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QUEENSLAND AGRICULTURAL JOURNAL

Crofton Weed—Prevent its spread.

LEADING FEATURES

Hybrid Maize

Mechanical Cotton Harvesting

Horticulture on the North Coast

Erection of Power Sprays

Fodder Crops for Sheep

Dehorning of Cattle

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Contents

Queensland Certified Hybrid Maize.

Part 1. The Story in General.

W. W. BRYAN, formerly Plant Breeder, Queensland Agricultural High School and College, Lawes.

[Editorial Note.—A progress report on hybrid maize production in Queensland was published in this journal in October, 1949. The State certified hybrid maize programme has now reached a stage at which it is desirable to place on record a statement of the work that has been done and to detail the procedure that has been adopted for certified seed production. The subject will be dealt with in three parts.]

INTRODUCTION.

Late in 1925 the first hybrid maize breeding programme in Australia was begun at the Queensland Agricultural High School and College, situated at Lawes, in the Lockyer Valley. Queensland was the first State to realise the value of maize hybrids. It was known that the older breeding methods of various types of selection and of the crossing of varieties would no longer give marked improvement, and the hybrid maize programme was undertaken as it offered promise of progress. The intervening twenty-four years have produced results which have amply justified the faith of the early sponsors of the work, and the purpose of this series of articles is to tell the story of hybrid maize in Queensland.

The first plant breeder engaged in the programme was Mr. (now Professor) J. R. A. McMillan. On his resignation in 1929, the author was appointed in his place and was in charge of the work until August, 1950. It will be understood that a large breeding programme is a matter of team work, and it is desired to acknowledge the very great assistance that has been given in the general conduct of the work and in the final shaping of procedures by Messrs. C. C. F. Bourne, E. U. McCarthy and L. T. Petersen. Their experience and judgment have been most useful. Messrs. S. Marriott, A. J. Schindler and P. W. Grogan also gave valuable service when associated with the College plant breeding section.

TYPES OF MAIZE.

Maize types now in existence are either varieties or hybrids. The varieties are known as "open-pollinated," as their pollination is not controlled. Even in normal and reasonably even crops of standard varieties there is a loss of up to 15 per cent. in yield caused by sterile stalks, by stalks producing only nubbins, and, in general, by a large amount of variation among individual plants and ears throughout the

field. The usual method of maintaining these varieties at their standard of excellence (or even raising this standard slightly) is by selection. This consists of selecting plants in the field and later selecting ears from these plants in the barn. The male or pollen parents of the selected seed ears are unknown, and pollen from some inferior plants at least will have taken part in fertilisation. This will result in undesirable characters reappearing in later generations.

Hybrid maize results from controlled breeding in which the parents of each plant are known and are uniform. If good parents are used, a uniform crop of good hybrid plants is produced and the 15 per cent. loss found with open-pollinated varieties is eliminated. Production of hybrids is the only known method of obtaining substantial yield increases in maize.

PRODUCTION OF HYBRIDS.

To produce hybrid maize, the following steps are carried out. They are shown diagrammatically in Plate 145.

(*a*) An outstanding maize plant from a standard or introduced variety is chosen. The ear from this plant is then inbred by "selfing" (i.e., placing the pollen produced by a single maize plant on its own ear silks). This procedure is followed for six to eight generations, and is normally done by controlled hand pollination. During this time all plants showing bad characters are discarded and only those with the required good characters are carried on. The process is continued until the selected plants breed true and are uniform. The resultant strain of maize, after tests to prove its usefulness in crosses, is then classed as an "inbred-line." These inbreds are smaller than normal types and their yield is from 5 to 15 bushels per acre, so they are useless in themselves for grain production.

By selecting different plants of many varieties for the initial inbreeding, inbred lines of widely different types can be obtained. It is essential for success that a series of inbreds of differing type and characters should be available.

(*b*) Two contrasting inbreds (e.g., A and B) are then crossed to produce the "single-cross" AB. This single-cross is much more vigorous and has a much higher yield than the inbreds. In fact, it compares more than favourably with the original open-pollinated plants from which it was bred. However, owing to the breeding process, the seed from which this single-cross grew was borne on an inbred ear, and only a small amount of seed is available. Single-cross seed cannot therefore be produced economically on a commercial scale. There is, however, a way out of the difficulty. It is found that if two *different* single-crosses are crossed together, the resultant second-cross or double-cross hybrid is not inferior to either of its immediate parents; so the process is carried one step further. Two more inbreds, C and D, are combined to form another single-cross, CD.

This process of breeding the two single-crosses is carried out at the Agricultural College. It represents Stage 1 in Plate 145.

(*c*) The two single-crosses (AB and CD) are then crossed to form the "double-cross" ABCD (Stage 2 in Plate 145). This time the seed is borne on single-cross ears and large quantities of seed can be produced economically. The double-cross thus made is the final hybrid seed,

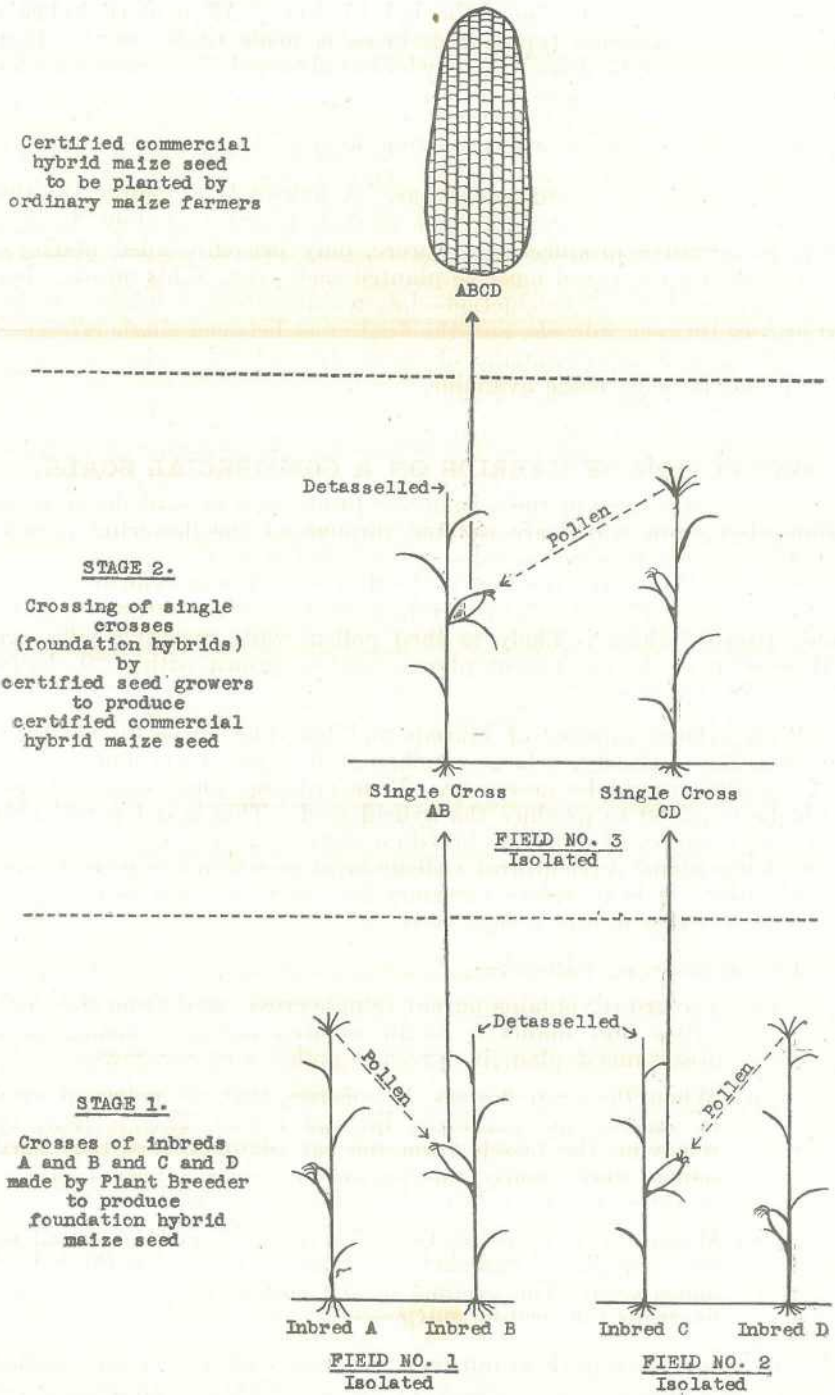


Plate 145.

Diagram Showing the Stages in the Production of Hybrid Maize Seed.

which, when planted, produces the hybrid crop. All modern hybrids are of this double-cross type. This cross is made under certification by the grower of hybrid seed maize who has obtained his parent (single-cross) seed from the Seed Certification Committee.

Seed should not be selected from a crop of hybrid maize. If seed is taken and planted, it will be found that yield will decrease by 12 per cent. to 25 per cent. each year. A hybrid is a "mule" in the sense that it does not reproduce its kind, but, unfortunately, it is a fertile mule which produces, as it were, only broken-winded donkeys. Fresh crossed hybrid seed must be planted each year. This means, also, that all stages of seed production—i.e., maintenance of inbred stocks, first crosses between inbreds, and the final cross between single-crosses—must be carried on continually if a steady and adequate supply of hybrid seed is to be made available.

PRODUCTION OF HYBRIDS ON A COMMERCIAL SCALE.

The whole success of the scheme for production of seed depends on maintaining crops which are isolated throughout the flowering period, so that no cross-fertilisation takes place other than that controlled by the grower. Therefore, isolation is the first necessity in growing a crop of hybrid seed. The rule for isolation is that no maize, other than the pollen parent, which is likely to shed pollen while receptive silks are still present on the ear parent plants, may be grown within 20 chains of the crossing plot.

With a large number of inbreds and breeding stocks to be maintained in any quantity, a large number of breeding plots and isolated crossing plots would be necessary. More crossing plots, also isolated, would be required to produce the hybrid seed. This is not practicable with the resources of only one breeding station. All that can be done at the Queensland Agricultural College is to maintain the inbreds and parent stock. It is therefore necessary for maize farmers to take part in the production of the hybrid seed.

This is done as follows:—

(*a*) The grower obtains parent (single-cross) seed from the Committee and plants it in an isolated block, according to a prearranged plan, in separate pollen and ear rows.

(*b*) When the crop flowers, he ensures that *no* pollen is shed by any of the plants in the ear rows. This is done by removing the tassels from the ear plants before they shed pollen, and usually this operation covers a period of two to three weeks, working the plot every day.

(*c*) When the crop is ready to harvest, the ear (detasselled) rows are picked and shelled; the resultant seed is the hybrid maize seed. The product of the pollen rows is useful only as grain for feeding purposes.

The whole procedure as outlined is covered by a seed certification scheme, and inspections are made of the seed before and during the growing and harvesting of the crop, so that the final product may be certified as hybrid maize seed. This will be explained further in Part 2 of this series.

COSTS OF SEED PRODUCTION.

As will be fully explained in a later section, two types of certified seed producers are recognised under the certification scheme. A commercial producer is a farmer who grows certified seed for sale as such, and a home producer is one who grows hybrid seed for his own use.

A commercial producer of certified hybrid maize seed will make a substantially higher profit than from growing a crop of maize for feed grain. For example, comparing gross returns on the basis of a 40-bushel crop, and assuming that a crossing plot will yield approximately 60 per cent. of seed and 40 per cent. of feed grain, we have the following:—

Ordinary Grower.	£ s. d.	*Hybrid Seed Producer.*	£ s. d.	£ s. d.
40 bushels at 8s.	16 0 0	24 bushels at 60s.	72 0 0	
		16 bushels at 8s.	6 8 0	
		Gross return	78 8 0	
		Less extra costs—		
		For parent seed	1 0 0	
		For working, etc.	10 10 0	
				11 10 0
		Gross profit		£66 18 0

Additional gross profit is thus £50 18s. per acre.

A home producer will be paying only 8s. 5d. per bushel instead of 60s. for his seed, as shown in the following statement, in which a 40-bushel crop is assumed:—

	£ s. d.	
Initial cost of production (i.e. ground preparation, cultivation, etc.)	5 0 0	per acre.
Extra cost for hybrid crossing plot	11 10 0	„ „
Total cost	£16 10 0	
Less 16 bushels grain for feeding at 8s. ..	6 8 0	
	£10 2 0	

24 bushels of hybrid seed produced at a cost of £10 2s. 0d. = 8s. 5d. per bushel.

