be converted into silage. Naturally some crops are better than others, while for the best results each crop or plant should be cut at a definite stage in its growth. Of all the crops, maize cut when the seed is just glazed over is undoubtedly the best. Then follows the sorghums cut when the seed has just set. Both of these are heavy croppers and give a large yield per acre. Maize and the sweet sorghums give the best fermentation in the silo. Other crops that might be mentioned are sudan grass, panicum and millets—summer crops which yield well but which do not make as sweet a silage as maize and the saccharine sorghums. But any green stuff can be made into silage, not forgetting our native grasses.

Some crops, such as wheat, oats, and barley, are best converted into hay, but can be converted into silage. The same applies to leguminous crops, such as lucerne, cow-peas, &c.

Again, in the process of making silage poisonous elements in the plants are destroyed. Thus there is no danger of sorghum poisoning;

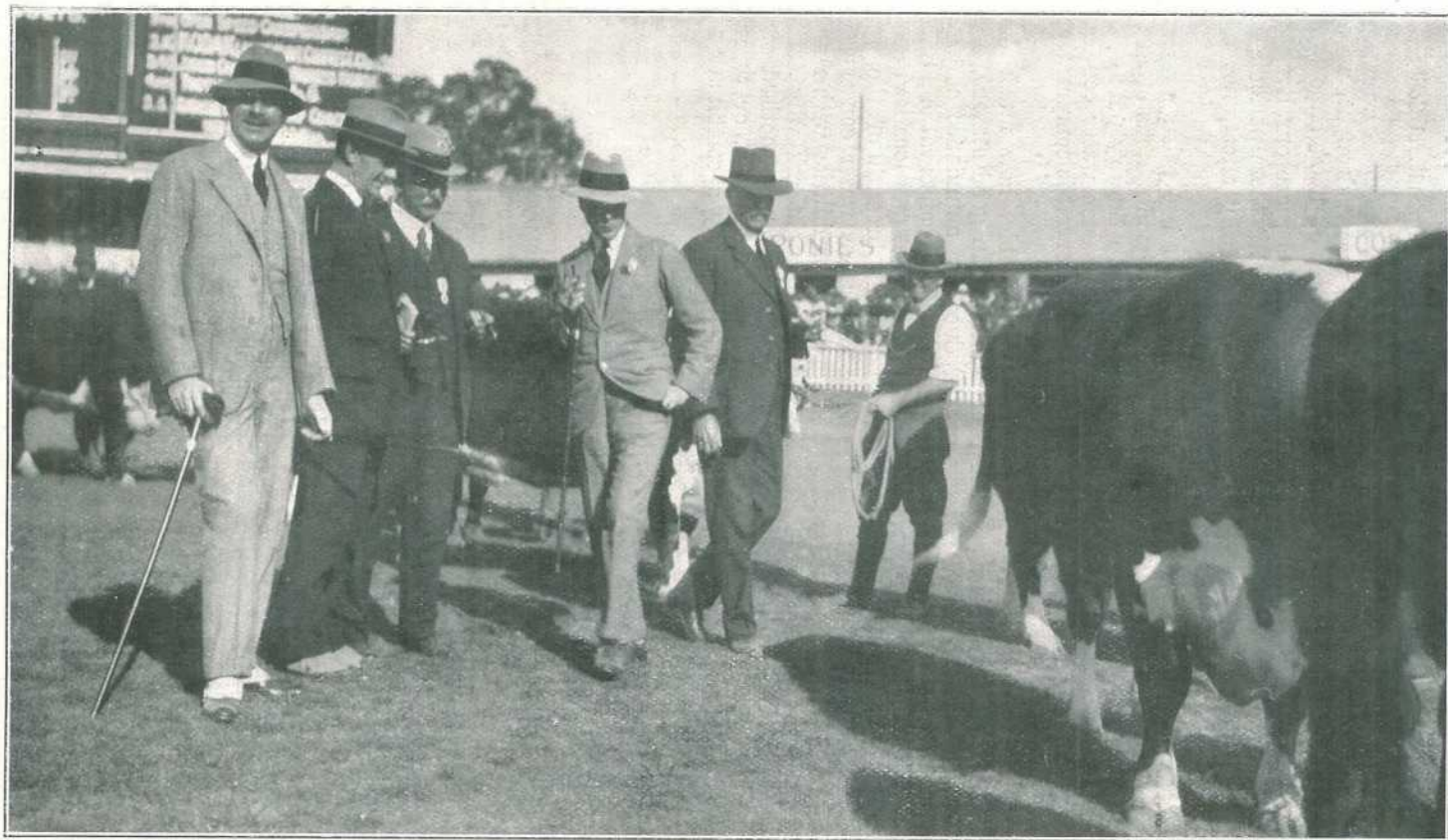


PLATE 5.—H.R.H. THE PRINCE OF WALES IN THE SHOW RING, OPENING DAY CATTLE PARADE—NATIONAL ASSOCIATION EXHIBITION, 1920.



PLATE 6.—CENTRAL FEATURE, AGRICULTURE AND FRUITS, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.

once the crop has been ensilaged. Similarly, immature or second growth cornstalks lose all harmful effects in the silo, while hard spines are so softened as to destroy their irritating effects.

Third.—Silage is a wet feed. It retains the succulence of the fresh green stuff, and when used it imparts this very important quality to the feed. This cannot be emphasised too greatly, especially for dairy stock. If we are forced to feed, with dry feeds only available, then, irrespective of any quality the feeds may contain, the fact that they lack succulence frequently results in losses due to stomach derangements.

Fourth.—When properly made, silage will keep for years. After the first few months it suffers no appreciable loss or deterioration. It is not attacked by mice or other vermin and there is no danger of loss by fire, as silage won't burn.

Fifth.—Thus silage retains all the advantages of succulent green fodder. The crops can be grown at any time the season is favourable. The whole of the crop is harvested and stored, to be drawn on when required. In brief, it makes a cheap green feed available quite independently of weather conditions.

The above short description of what silage is gives good and sufficient reasons why silage should be conserved. Instructions as to how to conserve it are contained in a pamphlet published by the Department of Agriculture and Stock, Brisbane. But there remains for us the other side of the problem—how to use or feed silage.

HOW TO FEED SILAGE.

Hand feeding is not cheap feeding. Not only is there the cost of the feed to be taken into consideration, but there is also the extra labour involved.

Careless and inaccurate feeding will almost certainly result in a big loss, but careful and accurate feeding may easily yield a profit; in any case it will minimise losses.

Now there are several reasons why we have to consider hand-feeding for our stock. At present, our beef cattle and sheep are grown on natural pasturage. For these stock we only consider hand-feeding in times of drought. Here the object is to keep the stock alive, and we give them a mere "maintenance ration." For this purpose *silage* is eminently suited—fed at the rate of from 30 lb. to 60 lb. per day per 1,000 lb. of live weight (2 lb. to 4 lb. per day per sheep, 30 lb. to 60 lb. per day per head of cattle).

In this class of feeding it must be stressed that a "maintenance ration" only is being fed. This will keep the animals alive, but it has not sufficient quality to allow the animals to grow and produce, and it certainly is not fit for breeding stock or for young growing animals. A "maintenance ration" for stock is very much what a bread-and-water ration would be for man.

When feeding a "maintenance ration" only, we have this little problem before us. On the one side we have the cost of the feed plus the cost of labour for feeding. Against this we can place no gains. The net result must be a loss. The question therefore arises as to whether it would not pay better to add some concentrates or richer feed to the "maintenance ration," and so allow of a certain amount of growth and production? If this were done, the cost of the feed would increase, but there would be practically no increase in the cost of labour for

feeding. Against this there would be a gain because of the growth or production. *If the value of this gain were greater than the extra cost of feed, then it would pay.* But it is quite possible that *the value of the gain might more than pay for the whole cost of feed and of the labour for feeding. If so, an actual profit would result.*

One is not prepared to assert that an actual profit is possible from the hand-feeding of beef cattle and sheep during drought periods, but what can be asserted is that losses would be less if the feed given were of a quality higher than that contained in a "bare maintenance ration." To attain such a result, however, it is absolutely necessary that systematic conservation of fodder must be practised. There would be no chance of success if the feed has to be purchased at famine prices. *The basis of any such systematic conservation is the storage of large quantities of silage.*

To emphasise the matter let us go a little further.

First we must clearly understand what is meant by a maintenance ration. A maintenance ration is that quantity of food which contains just sufficient strength and quality to enable an animal to retain his present condition, whether good, bad, or indifferent, provided such animal is called on for no work or production. Practically it is only possible to feed such a ration to a mature animal at rest. For example, we can feed a true maintenance ration to a full-grown bullock or horse if we don't expect them to increase in weight or to do any work, but we cannot feed a mere maintenance ration to a milking cow, or to young stock, or to sheep producing wool, for the simple reason that some of the strength of the feed is used for the production of milk or flesh or wool, as the case may be. Just in so far as the feed is used for production, so there is a shortage for maintenance, and in consequence the animal falls off in condition. We all know how female stock will hold their own on poor food right to the time of bearing their young, and then die off. All that this means is merely this: As the time for bearing comes near, too much of the strength of the feed is used up to allow the young to grow, and, in consequence, insufficient remains to maintain the mother.

But there is a further point to be emphasised. The maintenance ration will only maintain the animal's existing condition. There is not sufficient quality in the ration to build up a low-conditioned animal. Therefore, if stock have been permitted to get into low condition, the feeding of a maintenance ration is not enough. To merely feed to keep such stock alive in their weakened state is to invite disaster when the rain comes. Such stock must be built up. Their feed must be richer and, in consequence, more expensive than the true maintenance ration. *Had the maintenance feed been fed sooner, it would have been sufficient; but once the stock get very low, their feed must be richer.* We might sum this up thus:—*Early feeding is cheaper feeding.*

Naturally a man depending on natural pasturage only will hesitate before purchasing feed. He will wait till the last moment, trusting for rain. But would he do this if he had conserved fodder?

But to return to the feeding of silage:—If the stock had no other feed, no picking in the paddocks, then feeding—

No. 1—50 lb. of silage per day to each 1,000 lb. of live weight would supply a maintenance ration which would keep the animals fairly healthy, though they would lose condition, as 50 lb. of silage does not contain quite sufficient body in it. If there is dry picking in the paddocks the stock would probably eat sufficient of it to make good the deficiency in the silage.

But if—

No. 2—40 lb. of silage were mixed with
10 lb. of bush hay chaff,

and this quantity of mixture fed to each 1,000 lb. live weight per day, they would be receiving a good maintenance ration. This mixture should enable the stock to hold their condition without loss of fat. Of course, if the paddocks contain some feed or picking, a lesser quantity of the feed may be used. How much less can only be determined by trial and carefully watching the stock to see they are not falling off.

Now, both the above rations merely enable the stock to hold their own. If the feeding is only for a short period, such a ration could be given to young stock and producing stock, as well as to mature animals. But if the feeding is over a prolonged period, rations No. 1 and No. 2 are only fit for grown stock (*see above*). There will be no gains, the expense incurred will only keep things as they are—in fact, No. 1 ration will scarcely do this. *Such feeding continued for a long time may easily involve an expenditure for feed which is in excess of the value of the stock saved.*

Let us now consider feeding a richer ration, for example:—

No. 3—40 lb. of silage mixed with
15 lb. of lucerne chaff,

this being sufficient per day for each 1,000 lb. live weight. Such a ration should allow of an increase of body weight of about 1 lb. per day.

A better fattening or producing ration would be as follows:—

No. 4—40 lb. of silage
10 lb. of lucerne chaff
5 lb. of bush chaff }
4 lb. of maize } or 7 lb. of corn and cob meal.

This ration should allow of an increase of body weight of 2 lb. per day.

With Nos. 3 and 4 it must be impressed that the quantities given refer to the case where the stock have no other feed. If the paddocks provide some fodder, either the above quantities may be reduced somewhat or else larger gains may be expected.

Whether such feeding would pay or not depends on a number of conditions, the chief of which is *that the required fodder has been conserved in good seasons when the cost of production is low*. It is impossible to make hand-feeding pay if famine prices have to be paid for the feed.

Beyond this we have the following:—

(1.) If the stock are not fed at all during the drought, they will receive a set-back. Whether deaths occur will depend largely on the severity of the drought. But the set-back is there, and when the rain comes it will take some time before the stock recover; in fact, the young stock never will recover completely. If it merely means that the stock are a year older at marketing, this will mean an added expenditure in production.

(2.) If ration No. 1 were fed, it would largely prevent the set-back to the stock, while the young stock would not suffer so badly. The danger of loss by death would be almost entirely obviated. Stock so fed would be in the position to take immediate advantage of the grass when it came, and so reach market sooner. This quicker marketing together with the prevention of loss by death is a gain to be set against the cost of feeding. Will it pay?

(3.) What has been said with reference to ration No. 1 can be said with more force with reference to ration No. 2. No. 2 ration is slightly more expensive, but it would keep all stock in better heart and leave them in condition to take rapid advantage of any grass that comes.

(4.) The main advantage in feeding ration No. 3 is that forward stores could be topped up and sold, thus relieving the property. Young stock would also be kept growing slowly. Thus some revenue would be obtained (and prices during the drought would probably be good for prime stuff) while the break of the drought would find all stock more advanced.

(5.) Ration No. 4 would have the same effect as No. 3, but would be just about twice as effective. It would not, however, be twice as expensive. Therefore if No. 3 didn't quite pay, it is more than likely that No. 4 would pay. In other words, *when hand feeding, heavy feeding is generally the cheaper.*

(6.) Obviously it would pay better if the stock fed are well-bred high-class animals; that is, animals which convert their food into marketable products at an efficient rate. Hand feeding low-class scrubs will not pay.

Before leaving the question of our beef stock and sheep, the following is given as a well-balanced ration suitable for young stud stock and mothering females:—

No. 5—30 lb. of silage,
10 lb. of lucerne chaff,
5 lb. of ground maize,
3 lb. of bran,
2 lb. of linseed meal.

This being sufficient per day for each 1,000 lb. of live weight.

FEEDING SILAGE TO DAIRY STOCK.

Whatever be the position with regard to our beef cattle and sheep, there can be no doubt as to the necessity to practise hand-feeding with our dairy stock. During a portion of each year they require it, in some years to a very much greater extent than in others, and then there are the drought years.

During each winter our natural pasturage goes off, and with the fading of the pasturage the milk yield falls. Certainly we might breed so as to have our cows freshen in the spring, but against this we have to place our ideal climate and also the higher price which milk products command in the winter.

In drought we cannot afford to lose our cows, for if a man is breeding well each cow and heifer represents years of careful grading up for production. It is not the individual cow that matters—it is the accumulation of years of breeding which she represents that we cannot afford to lose.

Let us first consider the case where hand-feeding is not practised. We must first fully realise that the dairy cow has been bred for the express purpose of converting her feed into milk. Her function is production. In milk, therefore, she must receive a ration in excess of mere maintenance. If, then, we are not hand-feeding, what takes place as the pastures fall off in condition in winter is this:—The feed available is of poor quality; the cow endeavours to fulfil her function of milk production; she also has to maintain herself; the food available is not good enough for both purposes, so the milk flow decreases, as also does



PLATE 7.—WOOL EXHIBIT, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.



PLATE 8.—SISAL FIBRE AND COTTON EXHIBITS, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.

the cow's condition, for she starves herself in her endeavour to produce milk. Incidentally, if she is carrying a calf the calf also suffers.

The problem before us is whether we can make hand-feeding pay better than the practice briefly described above. Perhaps the best way to approach the matter is to consider our feeding in two sections, that is, consider the ration for maintenance first, and the ration for production next.

A Maintenance Ration.

No. 6—30 lb. of maize or sorghum silage,
5 lb. of oaten, wheaten, millet, or sudan grass chaff,
2 lb. of lucerne chaff.

This mixture is sufficient per day for each 1,000 lb. live weight, provided no other feed were available. It would maintain dry stock in excellent condition, but is not sufficient for growing heifers. What we should do is to feed little or much of this to all our stock, milkers included, in accordance with the condition of the paddocks.

Production Ration.

No. 7—5 lb. of lucerne chaff,
2 lb. of bran,
5 lb. of maize meal.

This mixture would be sufficient to produce 20 lb. of 4 per cent. milk or 3 lb. of the mixture sufficient for each 5 lb. of 4 per cent. milk. This production ration is the expensive portion of the feed, hence we should feed to each milker in proportion to her normal supply of milk. Thus if at the time she is capable of giving 30 lb. of milk she should receive 18 lb. of the production ration, but only 6 lb. of the ration if she cannot produce more than 10 lb. of milk.

Assuming the following prices, we can work out a very interesting table:—

	£	s.	d.	
Silage	0	12	6	per ton
Lucerne chaff	4	0	0	per ton
Oaten chaff	4	0	0	per ton
Bran	6	0	0	per ton
Maize	0	4	0	per bushel

(These prices have been assumed somewhat in accord with costs as they would be if fodder conservation were systematically practised.) With these prices the full maintenance ration would cost 5d., and 3 lb. of the production ration would cost 2d. Then with milk worth, say, 7d. per each 10 lb. (nearly a gallon) we get the following table:—

Cost of:—	Costs.	Returns.	Loss.	Gain.	If paddock supplied Half Maintenance.	
					Loss.	Gain.
	d.	d.	d.	d.	d.	d.
Maintenance only	5	0	5	..	2½	..
Maintenance and 5 lb. milk ..	7	3½	3½	..	1	..
" 10 " " " " " "	9	7	2	..	..	0½
" 15 " " " " " "	11	10½	0½	..	..	2
" 20 " " " " " "	13	14	..	1	..	3½
" 25 " " " " " "	15	17½	..	2½	..	5
" 30 " " " " " "	17	21	..	4	..	6½
" 35 " " " " " "	19	24½	..	5½	..	8
" 40 " " " " " "	21	28	..	7	..	9½

This table illustrates clearly that it pays best to feed the heavy producers. Perhaps it is because too many of our dairy stock are low-grade producers that hand-feeding is not more generally practised.

In ration No. 6 the true position of silage as a feed for dairy stock is indicated. It is a succulent roughage to be used as a substitute for natural green stuff. It is not a good producing feed, but it serves as an excellent basis for the maintenance ration.

CONCLUSION.

In the above no attempt has been made to give a complete description of feeding. Many rations over and above those shown here can be used. All that has been intended was to illustrate how silage might be efficiently used. Should any reader wish for further information, he should apply to the College.

SUNFLOWER SILAGE.

Mr. J. F. Keane, Carbeen, Cairns district, who has on several occasions contributed useful and informative articles to this Journal on tropical agriculture, particularly on rice-growing, writes as follows on the subject of Sunflower Silage, an article on which appeared in the June issue of the Journal:—

"In April, 1873, I left Odessa (on the Black Sea) as third mate of a large steamer, the "Bladworth," which carried a heavy cargo of sunflower seed for Nantes, in France, to be manufactured into a substitute for olive oil. I learnt from the shippers that the exportation of this seed was at that time a new trade, but sunflowers had been grown on large areas all over Southern Russia as the principal food of stalled animals from time immemorial. Owing to almost polar winters in that country, stock have to be housed for five or six months of the year. For myself I would not try to raise stock without the sunflower, though I were only able to give them an occasional handful. It acts just as beneficially on their health, no matter how much or what other kind of fodder they may be getting, as salt does on the condition of animals on green pasture."

The sunflower known as the "Giant Russian" grows so easily and thrives so well in all parts of Queensland that it is surprising that the seed has not, as far as we know, been fed to stock. As an oil-producer, also, it is of great value. Unfortunately, owing to the absence of oil mills, neither this nor olive, cotton, or castor oils, which are largely imported from Europe, are produced in Queensland. Should, however, cotton-growing on a large scale once more be vigorously taken up by farmers, of which there is some prospect, owing to a good price being guaranteed to them for their crops, we may some day see the erection and working of oil mills.

Mr. Keane was an enthusiastic ricegrower, and constantly advocated the cultivation of Upland rice in this State. But few were found willing to raise this valuable crop, notwithstanding the fact that large quantities of rice are imported, and that even in New Guinea (Papua) rubber and coconut planters imported rice to feed the native labourers, whereas it is a crop which succeeds admirably in all parts of the Territory.

IRRIGATION OF THE WOONGARRA SUGAR DISTRICT, BUNDABERG, No. 2.

(Continued.)

In the August number of the Journal, we described the facilities for irrigating this fertile tract of country afforded by the Elliot River. But before this, the cane-growers tried to obtain the much-needed water from wells sunk through rock, sandstone, and clay to a maximum depth of, in some cases, nearly 200 feet. We have no space to give to the details of the results, but, generally, only a few of the wells yielded a supply from 100 gallons per day to 5,000 gallons per hour, mostly brackish.

The cost of these wells ranged from 20s. to 50s. per foot, and summarising the average cost, it amounted to £3 8s. 10d. per acre merely to find water, and had it come about that the Elliot River scheme fructified, then a water rate of £3 per acre would have been most moderate, as the farmers would then not have been obliged to set up each a separate plant costing between £300 and £500.

We have a record of thirty wells in the Woongarra district, amongst which no water was struck in four. In fourteen others, the water proved to be salt, or, at the best, brackish, and in only seven was the water good enough for irrigation. From these figures, it will be seen that if each of these thirty wells had struck good water, and that each well were made to irrigate 50 acres, this would amount to one-half the area which it was intended to irrigate from the Elliot River.

The cost of sinking these wells ranged from 25s. to 50s. per foot, amounting in all to an expenditure of £5,163 in what was practically prospecting. One bore was sunk through 170 feet of solid rock, others from 20 to 110 feet of solid rock, and many, after getting through many feet of hard basalt, boulders, and sandstone, encountered sandstone and clay before reaching water. Dividing the cost of this prospecting amongst thirty farmers, it will be seen that the cost on an average amounted to £3 8s. 10d. per acre merely to find the water, after which would come the cost of engine and boiler, pump, piping, fluming, &c., to be added to the expense originally incurred.

On the other hand it follows, seeing that good water has been found below the surface in several parts of the Woongarra, that there must be a continuous supply of subterranean water in the district unless the wells have been sunk on extinct craters filled with water and having no connection with each other. At the Sandhills, 12 miles from Bundaberg, there was a shallow well in the sand on the sea beach, not far above high-water mark, from which a continuous supply of excellent drinking water was obtained during a severe drought, not only for domestic use, but also for the needs of all the stock in the Woongarra district. It would have been interesting to follow up the course of this water inland by a series of trial bores, which might have led to important discoveries in the Woongarra.

To understand the difficulties which had to be encountered in the matter of reaching the underground water in this particular district, it should be noted that the Burdekin delta was originally on the same level as Fairymead; but in pre-historic times the overflow of lava from the Hummock covered up the level land, and consequently 100 feet or more have to be passed through before reaching the sweet water at the same level as at Fairymead.

The Woongarra was the first district to be constituted an irrigation area. At a meeting of farmers interested in the Woongarra irrigation, held in May, 1902, Mr. John White, M.L.A., in the chair, the remarks of that gentleman were thus reported in the "Bundaberg Mail"—

"By an Order in Council, the farmers there have the sole control of that fine river, the Elliot, from its source to the limit of tidal influence. He congratulated them on this fact. There was no doubt as to the value of irrigation. They had control of one of the best water supplies, and trusted they would make use of it at an early date. As to the quantity of water available from this source, he was satisfied there was enough and to spare for all their requirements. They might not be able to deluge their land with water, but that there would be sufficient to enable them to get a most gratifying return for their outlay he felt absolutely confident. The cost of the installation would be about £70,000.

"On the annual field-day at Murgon on 5th June last, Mr. Cattermull recalled that some years ago the abovementioned irrigation scheme was launched in the Woongarra, but unfortunately it had been turned down. He thought they were all agreed to-day that the time had arrived when that scheme or some other scheme with the same object in view should be resurrected, and given effect to. They had an abundance of good water located some 8 miles away from the Woongarra, where some 12,000,000 gallons were flowing away every twenty-four hours, and the Government Hydraulic Engineer had stated that the total available could be triplicated if they threw a wall across the stream. He sincerely hoped that something would be done in the matter of irrigation. The scheme was one in which they could reasonably ask the Government to help them. It was stated that, under irrigation, the Woongarra would produce vastly more than it does to-day, and every individual in the community would benefit by it. It behoved every property-owner to put his back to the wall to carry a system of irrigation through."

Whatever scheme is finally adopted, the benefit to the canegrowers will be very great.



PLATE 9.—CEREALS AND GRAIN EXHIBIT, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.