ADVANTAGES AND DISADVANTAGES OF HYBRID MAIZE.

Advantages.

Hybrid maize has a higher yield. The hybrids will not be released for commercial sale unless they outyield the best local varieties in an official test over three seasons by at least 15 per cent., except where, in the opinion of the Seed Certification Committee, a hybrid merits certification for a special purpose, as in the case of very early maturing varieties.

Field characters are sound. Characters such as uniformity, erect stalks, good root system, etc., are fully as important as yielding ability, and hybrids must combine these characters with the 15 per cent. yield increase. Any hybrid possessing a major weakness is discarded, regardless of its yield. Hybrids are definitely easier to harvest than present day varieties, partly because of these characters.

Disadvantages.

Seed costs are slightly more. However, this extra cost is covered by the 15 per cent. increase, as shown by the following example.

Take a planting rate of 8 lb. per acre (i.e. 7 acres per bushel).

	s.	d.		
Cost of certified hybrid seed	60	0	per bushel.	
Cost of open-pollinated maize seed ..	17	6	„	„
Additional cost of certified hybrid seed	42	6	„	„ (i.e., 6s. 1d. per acre)

Let us assume that the best open-pollinated variety in the district will yield, on the average, 40 bushels per acre. A 15 per cent. increase will be six bushels.

	£	s.	d.	
Value at 8s. per bushel	2	8	0	per acre
Less extra seed costs	0	6	1	„ „
Gross extra profit	2	1	11	„ „

Seed cannot be taken for further planting from a crop of hybrid maize without serious loss of yield. This is a definite disadvantage, but the 15 per cent. increase in yield more than compensates for this.

QUEENSLAND DATA.

To date, 1,040 different maize types, of which approximately 700 have been standard varieties, have been introduced into the Queensland breeding programme. They have come from all parts of the world, but chiefly from the Americas and Australia. It is significant that the vast majority of the more useful inbreds produced at Lawes have come from varieties which have been established in Australia for many years. The value of local material as parent stock is undoubtedly great.

A vigorous policy of inbreeding was followed through the thirties, several hundred inbred strains being produced. Only a small proportion of these survived tests for combining ability, and the State now possesses 93 well tested inbred lines, four of which are new within the last year. Of the remaining 89 inbreds, 56 have been produced at Lawes, while 33 have been obtained from other sources. Queensland inbreds have also been distributed to other hybrid maize breeders and are now playing an important part in the New South Wales work at Grafton.

With 89 inbreds, 3,916 single-crosses can be made, and from these 2,441,626 different double-crosses can be made. To date, 819 single-crosses have been made, of which 115 are in use as parents, and 1,012 double-crosses produced, the first 58 of them in 1933. Of these, 704 have been discarded as of insufficient merit; 24 have earned the right to be certified, and 284 are still undergoing performance tests. It is obvious that vast scope exists for producing more and more hybrids, and there can be no doubt that future hybrids will set new standards of excellence.

The yields of hybrids certified in 1949 were given in the October, 1949, number of the *Queensland Agricultural Journal*. Initial tests are carried out at the Queensland Agricultural College, Lawes, and the more promising hybrids are then tested in official trials on private farms throughout the maize growing areas of south-eastern Queensland. The

period 1935 to 1950 was one of great activity in testing performance. Over that period 151 official yield trials were planted and 121 of these were successfully harvested. Distribution of trials planted has been as follows (see also Plate 146).

Coastal Moreton.	
Imbil	7
Kilcoy	2
Beaudesert	1
Rathdowney area	18
	28
South Burnett.	
Murgon	10
Wooroolin	10
Coolabunia	9
Kumbia	8
	37
West Moreton.	
Boonah	9
Harrisville area	11
Laidley	3
Mulgowie	2
Upper Tent Hill	2
Lockrose	5
Brightview	8
Morton Vale	5
Toogoolawah	1
	46
Darling Downs.	
Warwick	8
Glengallan	2
Clifton	3
Westbrook	13
Boodua	8
Cabarlah	1
Kulpi	1
	36
Callide.	
Biloela	4

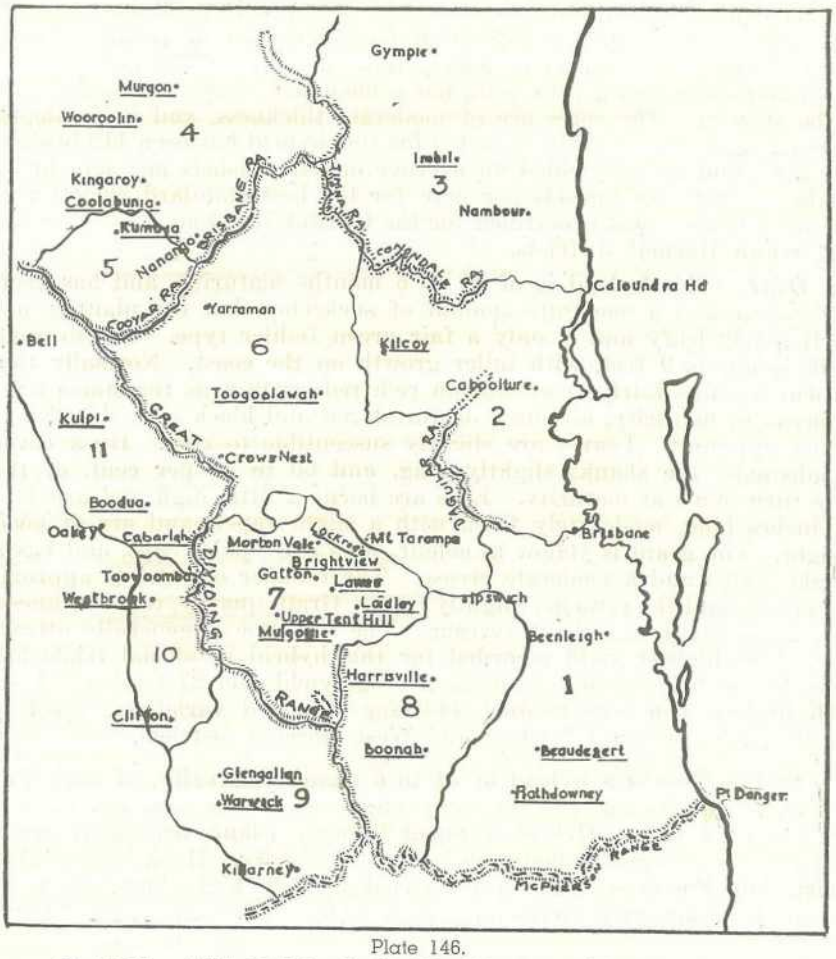


Plate 146.

Sketch Map of Hybrid Maize Certified Seed Districts.—Official trial sites are underlined.

As a result of these tests there is a definite assurance that hybrids recommended for certain areas have been carefully studied in those areas. Hybrids have limited ranges of adaptation, as do open-pollinated varieties. Some hybrids do well in some areas and not in others. The Queensland certified hybrids are useless on the Atherton Tableland, while U.S.A. hybrids from the Corn Belt have poor husk cover and have no place in Queensland except on the southern Darling Downs. This is exemplified by the performance of DS28 from Armidale, which, although it is quite successful south and east of Clifton, is elsewhere in Queensland quite unsuited and has averaged nearly 19 per cent. less in yield than good standard varieties in the six trials so far carried out with it. A grower must consider each hybrid individually and should grow only such hybrids as are proven for his district.

SOME QUEENSLAND HYBRIDS DESCRIBED.

Q23.—This hybrid, which matures in 5½ to 6 months, has an unusually dark colour, suckers more than the average, and is fairly leafy. The average height is 9 ft. to 10 ft. It has good root and stalk strength, the only weakness being that on rich red scrub soil some stalk breaking occurs at maturity. Husk cover is slightly short and not particularly tight, but ears turn down at maturity. The ears, which are carried rather high on a slightly long shank, are of good weight, 8 inches long and yellow to reddish yellow in colour. The grain is not thick and sometimes a little dull, has a moderate crease, and is inclined to be starchy. The cores are of moderate thickness, and grain depth is good. The highest yield recorded for this hybrid has been 113 bushels per acre, and it has yielded an average of 54.0 bushels per acre in 37 trials, against 45.8 bushels per acre for the best standard varieties in the same trials. Q23 is certified for the Coastal Moreton, West Moreton and South Burnett districts.

Q431.—This hybrid is of 5½ to 6 months maturity, and has good leaf colour and a moderate amount of suckering, but the plant is not particularly leafy and is only a fair green fodder type. The average stalk height is 9 feet, with taller growth on the coast. Normally this hybrid remains fairly erect, but on rich red scrub soils the stalks tend to break at maturity, although on forest red and black soils this defect is not apparent. Leaves are slightly susceptible to rust. Husk cover is adequate, the shanks slightly long, and 60 to 70 per cent. of the ears turn down at maturity. Ears are borne a little high and are 8 to 8½ inches long, moderately thick with a slight taper, and are of good weight. The grain is yellow in colour, with some paler caps, and has a bright lustre and a moderate crease. The number of rows is approximately 16, and the rows are slightly open. Grain quality, core thickness, and grain depth are about average. The ear type is generally attractive. The highest yield recorded for this hybrid in official trials has been 111 bushels per acre, and the average yield over 27 trials has been 53·6 bushels per acre against 44·9 for standard varieties. Q431 is certified for the South Burnett and West Moreton districts.

Q629.—This is a hybrid of 5½ to 6 months maturity, of dark leaf colour, not particularly leafy, only slight suckering, and a moderate green fodder type. Height is about 9 feet. Plants are fairly erect, and there is a slight tendency to lodge at maturity. Husk is somewhat short, but the ears, which are carried a little high, hang down at maturity. Ears are 8 inches long, more or less cylindrical, with slightly

open rows which are not quite regular; the colour is yellow and the grain slightly starchy but with only a moderate crease. The ears are not of show type but are attractive. The grain is slightly susceptible to weevil attack. The highest yield recorded for this hybrid has been 117 bushels per acre and the average yield over 37 trials has been 53·5 bushels per acre compared with 45·9 for the best standard variety. Q629 is certified for Coastal Moreton, West Moreton, and South Burnett districts.

Q692.—This hybrid matures in 6 months. It has fair to good leaf colour and a moderate amount of suckering. The average height is 9 feet and the plants are erect and fairly leafy. The husk cover is a little short. Ears hang down well at maturity. Ear height is satisfactory, the ears being 8 inches long, moderately thick, and tending to taper. Grain colour is yellow with a slight reddish tinge. The crease is average, rows somewhat open, and the grain very slightly starchy but bold and of fair depth. The highest yield recorded for this hybrid had been 98 bushels per acre and the average over 28 trials has been 53·4 bushels per acre against 46·3 for the best standard variety. Q692 is certified at present only for the South Burnett but may be given certification in the West Moreton.

Q716.—This hybrid takes 5 to 5½ months to mature, has vigorous plant growth, stands up well to adverse conditions, and is not susceptible to lodging. Plant height averages about 8 feet, and it makes a fair fodder type. The husk cover is somewhat short and loose, but the ears hang down well at maturity. The heavy ears are of deep orange colour and are tapering, of average diameter, approximately 8½ inches long, and carry 22 rows of fairly tightly packed grain. The grain is of good lustre, fairly hard, of medium depth, and inclined to be slightly peg-tooth shaped with a medium dent. The highest yield recorded for this hybrid has been 99·5 bushels per acre and the average over 44 trials has been 48·8 bushels per acre compared with 42·2 for standard varieties. Q716 is certified for the South Burnett, West Moreton, and Southern Darling Downs.

Q717.—This hybrid matures in 5 to 5½ months, has good plant colour, and suckers a fair amount, but is not very leafy. Plants are 8 feet tall and show a slight tendency to lodge. The husk is somewhat short and a little loose, but the ears hang down well at maturity, being carried on moderately long shanks. Ear height is good, the ears are 8 inches long, heavy, of moderate thickness with a slight taper. The grain is yellow and of good lustre, has a moderate crease, and is inclined to be a little shallow. Grain rows are a trifle irregular and open. The highest yield recorded for this hybrid has been 104 bushels per acre, and it has averaged 51·2 bushels per acre against 45·1 bushels per acre for standard varieties in 33 trials. As yet Q717 is certified only for the West Moreton district.