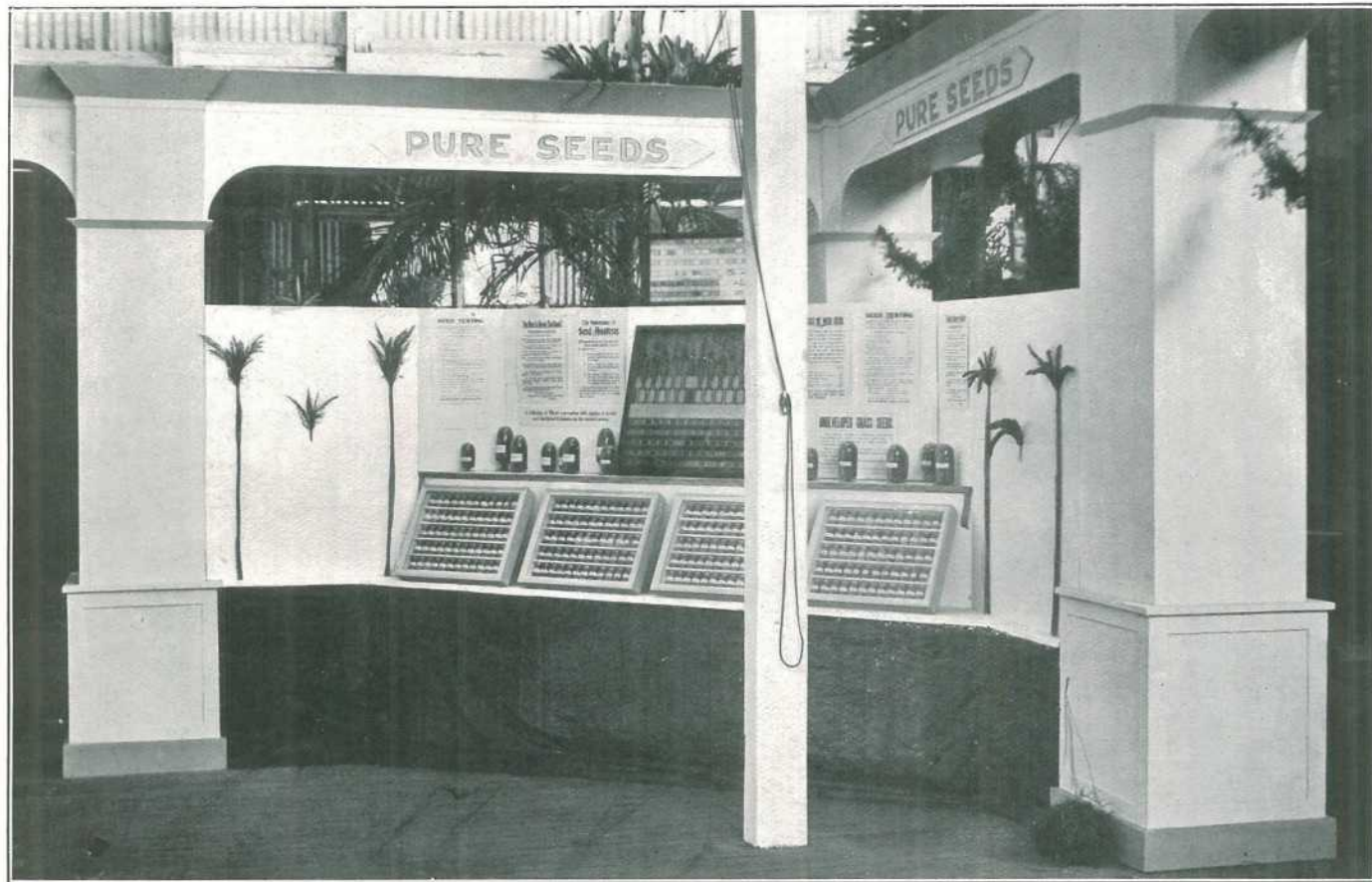


PLATE 10.—PURE SEEDS EXHIBIT, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.

EXHIBITION NOTES, 1920.

THE NATIONAL ASSOCIATION'S EXHIBITION, JULY, 1920.

Coincidentally with the arrival of His Royal Highness the Prince of Wales, the Annual Exhibition of the Queensland National Association, which, owing to the war conditions, lapsed last year, was revived most successfully last July, and is generally and appropriately christened "The Prince's Show." The Council and members of the National A. and I. Association cannot but be satisfied in the highest degree with the results of their efficient work in the preparation of what well deserves to be looked upon as the best Exhibition of the many which have been annually presented at Bowen Park.

THE DISTRICT EXHIBITS

especially deserve mention, as do also the one-farm sections. Each district had brought of its best to compete for the much-coveted awards. A visit to these exhibits gave a most favourable impression of the wonderful capabilities of the pastoral, agricultural, mining, and other industrial occupations of the dwellers in the country districts. Not only were the products of the soil from almost all parts of the State presented to the view, but those which more particularly pertain to domestic economy were particularly interesting. The exhibitors in the one-farm section in particular are to be commended for not only farm products, but for the variety of manufactured luxuries in the shape of jams, jellies, pickles, and a host of other domestic productions. The judges must have had a difficult duty in judging, where all seemed to be worthy of distinction. The districts represented were the North Coast, South Coast, Central, Kingaroy, Gympie, Fassifern, and West Moreton.

On this occasion the district exhibits were classified according to the class of exhibits, a distinction being made between agricultural products, manufactures, minerals, and other primary products.

Our space will not admit of a lengthy description of the various exhibits of each district. Suffice it to say that these included, in both A and B grade, tropical products such as sugarcane, cassava, arrowroot, and ginger, besides many varieties of maize, sweet potatoes, English potatoes, and almost every description of vegetable, and fruits of splendid quality. Fodder crops, chaff of different kinds, ensilage, broom millet, peanuts, and many other products of the soil were also largely in evidence. The one-farm prize was gained by Mr. W. Hughes, of New South Wales, who scored 283 against 271 points gained by Mr. J. Donges, of Drayton.

ONE-FARM EXHIBITS.

	Possible Points.	J. Donges.	W. Hughes.
DAIRY PRODUCE (50)—			
Butter, 6 lb.	25	20	18
Cheese, 1 large or 2 small	20	10	15
Eggs, 1 dozen	5	3	3
	50	33	36
FOODS (60)—			
Hams, 15 lb., bacon 15 lb.	20	12	15
Cured, smoked, spiced, beef and mutton	10	8	4
Honey, 12 lb.	10	6	9
Beeswax, 6 lb.	5	4	0
Bread, 2-lb. loaves, scones, 1 doz.	5	5	1
Confectionery and sweets, 3 lb.	5	4	3
Lard, tallow, oils	5	2	4
	60	41	36

ONE-FARM EXHIBITS—*continued.*

	Possible Pointst.	J. Douglas.	W. Hughes.
FRUIT, VEGETABLES, AND ROOTS (fresh and preserved, (143)—			
Fresh fruits, all kinds	25	15	12
Dried fruits	10	5	5
Preserved fruits and jam	15	11	14
Fresh vegetables	15	10	10
Pickles, sauces, &c.	15	10	12
Potatoes, 56 lb., and roots	25	15	12
Table pumpkins, squashes, marrows	10	5	8
Cocoanuts and nuts	3	2	3
Vegetable and garden seeds	5	3	4
Arrowroot, 10 lb.	5	0	4
Cassava, 3 lb.	5	0	0
Ginger, 3 lb.	5	..	..
Sugar beet	5	1	..
	143	77	84
GRAINS, & C.—(70)—			
Wheat	25	2	..
Maize	20	8	12
Barley	10	2	2
Oats, rye, and rice	15	4	4
	70	16	18
TROPICAL PRODUCTS (45)—			
Sugar-cane, 24 stalks or 1 stool	30	..	..
Cotton in seed, 10 lb., long staple	10	..	8
Coffee, 10 lb	5	..	4
	45	..	12
TOBACCO (10)—			
Tobacco leaf, dried, 5 lb.	10	..	5
Hay, oaten, wheaten, lucerne, &c.	20	10	6
Grasses and their seeds	10	8	7
Chaff, oaten, wheaten, lucerne	20	..	..
Ensilage, any form	15	4	..
Cattle fodder, including pumpkins	15	6	..
Sorghum and millet	10	8	7
Hemp, 5 lb.	5	..	4
Flax, 5 lb.	5	4	4
Cowpeas, seed, 7 lb.	7	6	5
Broom millet, 10 lb.	10	4	8
	117	67	47
WOOL (25)—			
Greasy, 5 fleeces	20	..	12
Mohair	5	..	..
	25	..	12
DRINKS, & C. (10)—			
Temperance drinks, 6 bottles	10	4	8
WOMEN'S AND CHILDREN'S WORK (30)—			
Needlework, knitting, fine art	10	9	6
School work, maps, writing, &c.	10	..	..
Fancy work	10	8	8
	30	17	14
Miscellaneous articles of commercial value			
Plants and flowers in pots	5	2	..
Time and labour-saving, useful articles, made on the farm	10	4	..
Effective arrangement of exhibits	10	6	9
	590	271	283



PLATE 11.—NATIVE GRASSES, SUGAR-CANE, AND SORGHUM EXHIBITS, DEPARTMENTAL COURT —NATIONAL ASSOCIATION EXHIBITION, 1920.



PLATE 12.—NATIVE GRASSES EXHIBIT, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.

DETAILS OF THE DISTRICT EXHIBITS.

"A" GRADE.

	Possible Points.	South Coast.	West Moreton.	Wide Bay and Burnett.	Central Queensland.
DAIRY PRODUCE (170)—					
Butter, 1 box	80	71	67	70	68
Milk, condensed, concentrated, or dried ..	30	..	24	..	..
Cheese, 1 cwt.	40	36	34	34	35
Eggs	20	6	12	10	6
	170	113	137	114	109
FOODS (180)—					
Ham and bacon	50	42	30	31	37
Rolled and smoked beef and mutton ..	30	18	14	8	8
Smallgoods and sausages, if smoked or preserved	10	8	7	4	6
Fish, smoked, &c.	10	3	6	..	6
Canned meat	25	10	..	..	20
Lard, tallow, and oils	20	17	14	12	14
All butchers' by-products, not included in any other part of scale of points	10	4	7	6	8½
Honey and its by-products	15	10	12	8	8
Confectionery	10	5	10	7	10
Bread, biscuits, scones, and cakes	10	6	10	6	10
	180	123	110	82	127½
FRUIT, VEGETABLES, AND ROOTS, fresh, preserved (200)—					
Fresh fruits all kinds	60	30	24	14	27
Preserved fruits, jams, &c.	30	28	12	11	24
Dried fruits	10	..	3	7	5
Fresh vegetables, all kinds, except potatoes	20	13	11	7	9
Preserved and dried vegetables, pickles, sauces, &c.	10	4	6	9	9
Potatoes	40	30	31	29	28
Roots, all kinds, and their products, arrow-root, cassava, meal, &c.	14	13	9	12	8
Cocoanut and nuts	6	4	3	5	4
Vegetable seeds	10	6	7	8	5
	200	128	106	102	119
GRAIN, &C. (150)—					
Wheat, flour, bran, pollard, and meals prepared therefrom	60	6	8	55	40
Maize, maizena, meals, starch, glucose, and cornflour	60	45	52	46	40
Barley, malt, pearl barley	20	6	6	17	10
Oats, rye, rice, and their meals	10	4	..	8	6
	150	61	66	126	96
MANUFACTURES AND TRADES (120)—					
All woodwork	20	10	10	8	10
All metal and iron work	20	8	15	18	15
Leather and all leather work and tanning ..	20	3	10	18	9
Manufactured woollen and cotton fibre ..	20	..	18	6	7
All tinwork	10	8	5	7	6
Artificial manures	10	9	4	7	6
Brooms and brushes	10	4	5	9	7
Manufactures not otherwise enumerated ..	10	5	7	5	6
	120	49	74	78	66

"A" GRADE—continued.

	Possible Points	South Coast.	West Moreton.	Wide Bay and Burnett.	Central Queensland.
MINERALS AND BUILDING MATERIALS (95)—					
Gold, silver, and precious stones	25	..	..	15	20
Coal, iron, other minerals, and salt	30	4	17	20	28
Stone, bricks, cement, marble, terra-cotta	20	19	15	8	14
Woods, dressed and undressed	20	15	10	12	10
	95	38	42	55	72
TROPICAL PRODUCTS (150)—					
Sugar-cane	60	48	12	40	45
Sugar, raw and refined	20	4	..	12	3
Rums, spirits, and by-products	10	8	4	8	..
Coffee (raw and manufactured), tea, and spices	10	3	1	2	1
Cotton (raw) and by-products	30	8	14	25	18
Rubber	10	..	..	..	..
Oils, medical and machinery	10	7	..	4	..
	150	78	27	91	67
WINES, & C. (30)—					
Wines	15	10	7	15	7
Aerated and mineral spa water	6	4	6	3	3
Vinegar and cordials	9	7	5	5	9
	30	21	18	23	19
TOBACCO (20)—					
Tobacco, cigar, and pipe, in leaf	20	7	12	15	15
HAY AND CHAFF, & C. (160)—					
Oaten, wheaten, lucerne, and other hay	30	13	20	20	30
Grasses and their seeds	10	2	4½	5	10
Oaten, wheaten, lucerne, and other chaffs	50	24	38	34	46
Ensilage and other prepared cattle fodder	20	8	18	12	7
Sorghum and millet	10	5	6	7	10
Commercial fibres (raw and manufactured)	10	3	6	6	8
Pumpkins and other green fodder	10	7	8	7	6
Hemp and flax	10	..	..	5	6
Broom millet	10	9	5	7	6
	160	71	105½	103	129
WOOL, & C. (110)—					
Scoured wool	40	30	20	30	40
Greasy wool	60	45	45	52	60
Mohair	10	..	7	9	5
	110	65	72	91	105
LADIES' WORK (20)—					
Needlework, knitting, fine art	10	7	5	7	5
School work, maps, writing, &c., for pupils of schools in the district	10	5	10	5	6
	20	12	15	12	11
EFFECTIVE ARRANGEMENT (50)—					
For effective arrangement of exhibits, with a maximum of 300 points	50	30	50	25	45
Totals	1,455	796	834½	917	980½

"B" GRADE.

There were three competitors in the "B" grade, which was won by Fassifern with 811 points out of a possible 1,230 points. Gympie came second with 793 points, and Kingaroy third with 681 points.

Following are the details:—

	Possible Points.	Kingaroy.	Gympie.	Fassifern.
DAIRY PRODUCE (170)—				
Butter	90	80	82	79
Cheese	60	49	36	50
Eggs	20	8	12	14
	170	137	140	143
FOODS (120)—				
Hams, bacon, rolled, and smoked meat and mutton	50	15	28	30
Fish, smoked	10	..	..	4
Lard, tallow, and oils	15	6	6	11
Honey and its by-products	25	8	14	16
Confectionery	10	7	10	8
Biscuits, bread, cakes, and scones	10	8	8	10
	120	44	66	79
FRUIT, VEGETABLES, AND ROOTS, fresh and preserved (185)—				
Fresh fruits of all kinds	60	13	29	27
Prepared fruits and jams, &c., prepared by farmer	20	16	17	16
Dried fruits, prepared by farmer	5	3	3	3
Fresh vegetables, all kinds, except potatoes	20	7	15	13
Preserved and dried vegetables, pickles, sauces, &c.	10	9	8	7
Potatoes	40	20	21	34
Roots (all kinds), and their products, arrow-root, cassava, meals, &c.	10	6	8	8
Cocoonut and nuts	10	8	6	6
Vegetable seeds	10	7	4	5
	185	89	121	119
GRAIN, & C. (150)—				
Wheat, flour, bran, pollard, macaroni, and meals prepared therefrom	60	40	35	22
Maize, maizena, meals, starch, glucose, and cornflour	60	45	48	55
Barley, malt, and pearly barley	20	10	12	10
Oats, rye, rice, and their meals	10	5	8	7
	150	100	103	94
WOODS—				
Dressed and undressed	20	10	10	10
Wattle bark	20	10	11	10
	40	20	21	20
Hides				
	20	15	15	30

"B" GRADE—continued.

	Possible Points.	Kingaroy.	Gympie.	Fassifern.
MINERALS (50)—				
Gold, silver, and precious stones	25	..	12	..
Coal, iron, and other minerals and salt ..	25	7	14	9
	50	7	26	9
TROPICAL PRODUCTS (115)—				
Sugar-cane	75	2	55	19
Coffee (raw and manufactured), tea, and spices	10	1	1	2
Cotton (raw) and by-products	30	4	6	10
	115	7	62	31
Tobacco, cigars, &c.	20	16	8	7
HAY, CHAFF, &c. (180)—				
Oaten, wheaten, and other hay	40	25	26	33
Grasses and their seeds	10	6	5	7
Oaten, wheaten, lucerne, and other chaffs ..	60	35	37	45
Ensilage and other prepared cattle fodder ..	20	9	10	15
Sorghum and millets	10	9	6	9
Commercial fibres (raw and manufactured)	10	7	5	8
Pumpkins and other green fodder	10	7	6	9
Hemp and flax	10	7	4	4
Broom millet	10	9	7	8
	180	114	106	138
WOOL, &c. (110)—				
Scoured wool	40	33	34	34
Greasy wool	60	40	47	52
Mohair	10	6	8	7
	110	79	89	93
LADIES' WORK (20)—				
Needlework, knitting, and fine arts ..	10	5	6	5
School work, maps, writing, &c., for pupils of schools in district	10	7	5	10
	20	12	11	15
EFFECTIVE ARRANGEMENTS (50)—				
For effective arrangement of exhibits ..	50	40	25	50
Totals	1,230	681	793	811

DETAILS OF CHEESE EXHIBITS.

Two export cheeses, 70-80 lb., to be not more than three weeks old prior to storing, white, suitable for English market. Exhibits to be placed in cold stores six weeks prior to July 26. First prize £5 5s., second £3, third £1.

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Downs Co-operative Dairy Co., Ltd., Hodgson's Vale	47	24	14 $\frac{1}{2}$	9 $\frac{1}{2}$	95
Greenmount Dairy Co., Ltd.	46	24	15	9	94
Pittsworth Dairy Co., Ltd., Scrubby Mount	45	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9 $\frac{1}{2}$	93
Greenmount Dairy Co., Ltd.	45	24	14 $\frac{1}{2}$	9	92 $\frac{1}{2}$
Gayndah Co-operative Dairy Co., Ltd., Byrnestown	45	24 $\frac{1}{2}$	14	8 $\frac{1}{2}$	92
Greenmount Dairy Co., Ltd.	44	24	14 $\frac{1}{2}$	9	91 $\frac{1}{2}$
Greenmount Dairy Company, Limited	45	24	14	8 $\frac{1}{2}$	91 $\frac{1}{2}$
Pittsworth Dairy Company, Limited	44	24	14	9	91
Southbrook Co-operative Dairy Company	44	23 $\frac{1}{2}$	14	8 $\frac{1}{2}$	90
Lauriston Co-operative Dairy Company, Limited	43 $\frac{1}{2}$	23 $\frac{1}{2}$	14	8 $\frac{1}{2}$	90
Sunnyvale Co-operative Cheese Company, Limited	44	23	14 $\frac{1}{2}$	8 $\frac{1}{2}$	90
Woodleigh Cheese Factory	42	24	14	9	89
Gayndah Co-operative Dairy Company, Limited	43	24	14	8	89

Two export cheeses, 70-80 lb. to be not more than three weeks old prior to storing. Coloured, suitable for English market. Exhibits to be placed in cold stores six weeks prior to July 26th. First prize, £5, second £3, third £1.

	Flavour.	Texture.	Colour.	Finish.	Total.
Possible points	50	25	15	10	100
Downs Co-operative Dairy Company, Limited, Hodgson's Vale	47	24 $\frac{1}{2}$	14	9 $\frac{1}{2}$	95
Greenmount Dairy Company, Limited	47	24 $\frac{1}{2}$	14 $\frac{1}{2}$	8 $\frac{1}{2}$	94 $\frac{1}{2}$
Greenmount Dairy Company, Limited	40	24	14 $\frac{1}{2}$	9 $\frac{1}{2}$	94
Downs Co-operative Dairy Company, Limited, Gowrie Junction	46	24	14 $\frac{1}{2}$	9	93 $\frac{1}{2}$
Pittsworth Dairy Company, Limited, Scrubby Mount	45 $\frac{1}{2}$	24 $\frac{1}{2}$	14	9 $\frac{1}{2}$	93 $\frac{1}{2}$
Greenmount Dairy Company, Limited	46	24 $\frac{1}{2}$	14 $\frac{1}{2}$	9	93
Pittsworth Dairy Company, Limited	46	24	13 $\frac{1}{2}$	9	92 $\frac{1}{2}$
Pittsworth Dairy Company, Limited, Springside	45	24	14	9 $\frac{1}{2}$	92 $\frac{1}{2}$
Woodleigh Cheese Factory	45	24	14 $\frac{1}{2}$	9	92 $\frac{1}{2}$
Rosalie Cheese Factory	45	24 $\frac{1}{2}$	14 $\frac{1}{2}$	8	92
Warwick Butter and Dairying Co., Limited	45	24 $\frac{1}{2}$	13 $\frac{1}{2}$	9	92
Gayndah Co-operative Dairy Company, Limited, Byrnestown	44	24 $\frac{1}{2}$	14	9	91 $\frac{1}{2}$
Lauriston Co-operative Dairy Company	44	24	14	9	91
Greenmount Dairy Company, Limited	46	24 $\frac{1}{2}$	13 $\frac{1}{2}$	7	91
Downs Co-operative Dairy Company, Limited, Koondai	43	24	14	9	90
Sunnyvale Co-operative Cheese Company, Limited	43 $\frac{1}{2}$	24	13 $\frac{1}{2}$	9	90
Gayndah Co-operative Dairy Company, Limited, Binjour	42	23 $\frac{1}{2}$	13	8 $\frac{1}{2}$	87

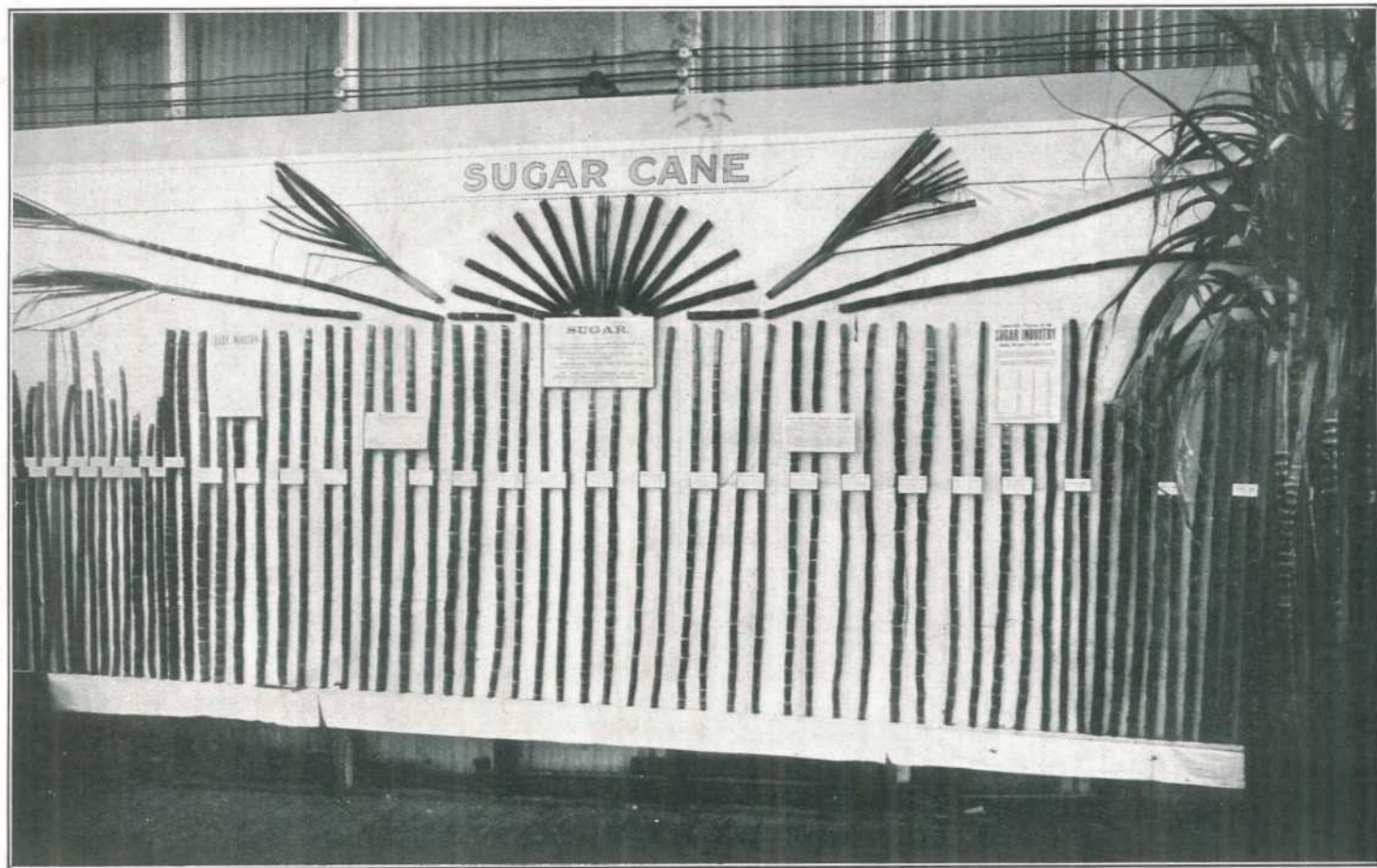


PLATE 13.—SUGAR-CANE VARIETIES EXHIBIT, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.

BUTTER EXHIBITS.

ONE BOX (SALTED) 30 DAYS' STORAGE.

	Flavour.	Texture.	Colour.	Salting.	Packing and Finish	Total.
Possible Points	65	20	7	4	4	100
Singleton Central Co-operative Dairy Company, N.S.W.	59	19	7	4	4	93
Downs Co-operative Dairy Company, Limited, Toowoomba Central	58	19½	7	4	4	92½
Queensland Farmers' Co-operative Company, Limited, Boonah	57½	19½	7	4	4	92
Downs Co-operative Dairy Company, Dalby	57	19	7	4	4	91
Dungong Co-operative Butter Factory, N.S.W.	56	19	7	4	4	90
Wide Bay Co-operative Dairy Company, Gympie	56	19	7	4	4	90
Queensland Farmers' Co-operative, Booval	56	19	7	4	4	90
Oakey District Co-operative Butter Company, Crosshill	56	19	7	4	4	90
Maryborough Co-operative Dairy Company, Kingaroy	56	16	7	7	4	90
Logan and Albert Co-operative Dairy Company, Limited, Beaudesert	56	19	7	4	4	90
Dorrigo Co-operative Dairy Company, Limited, N.S.W.	56	19	7	4	4	90
Warwick Butter and Dairying Company, Texas	56	19	7	4	4	90
Warwick Butter and Dairying Company, Allora	56	19	7	4	4	90
Maryborough Co-operative Dairy Company, Limited, Biggenden	55½	19	7	4	4	98½
Maryborough Co-operative Dairy Company, Limited, Mundubbera	56	18½	7	4	4	89½
Downs Co-operative Dairy Company, Limited, Clifton	55	19	7	4	4	89
Caboolture Co-operative Dairy Company, Limited, Pomona	56	19	7	4	3	89
Goombungee Co-operative Dairy Company, Limited, Goombungee	55	19	7	4	4	89
Warwick Butter and Dairying Company, Limited, Goondiwindi	55	19	7	4	4	89
Warwick Butter and Dairying Company, Limited, Millhill	55	19	7	4	4	89
Queensland Farmers' Co-operative Limited, Laidley	55	18	7	4	4	88
Maryborough Co-operative Dairy Company, Limited, Maryborough	55	18	7	4	4	88
Wide Bay Co-operative Dairy Company, Limited, Cooroy	55	18	6	4	4	88
Queensland Farmers' Co-operative Company, Limited, Grantham	54	18	7	4	4	87
Gayndah Co-operative Dairy Company, Limited, Gayndah	54	19	7	3	4	87
Kin Kin Co-operative Dairy Company, Limited, Kin Kin	53	18	7	4	4	86
Caboolture Co-operative Dairy Company, Limited, Caboolture	48	19	7	4	3	82

ONE BOX (SALTED) EIGHT WEEKS' STORAGE.

Queensland Farmers' Co-operative Company, Limited, Boonah	58	20	7	4	4	93
Maryborough Co-operative Dairy Company, Limited, Kingaroy	58	19½	7	4	4	92½
Downs Co-operative Dairy Company, Limited, Toowoomba Central	57	20	7	4	4	92

BUTTER—*continued.*ONE BOX (SALTED) EIGHT WEEKS' STORAGE—*continued.*

	Flavour.	Tenure.	Co'our.	Saltlag.	Packing and Finish.	Total.
Warwick Butter and Dairying Company, Limited, Mill Hill	57½	19	7	4	4	91½
Dungog Co-operative Butter Factory, Limited, N.S.W.	56½	19½	7	4	4	91
Wide Bay Co-operative Dairy Company, Limited, Gympie	57	19	7	4	4	91
Oakey District Co-operative Butter Company, Limited, Crosshill	57	19	7	4	4	91
Goombungee Co-operative Dairy Company, Limited, Goombungee	56½	19½	7	4	4	91
Dorrigo Co-operative Dairy Company, Limited, N.S.W.	57	19	7	4	4	91
Warwick Butter and Dairying Company, Limited, Goondiwindi	57	19	7	4	4	91
Singleton Central Co-operative Dairy Company, Limited, N.S.W.	56½	19	7	4	4	90½
Warwick Butter and Dairying Company, Limited, Allora	56½	19	7	4	4	90½
Downs Co-operative Dairy Company, Limited, Dalby	56	19	7	4	4	90
Queensland Farmers' Co-operative Company, Limited, Booval	56	19	7	4	4	90
Queensland Farmers' Co-operative Company, Limited, Laidley	55½	19½	7	4	4	90
Logan and Albert Co-operative Dairy Company, Limited, Beaudesert	56	19	7	4	4	90
Warwick Butter and Dairying Company, Limited, Texas	56	19	7	4	4	90
Wide Bay Co-operative Dairy Company, Limited, Cooroy	55	19	7	4	4	89
Queensland Farmers' Co-operative Company, Limited, Grantham	55	19	7	4	4	89
Caboolture Co-operative Dairy Company, Limited, Caboolture	56	19	7	4	4	89
Maryborough Co-operative Dairy Company, Limited, Mundubbera	56½	18½	7	4	4	89
Maryborough Co-operative Dairy Company, Limited, Biggenden	55	18½	7	4	4	88½
Maryborough Co-operative Dairy Company, Limited, Maryborough	54	19	7	3	4	87
Gayndah Co-operative Dairy Company, Limited, Gayndah	54	18	7	4	4	87
Kin Kin Co-operative Dairy Company, Limited, Kin Kin	53	18	7	3	4	85

ONE BOX (UNSALTED) EIGHT WEEKS' STORAGE.

Downs Co-operative Dairy Company, Limited, Dalby	58½	19½	7	4	..	89
Maryborough Co-operative Dairy Company, Limited, Maryborough	58	19½	7	4	..	88½
Dungog Co-operative Butter Factory, Limited, N.S.W.	57½	19½	7	4	..	88
Queensland Farmers' Co-operative Company, Limited, Laidley	57½	19	7	4	..	87½
Downs Co-operative Dairy Company, Limited, Toowoomba Central	57	19½	7	4	..	87½
Wide Bay Co-operative Dairy Company, Limited, Cooroy	56½	19½	7	4	..	87
Maryborough Co-operative Dairy Company, Limited, Biggenden	57	19	7	4	..	87

BUTTER—*continued.*ONE BOX (UNSALTED), EIGHT WEEKS' STORAGE—*continued.*

	Flavour.	Texture.	Colour.	Setting.	Packing and Finish.	Total.
Possible points	65	20	7	4	4	100
Warwick Butter and Dairying Company, Limited, Allora	57	19	7	4	..	87
Wide Bay Co-operative Dairy Company, Limited, Gympie	56½	19	7	4	..	86½
Queensland Farmers' Co-operative Company, Limited, Booval	56½	19	7	4	..	86½
Goombungee Co-operative Dairy Company, Limited, Goombungee	56½	19	7	4	..	86½
Warwick Butter and Dairying Company, Limited, Texas	56½	19	7	4	..	86½
Queensland Farmers' Co-operative Company, Limited, Boonah	56	19	7	4	..	86
Oakey District Co-operative Butter Company, Limited, Crosshill	56	19	7	4	..	86
Caboolture Co-operative Dairy Company, Limited, Caboolture	56	19	7	4	..	86
Maryborough Co-operative Dairy Company, Limited, Kingaroy	57	19	7	3	..	86
Maryborough Co-operative Dairy Company, Limited, Mundubbera	56	19	7	4	..	86
Logan and Albert Co-operative Dairy Company, Beaudesert	56	19	7	4	..	86
Dorrigo Co-operative Dairy Company, Limited, N.S.W.	56	19	7	4	..	86
Warwick Butter and Dairying Company, Limited, Goondiwindi	56	19	7	4	..	86
Warwick Butter and Dairying Company, Limited, Mill Hill	56½	18½	7	4	..	86
Queensland Farmers' Co-operative Company, Limited, Grantham	55½	19	7	4	..	85½
Kin Kin Co-operative Dairy Company, Kin Kin	55	19	7	4	..	85

THE DEPARTMENT OF AGRICULTURE

was well represented, especially in the exhibits of sugarcane, the different varieties of which were well classified. The following is a brief description of the general decorative scheme adopted this year by the Department, and arrayed by Mr. H. W. Mobsby, Artist and Photographer to the Department:—

The Court of the Stock Department of Agriculture and Stock at the Show this year was of a quadrangular setting of massive-looking columns and headings, situated as usual on the Gregory terrace side of the annexe. At each of the four corners of the quadrangle were displays of cotton, wool, Northern products, and pure seeds and cereals and grain, with two intermediate displays of sisal fibre, ropes and cordage on the centre of the main avenue front, and an exhibit of the work of the Stock Institute on the centre of the Gregory terrace avenue. On the wall of this avenue were shown exhibits of ensilage from the Q. A. College, native grasses, etc., from the Government Botanist's branch, varieties of sugarcane from the Sugar Experiment Stations, Mackay and Babinda, examples of fodders, etc., and a general Northern collection of Tropical Produce. On the wall at right angles to this, and on the top side of the Court, were examples of the work of the Government Entomologist and Pathologist's Branch, shown in natural-coloured enlargements, also cases containing "Life histories" of the several insects and pests. Situated in the centre of the Court was a trophy of octagonal design displaying general agriculture and fruits of Northern, Southern and Western Queensland, comprising varieties of wheats

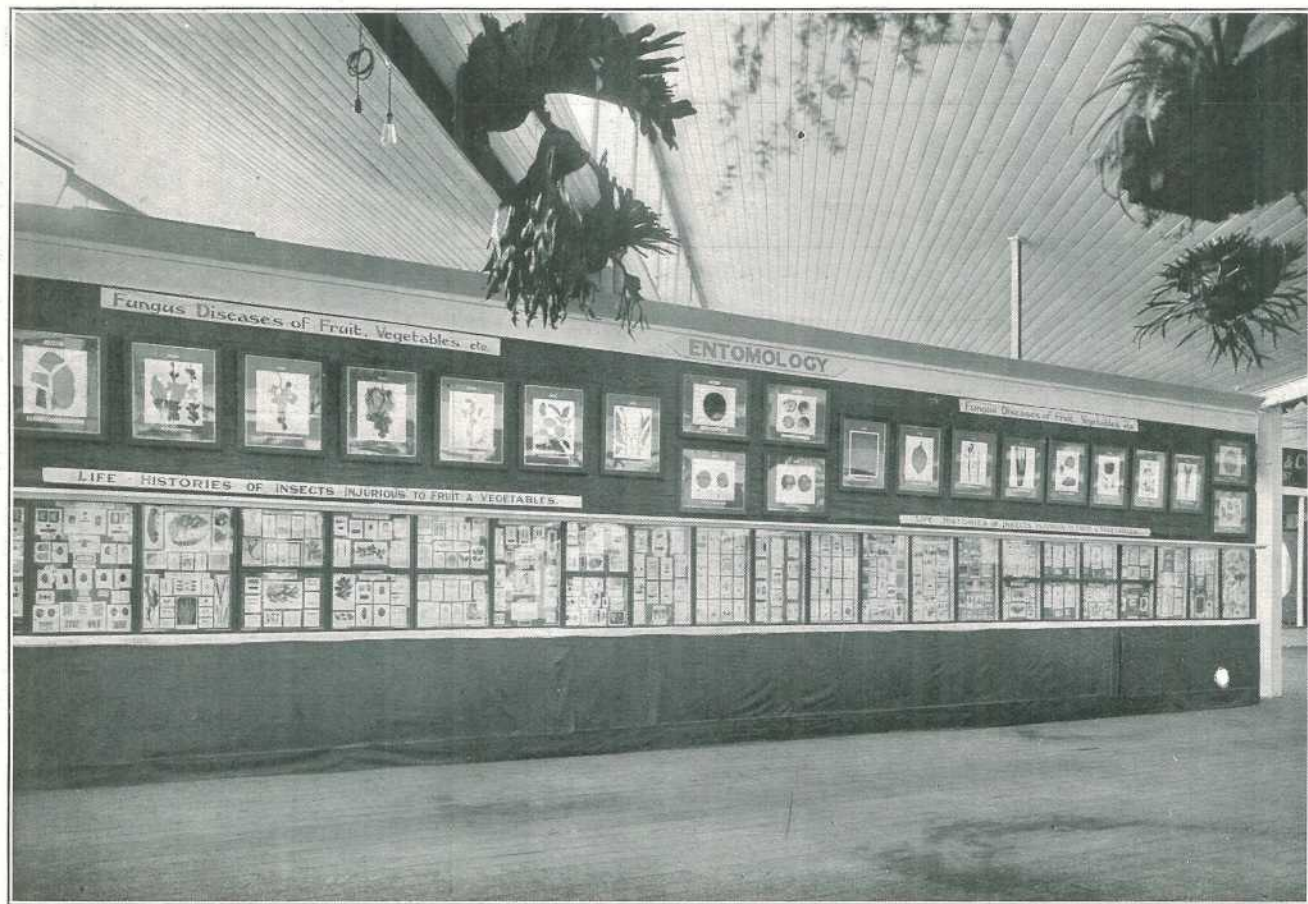


PLATE 14.—ENTOMOLOGICAL EXHIBIT, DEPARTMENTAL COURT—NATIONAL ASSOCIATION EXHIBITION, 1920.

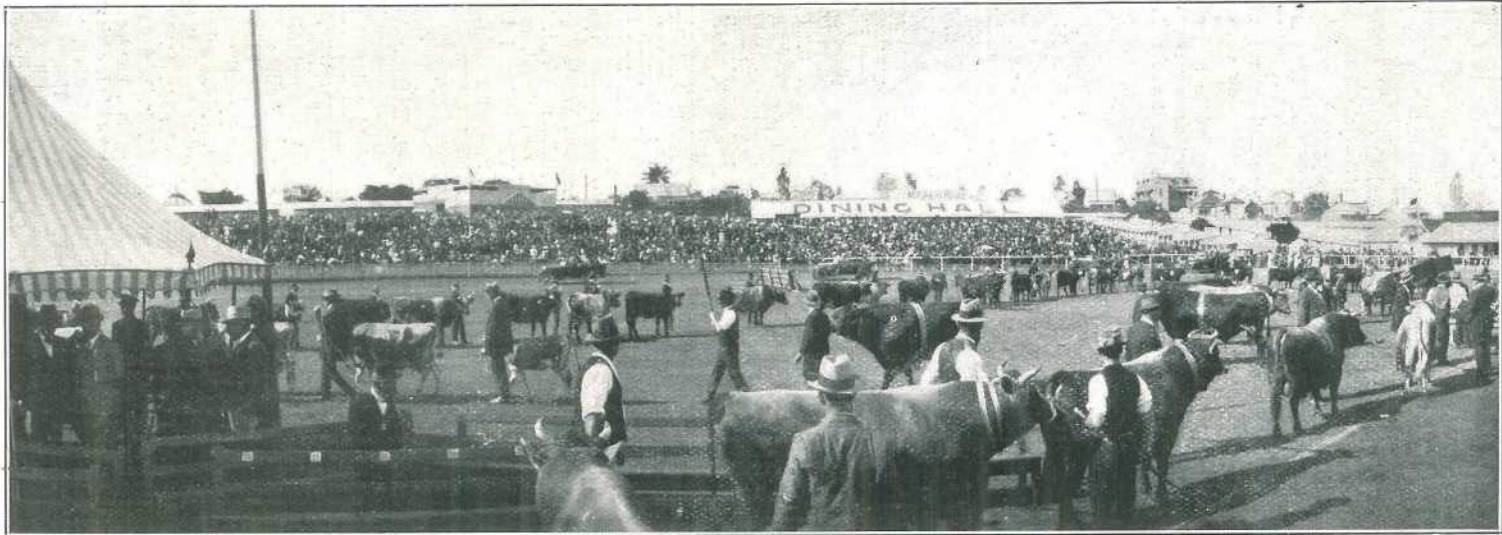


PLATE 15.—CATTLE PARADE—NATIONAL ASSOCIATION EXHIBITION, 1920—OPENING DAY.

in sheaf and glass; also varieties of maize, grains, etc. On each of the sections were sloping panels displaying maize, wheat, cowpea, and kaffir corn, each representing in design the "Prince of Wales Feathers," made of the grain; the panels between each of these contained displays of citrons and other fruits of Northern and Southern Queensland. Immediately above these panels were standing sheaves of wheat, supported by heads of fodder, grasses and grain in glass, and surmounting all was a central emblematical feature in the form of an "Imperial Crown," correct in all details including the gems, but represented entirely by the varieties and colours of maize, "King of Grain."

An important feature of the Court was the comprehensiveness of the display, forming an interesting exhibit of educational value, and depicting the operations of the Department of Agriculture and Stock, in no small degree, at the same time having a clear floor space enabling visitors to more easily view the exhibit.

A pleasing general colour scheme prevailed, ivory white and shades of purple, relieved with maroon and gold, also light asparagus festooning between the columns, making the whole aspect of the Court artistic, bright, and cheerful.

POULTRY.

(Judges, Messrs. A. A. Roberts, W. Hindes, W. D. Dell, J. Hallett, and T. Fanning.)

Brahma, any colour, cock or cockerel: W. E. Smalley 1, W. Want 2. Hen or pullet: W. E. Smalley 1 and 2. Dorking, any colour, cock or cockerel, and hen or pullet: Mrs. W. E. Faulkner. Langshan, any colour, any variety, cock or cockerel: F. G. Barnett. Hen or pullet: W. E. Smalley 1, F. G. Barnett 2. Plymouth Rock, single comb, barred, cock: Geo. L. Brauer 1 and 2, J. Page 3. Hen: J. E. Hastings 1 and 2, Frank Stanfield 3. Cockerel: C. F. Branthwaite 1, W. J. Ewart 2, Frank Stanfield 3. Pullet: J. E. Hastings 1, W. J. Ewart 2, W. J. Trezise 3. White, cock: Geo. L. Brauer 1, W. H. Duffy 2, A. R. Hatcher 3. Hen: G. L. Brauer 1, James Pryde 2, W. H. Duffy 3. Cockerel: A. R. Hatcher 1, James Pryde 2. Pullet: W. H. Duffy 1 and 2. Wyandotte, silver-laced, cock: A. Christensen 1, C. W. Searl 2. Hen: W. C. Oxlade 1, A. A. Roberts 2, Jas. Munro, jun. 3. Cockerel: W. H. Wakefield 1, A. Christensen 2, S. D. Raff 3. Pullet: S. D. Raff 1 and 2, Jas. Munro, jun., 3. Gold-laced, hen, cockerel, and pullet: W. E. Smalley. White, cock: R. C. Doherty 1, A. F. Knowles 2. Hen: H. Dickson 1, R. C. Doherty 2, T. B. Barker 3. Cockerel: Jas. Munro, jun., 1, H. Dickson 2, F. M. Vogel 3. Pullet: Jas. Munro, jun., 1, H. Dickson 2. Any other colour, cock: A. Miller 1, T. B. Barker 2. Hen: A. Miller 1, C. D. Hooper 2. Cockerel: James Ferguson 1, A. Miller 2. Pullet: C. D. Hooper 1, James Ferguson 2. Orpington, black, cock: W. J. Ewart 1, Geo. Grace 2, Mrs. A. E. Gallagher 3. Hen: Geo. Grace 1 and champion, T. B. Barker 2, Mrs. A. E. Gallagher 3. Cockerel: W. and G. W. Hindes 1, 2, and 3. Pullet: Geo. Grace 1, C. W. Searl 2, John McCaffrey 3. Buff, cock: A. G. Bennet 1, C. W. Watts 2, McBean Bros. 3. Hen: A. G. Bennet 1, McBean Bros. 2, W. J. Taylor 3. Cockerel: W. J. Taylor 1, C. W. Watts 2, C. W. Searl 3. Pullet: W. J. Taylor 1, A. G. Bennet 2, C. W. Searl 3. Favorolle, any colour, cock or cockerel, and hen or pullet: F. W. Leney, Rhode Island, single comb, red, cock: Victor Brand 1, J. N. Fisher 2, Holmes Bros. 3. Hen: J. N. Fisher 1, Holmes Bros. 2, James Ferguson 3. Cockerel: James Ferguson 1, 2, and champion, Mrs. E. A. Thompson 3. Pullet: James Ferguson 1, J. N. Fisher 2, E. Moore 3. Any other variety, cock or cockerel, and hen or pullet: F. W. Leney. Sussex, any colour, cock: F. P. Wotton. Hen: J. Williams 1, F. P. Wotton 2. Cockerel and pullet: F. P. Wotton. Any other variety, cock or cockerel: Tom Clarke 1, W. B. McLaughlin 2. Hen or pullet: Tom Clarke 1 and 2. Leghorn, single comb, brown, cock: John Erskine 1 and 2. Hen: A. L. Stewart 1, F. Miller 2, A. L. Stewart 3. Cockerel: Tom Bird 1, F. Miller 2 and 3. Pullet: John Erskine 1, F. Miller 2. White, cock: Alfred Astill 1, R. R. Brown 2, J. Larcombe 3. Hen: R. R. Brown 1 and 2, R. Cooper 3, David Ness 4. Cockerel: R. R. Brown 1 and 2, J. Larcombe 3, Fred Batchelor 4. Pullet: Henry Basford 1, R. R. Brown 2, Fred Batchelor 3, R. R. Brown 4. Rose comb, brown, hen or pullet, and cock or cockerel: Mrs. Heath. Minorca, single comb, cock: P. N. Ingham 1, Jas. A. McRobert 2. Hen: T. J. Hughes 1 and champion, P. N. Ingham 2, J. Williams 3. Cockerel: R. C. Doherty 1, T. J. Hughes 2, O. Meakin 3. Pullet: T. J. Hughes 1, H. Leeper 2, Jas. A. McRobert 3. Andalusian, cock: F. P. Wotton 1, 2, and champion. Hen: F. P. Wotton 1 and 2. Cockerel: F. P. Wotton 1, A. Miller 2. Pullet: F. P. Wotton 1, A. J. McGrory 2. Black Spanish, hen or pullet: Mrs. R. Murray 1 and 2. Hamburg, gold or silver spangled, or pencilled, cock: J. E. Hastings 1, S. Williams 2. Hen: S. Williams 1, J. E. Hastings 2. Cockerel: J. E. Hastings 1 and champion. Any other colour, cock: W. J. Brauer. Hen: W. G. Shearer 1, W. J. Brauer 2. Cockerel: W. J. Brauer 1, D. Owens 2. Pullet: W. G. Shearer 1, W. J. Brauer 2. Sicilian buttercups, cocks: F. J. Will 1 and champion, Jas. T. Wiley

2. Hen: W. J. Schrey, 1 and 2. Cockerel: R. Gillespie 1, J. T. Wiley 2. Pullet: W. J. Schrey 1, R. Gillespie 2. Silver Campines, any colour, cock: Arch. C. Davies 1 and champion, Mrs. R. Murray 2. Cockerel: Mrs. R. Murray. Pullet: Arch. C. Davies 1, Mrs. R. Murray 2. Aneonas, cock: Phil McGrory 1 and champion, T. E. Sleeman 2, H. Stephens 3. Hen: H. Stephens 1, John Docherty 2, Geo. Andrews 3. Cockerel: Phil McGrory 1, J. B. Thomson 2, H. Denby 3. Pullet: H. Stephens 1, Daniel Dalton 2, John Docherty 3.

Game Varieties.—Modern British, black-breasted, red, cock: W. Williams 1, F. Gerlee 2, W. T. Duthie 3. Hen: A. H. McConechy 1, Wilson and Smith 2, S. Webber 3. Cockerel: S. Webber 1, W. T. Duthie 2, C. H. Quince 3. Pullet: Henry Bashford 1, A. H. McConechy 2, Wilson and Smith 3. Pile, cock: W. T. Duthie 1 and 2. Hen: W. Williams 1 and 2. Cockerel: W. T. Duthie 1, 2, and 3. Pullet: W. Williams 1 and 2. Duckwing, cock: W. T. Duthie 1, Henry Bashford 2. Cockerel: A. H. McConechy 1 and champion, F. Gerlee 2 and 3. Hen: A. H. McConechy 1, Henry Bashford 2, Wilson and Smith 3. Pullet: E. B. Graham 1, W. Williams 2. Old English game, black-breasted, red, cock: H. A. Bostock 1, Hampson Bros. 2, W. H. Greasley 3. Hens: A. J. Larcock 1, A. A. Roberts 2, W. Latham 3. Wheaten or clay hen: Hampson Bros. 1, A. Priestly 2, A. Martin 3. Cockerel: A. J. Larcock 1, W. Fox 2, A. Martin 3. Partridge, wheaten or clay, pullet: W. Latham 1, A. Priestly 2, A. Martin 3. Spangled or broken colour cock: Hampson Bros. 1, H. A. Bostock 2, E. M. Jones 3. Hen: W. H. Greasley 1, Hampson Bros. 2. Cockerel: H. A. Bostock 1, Wm. Fox 2, E. M. Jones 3. Pullet: H. A. Bostock 1, A. J. Larcock 2, W. H. Greasley 3. Any other colour, cock: H. A. Bostock 1, A. J. Larcock 2, E. M. Jones 3. Hen: A. J. Larcock 1, H. A. Bostock 2. Cockerel: H. A. Bostock 1, Wm. Fox 2, Hampson Bros. 3. Pullet: H. A. Bostock 1, Hampson Bros. 2, Wm. Fox 3. Pit game, any colour, cock: Mrs. C. Donnelly 1 and champion, F. A. Green 2, James Page 3. Hen: D. J. Coogan 1, E. Walker 2, Jas. D. Wylie 3. Cockerel: F. A. Green 1, Joel Ashcroft 2 and 3. Pullet: D. J. Coogan 1, F. Tedman 2, E. Walker 3. Henfeather, cock: Watson and Brown 1, J. A. Poulton 2, Joel Ashcroft 3. Hen: Wilson and Smith 1, D. J. Coogan 2, W. D. Dell 3. Cockerel: G. Wilson 1, W. D. Dell 2, J. D. Stephens 3. Pullet: J. D. Stephens 1, W. D. Dell 2 and 3. Malay, cock and hen: S. Keith. Indian game, cock: A. J. McGrory 1, J. Gaydon 2, G. Grace 3. Hen: A. J. McGrory 1, J. W. Horrobin 2, S. Keith 3. Cockerel: J. W. Horrobin 1 and 3, J. Gaydon 2. Pullet: J. Gaydon 1, H. Stephens 2, J. Gambling 3. Australian game, cock: S. Keith. Hen: S. Keith 1, T. J. Mullen 2. Any other variety: T. J. Mullen.

Utility Classes.—Leghorn, cock or cockerel: M. Floyd 1, L. A. Peirce 2, F. W. Leney 3. Hen or pullet: M. Floyd 1 and 2, F. W. Leney 3. Any other light variety, hen or pullet: H. Stephens 1, J. Docherty 2 and 3. Orpington, cock or cockerel: J. J. Curley 1, John F. Beeston 2, F. W. Leney 3. Hen or pullet: Frank Lewis 1, J. J. Curley 2, R. Gillespie 3. Any other heavy variety, cock or cockerel: F. Keen 1, John F. Beeston 2, James Ferguson 3. Hen or pullet: John F. Beeston 1, F. W. Leney 2, James Ferguson 3.