Q739.—This hybrid matures in 4½ to 5 months and has done well in the cooler upland regions of south-eastern Queensland. It has sturdy stalks, good plant growth, is hardy, and has a good root system. The husk is good and the ears hang down at maturity. The ears are heavy, fairly symmetrical, 8 inches long, and with slightly open rows; the grain is yellow, bright, of good medium quality, and only slightly shallow. The shanks break easily and cleanly at harvest. The highest

yield recorded for this hybrid has been 87·6 bushels per acre and the average over 32 trials has been 47·9 bushels per acre against 42·8 for standard varieties. Q739 is certified for the South Burnett (except the southern end), West Moreton, and Darling Downs.

It is of interest to summarise (Table 1) the yield records of eight of the leading certified hybrids, remembering that these are full results which include trials in regions for which some of the hybrids are neither suited nor recommended. The first four of these hybrids are long-season or late-maturing types; the second group matures two to four weeks earlier.

TABLE 1.

AVERAGE YIELDS OF HYBRIDS IN OFFICIAL TRIALS.

Hybrid.	Average Yield.	Yield of Best Standard Varieties.	Number of Trials.	Percentage Increase.
	Bush per acre.	Bush. per acre.		
Q23	54·0	45·8	37	17·8
Q431	53·6	44·9	27	19·4
Q629	53·5	45·9	37	16·5
Q692	53·4	46·3	28	15·3
Av. of late maturing hybrids	53·6	45·75	129	17·2
Q440	47·3	40·7	44	16·2
Q716	48·8	42·2	44	15·9
Q717	51·2	45·1	33	13·6
Q739	47·9	42·8	32	11·9
Av. of earlier hybrids	48·7	42·5	153	14·6
Av. of all eight hybrids	51·0	44·0	282	15·9

The table shows that a gain of at least two bags of grain per acre can be expected in Queensland from the use of recommended hybrids. Hybrids are not super types, but they do represent a definite advance on older varieties. In Illinois and Iowa, in the U.S.A. Corn Belt, with an aggregate area of some 14,000,000 acres of maize, hybrids now comprise at least 99 per cent. of the crop grown, the increase in yield being of the order of 20 per cent. Queensland is not yet in this happy state, but the position is improving. New and better hybrids are in production and we can look forward to the future with confidence.

Mechanical Harvesting of Cotton in Queensland.

R. W. PETERS, Plant Breeder.

SHORTAGE of rural labour in Queensland has been a serious problem in recent years to primary producers in general and cotton growers in particular, and the serious decline in cotton production can be attributed in large measure to this shortage. The widespread use of mechanical equipment during the war years impressed landowners with the possibilities of mechanisation in overcoming the general shortage of rural labour. This is not confined to Queensland or Australia. For instance, the United States of America—the largest cotton producing country of the world—is experiencing the same problem in its cotton growing industry. To-day great changes are taking place in the methods of cotton production, and it is envisaged that in the near future the principal cotton growing countries of the world will adopt mechanised methods in all phases of cotton production, the most important being the widespread use of mechanical harvesting machines, thousands of which are being produced annually in American factories.

HISTORICAL.

Attempts to construct a mechanical cotton harvester date back to 1850, but it was not until 1937 that Rust Brothers, of Memphis, U.S.A., produced the first commercial mechanical harvester. This was followed a few years later by the McCormick-Deering picker.

The time taken to evolve a satisfactory machine gives some indication of the difficulties of the problem that inventors and engineers were required to solve, and the setbacks and disappointments which necessarily operated before success was achieved.

During this period of experimentation numerous types of machines were devised, but they all fell into five general classes, as follows:—

(1) The *picker* type of cotton harvester was designed to pick cotton from the open bolls by means of spindles, fingers or prongs at any time during the harvesting season without damaging unopened bolls and branches. This is the type now in commercial use in Queensland.

(2) The *thresher* type takes the entire plant into the machine, where the cotton is separated from the vegetative matter.

(3) The *pneumatic* type removes the cotton from the bolls either by suction or by air blasts.

(4) The *electrical* type depends upon attracting the cotton fibres to a statically charged belt or finger to remove the cotton from the plant.

(5) The *stripper* type of harvester removes the cotton from the plant by combing the bush with, or drawing it between, stationary slots or revolving rolls. This type of machine has possibilities under the climatic conditions of the Darling Downs and Maranoa, where large acreages of cotton could be planted. These districts usually receive early frosts and the stripper could harvest the entire crop in one operation following killing frosts.

MECHANICS OF THE PICKER TYPE.

There are four mechanical harvesters of the picker type operating at present in Queensland—two Rust machines and two McCormick-Deering machines. As both are essentially the same in principle, a description of the salient features of the McCormick-Deering machine adequately outlines the operations involved in the picker type.

The McCormick-Deering picker is designated as the M-11-H. It is a high drum type, which operates successfully in cotton growing up to five feet high, and is a one-man, one-row machine.

The picker is mounted on the rear of a modified Farmall M. tractor which operates in the reverse direction; that is, the drive wheels become the front wheels. The tractor provides the power to operate the picker mechanism and propels it through the field.

The picker is provided with two vertical parallel revolving drums between which the cotton plants pass as the machine moves forward along the rows. Each drum is equipped with cam-actuated picker bars on which are mounted rotating spindles having numerous barbs which catch the cotton. The rotative speed of the picker drums is synchronised with the travelling speed of the tractor so that the projecting rotating spindles enter and withdraw from the plants without disturbing the unopened bolls or otherwise injuring the plants.

As the rotating spindles penetrate the plants and contact the open bolls, the barbs catch the cotton and extract it. As the cam-actuated picker bars carry these cotton-laden spindles around they are withdrawn from the plant and the cotton is removed by rubber doffers which rotate in close proximity to the spindles. Before the spindles contact

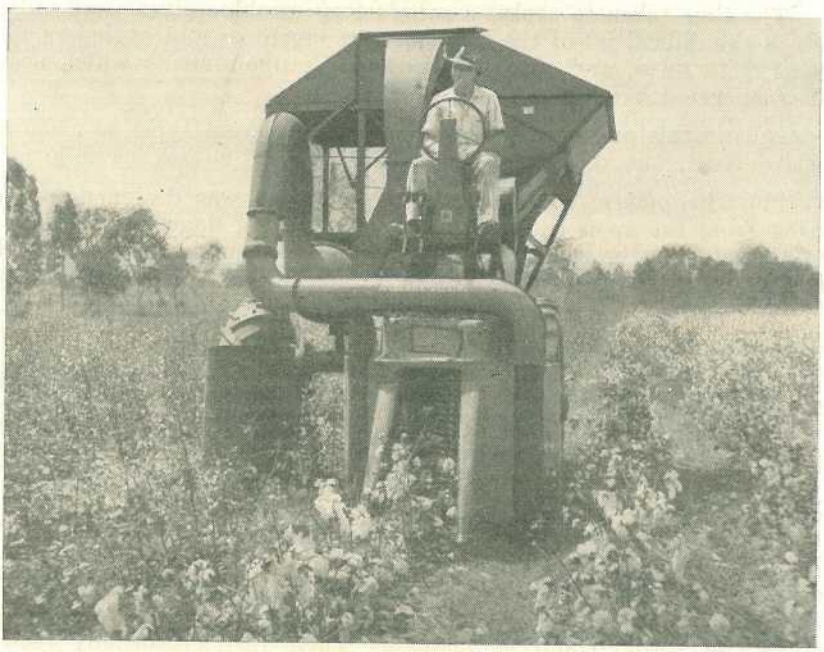


Plate 147.

A McCormick-Deering Cotton Harvester, Showing Cotton Plant Entering the Spindles.

the open bolls they pass under moistened rubber pads. The moisture assists in the doffing of the cotton. A water tank and metering system which supplies water to the rubber pads in uniform amounts is controlled by the operator, as moisture requirements vary under changing conditions.

Plate 148.
A McCormick-Deering Harvester Operating in a Crop Which Yielded 746 lb. Seed Cotton Per Acre.

Plate 149.
A Rust Cotton Picker Operating in the Kingaroy District.

Plate 150.
Rear View of the Rust Cotton Harvester.

After removal from the spindles the cotton is conveyed by suction to a separating chamber where considerable trash is removed. It is then blown up into the storage basket by air pressure produced by fan equipment. As the cotton enters the basket it passes along a grating which assists in removing loose trash and dirt held in the fibres. When the basket, which holds approximately half a bale of seed cotton, is full the contents are dumped into a wagon or truck by a mechanism powered by the Farmall hydraulic lift.

The driver is the only attendant required to operate the machine. He sits above the drum box and has a full view of the cotton row being picked. A diagram illustrating how the cotton picker works is shown in Plate 151 by courtesy of the International Harvester Company.

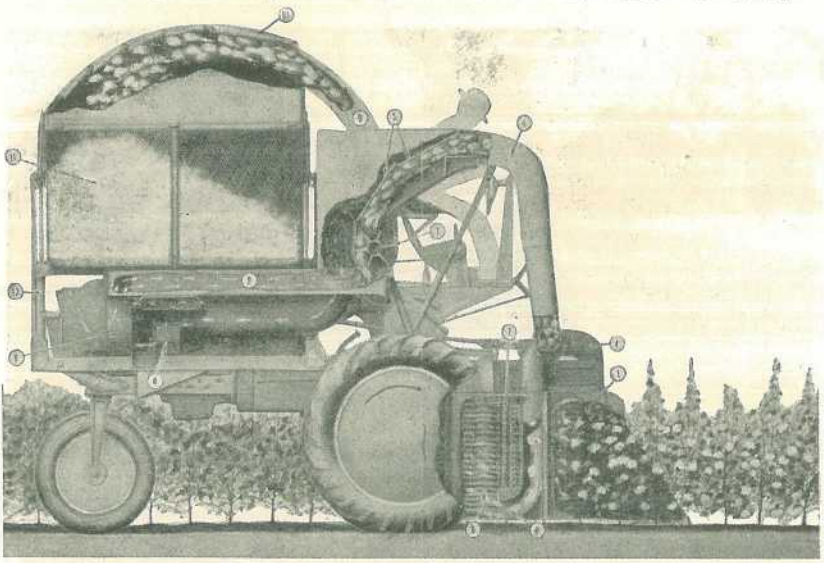


Plate 151.
Diagram Showing How the McCormick-Deering Cotton Picker Works.—
A description of the operations is given on the opposite page.

RESULTS WITH MECHANICAL HARVESTERS IN QUEENSLAND.

Summarising the results obtained over the years that the Rust and McCormick-Deering mechanical harvesters have operated in Queensland, it has been demonstrated that provided a field of cotton has received proper cultural care, is free of sticks, stones and rubbish, and the plants have developed normally, the mechanical harvester will pick cotton satisfactorily and efficiently at less than half the cost of hand picking and each machine will do the work of at least twenty pickers.

Cotton should not be allowed to remain open too long in the field, as exposure to the weather results in loss of grade; the cotton becomes dull by the action of rain or with the continued nightly wetting by dews, and the subsequent drying by the sun. This change of colour to a dull chalky white destroys the lustre of the fibres and no amount of cleaning prior to ginning will improve the quality of the sample. In addition, cotton left exposed soon loses weight and strength and is liable to collect more leaf trash. Cotton should therefore be harvested when there is sufficient open to warrant the use of the picker—a yield of approximately 500 pounds of seed cotton per acre or more is satisfactory. The amount of cotton mechanically picked in a treated field varies from 85 to 95 per cent. of the open crop. Tests carried out in the field during harvesting operations have shown that most of the cotton left on the plants consists of weak immature fibre in partially diseased locks which if picked would lower the grade of the cotton harvested and reduce its value.

Table 1 gives some indication of the efficiency of the mechanical harvester when working in fields suitable for its operation. Under less favourable conditions the percentage of open cotton picked has not been as satisfactory as the figures quoted in this table.

DESCRIPTION OF PLATE 151.

In the revolving picker drums (1 and 2) are the rotating barbed spindles which pick the cotton from each side of the plant.

Rubber doffers (3) remove the cotton from the spindles. The cotton drops down to the air conveyor inlet (4).

Moisture applicators (not shown) moisten the spindles, before they enter the plant, to aid in picking and doffing the cotton.

The vacuum conveyor system (4) draws the cotton from the air conveyor inlet to the grates (5).

At the grates part of the dirt and trash is removed with the air drawn into the vacuum fan (6).

The cotton drops from the grates (5) down to the revolving vacuum seal rotor (7) which transfers the cotton to a lower compartment. Here the cotton is picked up by the air blast conveyor system (9), powered by the air blast fan (8).

Cotton is blown against grates (10) at the roof of the basket (11). Additional dirt and trash are expelled through the grates and the cotton drops to the bottom of the basket.