Breeding Pen, male and two females.—Leghorns, single comb, white: Alfred Astill 1, J. A. Poulton 2, Alfred Astill 3. Brown: Tom Bird 1, John Erskine 2. Minorcas: P. N. Ingham 1, Alfred Astill 2, S. N. Wood 3. Aneonas: Albert Bevis 1, G. A. Andrews 2, W. Hasper 3. Any other light variety: Mrs. R. Murray 1, F. P. Wotton 2, Albert Bevis 3. Plymouth Rocks: W. E. Smalley 1, J. E. Hastings 2, Mrs. R. Murray 3. Wyandottes, any other colour: Jas. Munro, jun. 1, C. D. Hooper 2. Orpington, black: W. Hughes 1, W. and G. W. Hindes 2, C. W. Searl 3. Any other variety: C. W. Searl 1, M'Bean Bros. 2, J. G. Higgleton 3. Rhode Island, any colour, any variety: Holmes Bros. 1, J. N. Fisher 2, E. White 3. Any other heavy variety: Mrs. R. Murray. Indian game: A. J. McGrory 1, John Gambling 2, J. W. Horrobin 3. Pit: E. Herrington 1, G. Mellfont 2, J. O'Brien 3. Old English: A. Martin 1, Hampson Bros. 2. Any other variety: R. H. Bryans 1, W. T. Duthie 2, A. J. Schmieg 3.

Utility Pens.—White Leghorns: W. and G. W. Hindes 1, M. Floyd 2, R. H. Woodcock 3. Orpingtons: H. O. Jones 1, J. J. Curley 2. Rhode Island Reds: F. W. Leney 1, J. N. Fisher 2.

Table Poultry.—Dressed, 4½lb., and under: Mrs. R. Murray. Over 4½lb.: W. J. Trezise 1, Mrs. R. Murray 2, Mrs. A. Wyllie 3. Capons, light: J. Finnigan.

Bantams.—Modern game, any colour, cock: M. L. Davies 1, J. Rowan 2. Cockerel: W. Kyte 1, J. Rowan 2, M. L. Davies 3. Hen: J. Rowan 1, M. L. Davies 2. Pullet: M. L. Davies 1, W. Kyte 2, J. Rowan 3. Old English game, black, red, cock: H. Wotton 1, Geo. Mellifont 2, W. Want 3. Partridge, hen: Frank Stanfield 1, H. Wotton 2, J. Bailey 3. Wheaten or clay, hen: Frank Stanfield. Black red cockerel: F. Stanfield 1, J. Bailey 2, G. Mellifont 3. Partridge or wheaten, pullet: A. E. Simpson 1, J. Bailey 2, H. Wotton 3. Spangled or broken colour, cock: C. F. Branthwaite 1, A. Campbell 2, J. Rowan 3. Hen: J. Rowan 1, A. Campbell 2. Cockerel: W. Hughes 1, Mrs. O. Hopes 2, Mrs. R. Murray 3. Pullet: Mrs. R. Murray 1, J. Rowan 2. Duckwing, cock or cockerel: Mrs. R. Murray 1, M. L. Davies 2, W. Hughes 3. Hen or pullet: Mrs. R. Murray. Any other colour, cock: Frank Stanfield 1, Mrs. R. Murray 2. Hen: D. Parmenter 1, Frank Stanfield 2, Mrs. R. Murray 3. Rose comb, hen: A. Miller. Cockerel and pullet: A. Miller 1, M. L. Davies 2. Pekin, buff hen: J. Rowan 1, Mrs. R. Murray 2. Cockerel: A. Miller 1, J. Rowan 2. Pullet: J. Rowan 1, A. Miller 2. Black cock: J. Rowan 1 and 2. Hen: J. Rowan 1, M. L. Davies 2. Cockerel: J. Rowan 1, A. Miller 2. Pullet: J. Rowan 1, M. L. Davies 2. Any other colour, cock: M. L. Davies 1, J. Rowan 2. Hen: J. Rowan 1 and 2. Silkies, cock and hen: A. J. McGrory 1, J. Rowan 2. Cockerel: G. Mellifont 1, J. Rowan 2. Pullet: G. Mellifont 1, J. Rowan 2, A. J. McGrory 3. Siebrights, silver, cock: Phil McGrory 1, Mrs. R. Murray 2. Hen: Phil McGrory 1, A. Miller 2. Cockerel: A. Miller 1, J. Rowan 2. Pullet: A. Miller 1, M. L. Davies 2. Gold, hen or pullet: J. Rowan 1 and 2. Any other variety, 1, J. Rowan 2. Cockerel: Mrs. B. Murray. Pullet: Mrs. R. Murray 1, D. McDougall 2.

Breeding Pens.—Modern game, male and two females: J. Rowan 1, Mrs. R. Murray 2. Old English game, any colour: H. Wotton 1, Mrs. R. Murray 2. Pekins, any colour: R. Gillespie 1, J. Rowan 2, Mrs. R. Murray 3. Rose comb: Mrs. R. Murray. Silkies: J. Rowan 1, Mrs. R. Murray 2.

Ducks.—Rouen, drake: J. Rowan 1 and champion. Duck: J. Rowan 1 and champion. Muscovy, white, drake: C. C. Norton 1 and champion. Duck: C. C. Norton. Indian Runner, white, drake and duck: J. Rowan. Any other colour, drake: J. Soden, jun., 1 and champion, R. W. Robertson 2. Duck: J. Soden, jun. 1, R. W. Robertson 2. Indian Runner, young drake and duck, under 12 months: J. Soden, jun. Any other variety, drake and duck: J. Rowan.

Breeding Pens.—Indian Runner: J. Soden, jun. Muscovy, white: Chas. T. Woods 1, C. C. Norton 2. Any other colour: A. Dobson. Any other variety: J. Rowan.

Geese.—Toulouse or Emden, goose or gander: Mrs. R. Murray. Any other variety: A. E. Simpson 1 and 2.

Turkeys.—Bronzewing, cock and hen: Doyle and Charles. Breeding pen: Mrs. C. A. Mooreland.

Guinea Fowls.—Cock and hen: J. Rowan 1, A. E. Simpson 2.

Miscellaneous.—Guinea pig, buck or doe: J. Rowan.

LIST OF CHAMPIONS.

Light variety, male: Phil McGrory. Female: A. L. Stewart. Pit game: Mrs. C. Donnelly. Minorca: T. J. Hughes. Pekin, male: J. Rowan. Female: James Ferguson. Siebrights: A. Miller. Old English game, bantam: J. Rowan. Duckwing, male: A. H. McConechy. Female: W. H. Greasley. Spangled or broken colour, male: Hampson Bros. Female: W. H. Greasley. Australian game: S. Keith. Modern game: bantam, M. L. Davies. Indian game: A. J. McGrory. Henfeather: Watson and Brown. Malay: S. Keith. Champion male bird of show: J. Rowan.

JUVENILE CORN-GROWING COMPETITION.

It has been decided by the Department of Agriculture to hold another Juvenile Corn-growing Competition for 1920-21, which will be open to boys and girls who are under 18 years of age on the date of application being made.

Applications must be submitted to the Under Secretary, Department of Agriculture and Stock, Brisbane, not later than 9th October, this year, and be accompanied by an entrance fee of 2s. 6d. Particulars should be sent at the same time of the following:—

- (a) Full name and address, with christian names in full.
- (b) Date of birth (day, month, and year).
- (c) Name of dairy inspector who supervises the particular locality in which the applicant resides.

Three special prizes, to the value of £10, £5, and £3 respectively, will be awarded for first, second, and third prizes in the competition.

District prizes of £5, £2, and £1 will be given as district prizes under certain conditions, viz.:—

If there are less than six competitors the prizes will be allowed as follow:—

Four to five competitors (inclusive), two prizes—first and second;

Two to three competitors (inclusive), one prize only—first;

When only one competitor, he or she will be debarred from participating in the district prize, but will be eligible to compete for the special prizes.

It will thus be seen that it is in the interests of the competitors to encourage others to enter for the competition.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his or her prize.

No prize will be awarded unless the yield of corn equals 20 bushels per acre, but this stipulation may be waived under very exceptional circumstances in the case of a lower yield.

GRAIN FOR SALE.

SEED MAIZE.

To growers desirous of obtaining supplies of pure and reliable strains of improved seed, the following varieties are being offered and represent limited stocks raised from selected strains of Departmental seed:—

Yellow.—Improved Yellow Dent and Hiawatha Yellow Dent.

White.—Boone County White.

CONDITIONS OF SALE.

Applications for seed, with accompanying remittance (exchange added) should be addressed to the Under Secretary for Agriculture, Brisbane. (*Postal address and name of railway station should be given.*) It will be taken for granted (unless otherwise specified) that a similar type and kind of grain to the one ordered can be sent as a substitute. This provision applies only in cases where orders exceed the available supply of any one variety of seed (yellow).

Advice will be sent when seed is despatched.

Purchasers are requested to write promptly after receipt of seed should any matters require adjustment.

PRICES.

To enable applicants living at a distance to benefit, a flat rate of 15s. per bushel is being charged. This price includes all railage to the nearest railway station, but where steamer freight is necessary this and any charges in relation thereto must be paid by the purchaser, who must

furnish instructions concerning shipping arrangements and the name of agent to whom the grain is to be consigned.

Fifteen shillings (15s.) per bushel.

DESCRIPTION OF THE ABOVEMENTIONED VARIETIES OF SEED MAIZE FOR SALE.

Improved Yellow Dent.—This is perhaps one of the best known and most extensively grown varieties in this State. Numerous strains are met with in nearly all districts, all more or less emanating from the original "Yellow Dent." This variety has for many seasons undergone considerable improvement, and a type suitable to meet many of the State's requirements is now being offered. "Improved Yellow Dent" may be classed as a medium-late maturing variety, from five to five and a-half months, a strong, prolific grower, from 10 feet to 12 feet high, capable of giving large returns both of grain and fodder. The ears are of medium size, 8 inches to 10 inches, stout, cylindrically shaped, borne somewhat high on the stalk, semi-erect in habit, being well protected by a strong, tight, close-fitting husk; they are usually well filled, carrying from 16 to 18 rows of grain packed on the cob. The grain is of a rich amber colour, with a yellow tip cap; of medium hardness, and of a deep, flattened wedge-shaped appearance. The core is usually of a pink colour. This variety adapts itself readily to varying conditions, and has given splendid returns in many of the maize-growing districts.

Boone County White.—This is one of the heaviest yielding white varieties grown, and one that readily adapts itself to new conditions. A medium season variety, somewhat earlier than most maize of this type, taking from four to four and a-half months to mature. A fairly prolific bearer and a consistent yielder. The ears are exceptionally large, from 10 inches to 12 inches, and of large circumference, cylindrical in shape, carrying from 16 to 20 rows of tightly packed grain; being pendulous in habit, it is inductive to early ripening. The grain is of medium size, solid block wedge-shaped type of a hard, horny texture, with a light starchy tip leaving a slightly rough dent. This variety has undergone considerable improvement, proven by the consistent yields obtained, and is recommended for areas contiguous to the coast.

Hiawatha Yellow Dent.—The original seed of this maize was imported by the Agricultural Department in 1913. The History of the variety credits it as originating in Illinois, U.S.A., over thirty years ago, when it was known as "Mammoth Yellow Dent" and samples then exhibited were awarded a 500 dollar premium. A Mr. Ziller, of Hiawatha, Kansas, crossed it with a quicker maturing standard variety, "Legal Tender," paying attention in the selection to well developed ears with a deep kernel. This breeder's work proved successful, as he secured the premium for the best ten ears of yellow corn at the Kansas State Corn Show.

Hiawatha Yellow Dent is a strong grower and takes about five months to mature. Under favourable conditions, two large, fairly uniform ears are generally produced by each stalk; these are borne on a long shank. The ears are well covered with "husk" and turn down as they approach maturity. This characteristic protects the grain from insect attack and from damage by excessive rains.

Ears are large with a robust core, red in colour, and the rows of grain, usually 20 in number, are set fairly close on the cob. The grain is of medium size, wedge-shaped, and of fair depth. It is of medium hardness with an inclination to roughness on the crown.

DO HORNS TELL AGE?

Most people "read" the rings of the horns incorrectly. At about two years of age, a small ring appears at the base of the horn, and another at three years. Then these two preliminary rings fuse and almost disappear; but a deep ring soon forms, and indicates the fourth year. To correctly judge the age from the horns, one should count the smooth tip and the first slightly marked ring as representing three years, and add one year for each additional ring. In the aged animal there is a marked depression or lessening in circumference at the base of the horn, which, together with the loss of the broad parts of the incisors or great wear of these teeth, may be accounted unmistakable evidence of advanced age.—"Breeder's Gazette."

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The Office of the Secretary of the undermentioned Herd Book Societies is 303 Queen street, Brisbane:—

The Australian Hereford Herd Book;
The Shorthorn Herd Book of Queensland;
The Jersey Herd Book of Queensland;
The Illawarra Herd Book of Queensland;
The Ayrshire Herd Book of Queensland;
The Milking Shorthorn Herd Book of Queensland;
The Holstein-Friesian Herd Book of Australia.

NOTE.—Animals registered in the Commonwealth Standard Herd Book are not necessarily eligible for entry in the Jersey Herd Book of Queensland.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
DAIRY BREEDS.				
AYRSHIRES.				
W. C. Smith	The Haven, Goomeri	1	7	Ayrshire Society of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
J. H. Paten	Gwandalan, Yandina	6	21	Do.
Queensland Agricultural College	Gatton	4	10	Do.
State Farm	Warren	3	83	Do.
J. W. Paten	Ayrshire Park, Wanora, Ipswich	10	42	Do.
J. H. Fairfax	Marinya, Cambooya	9	55	Do.
J. Holmes	"Longlands," Pittsworth	6	20	Do.
H. M. Hart	Glen Heath, Yalangur	7	21	Do.
F. A. Stimpson ..	Ayrshire Stud, Fairfield, South Brisbane	7	77	Do.
M. L. Cochrane ..	Paringa Farm, near Cairns	5	21	Do.
John Anderson ..	"Fairview," Southbrook	7	34	Do.
JERSEYS.				
T. Mullen	"Norwood," Chelmer	3	20	Jersey Herd Book of Queensland
Queensland Agricultural College	Gatton	2	31	Do.
M. W. Doyle	"Oaklands," Moggill	4	12	Do.
G. A. Buss	Bundaberg	1	15	Do.
R. Conochie	Brooklands, Tingoorra	9	21	Do.
W. J. Barnes	Millstream Jersey Herd, Cedar Grove	10	37	Do.
W. J. Affleck	Grasmere, N. Pine ..	6	31	Do.
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Do.
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	2	11	Do.
State Farm, Kairi ..	Kairi, via Cairns ..	4	16	Do.
H. D. B. Cox	Sydney (entered in brother's name)	3	16	Commonwealth Standard Jersey Herd Book
GUERNSEYS.				
Queensland Agricultural College	Gatton	2	2	Eligible, but no branch of the Guernsey Herd Book Society of Australia in Queensland

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
DAIRY BREEDS— <i>continued.</i>				
HOLSTEINS.				
Queensland Agricultural College	Gatton	2	9	Holstein-Friesian Herd Book of Australia
George Newman ..	"St. Athan," Wyreema	9	92	Do.
F. G. C. Gratton ..	"Fowlerton," Kingsthorpe	1	15	Do.
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	3	Do.
Ditto	Ditto	1	..	Holstein-Friesian Herd Book of New Zealand
S. H. Hoskings ..	St. Gwithian, Toolooloowah	..	..	Holstein-Friesian Herd Book of Australia
C. Behrendorff ..	Inavale Stud Farm, Bunjurgun, Q.	3	9	Do.
E. Swayne	West Plane Creek, Mackay	1	2	Do.
ILLAWARRA.				
A. Pickels	Blacklands Stud, Wondai	4	62	Illawarra Herd Book of Queensland
J. T. Perrett and Son	Corndale, Coolabunia	3	43	Do.
W. T. Savage	Ramsay	2	22	Do.
Hunt Bros.	Springdale, Maleny ..	3	62	Do.
MILKING SHORTHORNS.				
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Do.
A. Rodgers	Torran's Vale, Lane-field	1	9	Do.
W. Middleton ..	Devon Court, Crow's Nest	3	27	Do.
A. K. Yorksten ..	"Dunure," Miles ..	2	8	Do.
W. H. Francis ..	"Exelawn," Colinton, Brisbane Valley Line	3	5	Do.
BEEF BREEDS.				
SHORTHORNS.				
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
Godfrey Morgan ..	"Arubial," Condamine	3	6	Do.
W. B. Slade	E. Glengallan, Warwick	2	20	Do.
HEREFORD.				
A. J. McConnell ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Do.
Tindal and Son ..	Gunyan, Inglewood	50	400	Do.
SUSSEX.				
James T. Turner ..	The Holmwood, Neurum	2	4	Sussex Herd Book of England

Dairying.

DUTCH OR FRIESIAN CATTLE.

In his excellent work, "Dairying in All Its Branches," Mr. M. A. O'Callaghan discusses the merits of the Dutch or Friesian cattle, as follows:—

"Holland has long been noted both for its cattle and cheese. The people of this State are intimate enough with the latter, but only in very few districts is the Dutch race of cattle known in its purity, although it is stated by some that there is a cross of what is called the Holstein in our Illawarra cattle. Holsteins is the common name given by all English-speaking people to Dutch cattle, no matter what part of the Netherlands they come from, although, strictly speaking, this title is an incorrect one, the cattle of other parts of Holland being longer and better known to history as excellent yielders of milk; and it must be remembered that Holstein was but a part of the Netherlands, and it is quite certain that the cattle of this province did not dominate the rest of the country. However, within late years, interchange of cattle for breeding between all parts of Holland has been going on, so that now we might look upon all the lowland races of Dutch cattle as similar, being alike in general characteristics and in dairy qualities. Holstein or Friesian cattle are in great favour in Germany and America, and I am surprised that they are not better known in New Zealand, as they are undoubtedly great cheese-producing cattle. They must, however, have deep rich pastures to graze on, and no greater folly could be permitted than to adopt this breed in our inland country where droughty conditions are frequent, or on light, or even medium coast country. Anyone who has ever seen the rich flat fields of Holland, with grass and water in abundance, would at once recognise that a race of cattle generated for over 2,000 years on such a country would be suitable only for our richest coast country, or for our deep river flats. The following are the measurements of one of the imported Dutch cows:—Height at shoulder, 56 in.; length from top of shoulder to the pin-bone, 66 in.; girth behind the shoulder, 84 in.; breadth across the hips, 26 in. This cow is in fair milking condition, and people conversant with cattle will recognise at once that these measurements represent a very big frame, and one that requires plenty of succulent food in order to maintain it in proper condition, and at the same time enable the cow to yield 4 or 5 gallons of milk per day for some months.

"The characteristics of good present-day Holstein or Friesian cows are large angular frames, great depth from the top of the shoulder to the dewlap, very big and roomy behind, with great udder space, big barrel, large udders, good-sized teats, and very big knotty milk veins running well forward. In colour they are black and white, either ridged or mottled with these colours, though the black with belts or ridges of white looked the handsomer, and the legs just above the hoofs are almost always white. The hair is smooth and short, and the skin is soft and pliable. The head is rather narrow, the face is generally long, though a shorter and dishd face is met with, especially in cattle from South Holland, which are scarcely as large as those of North Holland. The horns are short, fine, and crumpled, or turned in somewhat, like those of the Jersey, the colour of the horn being white, tipped with black. A section of the breed met with in Germany is entirely black, and there are also the brown (or lemon) and white-coloured specimens. The milk yielded is very white in colour, and, generally speaking, rather poor in fat, though I am confident this latter point could be greatly improved on with selection and breeding; but Holland is a cheese country, and the farmers there pay much more attention to the amount of milk yielded than to its richness in fat. As a race, perhaps, Holsteins are, under favourable conditions, the largest yielders of milk in the bovine world. Dr. Veith, Director of the Dairy Institute, Hameln, whom I know to be a reliable worker, recently completed some records of a herd of Holstein-Friesian cattle. Records are given of twenty-seven animals for a period of twelve months, this period sometimes including a portion of the milk of two calvings, especially in cases where cows were advanced in milk when the trials began. The cows were milked three times a day for a time after calving, the milk was recorded, and the butter-fat estimated twenty-six times in the year, and the averages taken. The richest average fat test was 4.26 per cent., this cow being 8 years old when the test began, and her milk yield was about 1,300 gallons, and she was in milk for the twelve months. The lowest average fat test was 2.92 per cent., this cow yielding 1,760 gallons in the twelve months. This represents ten months of one milking and two of another. The greatest amount of milk yielded was 1,980 gallons, the fat test of this cow averaging 3.16 per cent.

The Horse.

PREVENTION OF CORNS IN HORSES.

The following notes on this important subject in "The Rider and Driver" (New York) were republished in "The Live Stock Journal" of 21st May, 1920:—

"It is a prevalent belief that bruises cause corns. If this be so, it seems strange that 90 per cent. of horses affected with corns develop them in the same location of each foot. Surely a bruise could not be expected to hit the same place nine times out of ten. And horses whose feet are leathered, many of which have corns, surely do not get them from bruises. A corn is almost invariably seen on the inside quarter of the sole of the fore foot, between the bar and the wall. I am well convinced that a corn can be caused by a bruise, particularly in the case of a horse with a flat, thin-soled foot. But the reason for corns appearing regularly in the same place upon horses' feet should be fairly good evidence that causes other than bruises are mostly responsible for their appearance. Just why a corn should appear between the bar and the wall on the inner quarter is indeed worthy of consideration.

"Unless the shoer stands directly under the chest of the horse, he has to pull the foot eight or ten inches out of its natural perpendicular position. In paring the foot it is very easy to trim down the inner heel lower than the outer one, because when the foot is out of its natural perpendicular position it will not look level unless the inner heel is lower than the outer one. A good shoer will always measure the height of the inner and outer heel to make sure that the foot is level. Unless the shoe is level, the outer quarter comes in contact with the ground and receives the weight of the load before the inner quarter.

"This causes an uneven strain on the delicate tissues within the hoof, and in time causes the wall to warp away from the sensitive wall or lamina within the outer wall. Lameness, of course, follows.

"When the shoe is removed, a red area, termed a 'corn' may be noticed between the inner bar and the wall of the foot. When pressure is applied to this area it will be found that the spot is very sensitive. If the foot is levelled up and the horse allowed to rest until the congestion caused by the previous uneven shoeing has subsided, the sensitive tissue which has been injured will usually recover its normal condition without any attendant complications. Frequently the poor horse does not have the good fortune to receive this treatment, and an all-knowing know-nothing usually pares down the blood-stained area, which removes the support of the surrounding healthy tissue to the injured part and automatically removes the possibility of recovery in a few days to a few weeks.

"The next step by those who know but little of anatomy is usually the application of a bran or meal poultice, which supplies the exact conditions—namely, heat and moisture—requisite for the development of bacteria. If the poultice is kept on long enough suppuration begins, of course, and eats its way through the sensitive tissue lying next to the wall, until broken-down tissues form a protruding bunch above the coronary band.

"At this stage the poor animal is said to have 'gravel.' After suppuration has further advanced and Nature has perhaps developed a running sore, or outlet, to relieve the suffering tissues within the foot, the disease is called a 'quitter.'

"If fate accords the unhappy animal the good fortune to have a friend who will suggest to the owner that he have a veterinarian, the first step towards effecting recovery from the little corn from which it started will be undertaken. The animal will be put under complete anæsthesia in a hospital, the diseased tissue and the lateral cartilage will be removed, and in six or seven weeks, after enduring considerable pain, which naturally accompanies this affliction, the horse will recover.

"Horseowners and horseowners will spare their willing slave and faithful helper, the horse, much pain and suffering if they will see that the blacksmith levels the foot by having the outer and inner heel the same height, because it is unlevel shoeing and the irritation which follows the uneven paring of the outer and inner wall of the foot which causes corns in nearly every instance."

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1920.

All the birds are now in good laying stride and took little notice of the rain that fell during the latter part of the month. So far, broodiness has given very little trouble. The highest score for six birds for the month was achieved by a group pen—Mr. Lawson's White Leghorns, with 141 eggs, and Mr. J. E. Smith's Black Orpingtons, with 153 eggs. Mr. E. F. Dennis's "E" bird laid 30 eggs in 31 days; W. Smith's "F" hen laid 30 eggs in 31 days: both Black Orpingtons; J. E. Ferguson's "E" hen (Chinese Langshan) laid 28 eggs for the month; while Haden Poultry Farm's "A," Dr. Jennings's "F," and L. G. Innes's "C" each laid 26 eggs for the month, these being the highest totals for the month by single tested White Leghorns. There was one death during July, viz.:—E. F. Dennis's "C" hen, the cause of death being tuberculosis. Three birds received treatment for various ailments, but on the whole the health of the competitors has been excellent. The following are the individual scores:—

Competitors.	Breed.	July.	Total.
LIGHT BREEDS.			
*O. W. J. Whitman	White Leghorns	133	471
*G. Trapp	Do.	129	468
*Haden Poultry Farm	Do.	132	465
Geo. Lawson	Do.	141	456
*S. McPherson	Do.	136	450
*J. J. Davies	Do.	132	443
*J. Newton	Do.	121	434
*W. Becker	Do.	123	429
*Quinn's Post Poultry Farm	Do.	135	424
*F. Fanning	Do.	123	419
*J. M. Manson	Do.	123	413
*J. H. Jones	Do.	114	408
*W. and G. W. Hindes	Do.	125	402
*G. Williams	Do.	115	400
*Dr. E. C. Jennings	Do.	134	400
*H. Fraser	Do.	116	397
S. L. Grenier	Do.	133	389
*E. A. Smith	Do.	115	384
*S. W. Rooney	Do.	123	380
*Range Poultry Farm	Do.	123	378
Thos. Eyre	Do.	128	369
*L. G. Innes	Do.	136	361
*Mrs. L. F. Anderson	Do.	125	358
W. Morrissey	Do.	128	355
*N. A. Singer	Do.	128	351
*Mrs. L. Henderson	Do.	105	350
*B. Chester	Do.	111	350
A. J. Anderson	Do.	93	349
Mrs. R. Hodge	Do.	130	338
*Thos. Taylor	Do.	104	336
Miss E. M. Ellis	Do.	134	327
C. M. Pickering	Do.	105	324
E. Chester	Do.	107	319
C. Langsbecker	Do.	117	318

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	July.	Total.
LIGHT BREEDS— <i>continued.</i>			
Avondale Poultry Farm	White Leghorns	113	315
H. P. Clarke	Do.	121	312
R. C. J. Turner	Do.	117	306
C. H. Towers	Do.	108	293
S. Chapman	Do.	118	267
W. D. Evans	Do.	93	239
H. A. Mason	Do.	92	220
C. A. Goos	Do.	78	203
HEAVY BREEDS.			
*R. Holmes	Black Orpingtons	138	513
*D. Fulton	Do.	140	499
*E. F. Dennis	Do.	144	455
*R. Burns	Do.	135	450
*E. Morris	Do.	136	435
*A. E. Walters	Do.	106	427
H. M. Chaille	Do.	117	425
*W. Smith	Do.	128	417
*A. Shanks	Do.	138	410
*A. Gaydon	Do.	147	410
*T. Hindley	Do.	118	400
*E. Oakes	Do.	144	389
J. E. Smith	Do.	153	370
*Nobby Poultry Farm	Do.	84	353
*R. B. Sparrow	Do.	101	346
Parisian Poultry Farm	Do.	129	337
R. C. Cole	Do.	122	335
G. Muir	Do.	113	330
Mrs. G. H. Kettle	Do.	127	325
*J. E. Ferguson	Chinese Langshans	103	315
*E. Stephenson	Black Orpingtons	112	312
*J. Cornwell	Do.	136	307
G. Flugge	Do.	67	165
Total	...	7,855	24,095

* Indicates that the pen is being single tested.

RESULTS OF SINGLE TEST PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
O. W. J. Whitman	76	71	84	73	82	85	471
G. Trapp	84	71	83	78	83	69	468
Haden Poultry Farm	91	62	90	82	68	72	465
S. McPherson	78	73	77	74	83	65	450
J. J. Davies	76	73	71	89	65	69	443
J. Newton	91	66	76	51	69	81	434
W. Becker	75	77	81	66	53	77	429
Quinn's Post Poultry Farm	83	78	79	69	55	60	424
T. Fanning	29	77	69	79	81	84	419
J. M. Manson	74	70	83	64	52	70	413
J. H. Jones	70	71	75	75	78	39	408
W. and G. W. Hindes	75	70	51	75	57	74	402

RESULTS OF SINGLE TEST PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS— <i>continued.</i>							
G. Williams	64	69	68	67	78	54	400
Dr. E. C. Jennings	64	79	57	61	62	77	400
H. Fraser	62	53	73	72	74	63	397
E. A. Smith	62	59	73	63	69	58	384
S. W. Rooney	49	43	81	67	66	74	380
Range Poultry Farm	57	60	65	80	72	64	378
L. G. Innes	30	54	81	58	81	57	361
Mrs L. F. Anderson	79	68	75	49	45	42	358
N. A. Singer	58	55	63	77	70	48	351
Mrs. L. Henderson	40	56	64	58	77	55	350
B. Chester	63	37	62	67	63	58	350
Thos. Taylor	76	64	34	59	48	55	336

HEAVY BREEDS.

R. Holmes	87	86	80	85	86	89	513
D. Fulton	89	88	74	68	77	103	499
E. F. Dennis	70	57	91	72	71	94	455
R. Burns	74	51	89	67	93	76	450
E. Morris	74	78	83	55	64	81	435
A. E. Walters	63	76	54	87	62	85	427
W. Smith	67	89	75	83	52	51	417
A. Shanks	45	59	75	90	42	99	410
A. Gaydon	68	93	64	43	53	89	410
T. Hindley	69	85	70	85	38	53	400
E. Oakes	59	74	85	35	73	63	389
Nobby Poultry Farm	57	93	47	93	43	20	353
R. B. Sparrow	73	3	78	78	42	72	346
J. E. Ferguson	26	60	45	58	80	46	315
E. Stephenson	84	52	36	65	41	34	312
J. Cornwell	52	84	50	20	40	61	307

CUTHBERT POTTS,
Principal.

FINAL REPORT OF THE SIXTEENTH EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE.

The sixteenth egg-laying competition at the Queensland Agricultural College was concluded on 29th March, 1920. Only birds whose records were considered to approach previous world's records, or which were close to one another for positions in the prize list, were retained until the expiration of the full 365 days—viz., until 2nd April. The closing of the competition on the above-mentioned date was due to the Easter holidays and the railway offices being closed, making it impossible to despatch the birds.

WEATHER CONDITIONS.

Another droughty year made it extremely hard for the birds. The thermometer registered as high as 109 deg. in the shade, and a shade temperature for a week at a stretch in close proximity to 100 deg. was no uncommon event. It was very fortunate that greenstuff could be procured, for, without that necessary commodity, the splendid scores and averages could not have been attained.

FEEDING.

No alteration from former tests was made in the composition of the morning mash—viz., 60 per cent. pollard, 30 per cent. bran, 5 per cent. Meggitt's meal, and 3 per cent. to 7 per cent. dried blood. Judgment was used as to the increasing or decreasing any of these ingredients, but the above formula can be taken as the average. For instance, linseed meal was lowered during hot weather and increased

during bleak weather. Five per cent. dried blood was about the average quantity given during the greater part of the test, an increase of about 2 per cent. being made about December, when signs of tiring were noticed. For grain feed, wheat and cracked corn were the cereals used, oats being unprocurable. Although the quality of the foodstuffs was not so good as it should have been, the birds fared a good deal better than the general run of poultry in the State, as pollard and bran were always available, and the poor samples of wheatmeal so commonly used by poultry-breeders were not requisitioned by the College. Fresh greenstuff was available during nearly the whole of the twelve months.

GENERAL RESULTS.

The results have been highly satisfactory, for it must be taken into consideration that the birds were labouring under very adverse conditions. The contest for premier position has been very interesting, quite a number of single birds and pens being in a heap for the coveted places at the head of the score, and with magnificent records.

OBSERVATIONS.

Several proofs have been gained from this test.

1. It has often been remarked that the water system at the College was unfair to the birds. Being running water in a trough exposed to the sun, it has frequently been stated that, by the time it reached the lower birds, it would be tainted and hot, and thus detrimental to their health. T. Fanning's pen is last on the first row; J. M. Manson's, second from last on the second row; R. Burns's, second from last on the third row. R. B. Sparrow's heavy breed group was last on the group row, and it was in the last six months, during the hot weather, that this pen made its great run up the list from near the bottom. Not one of these competitors had to replace birds, and their health throughout was excellent.

2. A pen of birds that fret at the commencement of the test and lose their appetites seldom do well in the competition. The pens in front are those from which no food has to be picked up after feeding. They always require a little extra feed right from the beginning. Those birds that fret at the commencement do likewise when encountering the bad weather. It appears in a number of cases that the conditions at the College are vastly different from what the birds are accustomed to and what they have been brought up to. We can often imagine an intending competitor closing his birds in when indifferent weather crops up, and toning up with various condiments. In fact, fussing with the six birds he intends to send to the test more than he does with the rest of his flock. This is quite wrong, for birds so treated must inevitably suffer when placed in the competition where normal outside conditions prevail. One of the main objects of the College tests is to prove stamina as well as production, so that when successful competitors are called on to supply the public they will supply birds which will give a good account of themselves under ordinary conditions of housing and treatment. There are cases of hard luck where a competitor takes a lower position than he would have done had it not been for some unforeseen trouble. Such little things, as they appear at first, often become serious as time goes on. A bird getting a slight chill travelling to the College, or a slight internal trouble occurring during transit, often finishes up in death.

3. Sending birds to the competition when in lay has its advantages *if the birds have been reared under healthy conditions and possess stamina*. It is the birds that have been confined too much that make a moult on their arrival at the College when they encounter changed conditions. Many are under the impression that the best birds to send are those almost on the point of laying. During this last test it was noticeable that quite a number of this class hung fire, and certainly did not lay when their respective owners reckoned on their doing so. Provided the birds are strong, and that they have not been pampered, those in lay on arrival usually give the best results, especially as every care is given to encourage appetites, and the characters of the birds are studied to a marked degree. The characters of the birds, in our opinion, are not sufficiently studied by intending competitors. Fowls, like humans, have different temperaments and at times take understanding. There are pens that arrive that are really sulky; others are of a very timid nature. Another mistake that is often made is the sending of birds in too high a condition; these at times go off their food, which sometimes means a false moult.

HEALTH OF BIRDS.

There were twenty-two deaths, and two birds were destroyed, making twenty-four replacements during the year. There were seven cases of ovarian disorder, two cases of inflammation of the bowels, one case of appendicitis and ulcerated bowels, one case of ruptured liver, five cases of tuberculosis, one case of broken blood vessel, and five cases of heat apoplexy. The two birds destroyed were affected with paralysis. Fourteen birds were removed from their pens for treatment of various disorders for periods from two to twelve days.

BROODIES.

Broodiness gave considerable trouble, and this materially spoiled the chances of a number of pens. The pens owned by the following breeders were very free from broodiness:—R. Burns, R. B. Sparrow, R. Holmes, E. Morris, and G. Nutt. In the light section, as many as three birds belonging to one competitor were broody, whilst a fair number had one or two birds which gave trouble in this direction. Broodiness in the light section is disastrous to a competitor's chance of occupying a premier position.

RECORDS.

Although the highest score for a single bird was 335 eggs by Mr. R. Burns's "D" Black Orpington, it is to be regretted that this bird, as with his previous 335-egg hen in the 1917-18 test, produced an egg under the 2 oz. standard. The laying of 1,619 eggs by six hens owned by Mr. R. Holmes constitutes a record by Black Orpingtons for this State. It was unfortunate that Mr. T. Fanning's pen of White Leghorns should have laid eggs under the standard, for, with the fine score of 1,627 for six birds, they closely approached the existing Queensland record of 1,661, held by E. Chester. What probably is a World's record is the laying by one of the Kelvin Poultry Farm's Barred Rocks; this bird produced 290 eggs over the standard weight of 2 oz. One of the finest things to record is the equality between the six birds sent by the leading competitors. This equality speaks well for the breeders concerned. One phenomenal layer amongst indifferent layers is not a sign of a good strain. Equality in production is what is looked for.

AVERAGES.

240 White Leghorns averaged	..	..	205.5 eggs per hen.
6 Anconas averaged	..	..	162.5 eggs per hen.
132 Black Orpingtons averaged	..	..	206 eggs per hen.
6 Rhode Island Reds averaged	..	..	166.8 eggs per hen.
12 Chinese Langshans averaged	..	..	196.2 eggs per hen.
6 Plymouth Rocks averaged	..	..	218.2 eggs per hen.

TRUENESS TO TYPE.

For the *True to Type Prize* the following conditions were observed:—

1. It has to be recognised that birds are entered into the competition for test as to fecundity, with the ultimate object of using them as breeders. Hence all their characteristics have to be considered in the light of their possible transmission to the progeny.

2. To be true to type the birds must not possess any but breed characteristics. For example, side spikes in single combs, or feathered legs in clean-legged varieties, &c., would be disqualifications. At the same time, any exaggeration of features, such as too large a comb in White Leghorns, would count against the bird just as much as a comb that was too small and erect. In the same way, medium values are required in many of the features, for it is fully recognised that the birds are for utility, not show purposes.

3. Because the birds are to be used for breeding, stamina is considered of vital importance, hence it has been deemed necessary to score the birds for stamina independently of type and conformation. In judging for stamina the general habits of the birds during four to six months' observation are utilised.

4. Each bird is judged separately and the group of six birds finally classified as the aggregate of the six individuals. In this way a measure of the uniformity of the breeding is given.

5. For the type of the various breeds the standards of the Poultry Club of England have been taken as a basis, with the following modifications:—Exaggeration of points is not allowed: the general conformation of the body has to comply with that essential wedge shape which is characteristic of the good layer.

The Scale of Points adopted is as follows:—

No. 1.—*Type and Conformation*—

Head—

Comb	..	..	..	..	..	..	10 points
Skull	..	..	..	..	..	..	5 points
Ear lobe	..	..	..	..	..	..	5 points
Face	..	..	..	..	..	..	5 points

Body	..	..	..	..	..	..	25 points
Size	..	..	..	..	..	..	30 points
Legs	..	..	..	..	..	..	25 points
Colour of plumage	..	..	..	..	..	..	10 points
							10 points

Total 100 points

No. 2.—Stamina—

Eye	15 points
Head	20 points
Legs	15 points
Heart and lung room	15 points
Digestive capacity	15 points
Observation of general health and habits	20 points
Total	100 points

Disqualifications.—Showing alien blood. Inheritable characters, such as side spikes, feathering on shanks of clean-legged varieties, &c. Bodily deformities, including wry tail, squirrel tail, crooked toes, &c. Any competitor found guilty of faking will be disqualified and debarred from entering future competitions.

Birds gaining 75 or more points in each of the above standards will be placed in the first class. Any bird failing to obtain 50 per cent. of the points allocated for any one feature will be passed out.

In classifying the pens the following rule is adopted:—If all birds are Class I., the pen is Class 1. If one of the six birds does not pass, the pen is Class 2. If two of the birds fail to pass, the pen is Class 3. If more than two fail to pass, the pen is Class 4.

Only those placed in Classes 1 and 2 were eligible for the *True to Type Prize*.

[TO BE CONTINUED.]

THE CHINESE LANGSHAN FOWL.

By D. WALLACE, Rocklea, Langshan Breeder.

Nearly half a century ago the fowl known as the Chinese Langshan was introduced into England by an officer doing duty with his regiment in North China. This gentleman sent some of these birds to his uncle (also an army officer), named Croad, in Birmingham. Some five years later the breed made its appearance in America. In both countries the bird found many admirers, and quickly established a reputation as a layer and a table bird.

“Shanghais” and other breeds, that have since undergone considerable changes, had been previously exported from the coastal districts of China to European and American breeders; and the Langshan would have become known to Westerners many years earlier than it did if the Langshan Hills, from which it came, were as accessible from the coast then as they afterwards became.

Considerable opposition was evinced by breeders of Black Cochins and other breeds towards the new arrivals in the realm of Western poultrydom, and many of them claimed that the Langshan was merely an inferior Cochin, though the Langshan’s deep black plumage and lovely green sheen was the best thing in the way of black poultry colour the world had up till then seen.

The breeders of black fowls endeavoured to secure this Langshan black in their flocks, but were baffled by the persistent way in which other Langshan characters asserted themselves in the Langshan crosses, proving the great prepotency possessed by the Langshan, and, incidentally, that it must, even in those early days, have been a very long-established breed. So that through sheer merit the Langshan overcame all stupid opposition and forged ahead to the place it occupies to-day—in fact, the Langshan characters are so thoroughly fixed that they are almost immutable; and through all these years the Langshan has withstood, in the main, the vagaries of freak fanciers who sought to bring about various changes in the breed.

The “Croad” school have lengthened the leg and reduced fecundity. The “modern” school have increased size and also reduced fecundity. The outstanding characters, apart from the all-important feature of productiveness, remain virtually the same. The original Chinese Langshan still easily remains the best.

The winter of North China is both excessively cold and excessively damp; and the summer is very hot. A hen to lay under these conditions and lay well enough to pay, where poultry produce is cheapest and competition keenest in the world, must needs be a good hen. When she has done laying enough to pay, she

must be good enough for market. That is why the Langshan is such a valuable bird. If the breed were otherwise, it would never have survived.

The Langshan found its own type. No "expert" or judge or freak fancier fashioned it. No club drew up at the inception of the breed the "points" to be sought after. No poultry shows—at which "judges" criticised the points of its comb, the curve of its sickles, or the length of its toenails—figured in the breed's early history. At least, during two years' residence in China, I never saw or heard of shows, standards, or judges. The Chinese poultryman argues in this way:—"Breed for productiveness and stamina." When a bird like the Langshan lays splendidly all the year round, being little disturbed by sweltering heat, snow, slush, or bleak winds, and still carries a sufficiency of juicy meat, the type it has acquired can surely not be wrong; so leave its type alone. Don't fool about with it.

So jealously have the money-making qualities of the Langshan been guarded that abdominal capacity and other features indicating productiveness are uniform in a real Chinese Langshan flock to an extraordinary degree.

Black Orpingtons were evolved mainly from Chinese Langshans; and, after all the years the former were bred for Orpington type, no sooner did Orpington breeders in Australia set out in earnest to develop the Langshan productiveness in the Orpington than there was a response, but their job now is to keep the Orpington layer an Orpington, and not a Langshan. Many of the best of them have reverted to the Langshan, except in the leg feathering. The Langshan sticks out everywhere.

Other breeds that got into the hands of freak breeders succumbed in the sense that their money-making qualities vanished and their types changed beyond recognition.

Tegetmeier's Poultry Book shows a picture of some Light Brahmās that were sent to Queen Victoria in 1852. That picture represents the ideal fowl. Birds of beautiful poise, very fair size, and of a type that suggests eggs in every feature—fecundity, stamina, and beauty in one. What is the same breed to-day? Do they answer the above description? Those birds were pictured twenty years before the Langshan ever left China. So how many years earlier than the Brahma must the Langshan have been established to have come unscathed through the stress of all the "fancy" fired at it in different lands since 1872?

At a time when, a few years ago, the 200-egg hen in Australia was a wonder, birds of a strain of Langshans imported direct from their ancient home put up an average of 243 per bird at the Hawkesbury Agricultural College. Nothing new to the Langshans, this heavy egg production; just a matter of habit.

At the time of writing, a Langshan team at Hawkesbury is in the lead. They also hold 3rd, 4th, and 5th places; and they are easily ahead of all the Leghorns, the pick of all New South Wales. They lay large brown eggs, and lay early. They are not excitable, nor are they fliers. They stand confinement well, and are hardy, being quite at home roosting in the open, day or night, in any weather. The skin is white, and the flesh is of fine grain and most palatable.

Already busy-bodies have begun tinkering with this grand old breed here in Australia. Somebody—whose great-grandfather was a toddler when the Langshans had been long established—has discovered that the Langshans should be made a "heavy" breed. Somebody else wants to make them a "light" breed. Some club or other has adopted a standard defining the colour of its toenails and the precise number and length of points in its comb. The Langshan smiles and goes on her way shelling out eggs. She has withstood all this "fancy" before.

Seeing what a profitable and beautiful bird the Langshan is, it is really astonishing it has not been widely adopted by the practical people of the Commonwealth. But they are making up for lost time now, and Langshans are displacing other breeds everywhere. Already thirteen teams are in evidence at Hawkesbury, most of them at the top of the list.

There is also a white variety. The White Langshan originated as a mutation or, in poultry parlance, a "port" from the Blacks, as that grand variety the White Wyandotte, and also the White Campine, sprang from the Silvers. Like all mutants, they possess great stamina. The White Langshan is a beautiful bird, but being held sacred in China they can be got away only by strategy. Black is the Chinese "glad" colour, and white the mourning colour.

The Chinese Langshan bids fair to oust from public favour that Langshan cross, but withal most useful bird, the Black Orpington. A truly handsome bird is the Langshan, and she appears to realise that "handsome is as handsome does," for certainly she is a most handsome doer.

Horticulture.

SOME PHASES IN THE CULTIVATION OF SWEET PEAS.

[Paper delivered by Mr. F. PHILLIPS at the Sweet Pea Show of the Horticultural Society of Queensland, held in the Albert Hall, 7th August, 1920.]

It is not my intention to cover the same ground as in my previous paper; therefore I shall only refer to some particulars which may need correction, or which may call for emphasis. I will deal, first of all, with cultivation, and then with ailments, &c.

CULTIVATION.

I must again strongly emphasize the necessity of adhering to the following timetable for show purposes:—

Sow the seed sixteen weeks before the first show (July); you will then have the first blooms in ten weeks (always provided that you have not commenced to top-feed), leaving six weeks in which to develop blooms fit for the show bench. The plants and flowers will improve gradually until Exhibition time (August), when the blooms will be at their very best. From then on to September, the plants will gradually deteriorate, with a consequent deterioration of bloom, but with attention and judicious feeding high class blooms should be staged at the September show. Great care should be exercised in feeding. It is very important that no liquid manure should be applied earlier than thirteen weeks from the sowing of seed; then only a weak infusion given weekly. After the first show (July), the liquid may be given stronger, increasing in strength gradually as the plants gain vigour. I am still of opinion that the extravagant use of manure, when preparing the ground, does not give the best results. The method of digging in a large quantity of animal manure when preparing the ground, sufficient to last the season through, deprives the grower of any control whatever over his plants. That is to say, should he put in too much manure, the plants and flowers will be overgrown throughout the season; if he puts in too little and does not top-feed, he will not produce high-class show blooms. Too heavy manuring and the too early application of liquid manure will result in an extravagant growth of plant and, naturally, blooms that are coarse in texture, dull of colour, and badly placed on absurdly long stems.

It has been my aim since I first grew sweet peas and realised the possibilities of their improvement, to cultivate them with the view of increasing the size of bloom, brilliancy of colour, and length of stem, at the same time preserving their natural gracefulness. In this endeavour many experiments have been made and expedients resorted to and several varieties have been discarded, some for not responding to kind treatment, and others for responding too freely by running away to stems at the expense of the flowers. I am quite satisfied that results have amply repaid me for my work.

The tendency of growers in the Southern States is to grow extremely long stems, and I am afraid that judges are being educated up to awarding merit to such inferior stuff. This has been the case in England. In Brisbane, happily for the reputation of the Queen of Annuals, it is recognised that the gracefulness of the sweet pea is its chief charm, and to destroy that charm by overgrowing is almost sacrilege. Our judges do well to discourage overgrowing, and our growers know that to stage absurdities is to court failure.

To show that we are on the right track, it may not be out of place to quote some extracts from "The National Sweet Pea Society Journal" on the subject.

"LONG STEMS v. QUALITY AND REFINEMENT IN SWEET PEAS.

"In many instances, I am sorry to say, even at our leading shows, collections of Sweet Peas, including many of the prize-winning stands, resemble a forest of green stakes rather than what might be a brilliant display of the most gorgeous, the most refined, and the most popular flower in cultivation, as well as being the least expensive to cultivate. Indeed, we often see travesties of blooms on the top of enormously lengthened and often bloated-looking stems exhibited at some of our best shows.

"It has become the custom to speak of the stems and not the blooms, such as 'Look at those splendid stems,' &c. The judges at our leading shows are greatly answerable for this state of affairs, which is all too common, but one could only sympathise with the judges at the N.S.P.S. in their task of judging the show of 1916, as the majority of the exhibits were composed of Sweet Peas whose only qualification seemed to be that of extreme length of stem, and poor colour. I grant that the extremely wet season influenced this result, yet much might have been done, by modifying cultural methods, to prevent the production and the exhibition of extremely lanky, attenuated stems in some cases, and huge bloated and distorted stems in others. It is quite possible that many growers were quite unable to prevent the production of the extreme length of stem noticed in many cases, especially with the continually heavy rainfall and where unduly large supplies of rank farmyard or other manures such as pigeon manure, &c., were incorporated with the soil.

"This shows the folly of allowing the passion for long stems to overcome all other considerations, because some of the growers who aim at size of bloom and quality, as opposed to length of stem only, had some admirable exhibits, and it is remarkable how the same growers consistently exhibit the same type of bloom quite irrespective of the season. This seems to point that the responsible conditions are more cultural than climatic.

"I hope no one will misunderstand me or misconstrue this statement in the belief that I am advocating short stems or condemning modern culture, as the reverse is the case; but I do condemn those growers who, to produce twenty-four inch stems, sacrifice almost everything that is beautiful in a beautiful flower, a flower which has such a fascination that its devotees continue to grow it in many cases under the worst possible conditions, excepting that it is one of the least expensive of florists' flowers to cultivate, but no other popular flower gives such a continuous supply of blooms for such a long period.

"In recent years many growers have disclaimed to grow entirely for length of stem, yet nevertheless their methods of staging refutes this statement. Decorative effect and the necessity for displaying individual blooms, is entirely sacrificed by packing the stems together with the heads touching each other and almost level, the general effect of the bunch resembling nothing but a sheaf of corn, cut green, with the ears coloured. This is done solely to provide a splash of colour which is often brilliant, but which on close examination reveals the obvious defects. The bunches might just as well be pieces of brilliantly coloured silk, as all traces of individuality in the blooms are entirely eliminated. Why do these growers find it necessary to pack them thus? Solely because if they were displayed individually they would betray gappiness, irregular placement, poor thin texture, dull, lustreless colour, and weak top blooms, which frequently exhibit a pathetic droop as if protesting against the treatment meted out to them, and I am sorry to say that these exhibits frequently win prizes. These growers entirely lose sight of the fact that no flower is pleasing to the eye unless it is proportionately developed, and no one can object to long-stemmed Sweet Peas providing the blooms are proportionately developed, but I maintain that if a length of 18 inches is exceeded the stems are lengthened only at the expense of colour, size, and substance, and above all, placement. The aim should be to produce four fully developed blooms of good colour and texture well placed on the stem. Also the top blooms should not be small and quite out of proportion to the others, as they are frequently seen. These top blooms seem to suggest that as the stems have lengthened so excessively it is quite unfair to expect them to develop.

"Many of the exhibits of recent years have done much toward exciting the somewhat unfair criticism which we hear on all sides and that we sometimes see published in the horticultural press. This criticism is justified considerably, yet it does not reach the root of the evil; we constantly hear of coarseness, but the critics are often unable to describe a coarse Sweet Pea without falling back on the old excuse that they are too large. This I dispute, as no Sweet Pea bloom can be too large providing it is proportionate in all details, including good colour, which is one of the main reasons for growing flowers. I also maintain that any stem is long enough, providing it is long enough for the decorative purpose for which it is intended. Quality should be the supreme test. Many of our critics condemn modern Sweet Pea culture in a wholesale manner, especially those, I am sorry to say, who from various reasons are unable to grow good blooms themselves, but I am compelled to say that exhibits such as I have mentioned give them some justification."