Two hydraulic cylinders (12), powered by the Farmall Lift-all pump, raise the basket for dumping the cotton into a wagon or truck.

TABLE 1.

SOME DATA ON MECHANICAL COTTON HARVESTING IN QUEENSLAND COTTON FIELDS.

District.	Variety.	Acreage.	Pick.	Average Yield Seed Cotton per acre.	Amount Seed Cotton Picked per hour.	*Grade Seed Cotton.	Grade Lint.	Percentage of Open Cotton Picked compared to clean hand picking.
				lb.	lb.			
Home Hill	Triumph ..	5·75	..	746	558	All S.M. 3	S.M.3	90
Biloela	Miller and New Mexico Acala	9	..	628	401	All S.L.M. 2	S.L.M. 2	86
						lb.		
Theodore	Triumph† ..	19	1st	650	351	4,925 .. S.M.L.S. 3	M.L.S. 3	90
						7,380 .. M.L.S. 3	S.L.M. 3	
			2nd	324	252	6,156 .. S.L.M. 2	S.L.M. 2	
Theodore	Miller†	23	1st	1,046	559	15,918 .. S.M. 3	S.M. 3	
						8,134 .. M. 3		
			2nd	163	136	3,748 .. M. 3	S.L.M. 3 M. 3	95
Theodore	Miller†	9	1st	1,372	823	12,346 .. S.M. 3	S.M. 3	95
			2nd	211	190	1,907 .. S.L.M. 3	S.L.M. 2	
Theodore	New Mexico Acala†	6	1st	463	253	2,778 .. M. 3	M.L.S. 3 S.M.L.S. 3	85
			2nd	104	104	624 .. S.L.M. 3	S.L.M. 2	
Theodore	Miller	50	..	315	235	7,527 .. M. 3	S.L.M. 3	90
						8,217 .. S.L.M. 3	S.L.M. 2	

* Cotton grades are based on World Universal Standards for American Upland Cotton and are as follows in descending order of quality:—M.F.—Middling fair; S.G.M.—Strict good middling; G.M.—Good middling; S.M.—Strict middling; M.—Middling; S.L.M.—Strict low middling; L.M.—Low middling; S.G.O.—Strict good ordinary; G.O.—Good ordinary; Every grade may be modified by light spot (l.s.) or yellow spot (y.s.), except that no spot is allowed in M.F., no yellow spot in S.G.M., and no spot modifications are used with S.G.O. or G.O.

† Irrigated crops.

The McCormick-Deering cotton harvester is modified to operate in the reverse direction and is geared for two picking speeds. The first gives a speed of two miles per hour and is used for heavy crops and particularly first pickings where the yield of seed cotton exceeds 1,000 pounds per acre. The second speed is $2\frac{3}{4}$ miles per hour and is used for lighter crops and second picks.

Under Queensland conditions the picker averages 500 pounds of seed cotton per hour, but the rate varies according to the amount of seed cotton open. Since the speed of the machine is constant, and the picking percentage is also somewhat constant, the amount of cotton picked in a given time will be proportional to the yield of open cotton on the plants. Therefore the machine can be operated much more efficiently in high yielding crops.

TREATMENT OF MACHINE HARVESTED COTTON.

Machine picked cotton is usually graded lower than comparable hand picked cotton owing to its higher content of leaf and other foreign matter, and to improve the grade certain cleaning processes are necessary. In the United States of America, where a large proportion of the cotton crop is now mechanically harvested, considerable research

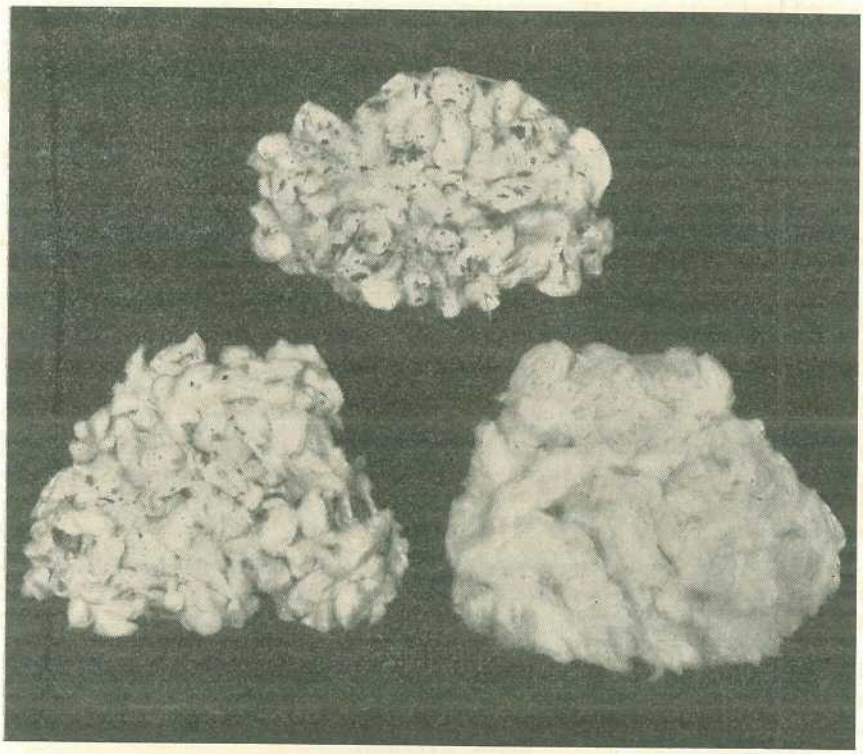


Plate 152.

Machine-picked Cotton. Top, sample showing trash, mostly dead leaf, in sample as picked. Bottom Left, the same sample after passing through airline and incline cleaners. Bottom Right, lint sample from the seed cotton at left after being ginned.

is being carried out for the purpose of raising the grade of this type of cotton, and certain machines are being developed. Until such time as the amount of machine picked cotton in Queensland warrants the purchase and installation of these specialised cleaning machines, considerable improvement can and is being made by the use of the existing airline and incline cleaners in the local ginneries. By these methods leafy samples of cotton can be improved by nearly three-quarters of a grade, which increases the value of the lint to approximately that of handpicked cotton.

CULTURAL AND PLANT BREEDING CHANGES REQUIRED FOR MECHANICAL HARVESTING.

The introduction of the mechanical cotton harvester into Queensland has necessitated some important changes in the cultural methods of production and breeding operations.

Cultural.

The wheel spacing of the picking machine is 38-42 inches, which necessitates a reduction in the normal Queensland row planting distance from 4-4½ feet to 3½-4 feet according to soil type, plant variety and locality. Some difficulty may be experienced in this respect on the more fertile alluvials where rank growth is likely to occur in wet seasons on old cultivations. However, the use of grassland rotations should allow of satisfactory results being obtained with the closer row spacing.

Rank growth is unsuitable for machine harvesting owing to the development of vegetative branches, too many of which prevent the spindles engaging the open bolls of seed cotton as they pass through the plant. Where heavy plant growth develops, it is sometimes necessary to repick the rows, working in the opposite direction. Some control in suppressing this vegetative tendency may be obtained by spacing the plants more closely. Good results have been obtained by this method in the United States of America, but the results from spacing tests carried out at Biloela Regional Experiment Station in Queensland have indicated that spacing too closely tends to reduce both yield and quality of the cotton produced. In the plant spacing operation it is suggested that thinning should be delayed slightly longer than previously recommended for cotton planted for hand harvesting. By leaving seedlings closely spaced until they attain the height of 8-10 inches, the development of basal vegetative growth tends to be checked, thus inducing the crop to form higher above ground level, and, as the picker fails to gather bolls formed close to ground level, loss of crop in harvesting is consequently reduced.

For the successful operation of the mechanical picker close attention must be given to cultural practices so that at harvesting time the field is free of weeds, grasses, sticks and rubbish. The last two obstacles can be instrumental in causing long delays, as well as possible serious damage to the machine; the capital involved in the purchase of these machines compels care in their operation in order to keep running costs at a minimum.

Plant Breeding.

The ideal type of plant for mechanical harvesting is one not exceeding five feet in height, having an open habit of growth, with the bolls arranged symmetrically over the plant, and with a minimum of vegetative growth, particularly at the base of the plant. While

specialised methods of cultivation can do much towards the production of this type of plant, more can be done by careful breeding. Already progress has been made in improving the varieties being grown commercially and in testing new varieties that have recently been introduced for their potential suitability for machine harvesting, in relation to both plant type and fibre characters.

CONCLUSION.

In cotton growing in Queensland, land preparation, planting, crop cultivation and insecticidal applications can be handled very efficiently by ordinary farm machinery, but most seed cotton is still harvested by hand, necessitating a concentration of labour at picking time. On present indications, it seems clear that the solution of the harvesting problem is vital to the existence and expansion of the industry in this State.

The modern cotton harvester offers very bright hopes that the problem of shortage of hand labour can be overcome. For most efficient use and low picking costs, the co-operation of cotton growers is essential. Fields should be well cultivated and free of excessive weed growth, sticks, stones and similar rubbish which is liable to cause a breakdown of the harvester. It is also necessary that the cotton should be planted with a row interspace of 3½ to 4 feet in order to obtain the best results from the harvesting machine.

Horticultural Districts of Queensland.

5. North Coast.

P. MITCHELL, Senior Adviser in Horticulture.

THE North Coast horticultural district (Plate 154) is a coastal strip approximately 80 miles long by 15 to 25 miles wide, extending from the Caboolture River on the south to Gunalda on the north, and bounded on the west by the D'Aguilar and Blackall Ranges. It embraces the shires of Caboolture, Landsborough, Maroochy, Noosa and Widgee, the principal towns in each being respectively Caboolture, Landsborough, Nambour (Plate 153), Pomona and Gympie.

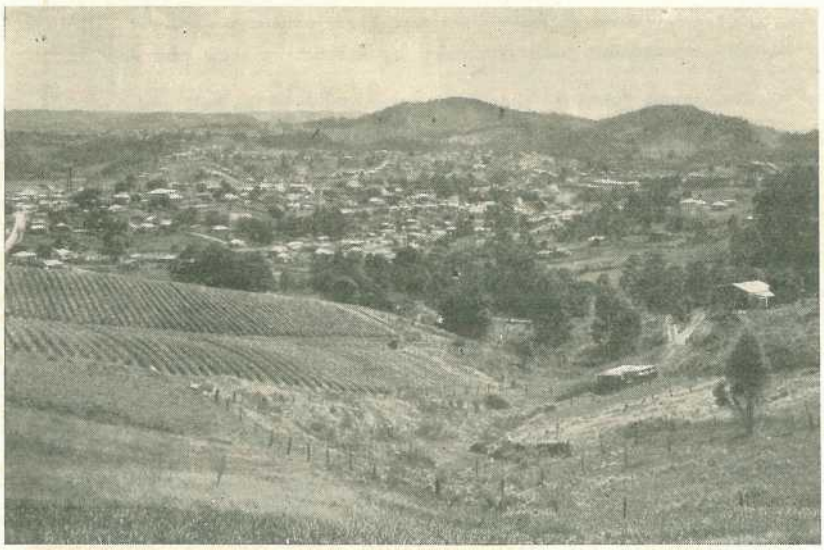


Plate 153.
View of Nambour, the chief town in the Maroochy Shire.

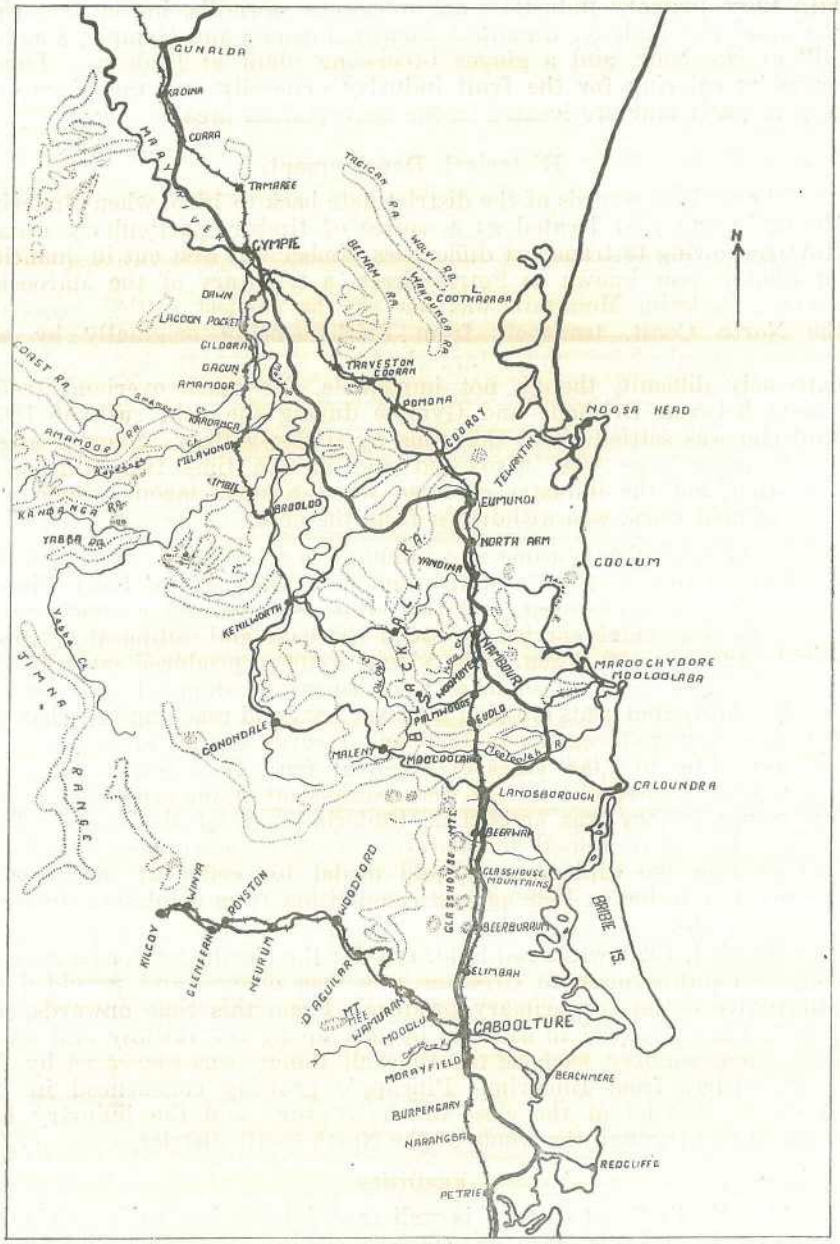


Plate 154.

Sketch Map of the North Coast District.

The district has been aptly termed the "garden of the State," since practically all sub-tropical crops flourish in it and contribute to its prosperity. The major primary industries are timber, dairying, cane growing and fruit production, the more important horticultural crops being pineapple, citrus, banana, papaw, avocado, nuts, strawberry, passion fruit, ginger, and beans and other vegetables. Associated

with these primary industries are numerous sawmills, butter factories at Caboolture, Maleny, Eumundi, Cooroy, Pomona and Gympie, a sugar mill at Nambour, and a ginger processing plant at Buderim. Large canneries catering for the fruit industry generally and the pineapple crop in particular are located in the metropolitan area.

Historical Development.

The earliest records of the district date back to 1865, when Buderim Mountain was first located as a source of timber, particularly cedar. However, owing to transport difficulties, timber was first cut in quantity on what is now known as Petrie Creek, a tributary of the Maroochy River. Buderim Mountain was one of the earliest settled areas on the North Coast, transport from Brisbane being originally by sea through Mooloolaba and Maroochydore. Transport by road was extremely difficult, though not impossible, for much overland traffic passed between Brisbane and Gympie during the gold rush of 1867. Buderim was settled about this time by timber-getters. Shortly afterwards sugar cane was introduced and at one time two mills were operating, but the industry declined when Kanaka labour, which was used in field work, was withdrawn from the area.

The fruit industry came into prominence after the decline of sugar. Bananas, mostly of the Cavendish and to a lesser extent Lady Finger varieties, were introduced, and this crop developed on a considerable scale, the fruit being carried by sea to Brisbane and selling at approximately 12s. per 100 dozen. The virgin country produced magnificient fruit, but thousands of bunches were sometimes dumped when rough weather prevented boats crossing the river bars and reaching the wharves. Citrus was introduced about 1890 and records reveal an annual production of up to 2,000 cases of excellent fruit from one orchard ten years later. Coffee plantations were established at the same time and a processing factory was erected at Buderim to treat the beans. This factory has since ceased to operate. A well known pioneer of the district won the diploma and gold medal for coffee at the Greater Britain Exhibition in 1899 against competition from exhibitors throughout the world.

March 1, 1890, was a red letter day for the North Coast, as a railway joining Landsborough to Brisbane was then opened and provided an alternative outlet for primary produce. From this time onwards, the fruit industry spread to districts opened up by the railway and much of the new country, such as the Blackall Range, was pioneered by the early settlers from Buderim. Pineapple growing commenced in the Woombye district at the close of the century and the industry has since spread through the whole of the North Coast district.

Facilities.

The North Coast district is well served by a fast train service to Brisbane, and good all-weather arterial roads linking the more important country towns with the capital city. As a result, there is an extensive tourist traffic to mountain resorts at Montville and Buderim and also to the beaches at Noosa, Coolum, Maroochydore, Mooloolaba and Caloundra. The district is supplied with excellent educational facilities.

The importance of the timber industry in the district is reflected by large-scale reafforestation projects at Glasshouse Mountains, Beerwah and the Mary Valley near Gympie. Horticultural crops on the North Coast are serviced by research and advisory officers of the Department

of Agriculture and Stock at Nambour and some other North Coast towns. The Maroochy Horticultural Experiment Station at Perwillowen, three miles from Nambour, was established a few years ago to provide facilities for plant breeding and selection work in pineapples, but problems in other horticultural crops are also being investigated at the station.

Climate.

The climate is mild, sub-tropical, with temperatures ranging from a mean minimum of about 42°F. in winter to a mean maximum of about 88°F. in summer. Temperatures vary according to proximity to the sea coast and altitude, and frosts occur in many parts of the district during June, July and August. The annual rainfall ranges from 45 inches at Gympie to 64 inches at Nambour. It is distributed throughout the whole year, with the heaviest rainfall during the period from January to March; light winter rains can be expected but the spring rainfall is variable and usually low. Table 1 shows the mean monthly rainfalls for Nambour, Caboolture and Gympie and the mean monthly temperatures for Gympie.

TABLE 1.

CLIMATIC DATA FOR NORTH COAST TOWNS.

Temperature (Gympie).

—	January.	February.	March.	April.	May.	June.	July.
Mean Max. Temp. °F.	88·5	86·9	85·1	82·1	76·9	72·0	71·6
Mean Min. Temp. °F.	66·6	66·5	63·8	57·9	49·9	46·3	42·9

—	August.	September.	October.	November.	December.	Year.
Mean Max. Temp. °F. ..	74·1	78·9	83·7	86·7	88·5	81·2
Mean Min. Temp. °F. ..	44·2	50·2	56·5	61·3	64·9	55·9

Mean Monthly Rainfall (Points).

—	January.	February.	March.	April.	May.	June.	July.
Caboolture ..	796	782	783	448	327	274	237
Nambour	937	957	941	613	509	369	267
Gympie	657	658	613	343	291	260	207

—	August.	September.	October.	November.	December.	Yearly Total.
Caboolture	162	176	273	351	548	5,189
Nambour	188	226	323	421	665	6,416
Gympie	165	202	273	333	540	4,542

Soils.

As might be expected in a coastal area with high ranges running parallel to and relatively near the coast, the district includes a large variety of soil types. The alluvial flats along the major rivers and creeks are mostly used for the production of sugar cane. Horticultural industries are, however, developed on most other soil types. Perhaps the most important of these are the dark-brown to red-brown soils and the grey-brown soils of the Nambour-Woombye-Palmwoods district.

These are used mainly for pineapple production. They are generally low in organic matter and the major plant nutrients nitrogen and phosphoric acid. Provided they are reasonably well drained and adequately fertilized, these soils are highly productive. In the Beerburrum-Glasshouse Mountains-Beerwah areas, the soils used for horticultural crops are usually sands and sandy loams with a reddish brown subsoil. Many areas characterised by soils of this kind are subject to waterlogging and growers must, therefore, give very careful attention to land drainage, particularly in pineapple areas.

Basaltic red loams are represented by the soils of the Blackall Range and the Maleny and Buderim plateaux. Where these have been intensively farmed for long periods, the effects of soil erosion and leaching are apparent. Although these soils were originally very fertile, they are now low in essential plant foods and organic matter.

The Mary Valley soils are very variable and horticultural production in this district is mainly confined to relatively steep slopes, pineapples and beans being the major crops. Red loams and clay loams developed on jaspar are well drained but may be high in manganese, which is responsible for induced iron deficiencies in some crops. These and similar soils in the district normally have a high pH value.

The horticultural importance of the North Coast district is obviously due less to the inherent fertility of its soils than to the growers' ability to use them for the economic production of the perishable commodities required for metropolitan and southern markets. A high standard of farming efficiency is demanded of growers in the area.

Plate 155.
Pineapple Plantations, Woombye District.

Pineapples.

The pineapple is the major fruit (Table 2) grown in the district and the industry contributes a great deal to closer settlement. The Maroochy Shire in particular is one of the most closely settled rural areas in the State and this is largely due to the fact that the pineapple crop when properly handled enables a man and his family to obtain

a good living from a comparatively small area. Pineapple farms (Plate 155) generally average 20-25 acres, of which approximately 15 are suitable for the crop. Of these 15 acres five or six would be in full bearing, and smaller areas planted but not bearing or lying fallow. A farm of this size with an average house, packing shed and the usual farm implements would at present cost from £4,000 to £4,500.

The principal variety now grown is the Smooth Cayenne, which is suitable for both the cannery and fresh fruit markets. Rough leaf varieties are grown only on a small scale and exclusively for the fresh fruit market. Woombye is the centre of this flourishing industry and has maintained its position as the largest single pineapple producing area in the State since the crop was first planted more than seventy years ago. Since pineapples were introduced to Woombye, the industry has spread and is now well established at Palmwoods, Nambour, Beerwah, Glasshouse Mountains, Elimbah, Caboolture, Wamuran, Blackall Range, Buderim, Cooroy, Mary Valley and Gympie. In this district there are some 1,100 growers producing more than 1,000,000 cases of fruit annually, and there is no doubt that the output could be increased a great deal.

Production over the years has been maintained and increased through the operation of several canneries in Brisbane which handle surpluses over fresh fruit market requirements. Recently, pineapple growers established a co-operative cannery at Northgate and this should further stabilise the industry in the future.

Bananas.

The banana industry in coastal districts south of Brisbane received a severe setback from the virus disease bunchy top in the period 1920-25. The North Coast then became the main producing area in the State. Large areas of virgin scrub land were cleared and production from the district was phenomenal for about ten years. However, the rehabilitation of the industry in bunchy top infected areas, combined with severe losses from banana rust thrips around Gympie, caused a reduction of the area under crop in the North Coast district. The industry then went through a difficult period. Little new scrub land was available, but reasonable stability was achieved when methods of commercially producing bananas on open forest country were developed. As these soils are less fertile than virgin scrub land, artificial fertilizers have to be used and cultural methods must be efficient. One significant change was the introduction of the one-bunch-one-follower system of management, which has since proved its value both on the North Coast and in other banana growing areas of the State.

Bananas (Plate 156) are now grown on a variety of soils ranging from red basaltic loams to grey sandy loams, the main centres of production being Caboolture, Wamuran, Mooloolah, Eudlo, Palmwoods, Buderim, Eumundi, Cooroy and Gympie. Dwarf Cavendish is the main variety, but Mons Mare, a sport which originated from Cavendish at Buderim, is gaining popularity. The Lady Finger banana is grown extensively at Buderim and also on some alluvial flats where the risk of frost is not excessive. Small areas of William's Hybrid, Sugar and Ducasses bananas are in production. The future prosperity of the

industry in the district depends on the growers' ability to maintain soil fertility on forest soils and the practicability of reconditioning scrub soils for new plantings.

Plate 156.

Portion of a 20-acre Mons Mare Banana Plantation at Yandina, showing the One Bunch One Follower System of Management.

Citrus.

The citrus industry was established some fifty years ago at Buderim, and at Montville, Flaxton and Mapleton on the Blackall Range. The Blackall Range, with its undulating country carrying large acreages of citrus trees on a red basaltic soil, presented a fine picture. During the early 1930's, prices for citrus fruit were low and many orchards in full bearing were destroyed to make way for the pineapple crop, which offered better prospects at that time. Citrus is now being grown in all parts of the district. Some of the better orchards are provided with irrigation facilities and it is probable that others will be so equipped in the future. The principal varieties are Washington Navel, Joppa and Valencia Late oranges, Emperor and Glen Retreat mandarins and Marsh grapefruit.