"In looking forward, one must not forget to remark on some of the present-day methods of cultivation. That they are not as they should be is not entirely the fault of growers. One sometimes sees the premier prize at provincial exhibitions given to an exhibit that only has length of stem to recommend it, the blooms being badly placed on huge stems, the top flowers very small in comparison, and the spikes

bunched together to hide these defects. We must not sacrifice quality of bloom for length of stem, and I, for one, sincerely hope judges will discourage it."

"Lavender George Herbert was regarded by the judges as the best vase in the show, but the decision was subjected to much adverse criticism. The blooms were badly placed on several of the stems, one in particular having the top and bottom pairs separated by a space of $5\frac{1}{2}$ inches."

You will therefore see that the evil is rampant in Great Britain, and it will be most difficult to eradicate.

Growers for show purposes are advised to exercise great care in selecting varieties. Choose pronounced self-colours—reds, blues, pinks, with white, cream, maroon, and as there is only room for three flakes, choose the best. To keep up to date, grow two or three varieties with reputation for trial, and if they do well, cast out varieties which do not give as good results. Be careful not to grow too many varieties. Lay out your plans for what you intend to show next season. It is advisable to duplicate one red, a white, and a blue. A plan I have adopted with good results is to allow for the plants to be a foot apart, with two stems. If you lose a plant from any cause, grow the plants on each side with three stems. By this method, unless you have very bad luck, the requisite number of stems may be retained.

Although the natural Sweet Pea stem carries three blooms, it is desirable to produce four blooms on a stem, and with many varieties, these are easily obtained. Do not strive after fives and sixes on a stem, because, in nearly all cases, they are inferior flowers or malformations, such as double stems, &c., which are generally the result of overfeeding.

AILMENTS.

I will now deal with some of the ailments of Sweet Peas. The various phases to be referred to have been experienced by myself; in fact, they are with us, more or less, every season, and have called for serious thought and watchfulness in trying to discover the causes. I have heard several opinions expressed, but no real effort seems to have been made to get to the root of our troubles. The non-flowering of plants is a common trouble when growing for show, and is caused through the top soil being over manured, or by the too early use of liquid manure, or both, the result being a rampant growth of plant. I have already emphasized the danger of overfeeding, even when the plants have commenced to bloom, the result being that the plants will miss flowering for several joints; so also, if you feed too soon, the commencement of flowering will be delayed. I remember one case of a grower, some of whose plants would not flower, feeding them up. Of course, the more he fed them, the more they grew until, in sheer desperation at a height of 10 feet, they threw out a bunch of about a dozen heads and no flowers. This is one of the evils of being too kind to plants.

Dropping of buds is also very common, but a trouble which is easily overcome. It is the result of too much watering. The present season is bad in this respect. The month of May being very dry made copious waterings necessary. Heavy rains in June and July caused an excess of moisture, hence bud dropping. Cease watering for a few days and the plants will recover.

We now come to two of the most serious ailments. I will term them, "Plants running out," and "Yellowing of plants." Although bracketed together, I propose dealing with them separately, because I believe the cause to be the same in both cases. It may be necessary to explain what I mean by "plants running out." Although the seed germinates equally well, some plants are weakly, and the head of the stems will gradually become smaller and smaller, until it eventually disappears and the plant is done. Most of such plants will bear sickly flowers, at the same time yellowing up. This season some of my plants ran out before flowering and without any yellowing. The "yellowing of Sweet Peas" has been more serious this year than is usually the case, and very speculative theories as to the cause have been advanced. Some call it a disease brought about by high cultivation. How about those who do not highly cultivate? Is it in the seed? In my opinion, it is not so. I save and

use the seed from my strongest plants year after year, with, I think you will agree, fairly good results.

In an endeavour to arrive at the solution of a problem which has engaged my attention for the past four years, I have pieced together certain data which have come under my notice. In August last, when in Sydney, I called on Mr. Ifould, one of the most successful show growers, and his plants had the ailment so badly as to run all chances of success that season. He attributed the cause to too much rain. Up to a certain point, the season had been dry, and the plants had been freely watered. Then heavy rains set in—hence his conclusions as to cause. So far as I can remember, it was his third year of growing on the same ground.

Two years ago, Mr. Whitfield, one of our successful growers, was troubled with the ailment, but after removing the top soil and thoroughly washing the surface roots, a considerable number of his plants partially recovered. It was a very dry season and the plants had been watered very freely—third year on same ground.

Three seasons back, my plants were attacked, not seriously, but badly enough, under similar conditions—a dry season, with free use of hose, and the third season of growing on the same ground.

This year I have the same trouble, although it has proved a wet season, but it is the third year of growing on the same ground.

The instances I have quoted seem to indicate that the plants are attacked more seriously the longer they are grown on the same ground. Another thing to observe is, that the plants are attacked at two periods—before they have attained their full vigour, and towards the end of the season, when they are losing vigour. It is well known that legumes need a large amount of nitrogen, and generally that they return a large amount to the soil. The Sweet Pea, although leguminous, is, in my opinion, in quite a different class. It requires a large amount of nitrogen, denudes the soil of that element, and returns nothing. The soil being thus denuded of the most important element, with a consequent serious reduction of bacterial activity, the absence of which renders chemical fertilisers practically useless, produces plants of weakly growth, very susceptible to fungus disease. The repeated growing on the same ground, the copious watering, the long growing period during our winter months, when the purifying effect of the sun is at its lowest, all tend to produce sourness of the soil and the formation of fungus. With this and other data to work upon, I have formed the opinion, whether rightly or wrongly—(1) that our Winter Flowering Sweet Pea is still free from any constitutional disease; (2) that the probable cause of the trouble is the exhaustion of a certain element in the soil, which I believe to be nitrogen, resulting in weakly growth of plant and susceptibility to fungus disease, which is caused by sour soil; (3) that the trouble is more prevalent in the third year of growing on the same ground, regardless of weather conditions. The use of superphosphate, which is known to have an acid reaction on sour soil, may also be a contributing cause.

In conclusion, I would suggest, as a means of avoiding the trouble—

- (1) Not to grow more than two seasons on the same ground.
- (2) To renovate the soil by growing a green manure crop.
- (3) The liming of the soil to produce sweetness.
- (4) The use of Holborne Island phosphate, which contains a considerable amount of lime, instead of superphosphate.
- (5) An increased application of nitrogen.

A PESTILENT WEED.

A weed which causes much trouble to horticulturists is widely spread in numerous flower gardens. It is often called by amateurs a trefoil, but the true name, as given by Mr. C. T. White, Government Botanist, is *Oxalis corymbosa*, which has a pretty pink flower and a small carrot-shaped root, which in the summer time is crowned with a mass of bulbils which, about the spring time, cling closely together. As the summer approaches, these ripen and fall off, when each will form an individual plant. Mr. White says that the practice adopted at the Botanic Gardens is to attack these plants in the spring (*i.e.*, from now on) before the little bulbils fall off from the parent plant.

Tropical Industries.

SUGAR CANE PLANTING IN THE NORTHERN DISTRICT.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Field Assistant, Mr. J. C. Murray:—

“Planting is going on vigorously, and next season should, with ordinary good fortune be a large one. Farmers are cultivating every available acre of ground, and warm weather, very suitable for planting, is still holding.

“Plenty of labour is available of an efficient sort, and differences of opinion regarding prices between sugar millers and growers appears to be amicably settled.

“The new varieties that were distributed from Mr. Mackersie's plot last year are doing well under field conditions, the best probably being Q.855, Q.1098, Q.813, and Hybrid No. 1. Mr. Craig, a Klondyke farmer, has achieved some fine results from these canes, and any farmer wishing to see them growing should have a look over this gentleman's place.

“With regard to these latterly distributed varieties, I find that the best time to plant in the Ayr district is about June and July. Being vigorous strikers and rapid growers, the Queensland seedlings, if planted too early, have a tendency to grow to great size, which is detrimental to the sugar content, and show an inclination to arrow. Planted about July, though, the Q.855 is an especially fine cane for a plant crop, with a high sugar content. The New Guinea canes are not shaping as well as those raised in the Australian tropics. N.G.103 is about the most attractive of these varieties, having withstood the drought and generally bad weather conditions prevailing during the last twelve months, about as well as any of the New Guinea varieties, in addition to having better striking and early maturing properties.

“The Q.813 is not doing as well on the Lower Burdekin as elsewhere in the State, although conditions on the Houghton River appear to suit this cane.

“Owing to prolonged spells of drought and flooding by means of irrigation, combined with, in many cases, insufficient cultivation, the acidity in most of the cane soils is pronounced, more so on the Lower Burdekin than on the areas between Ayr and Townsville.

“The average reaction of soil right throughout the district is, however, distinctly acid. Supplies of lime have become absolute necessities, if the tonnages are to be maintained on irrigated areas.

“The new Houghton Mill is rapidly approaching completion, and is up to date in every particular. This is undoubtedly a good speculation on the part of the farmers here, as in the past their enterprise has been cramped by lack of milling accommodation. That is, however, now overcome, and these fertile areas will soon be producing more cane than they have been doing.

“Pioneer Company is taking a keen interest in the work of experiments and fertilisation, a factor which must benefit the district largely. Growth of varieties and results of irrigation and manuring are being tabulated in an instructive and useful manner. Mr. L. Smith, the mill manager at Pioneer, is chiefly carrying out the work.”

SUGAR CANE IN THE NORTHERN DISTRICT.

The General Superintendent of the Bureau of Sugar Experiment Stations, who has been visiting several of the northern sugar districts during the past seven weeks, has returned to Brisbane.

Reporting on his trip, Mr. Easterby said that the first district visited after leaving Brisbane was Mackay. Good rains set in on this area in January, which were followed by dry conditions until April, when a belated wet season set in. Due to the severe check caused by the absence of the usual wet season in February and March and the dry conditions of 1919, the cane, while it had made a remarkable recovery, had missed too much favourable growing weather to make a full crop. The cane, however, was green and vigorous and growing rapidly, but the crushing

is expected to be a medium one, though there is still time for the cane to improve, as the commencement of harvesting operations will be late this season in Mackay. Should favourable weather conditions continue, the crop next year should be a great one, as everywhere throughout the district, growers were preparing land for planting. A highly successful field day was held at the Mackay Sugar Experiment Station on 19th June, at which about 300 growers attended.

The necessity of increasing our sugar production was made the subject of an address by the General Superintendent, and after a thorough inspection of the experimental work a demonstration of field implements were carried out in the afternoon. The work of the Experiment Station was found to be progressing satisfactorily, and the station grounds and cane presented a fine appearance.

At Cairns, which was next visited, grubs were found to be doing a great deal of damage in many parts of the district. The D. 1135 variety appears to be more resistant to grubs than Badila or Goru, and is coming more into prominence on the Cairns areas. At one large estate it is stated that out of an estimated crop of 12,000 tons only 4,000 tons will be cut, the remainder having been destroyed by grubs. On this estate it is estimated that the loss by grubs during four years has been 98,000 tons of cane, an immense monetary loss. The cane generally about Mulgrave and Hambleton was more or less backward for the same reasons as given in connection with the Mackay district. However, the crushing at Mulgrave and Hambleton will be good, the cane having made a better recovery than at Mackay. Babinda also anticipates a fine crop, and the density of the cane in this district was decidedly improving as the crushing proceeded. The mill was working exceedingly well at the time of Mr. Easterby's visit. In all the Cairns districts large areas had been, or were, in course of planting for next year. A meeting of growers was held at Babinda to deal with cultivation and other questions.

Due to the severe cyclone experienced at Mossman during February, the cane was found to have suffered a great deal, particularly the variety known as Clark's Seedling, large numbers of the sticks of which were badly broken, as was also the case in Mackay in the 1918 cyclone. This has put the district back, and though the farmers have repaired their dwellings, &c., they have had a hard knock in the damage done generally by the cyclone. About 50 per cent. of the cane grown here is D. 1135. There are very few grubs about, and the cane is healthy and good.

The rat pest, once so prevalent here, has also diminished. An inspection of varieties growing on Messrs. Crees Brothers' farm was exceedingly interesting. Some years ago a number of seedlings were found on the sandy bank of the Mowbray River, below a field of cane. These seedlings were propagated and there are now some ten being grown experimentally at the farm in question. Of these, the one known as Mossman Queensland No. 1 is apparently the best. The stick greatly resembles Badila, but the top is different. The Mossman Mill expect to crush about 50,000 tons of cane this year.

Fine crops of cane were observed at Innisfail, and a good crushing is anticipated. While the cane here has not made the growth it would have done under more favourable conditions, it had grown wonderfully well during the past three months. Much of the cane upon the South Johnstone area was already arrowing. The cane generally was not much affected by grubs. The new experiment station at South Johnstone was looking particularly well, and the cane planted last October had grown into a very fine crop. Many of the varieties had made tremendous growth. The fertilising experiments were also showing up well. A well-attended meeting of canegrowers was held at Innisfail, at which many questions affecting lime and fertiliser were brought forward. Some grubs were observed at Fisher's Creek, but there does not appear to be many of these in other parts of the district.

Ayr was the last district visited. The cane here in the early part of this year was in a very backward condition, but since the late rains it has made amazing growth and the crushing will now be a medium one. Grubs have been noticed attacking cane about Ayr for the first time, but this occurrence is not, so far, large. A good deal of cane, however, about the Haughton is affected by this pest. Large areas of land are being put under cane in all parts of the district. The re-erection of the Invieta Mill at Giru, Haughton River, is proceeding most satisfactorily. This mill, which formerly served the Invieta district, near Bundaberg, was dismantled and shipped to the new proprietors, the Haughton Sugar Company, Limited. The whole of this mill was sent by train and steamer, and it is stated that no piece of the building or machinery was lost in transit. The mill building is now practically completed, and very little of the machinery remains to be put in position. It is expected that the work will be completed in November, but owing to the small crop this year, the mill will not start operations till 1921. A splendid job has been made of the removal and re-erection, the contract being in the hands of Barbat and Sons, of Ipswich.

At Mr. Mackersie's farm, Ayr, the variety known as H.Q. 458, recently sent up by the Mackay Sugar Experiment Station, was found to be doing well. Very fine crops of Q. 855, another of the station canes, were observed at Pioneer Mill and upon Mr. Craig's farm. This latter variety is preferred by some farmers in the Ayr district to the Q. 813, which also appears to be doing well.

The new irrigation works at Home Hill are progressing, but the difficulty in procuring cement and electrical supplies is hindering the work of completion. A magnificent display of cane was made at the Lower Burdekin Agricultural Show, the exhibition of stools of cane being probably the finest ever shown. These included some very large stools of the Badila cane from the river bank country. The champion test was won by the variety known as B. 208, with 18.35 per cent. of commercial cane sugar.

Summing matters up, the General Superintendent stated that the crops above Townsville were almost all fine and would produce a good tonnage of sugar. Below Townsville, however, the crops were only medium to poor, so that the South would be largely responsible for the deficit in this year's output. It is gratifying, however, to note that large areas are being got ready for next year, so that, should good weather conditions ensue, the 1921 season may easily be a record.

THE SISAL FIBRE INDUSTRY.

The exhibit of sisal hemp by the Department of Agriculture and Stock at the late Exhibition, clearly demonstrated that the plant producing this valuable fibre finds a congenial home in Queensland, from the southern border to the farthest north and west. During the years of war the demand for sisal could not be taken advantage of by the countries producing it, owing to shipping difficulties. The price accordingly rose to something like £150 per ton, but growers in East Africa and South America were compelled to store their crops for a time. It will possibly interest both growers and utilisers of this fibre in Australia to note what is reported by the June issue (1920) of the Monthly Hemp and Fibre Report.

Of Manila hemp, we need say little, as this fibre has never been produced industrially in Queensland. Concerning Maguey fibre, Mexican and East African sisal, the report is—

"Maguey Fibre.—Quiet, with a small turnover. Cebu No. 1, £—; Cebu No. 2, £50; Cebu No. 3, £46; prompt or June-July shipment.

"Mexican Sisal.—Of no interest to Europe, chiefly on account of its low quality, but a fair amount of business is being done with the United States at 8 cents per lb.

"East African Sisal.—Recent heavy arrivals have, to a great extent, been disposed of at £56 to £56 10s. for best quality, £52 to £53 for No. 1, and £46 to £47 for No. 2. The quality, however, leaves much to be desired, hence present somewhat low prices, which will scarcely tend to stimulate production.

"Java Sisal.—No business reported, which is scarcely to be wondered at owing to the low prices ruling for African sisal.

"Mauritius Hemp.—Next arrival of about 1,200 bales expected in ten to fourteen days. Market on the easy side for all grades except prime quality, which is in good demand, but there is none offering for the moment. Values: good, £50 to £52; good fair, £49 to £50; fair, £46 to £46 10s."

Both sisal and Mauritius hems can be plentifully produced in this State. The labour conditions have, however, for a long time made it impossible to produce the fibre at a profit in Queensland, and hence the collapse of an industry which a few years ago promised to figure largely in our exports.

VARIATION IN COCOANUTS.

Some years ago a bunch of cocoanuts was obtained from the North-Western Province, which bore both yellow and green nuts. Of the five nuts of the bunch, three were green and two yellow. The main stalk of the bunch was longitudinally striped with green and yellow, the side branches which arose from the green areas being green and bearing green fruits, while those arising from the yellow areas were yellow and bore yellow fruits.

Two nuts of each colour were planted, but only two germinated, fortunately one of each kind. These two plants have since been growing side by side. The plant from the yellow nut has a distinct yellow tinge, with a yellow or bronze midrib to the leaves.

The two plants, though still small, are now beginning to show a distinct difference in size, the leaves of the green plant being noticeably longer than those of the yellow.

The occurrence of yellow nuts on a tree which otherwise bears green nuts is an instance of what is usually known as chlorosis—i.e., a deficiency, or marking, of the green colouring matter of the plant. It would be expected that in such a case the yellow plant would be of slower growth than the green one. The precise form of this particular example of chlorosis has not yet been determined, as it has not been possible to devote time to its examination.

The interest of the case, however, lies in the fact that it indicates that the yellow varieties of cocoanuts may have originated as similar "sports" from the normal green varieties; and the practical bearing of this is that, unless yellow varieties are desirable on account of other qualities, they should not be planted because their slower growth, owing to their chlorotic condition, will render them less profitable than the green varieties.—"Tropical Agriculturist," January, 1920.

TANNING HIDES.

Amongst the various tanning materials, oak bark (*Quercus robur*) is the most useful; and the excellence of British sole leather is due, in a great measure, to the superior oak bark produced there. Next in importance comes the Mimosa or wattle bark of the genus *Acacia*, the tannin contents of which range from 15 to 35 per cent., and the richest of the Mimosas (the Black Wattle) tannins imported into England (pre-war) were the Black, Gold, and Silver Wattle from Queensland and Tasmania. All the vegetable tanning materials are reduced by grinding to a uniform size, and are subject to the following processes. This is done by a series of "leachers" or "spender" pits:—

The new, fresh bark is put into the first of the series of pits, and over it is pumped (cold) the well-strengthened ooze from the next leacher. In the first pit the ooze or infusion is brought up to the full strength required for the "lay-away" tan pits; and after the infusion is pumped off the tan it is passed over to No. 2 leacher, where it is treated with liquor also somewhat lower in strength. In this manner the bark passes by stages through a series of pits, diminishing in richness in tannin at each stage, till in the last of the series it is fully exhausted with pure, warm water. Finally, this pure water is put in at one end of the range of pits and fresh tanning material at the other.

The hides of cattle are received at the tanyard in four different conditions. These are—(1) market or slaughter hides, which are soft, moist, and covered with dirt and blood; (2) wet, salted hides; (3) dry, salted hides; and (4) sun-dried or "flint" hides.

On arrival at the tannery, they go through a variety of treatment to clean them, free them from salt, and soften the hard dried hides, and to get rid of the lime used in the dehairing process. They are then passed through the tanning pits, hides which were at the top of one pit being placed in the bottom of the next. This handling process takes six weeks, after which they remain another six weeks in the "layers," when these pits are cleaned out and replenished with fresh ooze, hides, and tan as before. These processes may be repeated three or four times before the tanning is completed, and the whole operation varies from one to four years for heavy leather.

The yield of leather per hide varies. As a rule, it may be said that 100 lb. of green hide will yield 40 to 50 lb. of leather; 100 lb. of green hide, however, when deprived of hair, flesh, and moisture, will weigh only 18 lb.; 100 lb. of dry hide, when fleshed and haired, will weigh 85 lb.; and the yield of leather will be from 180 to 200 according to the tannage, the absorption of tanning being as high as 90 per cent.

Botany.

THE WHITE CEDAR (*MELIA AZEDARACH*, VAR. *AUSTRALASICA*): A PLANT POISONOUS TO PIGS.

By C. T. WHITE, F.L.S., Government Botanist.

During the past couple of months several samples of berries* taken from the stomachs of pigs supposed to have been poisoned have been forwarded to the Department for determination. On examination these berries have proved to be those of the White Cedar (*Melia azedarach*, var. *australasica*), a very common tree in many coastal dairying localities from the Tweed River to the extreme North. It is also commonly planted for ornamental and shade purposes, and being hardy and drought-resistant is extensively used for street planting, &c., in and about many inland towns.

Judging by the specimens sent in, many farmers are unacquainted with the tree and its dangerous character when growing about pig yards and sties, and the following notes and illustration are, therefore, published to bring the matter under notice:—

Several cases in the Beaudesert district recently of pigs having been poisoned by White Cedar berries have come under the notice of the local Stock Inspector (Mr. J. H. McCarthy), who, in a letter dated 18th June, 1920, stated that "it has no doubt caused heavy losses in the district."

H. R. Brake, Deeford, Dawson Valley Line, wrote, under date 24th April, 1920:—"Will you kindly analyse the enclosed berries, as I have lost twelve pigs? On the dead pigs being cut open, each had these berries in the stomach, from which I conclude the berries must be poisonous."

W. L. Guy, of North Rockhampton, wrote, under date 14th July, 1920:—"I had eleven pigs seven weeks old and wishing to wean them placed them in a pen in which was growing a tree locally known as 'White Cedar' or 'Queensland Beech.' I enclose fruit and leaves.† The pigs ate liberally of the fruit; and within twelve hours two were dead, and thirty-six hours later another one died. Three more were affected with cold extremities, shivering, and partial paralysis of the front legs. I dosed them with castor oil, and put them in a warm box. Those treated recovered. I examined the contents of the stomachs of the dead ones, and found whole fruits and portions of others of the 'White Cedar,' which I thereupon concluded contained the poison."

In New South Wales the fruit has often been blamed as the cause of the death of pigs, numerous cases being cited by the State Botanist (Mr. J. H. Maiden), who gives a very full summary in his "Forest Flora of New South Wales" (Vol. III., pp. 94-97). He quotes one instance where the plant was growing as an ornamental tree in the grounds of a public school, and a child was taken suddenly and seriously ill through eating "some berries that grew on the White Cedar tree in the playground."

Melia azedarach L., is a common tree in India and the Eastern Archipelago, and is widely cultivated throughout the warmer parts of the world as an ornamental species. The Australian form has been designated a distinct variety (var. *australasica*) by the late C. de Candolle in his monograph of the family (Meliaceæ) to which it belongs.

* Technically, the fruit of the "White Cedar" is a "drupe," not a "berry," these two terms having definite and restricted meanings in botanical terminology; but, as the fruits of this tree are always popularly spoken of as berries, this term has been used in this article.

† The name "Queensland Beech," if in use in the Rockhampton district, is to be deprecated, as this name is generally applied to species of *Gmelina*—e.g., *G. Leichhardtii* of Southern Queensland, and *G. fasciculiflora* of Northern Queensland, respectively.

In America V. K. Chesnut ("Preliminary Catalogue of Plants Reported Poisonous to Stock"—Ann. Rept. Bureau of Animal Industry, U.S.A., 1898, p. 406) says:—"Much cultivated for ornament and sparingly escaped from cultivation in the South. A correspondent from Arizona states that three of his hogs were poisoned by eating the seed which was ignorantly offered them as food."

W. E. Safford, in "The Useful Plants of the Island of Guam" (Contr. U.S. Nat. Herb., Vol. IX., 1905), states:—"The berries are poisonous," and then goes on to quote Oudenhampsen,* "who has made a careful study of the properties of this plant," to the effect that the bark contains a substance which is stupefying to fish, and that the narcotic properties are due to a saponin.

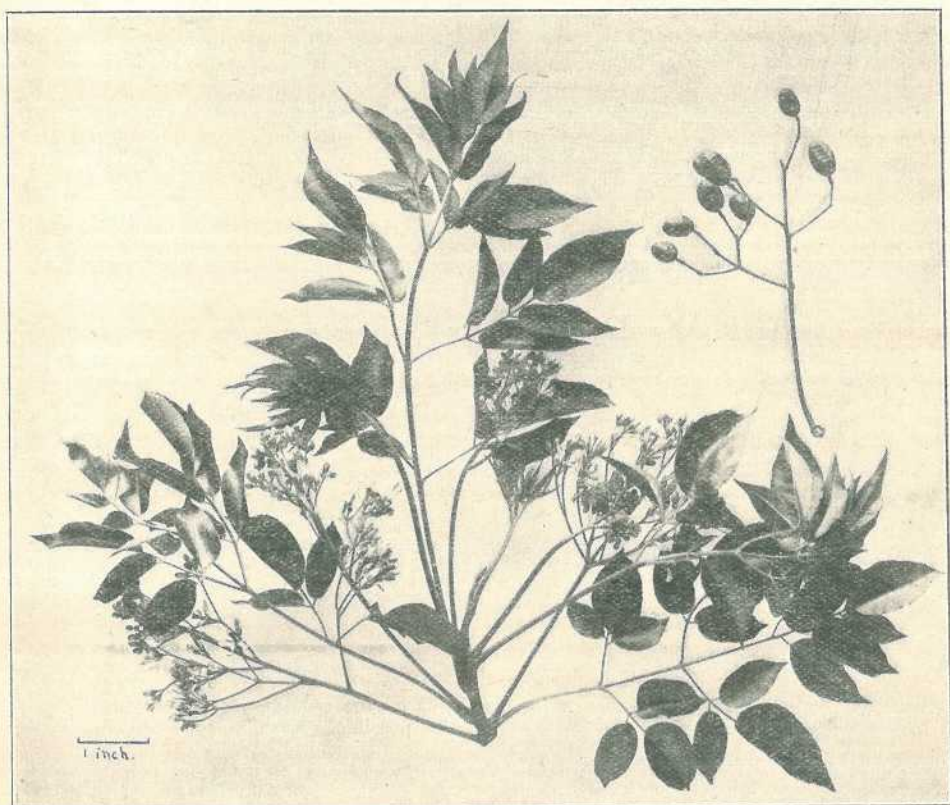


PLATE 16.—WHITE CEDAR (*MELIA AZEDARACH*, VAR. *AUSTRALASICA*):
A PLANT POISONOUS TO PIGS.
(About half natural size.)