Citrus orchards are subject to the usual wide range of pests and diseases which occur in coastal areas, and as summer rains often interfere with spray programmes, control is far from easy. Nevertheless, the North Coast is still one of the largest citrus producing districts in the State, and is favoured by its proximity to the Brisbane market There are many unused areas of land suitable for the crop in the Beerwah, Glasshouse Mountains, Caboolture and Wamuran areas, so there is ample scope for expansion.

TABLE 2.

HORTICULTURAL PRODUCTION—NORTH COAST DISTRICT (1948-49).

FRUIT.

Crop.	Not Bearing.	Bearing.	Production.
Citrus—	Trees.	Trees.	
Navel oranges	11,914	10,875	16,262 bushels
Valencia oranges	15,701	22,355	38,348 bushels
Other oranges	16,952	29,536	57,744 bushels
Mandarins	10,637	24,075	45,890 bushels
Other citrus	4,416	7,465	12,833 bushels
Custard apples	1,114	525	1,369 bushels
Mangoes	794	1,115	1,845 bushels
Nuts	2,907	8,043	68,395 lb.
	Acres.	Acres.	
Bananas	1,258	2,580	195,057 1½ bushel cases
Pineapples	1,737	4,576	13,289 tons (factory) 542,087 1½ bushel cases (fresh fruit)
Papaws	57	143	37,761 bushels
Passion fruit	19	19	2,045 ½ bushel cases
Strawberries	..	90	232,755 lb.

VEGETABLES.

Crop.	Area.	Production.
	Acres.	
Potatoes	335	544 tons
Sweet potatoes	33	134 tons
Turnips	4	15 tons
Carrots	19	523 cwt.
Beetroot	5	115 cwt.
Tomatoes	104	18,840 ½ bush. cases
French beans	2,137	219,775 bushels
Green peas	95	4,737 bushels
Cabbages	15	3,755 dozen
Cauliflowers	15	2,211 dozen
Lettuces	2	612 bushels
Melons—Water	40	174 tons
Rock	5	6 tons
Pumpkins	205	590 tons
Marrows and squashes	11	39 tons
Cucumbers	140	13,115 bushels

Papaws.

At the present time, papaws are grown in many parts of the district though usually on a small scale in conjunction with other more important crops such as pineapples and bananas. The papaw is highly susceptible to frost injury and plantations are, therefore, limited to those areas which are free from frost and reasonably well protected from strong winds.

Considerable attention has been given to papaw improvement projects during recent years. Seed of two new varieties, Bettina and Improved Petersen, was made available to growers in 1949 and arrangements are being made to supply all grower requirements in the future. This development should effect an improvement in the quality of the fruit marketed from 1951-52 onwards. Steps are also being taken to develop varieties more resistant to ripe rots, so that the fresh fruit market in southern States can be adequately supplied. At the present time, there is an increasing demand from canneries for papaw fruit and this outlet does much to stabilise the industry.

Ginger.

Commercial ginger growing commenced at Buderim about 20 years ago, but the industry made little progress until the commencement of World War 2, when overseas supplies ceased. The erection of a co-operative factory at Buderim has stabilised markets and permitted further expansion of the area under crop. Ginger (Plate 157) requires a comparatively heavy soil and can be grown in areas subject to frost, for growth takes place during the summer months and the rhizomes are harvested in autumn. Ginger growing has spread from Buderim to Woombye, Nambour, Eumundi and Cooroy during recent years, and approximately 650 tons are produced and treated annually.

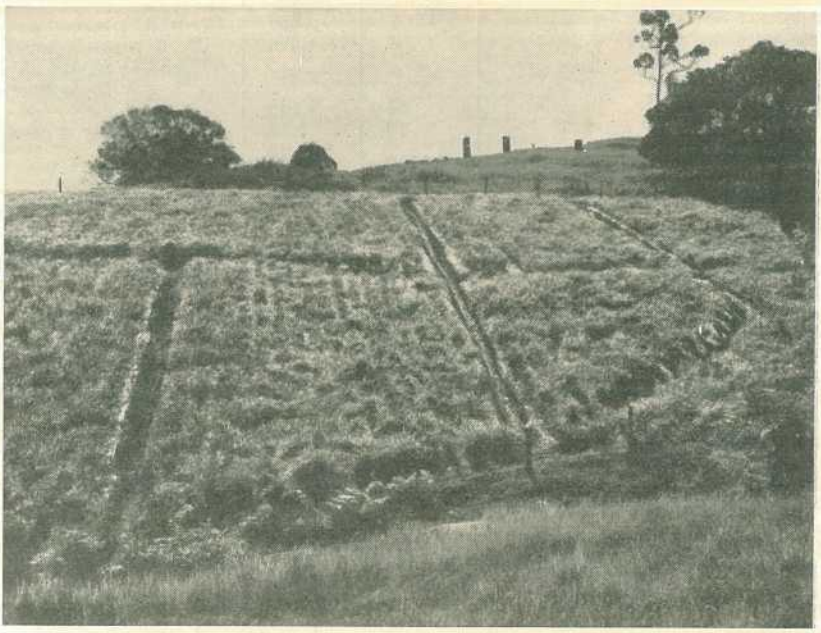


Plate 157.

A Stand of Ginger at Buderim. Note drainage trenches and the use of mulching material between the plants.

Avocadoes.

Seedling avocadoes were grown at Woombye fifty years ago and a number of these original trees are still bearing fruit. Though the fruit from seedling trees is suitable for local consumption, it is of little value for large-scale marketing. Consequently, as commercial production developed during the past twenty years, the area under good varieties such as Fuerte, Nabal and Anaheim has increased, the emphasis being on worked trees. However, there is still scope for considerable expansion.

The avocado, though well known in the North Coast district, is a novelty to the consuming public in the larger cities. Considerable publicity is needed to educate the consumer in the value and use of this nutritious fruit.

Strawberries.

The strawberry industry was originally centred on Palmwoods, Eudlo and Buderim, and catered for a fresh fruit market. During the past twenty years it has expanded to Woombye, Nambour and Gympie. Jam factories are now absorbing much of the increased production.

The main varieties grown are Phenomenal and Aurie, with the former predominant. The crop is affected by two virus diseases, yellow edge and crinkle. An approved runner scheme is operated by the Department of Agriculture and Stock to ensure that runners from disease-free crops will be available to growers.

The crop grows on a wide range of soils mainly in areas where irrigation is practicable. A considerable amount of labour is required in harvesting, and individual cropping areas are therefore relatively small, the crop being invariably grown in conjunction with other fruits. There is ample land for further expansion, but limiting factors are shortage of labour for harvesting and scarcity of good planting material.

Passion Fruit.

Passion fruit grows well in the district and can be a very profitable crop. Due to the incidence of diseases such as woodiness and brown spot, the plant is rather short-lived and goes out of production within four years. The scarcity of wire and the cost of trellising generally, combined with disease control problems, greatly reduce the prospect of any early expansion in this industry.

Nuts.

Both pecan and Macadamia (Queensland) nuts are grown on the North Coast. The pecan does particularly well in the deep soils and can withstand light frosts, so that it may be grown on the lower portions of many farms. The Macadamia nut, which is indigenous to the rain forests of southern Queensland, grows well under cultivation and is usually planted on the more broken ground which is not suitable for crops requiring intensive cultivation.

Beans.

Beans are grown extensively as a winter crop throughout most parts of the district from April to September. The plant thrives on a variety of soils provided they are not too acid, but careful selection of the area to be cropped is necessary, the main factors requiring consideration being freedom from frost and protection from strong winds. The principal variety is Brown Beauty. It has proved very suitable for southern markets, which are short supplied when colder areas cease production.

The bean industry is valuable to the North Coast district. Some growers specialise in the crop but many treat it as a sideline to be grown during the winter months when maintenance work on pineapple or banana plantations is comparatively light. It is a quick cash crop and a very desirable one provided adequate labour can be secured for harvesting.

Formerly the crop was grown under natural rainfall, but more and more growers are now using irrigation, particularly in the northern part of the district. This development has reduced much of the uncertainty formerly associated with the industry and crop yields are sometimes extremely high.

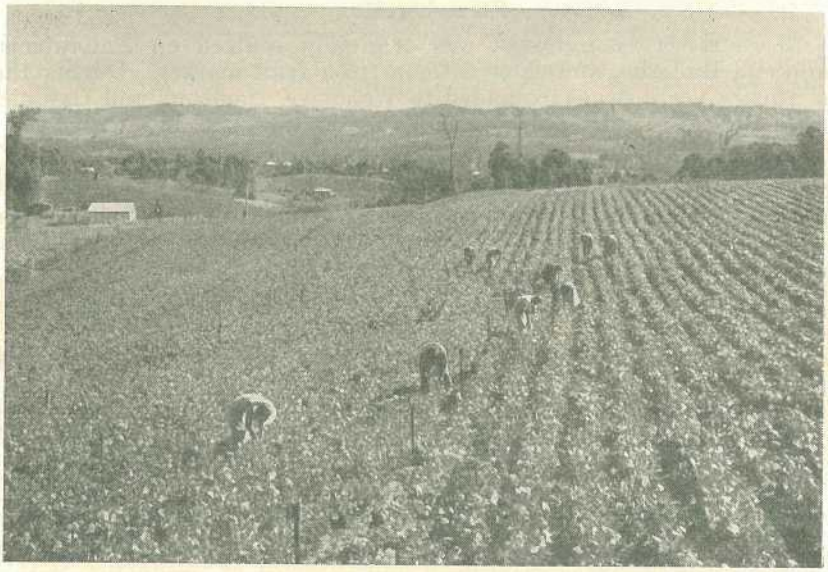


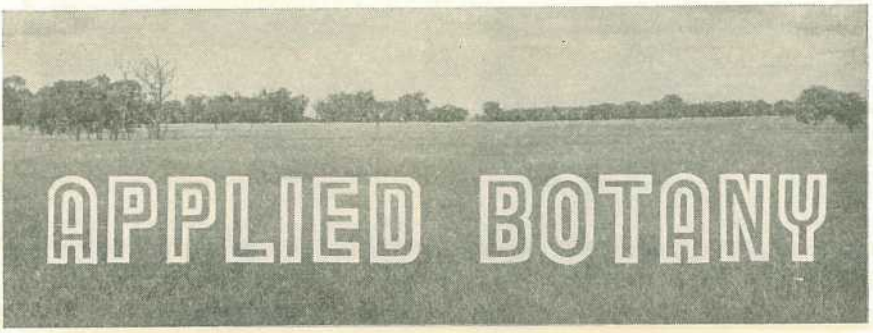
Plate 158.
A Good Crop of Brown Beauty Beans in the Woombye-Palmwoods District.

Other Vegetables.

With the exception of beans, the North Coast is not a commercial vegetable growing district, but it is capable of producing excellent tomatoes, cabbage, cauliflowers and other crops, particularly in the Mary Valley. At present, however, these crops are produced on a small scale only for domestic consumption and local markets.

Future Prospects of the District.

For many years there was a feeling of insecurity in the district, due largely to frequent over-production for the fresh fruit market. Often the prices realised were not sufficient to adequately cover costs of production and there was, therefore, little encouragement for rapid expansion. Now organised marketing systems and the establishment of co-operative factories capable of processing surpluses at a price profitable to the grower have stimulated production and there is every reason to expect a steady increase in the area assigned to the more important fruits for which there is now a reasonably assured market.



Purple Thorn Apple and Hairy or Recurved Thorn Apple.

Prepared by the Botany Section.

FOR some time common thorn apple or stramonium (*Datura stramonium*) and fierce thorn apple (*Datura ferox*) have been declared under the Local Government Acts as noxious weeds throughout the State. At the request of various bodies, purple thorn apple (*Datura tatula*) and hairy or recurved thorn apple (*Datura metel*) have been added to the list of declared noxious plants. The following illustrated account of these two weeds has been prepared with the object of enabling shire councillors, employees, and landholders in general to identify them.

PURPLE THORN APPLE (*Datura tatula*).

Description (*See Plate* 159).—A coarse, ill-scented weed of annual growth. Stems deep purple. Leaves irregularly cut and toothed, dark green, on short leaf stalks; leaf stalks and principal veins deep purple. Flowers purple or lavender, paling to white in the throat; trumpet-shaped; solitary in the forks of the branches. Seed capsule egg-shaped or somewhat pyramidal when mature, opening at the top into four valves. Seeds numerous, dark brown or blackish, flat and wrinkled.

Distribution.—It is widely spread over the whole world with the exception of the cold temperate regions. Like many other widely distributed plants, its country of origin is doubtful. In Queensland it mostly occurs as a weed of cultivation areas and of vacant allotments around towns.

Properties.—All the thorn apples must be looked on with suspicion. Purple thorn apple is little more than a colour variant of common thorn apple and possesses the same properties. It is poisonous but is usually left untouched by stock. Drying does not destroy the poisonous properties and most of the cases of stramonium or thorn apple poisoning that occur in Queensland are from feeding contaminated chaff. Both seeds and leaves are used medicinally.

Plate 159.
Purple Thorn Apple.

HAIRY OR RECURVED THORN APPLE (*Datura metel*).

Description (see Plate 160).—A tall, robust weed. Stems and leaves softly hairy. Leaves mostly 4–5 inches long and 2–3½ inches across, apex pointed, base usually very unequal sided, margins often wavy edged. Flowers white, large, and trumpet-shaped. Seed capsule globular, large (about 2 inches in diameter), reflexed (nodding), prickly.

Plate 160.

Hairy or Recurved Thorn Apple.

Distribution.—A native of tropical America, now widely spread over the warmer regions of the world. In Queensland it mostly occurs as a weed of roadsides and waste places about towns.

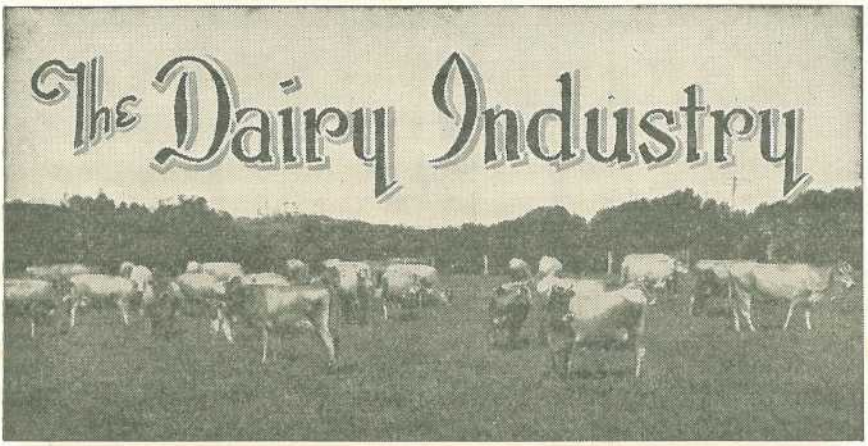
Properties.—Like other species of Datura it is poisonous, but is usually left untouched by stock. Being mostly a weed of roadsides and vacant allotments it is not so often a contaminant of chaff and hay as some of the other Daturas.

Eradication.

Hand-pulling, chipping, or mowing the plants before they seed will eradicate these weeds if persisted with. 2,4-D sprays have given very variable results and cannot be recommended. Recent work with the hormone weed killer 2,4,5-T suggests that at least one of the Daturas is fairly readily killed by spraying with a 0·1 per cent. emulsion of 2,4,5-T at a rate of application of about 140 gallons per acre.

TUBERCULOSIS-FREE CATTLE HERDS (AS AT 19th SEPTEMBER, 1950).

Breed.	Owner's Name and Address of Stud.
Aberdeen Angus ..	The Scottish Australian Company Ltd., Texas Station, Texas
A.I.S.	F. B. Sullivan, " Fermagh," Pittsworth D. Sullivan, Rossvale, *via* Pittsworth W. Henschell, Yarranlea Con. O'Sullivan, " Navillus Stud," Greenmount H. V. Littleton, " Wongalee Stud," Hillview, Crow's Nest J. Phillips and Sons, " Sunny View," Kingaroy
Ayrshire	L. Holmes, " Bencecula," Yarranlea
Friesian	C. H. Naumann, " Yarrabine Stud," Yarraman J. F. Dudley, Yarraman
Jersey	W. E. O. Meier, " Kingsford Stud," Rosevale, *via* Rosewood J. S. McCarthy, " Glen Erin Jersey Stud," Greenmount J. F. Lau, " Rosallen Jersey Stud," Goombungee G. Harley, Hopewell, Childers Toowoomba Mental Hospital, Willowburn Farm Home for Boys, Westbrook F. J. Cox and Sons, Crawford, Kingaroy Line



Erection of Power Sprays in Relation to the Dairy Premises.

J. D. ELRINGTON and S. W. IVERS, Division of Dairying.

ENQUIRIES have been received from a number of dairy farmers as to whether it is permissible to use a power spray for the control of cattle tick in conjunction with the existing installations at the cow yards and milking sheds. The use of the milking machine engine as motive power would save the farmer considerable expense, and for this reason requests have received sympathetic consideration.

The advantages claimed for a power spray are:—

1. It is more convenient to use. The cattle simply walk through the spray instead of being forced to swim through a plunge dip.
2. There is little risk of physical injury to the cattle.
3. Overheating and undue excitement are eliminated.
4. Loss of production is negligible.

The Dairy Produce Acts, 1920 *to* 1944 prescribe that certain requirements must be complied with for dairy yards, buildings and surroundings, and as long as these requirements and strict hygiene are observed, there can be little possibility of a power spray affecting the quality of the dairy produce. The relevant requirements are that stock must not be allowed to approach within 30 feet of the dairy house in which cream is stored and that there shall not be an accumulation of manure within 130 feet of the dairy house or 100 feet of a milking shed.

Layout.

Field officers of the Division of Dairying have suggested a number of layouts which would permit a power spray utilising the milking machine engine as motive power to be operated in close proximity to the milking shed without infringing the provisions of the Dairy Produce Acts and Regulations. Selected suggestions on layout are included in the design given in Plates 161 and 163 for the guidance of farmers who may be contemplating the installation of such a plant.

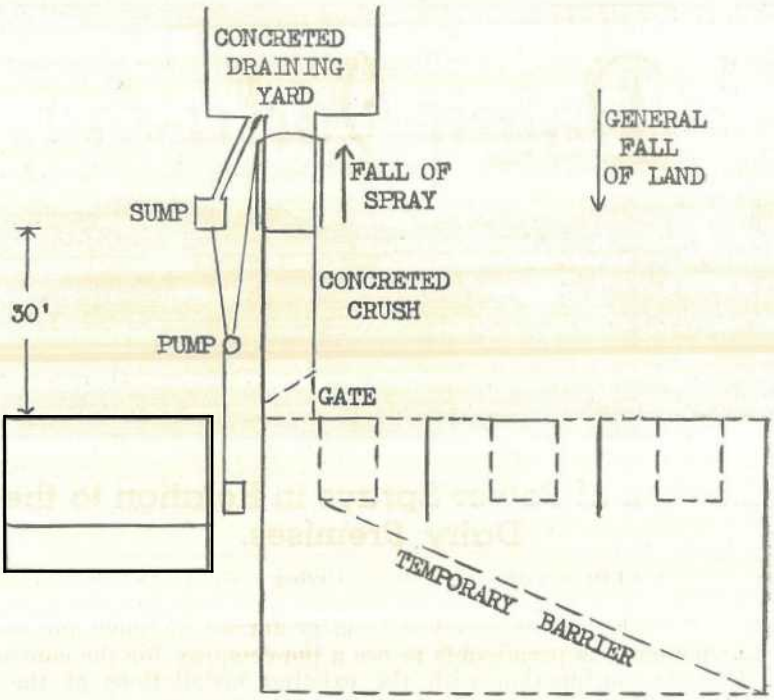


Plate 161.
A Suitable Layout (No. 1).

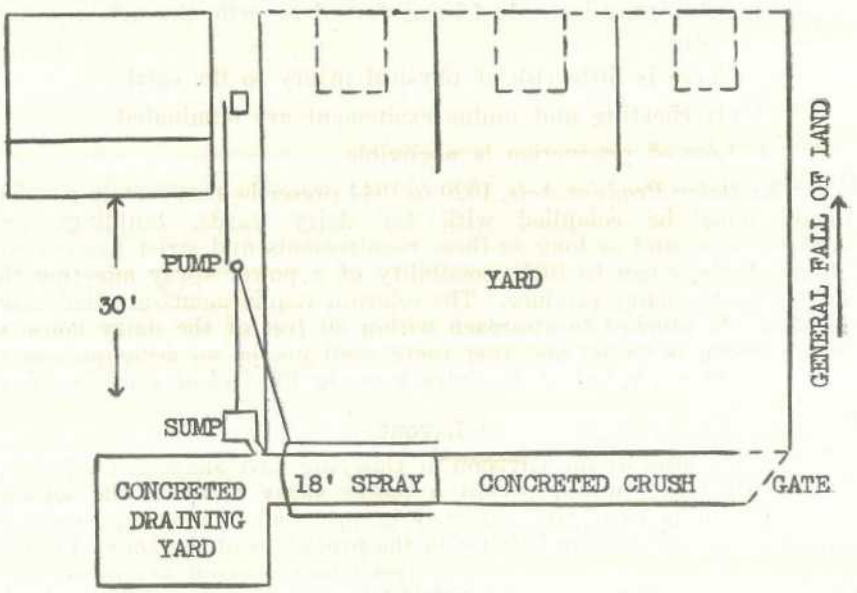


Plate 162.
A Suitable Layout (No. 2).

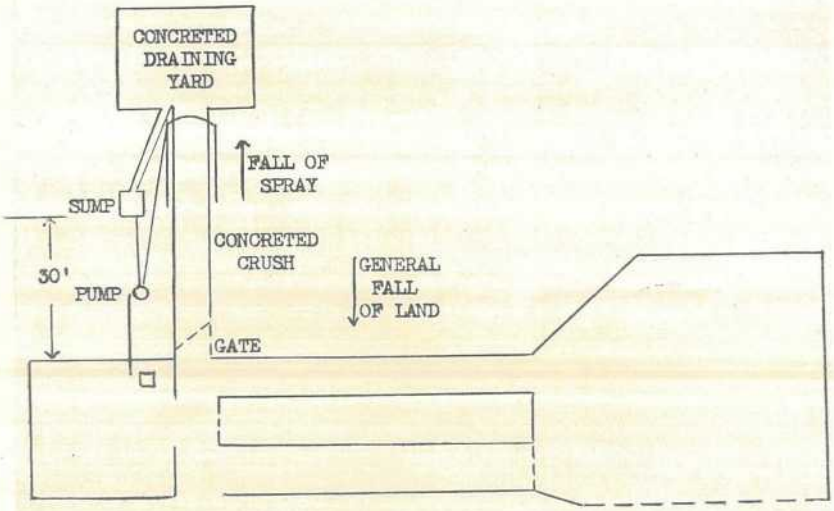


Plate 163.

A Suitable Layout (No. 3).

The mechanical points to be considered are the relative positions of the engine, pump, tank and spray, the drain from the spray back to the spray-fluid tank, and the speed of the pump. Obviously, the spray and tank must be outside the 30-ft. stock-free area, and the race, spray and drain yard concreted. As the pump travels at 2,000 revolutions per minute, it would be desirable to drive it with a belt direct from the engine, which revolves at approximately 1,000 revolutions per minute, the reason being that a 27-inch pulley (depending on the revolutions per minute of the countershaft) would be required on the countershaft. The drive is easily arranged by installing the pump approximately 10 feet from the engine, which is fitted with a pulley of appropriate size, or a pulley of correct size may be fitted to work off the pulley already on the engine. The correct size of pulley may be ascertained from the formula:—

$$\text{Diameter of pump pulley in inches} = \frac{\text{Engine speed (RPM)} \times \text{Diameter of engine pulley in inches}}{\text{Pump speed (RPM)}}$$

If the maker supplies a pump and pulley complete, and the farmer is prepared to change the engine pulley for each spraying, the required size of pulley can be found from the following formula:—

$$\text{Diameter of engine pulley in inches} = \frac{\text{RPM of pump} \times \text{Diameter of pump pulley in inches}}{\text{RPM of engine}}$$

Extra pipeline will be required from the tank to the pump and from the pump to the spray. Friction losses in this extra pipeline are negligible, the important point being the height of the pump vertically above the level of the liquid in the tank. If the site is a good one, then a natural fall of the land can be used to advantage here. In the installation shown in Plates 164 and 165 the pump is actually below the level of the liquid in the tank, which is desirable. It will also be noted that in this installation the pump is driven from the countershaft, but the owner of this power spray, who is content to drive the pump slower than the recommended speed, assured the writers that he obtains satisfactory results.