A strange fact is that fruit-eating birds are said to eat the fruits without any ill-effects following; and I have been told that flock pigeons feed largely on the fruit in the season, and further that ducks and fowls eat the berries with impunity. J. H. Maiden ("Agricultural Gazette of New South Wales," Vol. VII., 1896, p. 564, and "Forest Flora of N.S.W.," Vol. III., p. 95) quotes Thos. Luxton, of Lower Portland, N.S.W., to the effect that "they [the fruits] do not seem to hurt the birds, some varieties of which are very fond of them, notably the green pigeon of the Richmond River, which when these berries are ripe get so fat and lazy as to be easily shot."

* Oudenhampsen, "Bydrage tot de Kennis var. *Melia Azedarach*, L.," 1892.—A work to which, unfortunately, I have not access.

Entomology.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigation, from the Entomologist, Dr. J. F. Illingworth:—

The rainy season, so late in starting, is still with us; and the weather continues favourable for growth. This is very fortunate, since much of the cane, retarded by the drought, has not begun to form in places, and it is doubtful if it will be ready to cut this season. The grubs, too, are still active (15th June); but luckily their damage is not general this season. While I have never seen them worse at Greenhills, there are few other farms that have suffered seriously. I have also had favourable reports from Mossman and the Herbert River. In both of these districts the beetles were abundant during the last flight, hence it is gratifying to learn that noticeable injury from these pests has failed to appear.

Several other pests, however, have been particularly abundant in this district. Among these I may mention cut-worms, locusts, beetle-borers, and a new bug which is transferring its attention from the native grasses to sugar-cane.

OBSERVATIONS ON RESISTANCE OF D. 1135.

In earlier reports I called attention to the deep-rooting habit of this variety; and at various times I have remarked upon its comparative resistance to the attacks of grubs.

In making further study along this line during the past season I find much to commend D. 1135 as a cane for the grub-infested red volcanic soils. A remarkable instance is a field of three varieties, planted for experiment, in an area invariably devastated by grubs, at Meringa. The D. 1135 has Goru on one side and Badila on the other. The grubs have killed the Badila and badly injured the Goru, while the D. 1135 is hurt but little—standing out in marked contrast, between the two devastated plots, with its dark green colour and superior height.

In another field on the same red soil the misses in a field of Goru were planted with D. 1135. The grubs have been bad in the area, but it is remarkable how the stools of D. 1135 stand out dark and green and tall in the midst of the yellowing and dying Goru.

In spite of the fact that I have favoured late planting of cane like Badila, to facilitate thorough cultivation during the flight of the beetles, the present evidence would urge the planting of D. 1135 as early as possible. With this upright variety, cultivation could be continued under ordinary conditions right up to the time that the beetles were ovipositing. Furthermore, the cane being formed, the root system would save it from deteriorating until it could be milled—it would not rot on the ground as Badila does.

ARSENIC FOR CANE GRUBS.

Experiments with arsenic for the control of the grubs are progressing well, and I am pleased to report that exhaustive chemical tests have failed to reveal any trace of arsenic in the juice of cane treated by applying arsenic at the rate of 70 lb. per acre in the drill with the plants. I was able to have these tests made through the courtesy of Mr. W. F. S. Howe, Manager of the Mulgrave Central Mill, and Mr. J. F. Foster, the mill chemist, who went to considerable trouble that all possible tests might be applied. This news will ease the minds of those who have been afraid that some of the arsenic might find its way into the sugar. In any case, the luxuriant growth shown by this cane would have been impossible if it had absorbed the poison into its circulation.

Present investigation demonstrates that it is entirely useless to place poison in furrows on either side of the stools of cane. The first use of arsenic at this station was based upon the supposition that the grubs travel more widely, and ignored the fact that the eggs are usually placed directly in the stool. Hence, to be effective, we now know that the poison must be among the roots of the plant—right where the grubs are at work.

As previously indicated, I am now favouring larger applications of the poison. In all cases it is being placed in the drill at time of planting. In these experiments I use 40 lb., 60 lb., 80 lb., 100 lb., and even 200 lb.—the latter to note any ill-effects upon the growth of the cane.

Every poison plot alternates with a check plot, which is not treated; and there are duplications of the plots in each field, so that an average, which will not be misleading, can be drawn. I favour placing the arsenic in the drill before planting, so that the planter will stir it well into the soil about the plant. I have noted that the men, in chipping, have a tendency to pull the top layer of soil out of the drill, and hence a portion of the poison would inevitably be scattered if it were applied after planting.

To insure a supply of the poison among the roots in the centre of the stool, it may be profitable to make one application before planting and a second after the plants are up—at the time the drill is being filled in by the scarifiers. In testing out this method, I found slight burning of the outer leaves of the young shoots, which is easy to understand, for the poison was applied when the leaves were wet. However, the plants made a quick recovery, when the new leaves pushed up from the inside.

Nevertheless, experiments have demonstrated that arsenic is not injurious to the eyes of the plants, for the cane comes away vigorously, even when placed in the drill in contact with the poison.

Since arsenic is being used rather generally, it may be well to repeat that hypo (hyposulphite of soda), the common fixing bath of photography, is an excellent remedy for any irritation to the skin that may develop when handling the poison. The affected parts should be bathed in a saturated solution of this salt from time to time. With ordinary care, however, one need suffer no inconvenience from handling arsenic.

OTHER TROUBLESOME CANE PESTS.

A serious outbreak of cut-worms (*Cirphis loreyi*, Haw.) has attacked the cane which was recently laid low by the flood of the Mulgrave River. On another occasion a field of young plant cane which accidentally had a fire run through it was attacked in the same way as soon as it began to grow again. This pest is also rather serious, at times, on the grass paddocks, under similar conditions. It is possible that fire and floods so retard the parasites that the pest gets considerable headway before it can be brought into check again. Field observations would indicate that under ordinary conditions parasites are so numerous that very few of these moths come to maturity. On several occasions I have dug up the pupæ in numbers about stools of cane, and I have seldom got one of the moths to emerge—100 per cent. being parasitised. Hence I was interested to note in the flooded area that none of the parasites were in evidence.

Locusts, too, are exceedingly abundant this year in some of the drier areas. The principal devastation is done by *Locusta australis* (Sauss.). The young hoppers go in droves as one wades through the grass along the headlands of infested areas. The older insects climb into the cane, riddling the leaves—similar to the work of the cut-worms.

The beetle borer (*Rhabdoenemis obscura*, Boisd.) is rapidly spreading, and we are hearing of them in many districts now that cutting has started. To hold them in check let me urge a general burning of the trash in all infested areas before the cane is cut. In this way the adult beetles are kept from flying away to other fields of young cane, and most of the grubs are killed in the sticks—only those that happen to be down in the root escape. If this practice is carried out the pest can be held down until such time that the parasites become established.

The breeding of the parasites in the large new cage at the station is progressing well. I have had considerable difficulty in securing a sufficient supply of the borer grubs. I hope, now that cutting is starting, growers will send us as many grubs as possible. These, when cut out of the cane, can easily be packed up in tobacco tins with a good supply of the fibre that they chew up in their burrows. If placed in tins without fibre they quickly chew each other up. The tins can be posted to Meringa.

A new bug, common on native grasses, has turned its attention to cane. It belongs to the family *Lygaeidae*, hence is closely related to the destructive chinch-bug of the United States, which also originally fed on native grasses; but turning its attention to cultivated cereals, the damage was estimated at one hundred million dollars for the country in one year. I sent specimens of this bug to Mr. O. H. Swezey, the entomologist of the Hawaiian Sugar Planters' Association, who kindly identified it as *Phanacantha australica* Kirkaldy, a new species which was collected by their entomologists when here several years ago.

The habits of this insect are remarkably like those of the chinch-bug. They hibernate in bunches of grass and trash; their eggs, too, are very similar, and are scattered about in the same way on the soil at the roots of grasses; and, fortunately, they suffer the same natural checks.

The eggs are elongate-oval in shape and very minute, being slightly over one-sixteenth of an inch in length. The colour when newly laid is light amber, becoming darker as the embryo develops. The upper end is docked off, bearing a cap with a number of tubercles, very similar to that of the chinch-bug. The egg is distinctly flattened, and the tubercled cap is tilted well over to what may be called the front. Looking at the back, the tubercles scarcely appear. Edge-view, the diameter is hardly more than half that of the other surfaces.

The newly hatched nymphs begin to appear in April; by July they are exceedingly abundant. The youngest stages are found on the ground at the roots of grasses, where they are hatched, but they soon climb into the leaves of the cane, where they may be found in hoards throughout the winter months (June to September).

The work of these bugs is more noticeable in some varieties, especially Clark's Seedling and Badila. D. 1135 is little affected. The bugs feed on the underside of the leaves, inserting their needle-like beaks and sipping the juice. Since they are continually moving about, it is needless to say that each bug makes numerous openings in the epidermis of the leaf, thus providing easy access for spores of disease. The area punctured becomes light-coloured at first, later yellow, and finally appears as a brown spot, this latter probably caused by a fungus which enters through the puncture. Where the spots are abundant enough the whole leaf soon dries up, starting at the tip and working backward. Hence, during dry weather, when the bugs become so abundant, they are rather a serious pest.

As indicated, multiplication takes place only during the drier part of the year, for humidity soon brings about a disease among them. I have often found the dead bugs sticking to the backs of the cane leaves, with evidence that they had been destroyed by a fungus.

I have not had time yet to study the eggs for parasites, though undoubtedly they are largely held in check by these natural enemies. I have found several predaceous insects feeding upon the bugs. Most common among these are other larger bugs, belonging to the family *Reduviidae*, and the omnivorous brown ant, *Pheidole megacephala*.

THE BANANA-ROOT BORER.

Though this insect is not known to attack sugar-cane it may be interesting to record its abundance in banana plantations at Babinda.

While I was in Fiji in 1913, several of the growers were very insistent that this pest turned its attention to cane whenever planted on areas where old bananas had been routed out. I had no opportunity to investigate the matter, but I do not think it likely, since the habits are so different from the borer beetle of cane, though the adult beetles of the two species bear a close resemblance.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigation from the Entomologist, Dr. J. F. Illingworth:—

"As is usual, for this season of the year, the weather has at last turned off dry; thus favouring the harvest of damaged cane, which has been progressing for the past month. The continued rains, well into June, resulted in exceedingly low density in certain areas for the first cut, but the e.e.s. is rapidly rising with the cooler weather.

"On the other hand, climatic conditions have been most favourable for the development of natural enemies of the cane grub; myriads of the grubs have succumbed to contagious diseases, parasites, and the numerous predators.

"NOTES ON CANE GRUBS.

"The long drought, early in the year, has resulted in a peculiar situation for the cane grubs; some are still in evidence (15th July) fully three months past their usual time of going deep into the soil to pupate. Moreover, this delay has proved fatal to the large majority of them in the older-infested districts. The rains

continuing for some time after the cool nights set in brought about conditions ideal for the development of disease organisms, and in some fields these have multiplied with remarkable rapidity.

"NATURAL ENEMIES ACTIVE.

"Among these I may mention ibises, bandicoots, parasitic and predaceous insects, and contagious diseases. In certain fields at Greenhills there is a most remarkable decrease in the number of live grubs in the soil. At first I concluded that they had gone down to hibernate, but digging failed to disclose any of them deeper than 12 in.; natural enemies had evidently destroyed them.

"Excavating recently in one of the worst-infested fields, where earlier in the year there was an average of 100 or more grubs per stool (in one case I found 134), I was unable to get an average of more than four alive. A typical stool, 9th July, gave—

2 in. to 6 in. deep, two alive and one just destroyed by fungus. 6 to 12 in. deep one live and one sick with black spots on skin, indicating a bacterial disease; one dead by fungus; and another dead, with black patches and very soft, due to bacterial disease. None were found deeper, though we dug down 3 ft. The soil was rather dry and crumbly, so that the dead grubs were easily broken up and difficult to discover—only the chitinous head-shield remaining for a time after decomposition of the soft body sets in.

"Furthermore, experiment has demonstrated that diseased grubs usually come to the surface, where they are easily removed by predators—ants, ground beetles, mammals, and birds. In this same field I watched a flock of fully 500 ibises assiduously probing about the grubby stools, and in almost every case the soil had been dug up at the roots by the omnivorous bandicoot in his search for the fat grubs. With all these grub-destroyers at work it is not hard to understand the rapid disappearance of the pest.

"*Muscardin Fungus*.—I have found grubs every year at Greenhills destroyed by this disease. Heretofore, however, the mortality has not been remarkable, for the grubs normally go down to hibernate in March before the cool weather sets in. It is noted from our experiments that an epidemic can apparently only occur when there is lowered temperature and abundant moisture; hence the recent heavy death-rate is just what we might expect from the combination of those favourable circumstances.

"I first noticed this remarkable mortality among the grubs about the middle of June, shortly after the rainy season terminated. In one stool of the thirty-two grubs uncovered twelve had been destroyed by the fungus. The growth was a mass of greenish-white mycelium, extending into the soil for about 2 in. or more from the stiffened body of the grub. In some cases the mycelium had attached itself to the underground portions of the cane, wherever the diseased grub had been in contact; in fact, we often discovered the disintegrated grubs by seeing the gray-green spores or mycelium on some portion of the root system. By the 1st of July the percentage of dead grubs had more than doubled. The first stool that I dug gave twenty-six grubs, but eighteen of them had been destroyed by the fungus. The ibises were in hundreds in this field gathering up the larvae within reach of their long bills. On 13th July we dug out many stools in the infested area, noting the percentage dead in each; and, though the weather was dry and the soil powdery, the deceased grubs were still everywhere in evidence. In a number of cases all the grubs that we found had succumbed (100 per cent.).

"Following on this important evidence, we made a careful survey of all the infested area at Greenhills to learn if this valuable disease was distributed throughout the plantation. This was done by digging out numerous stools in each of the infested fields, the result being indicated on the plan of the estate by an x for disease and an o for none. By this method I developed an interesting discovery—the fungus appears to be well distributed in all of the areas which are regularly attacked, but we have not been able to find it outside of this well-defined region, especially where the pest, in its erratic flight this year, caused the devastation of fields that are usually immune. Hence, we must conclude that next year's infestation will come largely from the beetles that emerge in these newer devastated areas, i.e., where the fungus has not had time to become established. Apparently the spores, once introduced, continue in the soil from year to year, ready to bring about an epidemic when conditions are favourable. As indicated above, we have learned from experiment that a contagion can be brought about by excessive moisture when the weather is cool. I have demonstrated this with grubs in pots of the spore-laden soil. Hence it would appear that all that we require is water for irrigation under such conditions. The soil became dry too soon, which resulted in a cessation of the

epidemic just before the finish of the last grubs. Undoubtedly one more good rain about the beginning of July would have completed the work.

"Bacterial Disease.—During the survey of the muscardine fungus I discovered many grubs which had died of some bacterial disease. The diseased grubs had the same habit, as noted above, of coming to the surface of the soil before succumbing. By digging, specimens were found presenting all stages of the disease, which usually appears at one of the spiracles or in the membrane between the segments of one or more legs. In the latter case the affected appendage soon drops off, and the disease rapidly progresses upward into the body. The affected parts have a peculiar shiny-black appearance, which coincides with that described by Zae Northrup, who gave the name *Micrococcus nigrofaciens* to the organism causing the disease. This friendly organism was found to be well distributed in the United States.* Finally, at death, the body becomes very soft and black all over; totally different in appearance from specimens which have died from the fungus, the latter being hard and cheesy. Naturally, such macerated specimens quickly decompose in the soil, and it is almost impossible to find them after a few days. This accounts for the way that grubs disappear as if by magic in some instances when climatic conditions are just right. The remarkable disappearance of the grubs at Fairymead, in 1909, is a case in point. I have discussed this matter with Mr. Howe, manager of the Mulgrave Central Mill, who was located at the Lynwood Estate at that time, and who made a careful study of the mortality of the grubs.† From all that I can learn, the mites which appeared in such numbers on the sick grubs were only an after-effect—the real cause of death being apparently due to a bacterial disease similar to the above. Mr. Howe also informed me that that district had been free from grubs for years, but that they had begun to give trouble again this past season.

"I am multiplying both this disease and the muscardine fungus, hoping to be able to widen the area of usefulness. Already several hundreds of the diseased grubs have been planted in widely-separated fields where they are not known to occur. It may be possible in this way to establish them in any region where the grubs are normally active.

"Parasitic Wasps.—Two species, *Campsomeris tasmaniensis* Sauss., and *C. Radula* Fab., have been particularly abundant. The males are always seen on sunny mornings flying about in swarms close to the surface of the soil in the grubby areas. The females, too, though normally below ground, may be easily observed, for they emerge early in the day to feed at flowers such as those of the Chinese burr, &c.

"By digging numerous pits about 3 ft. deep in infested fields at Meringa, I found that these friends were doing excellent service. The soil was red volcanic, very loamy and rather dry; hence the wasps had gone to remarkable depths after their prey. In most instances the parasitised grubs were down 18 in.—the deepest 24 in. Of the grubs unearthed, 25 to 60 per cent. had been destroyed by these wasps. This is the highest record I have seen, and is undoubtedly due to the lateness of the grubs in hibernating.

"The Beetle Borer.—Cutting operations being now in full swing, this pest does not appear to be as abundant as usual in the region about Gordonvale. I have not had reports from other districts, but I trust they have fared as well. The practice of burning the trash from practically all cane before cutting last year evidently accounts for this diminution of the pest. Undoubtedly it is a wise procedure wherever the borer beetle is doing considerable damage.

"Colonies of the parasites (*Ceromasia sphenophori* Vil.) are being liberated, from time to time, from the large breeding cage at the station, and I expect to get a fresh supply of the flies from Mossman, now that harvesting has begun there. Growers in other infested areas certainly owe a debt of gratitude to the Mossman Mill Company, and especially to Crees Brothers, for their kindly assistance in supplying these friendly insects; they have shown a spirit of co-operation it behove us all to emulate."

* Mich. Tech. Bulletin, No. 18.

† Aust. Sugar Journal, Vol. 1, p. 65.

General Notes.

A NEW FRUIT EVAPORATOR.

The West Australia "Farmer" publishes the following note on a new fruit-drying evaporator, which should be of interest to fruitgrowers in Queensland:—

"Says 'Sarnia Topics': 'After three years' exhaustive experiments, we believe that Mr. Frank Williams, of Adelaide, in conjunction with G. W. Beverley and Percy Short (manager and engineer of Pyap Estate), has secured an evaporation plant which will be a boon to the whole dried fruits industry. The previous 'Vrai' evaporator did the work, but it was too slow and too expensive in fuel costs. The latest invention to be seen at Pyap actually gave us dried sultanas and dried lexias (top grades) within twelve hours from the vine. No need to enlarge on the value of this with apricots, peaches, vine fruits, &c. Its advantages are manifest.'"

A BRITISH COTTON SUBSTITUTE.

Rumour lately was responsible for the information that a substitute for cotton was being manufactured in Germany, but no particulars concerning this have been published. We now take the following paragraph from "Industrial Publicity Service," London, a publication which supplies the Press with the latest reliable information on a variety of interesting subjects:—

"Great interest has been aroused in Great Britain by announcements concerning a textile material called 'cotton substitute.' It is not, however, a new thing, but its revival at the present time is due to the advancing price of raw cotton. It was invented ten years ago by a British engineer, and is a result of a special process of treating 'china grass.' By steeping the grass in certain chemicals the inventor obtains a fibre which can be spun in ordinary cotton-spinning machinery. The resulting material takes dye readily, has a good lustre, and when mixed with cotton yarn produces a hard-wearing fabric. Apparently the only objection to it is its hairiness and harshness, but for certain purposes these qualities would not prove a serious drawback. Experts consider that its main value will be as a union fibre with cotton and wool."

WAR ON FRUIT-EATING BIRDS AND RATS IN THE CANE FIELD.

Mr. H. Easterby, Superintendent of Sugar Experiment Stations, in a report on a visit to the Northern sugar districts last July, mentions the damage done to the cane by rats. This pest, which was once so prevalent in the Mosman district, had diminished to some extent. Possibly, the remedy here suggested might be applied with the prospect of entirely eliminating the rat from the canefields. It is not a new idea, however, as we know of a case where, some years ago, a farmer banished all the rats from his barns by the same process.

Mr. J. Jorgensen, of "Mayfield," Southbrook, writes:—

"About six weeks ago I found a way of keeping birds from fruit trees and rats out of the barn. I had only one loquat tree on the farm, and the 'mickey' birds devoured the fruit as soon as it began to ripen. All means were tried to get rid of them, but without success till, one day, the thought struck me that the pieces of worn-out garden hose (the kind with wire twisted round it) looked so much like snakes that it might frighten the birds if placed among the branches. And so it proved. The birds came every day and looked at the loquat tree from a pear tree close by. Some call them 'soldier' birds, but they certainly have not a soldier's courage, as not one of them has ventured into the loquat tree since.

"The rats I have completely banished from the barn, the pig-sty, the dairy, and the house. It is no exaggeration to say that there were hundreds of them, and although we tried many remedies they still increased. I at last remembered that I had seen in some paper a suggestion that if some tar were smeared on a live rat, and he were let go amongst the others, the whole tribe would clear out. So I set my traps and caught five alive, smeared them and others that I caught with tar, and let them go amongst their friends, with the result that before a month had elapsed not one rat was to be seen in any spot on the farm, and that was two years ago."

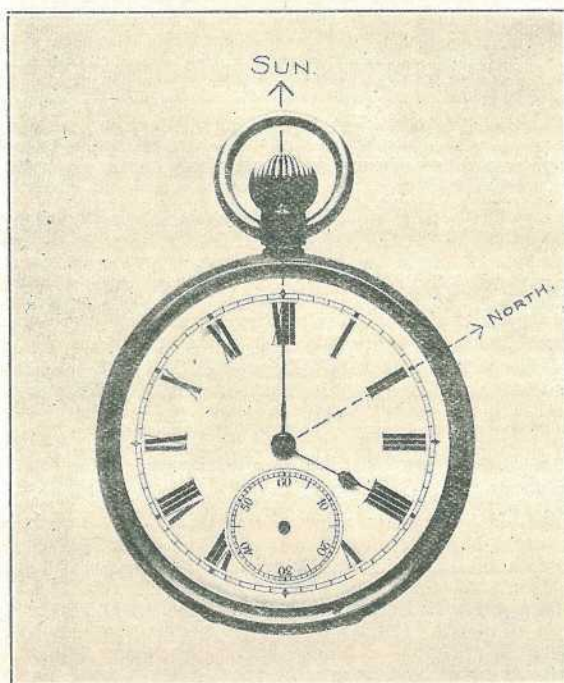
SOCIETIES, SHOW DATES, ETC.

CAVES (NORTH ROCKHAMPTON).—The name of the Caves Farmers' Association has been altered to "The Caves District Farmers' Association."

ORMISTON.—Ormiston Fruitgrowers' Association. President, G. Smallman; Secretary, W. Manders. Meet on second Monday in the month.

A WATCH AS A COMPASS.

Travellers often get "bushed" when out prospecting in still unpeopled country, or in trying to make a short cut to their destination. In such a case, a watch will take the place of a compass in pointing out the four cardinal points. Hold the watch so that the figures 12 points to the sun. Look where your hour-hand is. The north is just half-way between. Having located the correct north, the south, east, and west can be easily found.



EXHIBITION SALES.

Animal.	AUGUST.
	Prices.
Bullocks	£34 5s.
Bullocks (Champion)	£38 10s.
Cows	£23
Cows (Single, Aberdeen-Angus)	£30
Merino Wethers	52s. 6d.
Crossbred Wethers	80s.
Merino Ewes	46s.
Crossbred Ewes	36s.
Lambs	54s.

Answers to Correspondents.

CONSTRUCTION OF SUNDIAL.

“NEW CHUM,” Amiens.

Your change of address has been noted. The method of construction of a sundial will be published in the October issue of the Journal, as it is too late to do so in the present number.

HOW TO GET RID OF WARTS ON CATTLE.

“WARTS,” Port Douglas—

Your letter on this subject was, as requested, forwarded to the Stock Department. The Veterinary Surgeon recommends the following treatment:—“Wash the affected parts thoroughly with a strong solution of washing soda in water. Then apply castor oil freely around the bases of the warts. Repeat the treatment every seven days. The warts will fall off. In the majority of cases the warts fall off without treatment.”

For tanning heavy hides, see instructions in the issue of the Journal for November, 1919, page 263.

CONTENTS OF A SILAGE STACK.

In reply to a correspondent wishing to know the contents of a stack silo, the Department's Surveyor (Mr. A. Morry) writes:—

“The weight depends upon a variety of circumstances, such as the age of the stack, the condition of the corn stalks when stacked—whether very dry or fairly succulent; whether any weight has been applied to the top of the stack to compress it; and other such-like conditions. There is no rule by which the weight can be accurately ascertained, for reasons above stated, but if the stack was carefully built, and has existed, say, for twelve months, 60 cubic feet to the ton may be considered a fair average weight throughout.

“The size of the stack under consideration is 10 ft. high, 12 ft. 6 in. long, and 8 ft. wide, which equals 10 ft. by 12 ft. 6 in. by 8 ft.=1,000 cubic feet; divided by 60 cubic feet to the ton, it should contain about 17 tons, but it should be clearly understood that this is only an approximation depending entirely on the above conditions.”

ROUP IN FOWLS.

In reply to a correspondent who asked for advice on a disease of the eyes amongst his fowls and paralysis in their joints, Mr. J. Beard, Instructor in Poultry Management, Department of Agriculture and Stock, stated that in the first instance the birds were affected with roup, which, if not checked, would spread through the whole flock; and he recommended, as a cure and prevention, the addition of one tablespoonful of kerosene to half a kerosene tin full of water twice a week until a cure was effected, until which, all badly affected birds were to be removed to a dry, warm place, and their heads washed thoroughly daily with a weak solution of boracic acid and warm water, using pressure on the nostrils, and with a feather clean all the mucous out of the upper mandible inside the mouth. When dried, paint the nostrils and cleft with a feather dipped in kerosene and repeat until a cure is effected. For all birds that are badly affected, use of the axe is the best cure. Disinfect the houses with a strong liquid disinfectant.

The paralysis of the fowls may be caused by exposure to cold and wet and damp ground. If a cure is effected, these birds should never be bred from.

Treatment.—Remove the cause, isolate the birds, and give warm bedding, together with plenty of green food. Rub the affected parts with 1 part of turpentine and 3 parts of olive oil, or rub the joints with belladonna liniment, adding 10 grains each of iodide of potassium and salicylate of soda to each half-pint of drinking water. Give no meat of any kind.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST, 1920.

Article,						AUGUST.	
						Prices.	
Bacon	...	...	...	...	...	lb.	1s. 5d.
Bran	...	...	...	...	...	ton	£10 10s.
Broom Millet	...	...	...	...	...	"	} Nominal
Broom Millet (Sydney)	...	...	...	...	...	"	
Butter (First Grade)	...	...	...	...	...	cwt.	228s. 8d.
Chaff, Lucerne	...	...	...	...	...	ton	£9 10s. to £13
Chaff, Mixed	...	...	...	...	...	"	£9 to £11
Chaff, Oaten	...	...	...	...	...	"	£14 10s. to £14 15s.
Chaff, Panicum	...	...	...	...	...	"	...
Chaff, Wheaten	...	...	...	...	...	"	£10 10s. to £12
Cheese	...	...	...	...	...	lb.	1s. 1d. to 1s. 2d.
Flour	...	...	...	...	...	ton	£19 10s.
Hams	...	...	...	...	...	lb.	1s. 8d. to 1s. 11d.
Hay, Lucerne	...	...	...	...	...	ton	£9 to £11
Hay, Oaten	...	...	...	...	...	"	...
Honey	...	...	...	...	...	lb.	7d. to 7½d.
Maize	...	...	...	...	...	bush	8s. 2d. to 8s. 3d.
Oats	...	...	...	...	...	"	...
Onions	...	...	...	...	...	ton	£13 to £17.
Peanuts	...	...	...	...	...	lb.	7d. to 9d.
Pollard	...	...	...	...	...	ton	£13
Potatoes (English)	...	...	...	...	...	"	£17 5s. to £19 10s.
Potatoes (Sweet)	...	...	...	...	...	cwt.	...
Pumpkins (Cattle)	...	...	...	...	...	ton	£6 to £9
Turnips (Swede)	...	...	...	...	...	"	£5 to £6
Eggs	...	...	...	...	...	doz.	1s. 3d. to 1s. 4½d.
Fowls	...	...	...	...	...	per pair	8s. 11d. to 10s. 6d.
Ducks, English	...	...	...	...	...	"	5s. 9d. to 6s. 4d.
Ducks, Muscovy	...	...	...	...	...	"	9s. to 18s.
Geese	...	...	...	...	...	"	10s. to 11s.
Turkeys (Hens)	...	...	...	...	...	"	12s. to 14s.
Turkeys (Gobblers)	...	...	...	...	...	"	30s. to 40s.
Wheat	...	...	...	...	...	bush.	...

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar bag	...	...	...	...	...	5s. to 8s. 6d.
Beetroot, per dozen bunches	...	...	...	...	...	9d. to 1s. 6d.
Cabbages, per dozen	...	...	...	...	...	2s. 6d. to 4s.
Carrots, per dozen bunches	...	...	...	...	...	1s. 6d. to 2s. 6d.
Cauliflowers, per dozen	...	...	...	...	...	3s. to 12s.
Chokos, per quarter case	...	...	...	...	...	4s. to 5s.
Lettuce, per dozen	...	...	...	...	...	4d. to 6d.
Marrows, per dozen	...	...	...	...	...	3s. 6d. to 6s.
Peas, per sugar bag	...	...	...	...	...	4s. to 8s.
Potatoes (Sweet), per sugar bag	...	...	...	...	...	3s. to 4s. 6d.
Pumpkins (table), per dozen	...	...	...	...	...	3s. to 6s.
Tomatoes (Special), per quarter case	...	...	...	...	...	12s. 6d. to 18s. 6d.
Turnips (Swede), per sugar bag	...	...	...	...	...	2s. 6d. to 3s. 6d.

SOUTHERN FRUIT MARKETS.

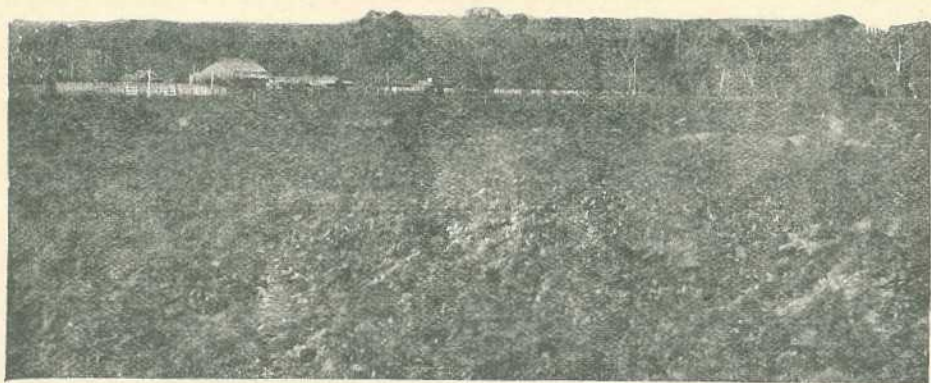
Article.	AUGUST.	
	Prices.	
Bananas (Tweed River), per double case	25s. to 32s.	
Bananas (Queensland), per double case	25s. to 30s.	
Bananas (Fiji), per double case	...	
Lemons, per bushel case	3s. to 5s.	
Mandarins, per bushel case	2s. 6d. to 9s.	
Oranges (common), per bushel case	6s. to 8s.	
Oranges (Navel), per bushel case	12s. to 14s.	
Passion Fruit, per bushel case	10s. to 15s.	
Pineapples (Queens), per double case	13s. to 25s.	
Pineapples (Ripley), per double case	13s. to 25s.	
Pineapples (common), per dozen	...	
Tomatoes, per quarter case	...	

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per half bushel case	12s. 6d. to 15s. 6d.
Apples, Cooking, per bushel case	9s. to 14s.
Bananas (Cavendish), per dozen	4d. to 11d.
Bananas (Sugar), per dozen	4d. to 6½d.
Cape Gooseberries, per quarter case	12s. to 14s.
Citrons, per cwt.	14s. to 15s.
Cocoanuts, per sack	£1 5s.
Cumquats, per quarter case	5s. to 6s. 6d.
Custard Apples, per tray	2s. 6d. to 3s. 6d.
Custard Apples, per half bushel case	3s. to 5s. 6d.
Gooseberries, per quart	...
Lemons (Lisbon), per half bushel case	11s.
Mandarins, per case	8s. to 20s.
Oranges (Seville), per cwt.	16s.
Oranges (special), per case	12s. to 15s.
Oranges (second crop), per case	5s. to 6s.
Papaw Apples, per quarter case	2s. 6d. to 5s. 6d.
Passion Fruit, per half bushel case	8s. 6d. to 14s.
Pineapples (smooth), per case	5s. to 8s.
Pineapples (rough), per dozen	1s. to 3s. 6d.
Strawberries, per dozen boxes	4s. 6d. to 12s.
Strawberries, per tray	2s. 6d. to 3s.
Tomatoes, per quarter case	7s. to 15s.

TOP PRICES, ENOGGERA YARDS, JULY, 1920.

Animal.	JULY.	
	Prices.	
Bullocks	£22 to £24	10s.
Cows	£16 2s. 6d. to £18	5s.
Merino Wethers	51s.	
Crossbred Wethers	60s. 6d.	
Merino Ewes	35s. 6d.	
Crossbred Ewes	46s. 6d.	
Lambs	40s. 9d.	
Pigs	101s.	



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A VALUABLE WINTER CROP for pasturing Sheep—will fatten three more to the acre than any other variety. Easily cultivated. Strong rapid grower, producing an abundance of highly nutritious green feed, greatly relished by all stock; a long strong taproot enables it to stand long periods of drought. Sow 4 to 6 lbs. per acre in drills, or 8 to 12 lbs. per acre broadcast.

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10/- bushel; 9/6 bushel in sack lots;
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Farm and Garden Notes for October.

FIELD.—Under ordinary favourable conditions, harvesting the wheat and barley crops may now begin. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, kafir corn, teosinte, sorghum, &c. Plant sweet potatoes, sisal hemp, yams, peanuts, and ginger.

KITCHEN GARDEN.—Why do so few gardeners and farmers grow their own vegetables? This is a question frequently asked by visitors to the farming districts. The reason probably is, that vegetables require a good deal of care and attention, which means also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them himself. The only vegetable grown on many fine farms are cabbages and rumpkins, not to class potatoes under the head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy; the Chinese gardeners supply the towns with all kinds of vegetables, except, perhaps, cauliflowers, during the whole of the summer. It is, therefore, clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March. If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming months. It does not pay to work shallow-dug ground. When sowing and planting during this month, give plenty of room between the rows and the plants; otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines; they will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radishes, pumpkins, cucumbers, marrows, rosellas, &c.; and transplant for succession in calm, cloudy weather.

FLOWER GARDEN.—Stake any dahlias which may be now above ground, and plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs which have done flowering, and store them in a dry place. Winter-flowering plants will have gone off almost; still, the garden should be in full bloom, and will well repay the trouble bestowed on it, and a little fertiliser given as a top-dressing will assist the plants to bloom and look well for a longer time than if they were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissi. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer chrysanthemum, calliopsis, and nemophila.

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

November is somewhat of an off month for fruit, as the crop of strawberries is about over; pineapples, with the exception of a few off-season fruit, are not ready for marketing; and citrus fruits of all sorts, with the exception of those grown in the latest districts, are now over. Bananas should, however, be improving, particularly if the season is favourable.

The most important work of the month is the cultivation of the orchard, as, in order to retain moisture in the soil, it is essential that the soil be kept in a fine state of tilth. Where land is liable to wash, breaks should be left between the fine-worked land, or, even better, a good break of cowpea or other leguminous crop,

valuable for producing nitrogen and humus, should be grown. All fruit pests should be attended to; cyaniding can be carried out where necessary, and is especially useful now in the case of the Red, Purple, Mussel, Circular Black, and Glover Scales. Fruit-fly should be systematically fought; all infested plums, peaches, guavas, or other fruits should be gathered and destroyed, so as to prevent the spread of the pest. Sucking bugs of all sorts should be gathered and destroyed, the egg-clusters, as well as the immature and mature insects, being destroyed. Hand-gathering is as good a plan as any. Fig beetles should be destroyed by spraying with Kedzie's mixture; and the egg-clusters should be destroyed whenever found.

Bananas and pineapples can be planted during the month, taking care, in the case of the pineapples, not to set out suckers that will immediately throw out a fruit, but those that will become firmly established before they fruit. Examine the vineyard carefully, and keep it well worked. Look out for Oidium and Black Spot, and treat for same as recommended in the Orchard Notes of the two previous months.

Early ripening grapes will be reaching maturity towards the end of the month; but few, if any, will be ripe. In any case do not market too immature fruit; rather wait a few days longer, till it is fit to eat.

THE TROPICAL COAST DISTRICTS.

The main crop of pineapples will ripen during the month; and if gathered at the right time—viz., when fully developed, but not turned colour—they will carry all right South, if carefully handled and well packed. Papaws and granadillas are still in season, and will meet with a good Southern demand; they must be packed in cases containing only a single layer of fruit, and should be sent in the cool chamber. I am certain that a good market can be got for these fruits in both Melbourne and Sydney, particularly at this time of year, when their winter fruits are off and their summer fruits are not yet on.

Watch bananas carefully for fly. Keep the orchards well cultivated.

Only ship good mangoes South; far too much rubbish is sent to Brisbane. Good mangoes will pay to pack properly, but the common sorts, which predominate to an enormous extent, will barely pay freight, if there is a good crop. The canning of good types of fibreless mangoes of good flavour is well worth taking up commercially in the North, as a ready sale for the canned fruits can be obtained.

As in the Southern Coast districts, all fruit pests should be systematically fought, and the orchard should be kept in a good state of tilth, as, once the wet season starts, there is little chance of cleaning up weeds and rubbish of all kinds, or of cultivating and sweetening soil.

THE SOUTHERN AND CENTRAL TABLELANDS.

The earlier kinds of summer fruits, such as cherries, will ripen during the month. See that, if the fruit-fly makes its appearance, it is systematically fought.

Look out for Codling Moth, and continue the sprayings with Kedzie's mixture.

Look out carefully for any San José Scale that may have escaped the winter spraying, as, if the trees are sprayed whilst the young are hatching out, the bulk of the insects are killed and little damage is done either to the trees or fruit.

The sulphide of soda spray is one of the best to use now. Keep Woolly Aphis in check, should it make its appearance, using the resin washes; or, if it and San José Scale are both present, use the sulphide of soda spray.

Watch the vineyards carefully for Black Spot and Oidium. Keep the orchard and vineyard well cultivated, so as to retain all the moisture in the soil required for the growth of the tree and development of the fruit. In the warmer parts, irrigate when necessary, following the irrigation by deep and systematic cultivation.

See that grape vines have plenty of foliage to protect the ripening fruit from sun scald, but yet not so dense a foliage as to induce Oidium or Black Spot. Look out for Red Scale on citrus trees, and cyanide to check same. Look out for fruit-fly in the early-ripening fruits, and gather and destroy all that may be so affected.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1920 AND 1919, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	July.	No. of Years' Records.	July, 1920.	July, 1919.		July.	No. of Years' Records.	July, 1920.	July, 1919.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	0.88	19	1.04	0.66	Nambour ...	2.56	24	2.72	1.65
Cairns ...	1.59	38	2.32	3.01	Nanango ...	1.68	38	3.13	0.12
Cardwell ...	1.40	48	3.25	0.16	Rockhampton ...	1.39	33	0.83	Nil
Cooktown ...	0.99	44	1.31	0.87	Woodford ...	2.45	33	1.99	0.58
Herberton ...	0.63	33	0.88	0.49					
Ingham ...	1.49	28	3.81	0.09					
Innisfail ...	4.25	39	7.89	4.46					
Mossman ...	1.43	12	3.68	1.17					
Townsville ...	0.53	49	0.27	0.02					
<i>Central Coast.</i>					<i>Darling Downs.</i>				
Ayr ...	0.53	33	0.42	Nil	Dalby ...	1.76	50	3.36	0.08
Bowen ...	0.91	49	1.17	Nil	Emu Vale ...	1.35	24	3.45	0.23
Charters Towers ...	0.53	38	0.37	Nil	Jimbour ...	1.65	32	3.46	0.11
Mackay ...	1.61	49	0.93	0.44	Miles ...	1.74	35	3.67	0.18
Proserpine ...	1.02	17	1.44	0.58	Stanthorpe ...	1.91	47	3.11	0.27
St. Lawrence ...	1.21	49	0.80	Nil	Toowoomba ...	1.95	48	4.03	0.27
					Warwick ...	1.71	33	3.73	0.13
<i>South Coast.</i>					<i>Maranoa.</i>				
Biggenden ...	1.23	21	1.59	0.22	Roma ...	1.37	46	3.24	Nil
Bundaberg ...	1.89	37	1.87	Nil					
Brisbane ...	2.22	69	2.19	0.18					
Childers ...	1.59	25	1.49	0.03					
Crohamhurst ...	2.92	25	2.60	1.35					
Esk ...	1.88	33	3.76	0.14					
Gayndah ...	1.47	49	1.18	0.04					
Gympie ...	2.11	50	1.97	0.38					
Glasshouse M'tains	2.05	12	2.47	0.68					
Kilkivan ...	1.70	41	1.32	0.24					
Maryborough ...	1.93	49	1.58	0.30					
					<i>State Farms, &c.</i>				
					Bungewongorai ...	0.83	6	3.03	Nil
					Gatton College ...	1.26	21	2.55	0.04
					Gindie ...	1.05	21	1.23	Nil
					Hermitage ...	1.32	14	4.07	0.12
					Kairi ...	0.99	6	1.78	1.52
					Sugar Experiment Station, Mackay	1.30	23	0.82	0.59
					Warren ...	0.64	6	0.91	Nil

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year, and for the same period of 1919, having been compiled from telegraphic reports are subject to revision.

GEORGE G. BOND, State Meteorologist.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

AT BRISBANE. **TIMES OF SUNRISE AND SUNSET.**

1920.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.		PHASES OF THE MOON, ECLIPSES, &c. (The times stated are for Queensland, New South Wales, and Victoria).
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	6.1	5.35	5.29	5.47	4.59	6.5	4.46	6.28	6 Sept. ☾ Last Quarter 5 5 a.m. 12 " ☉ New Moon 10 52 p.m. 20 " ☾ First Quarter 2 55 p.m. 28 " ○ Full Moon 11 57 a.m. Perigee on 9th at 8.12 a.m. Apogee on 21st at 8.42 a.m. 5 Oct. ☾ Last Quarter 10 54 a.m. 12 " ☉ New Moon 10 50 a.m. 20 " ☾ First Quarter 10 30 a.m. 28 " ○ Full Moon 12 9 a.m. Perigee on 4th at 7.54 p.m. and 31st at 12.26 a.m. Apogee on 19th at 4.42 a.m. A Total Eclipse of the Moon will occur on the night of the 27th, commencing about 11.30. An hour earlier it will be entering the dark shadow of the earth. 3 Nov. ☾ Last Quarter 5 35 p.m. 11 " ☉ New Moon 2 5 a.m. 19 " ☾ First Quarter 6 13 a.m. 26 " ○ Full Moon 11 42 a.m. Apogee on 18th at 12.18 a.m. Perigee on 27th at midnight. The Moon will cause a partial eclipse of the Sun during the night of the 10th, visible only on the other side of the world, including Great Britain and Ireland. 3 Dec. ☾ Last Quarter 2 29 a.m. 10 " ☉ New Moon 8 4 p.m. 19 " ☾ First Quarter 12 40 a.m. 25 " ○ Full Moon 10 39 p.m. Apogee on 13th at 3.30 p.m. Perigee on 26th at 10.24 a.m.
2	6.0	5.35	5.28	5.48	4.58	6.6	4.46	6.29	
3	5.59	5.36	5.27	5.49	4.57	6.6	4.46	6.30	
4	5.58	5.36	5.26	5.49	4.57	6.7	4.46	6.31	
5	5.57	5.37	5.24	5.50	4.56	6.8	4.46	6.32	
6	5.56	5.37	5.23	5.50	4.55	6.9	4.46	6.33	
7	5.55	5.37	5.22	5.50	4.55	6.9	4.46	6.33	
8	5.54	5.37	5.21	5.51	4.54	6.10	4.47	6.34	
9	5.53	5.38	5.20	5.51	4.53	6.10	4.47	6.34	
10	5.52	5.38	5.19	5.51	4.52	6.11	4.47	6.35	
11	5.50	5.38	5.17	5.52	4.52	6.12	4.47	6.35	
12	5.49	5.39	5.16	5.52	4.51	6.13	4.48	6.35	
13	5.48	5.39	5.15	5.53	4.51	6.14	4.48	6.36	
14	5.47	5.40	5.14	5.54	4.50	6.15	4.48	6.37	
15	5.46	5.40	5.13	5.55	4.50	6.16	4.49	6.37	
16	5.45	5.41	5.12	5.55	4.49	6.17	4.49	6.38	
17	5.44	5.41	5.11	5.56	4.49	6.18	4.49	6.38	
18	5.43	5.42	5.10	5.56	4.48	6.18	4.50	6.39	
19	5.42	5.42	5.9	5.57	4.48	6.19	4.50	6.39	
20	5.41	5.43	5.8	5.58	4.48	6.20	4.50	6.40	
21	5.40	5.43	5.7	5.59	4.48	6.21	4.51	6.40	
22	5.39	5.43	5.6	5.59	4.48	6.21	4.51	6.41	
23	5.38	5.44	5.5	6.0	4.48	6.22	4.52	6.41	
24	5.37	5.44	5.4	6.0	4.47	6.22	4.52	6.42	
25	5.36	5.44	5.4	6.1	4.47	6.23	4.53	6.43	
26	5.34	5.45	5.3	6.1	4.47	6.24	4.53	6.43	
27	5.33	5.45	5.2	6.2	4.47	6.24	4.54	6.44	
28	5.32	5.45	5.1	6.2	4.47	6.25	4.54	6.44	
29	5.31	5.46	5.0	6.3	4.47	6.26	4.55	6.45	
30	5.30	5.46	5.0	6.3	4.47	6.27	4.56	6.45	
31	...	...	4.59	6.4	...	...	4.57	6.45	

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise about 4 minutes later than at Brisbane if it were not for its higher elevation, and at Oontoo (longitude 141 degrees E.) about 48 minutes later.

At St. George, Cunnamulla, and Thargomindah the times of sunrise and sunset will be about 18 m., 30 m., and 35 minutes respectively, later than at Brisbane.

At Roma the times of sunrise and sunset may be roughly arrived at by adding 16 minutes to those given for Brisbane, but an allowance of 3 or 4 minutes more is sometimes necessary.

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

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

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GLYCERINE FROM SUGAR.

GERMAN AND AMERICAN DISCOVERIES.

At a meeting of the Royal Society of New South Wales recently, Dr. R. Greig-Smith stated that the recent discoveries of the economic chemist showed how the molasses output of sugar mills could be turned to profitable account. It was explained that when the blockade began to be felt, and the supply of fats and oils was stopped, Germany was faced with the fact that she must get glycerine somehow. It is produced during the fermentation of wine and beer, though in small amount; the most that is found in the richest wines is about 3 per cent.

But it occurred to the Germans that this might be increased, and experiments showed that by altering the method of fermentation and permitting it to proceed in the presence of sulphite, the quantity of glycerine could be greatly improved. Further work showed that 20 per cent. of the sugar could be changed to glycerine, and this led to the establishment of many factories with the result that the output reached 1,000 tons monthly.

Upon the American Government learning that glycerine was being made by a fermentation process, it instructed several institutions to investigate the problem. In three months a method had been devised which was subsequently found to differ slightly from the German process, inasmuch as soda ash was employed in place of sulphite. Using molasses as a source of sugar, the American investigators were able to get one-quarter of the sugar fermented to glycerine, and to recover one-half of this, so that from five and a-half to six lb. of dynamite glycerine were got from one cwt. of inedible molasses. It was considered that the alcohol which is also obtained would pay the most of the manufacturing expenses, leaving the glycerine to pay for its own separation from the fermented slop.—*South African Sugar Journal*.

TO PICKLE ONIONS.

Endeavour to obtain an even-sized lot. See that they are perfectly dry. Throw out all growing ones. Do not scald to take off the skins, but peel dry. As the onions are peeled put them into a large bowl (earthenware or enamelled; not tin). When the bottom is covered, sprinkle with salt, and as layer succeeds layer again sprinkle with salt, so that when the bowl is full the covering is salt. Let it stand in a cool place for twenty-four hours, then stir (with a wooden spoon) and sprinkle more salt. Again let it stand for twenty-four hours and sprinkle salt once more. After the lapse of another twenty-four hours drain away the brine. Wipe every onion dry, lay out on a cloth in the sun for two hours, then put in bottles or jars. To each half gallon of brown vinegar add a handful of whole pepper, four or five cloves of ginger, bruised, two or three blades of mace, and about twenty cloves; place on the fire in a perfectly clean stewpan. Be sure this has no particle of grease about it. Bring to the boil. Take off the fire and let it stand until stone cold, then pour over the onions, leaving all the spice in the stewpan. Stand the bottles in a cool place for two days, each bottle covered with a piece of cardboard. At the end of that time return all the vinegar to the spice and bring to the boil again, repeating this twice at intervals of two days. On the last occasion add to the vinegar as many red peppers as desired. Finally fill up the bottles with a proportion of spice to each one, and on the top of all a few scrapings of horseradish. Cover with bladder or in any way to make the bottles airtight, and stand away in a cool cupboard for use in about five or six weeks, labelling the date of bottling. When removing any of the pickles close the bottle securely again. Never use a metal fork or spoon for the extraction of the pickles. A sharp-pointed wooden skewer is as good as anything.—*Farm, West Australia*.

PICKLED RED CABBAGE.

Ingredients.—Red cabbages, salt and water to each quart of vinegar, $\frac{1}{2}$ oz. ginger well bruised, 1 oz. whole black pepper, and when liked a little cayenne.

Mode.—Take off outside decayed leaves of a nice red cabbage, cut it in quarters, remove the stalks, and cut it across in very thin slices. Lay these on a dish, strew them plentifully with salt, and cover them with another dish. Let stand twenty-four hours, turn into a colander to drain, and if necessary, wipe lightly with a clean, soft cloth. Put them in a jar, boil up the vinegar with spices in the above proportions, and when cold pour it over the cabbage. It will be fit for use in a week or two. Tie down with bladder and keep in a dry place.