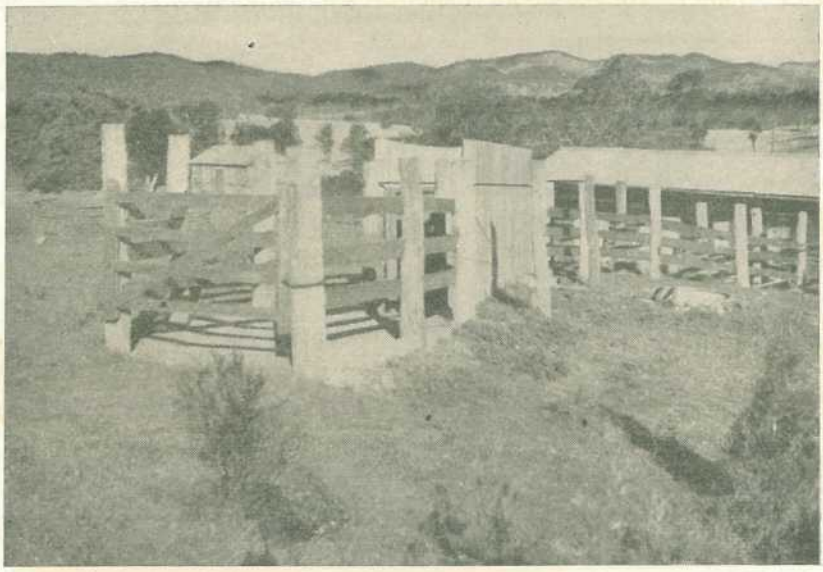


Plate 164.
Showing How Natural Fall of the Land Can be Used to Facilitate Pumping.

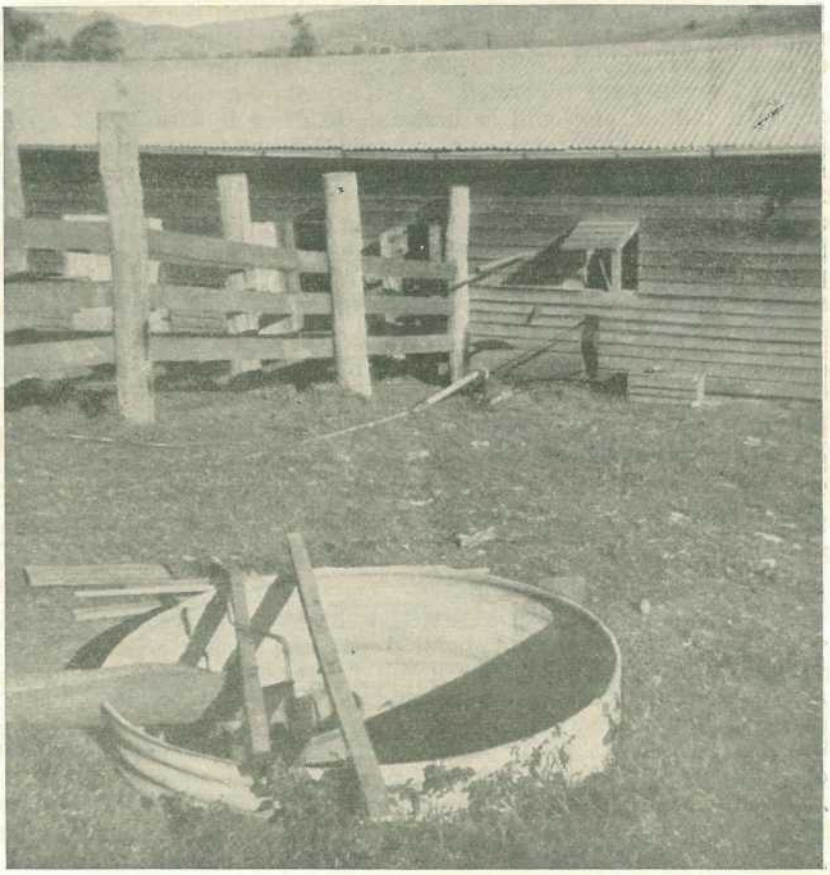


Plate 165.
An Installation in Which the Pump is Driven from the Countershaft.

The plans in Plates 161 and 162 are for use with the "walk through" type of bail, while that in Plate 163 is for use with the "crush type of bail.

In the first plan it would be more convenient to build the drain from the bail end of the spray. However, as the cattle tend to jump over the drain full of spraying solution when entering the spray, it is considered desirable to excavate for the spray and build the drain as shown. The cattle will then walk quietly into the spray and out the other end.

Briefly, a power spray installation consists of a crush and holding yard (Plate 166). The crush portion is usually 18 feet or 36 feet long. The smaller size is for handling up to 80 head and the larger one for larger herds. In the crush are patented spray nozzles (Plate 167).

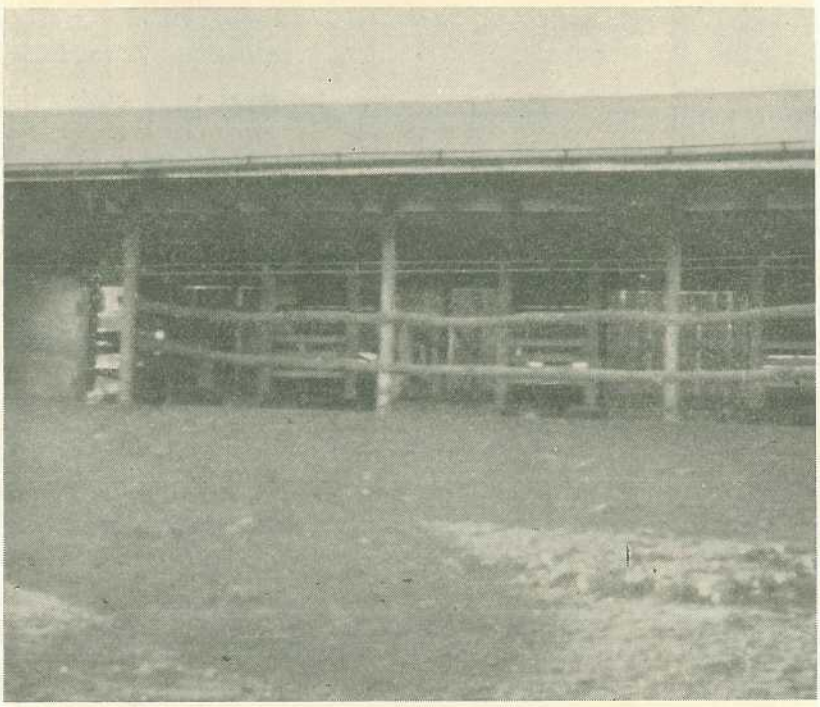


Plate 166.
A Temporary Barrier Erected Across the Holding Yard.

Spraying.

Spraying solution is forced under pressure through the spray nozzles, where it is diffused into a fine spray. The cattle pass from the crush to the draining yard. Excess fluid from both the draining yard and the crush portion runs back to a sump which is connected to the pump and so the fluid is kept circulating. One major problem has been the clogging of the spray nozzles by the dirt and hair washed off the cattle finding their way back to the pump by way of the sump. Originally, a trap was tried for arresting this, but this has now been superseded by a more efficient strainer and screen arrangement (Plate 168). It is important that this be kept free and not permitted to overflow, otherwise clogging will again result.

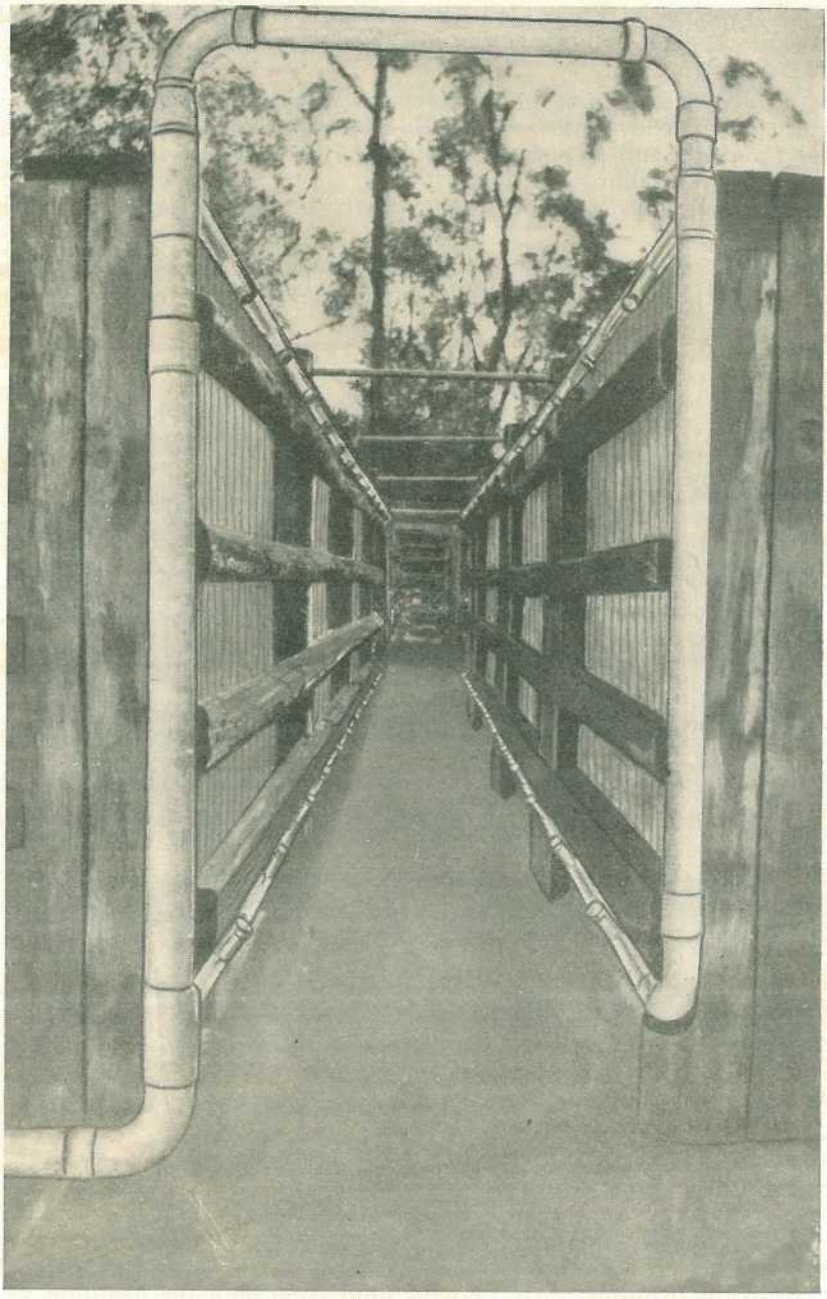


Plate 167.
A Crush Equipped with Special Spray Nozzles.

There are a number of parasite-control preparations suitable for use in a spray plant. These preparations need special techniques to ensure maximum results; the latest information on various spraying solutions can be obtained from the local Inspector of Stock or the manufacturers of the different products.

The cost of installing a power spray ranges from £100 upwards. However, the cost can be reduced by the farmer himself providing labour and some materials and using the milking machine engine in preference to purchasing a new one.

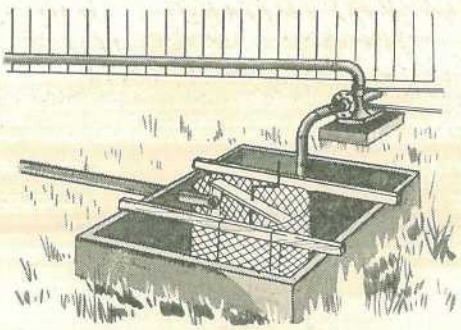


Plate 168.

Diagram of Strainer and Screen Arrangement for Cleaning Spray Solution.

Official Advice Desirable.

In conclusion, it should be pointed out that any farmer who erects a power spray plant adjacent to his milking shed must see that it is operated and kept in a condition which will obviate any risk of contamination of dairy produce. If it is desired to use the milking machine engine as motive power for the spray, the layout should be in accordance with the suggestions contained in this article, and the advice of the local Dairy Officer should be sought before construction is proceeded with.

JUNIOR FARMERS AT THE BRISBANE SHOW.

Much greater interest was displayed by members of Junior Farmers' clubs at this year's Brisbane Exhibition than on previous occasions, as in addition to the fifteen boys selected to constitute the Royal National Association's "camp" held on the showgrounds, many outside club members were in attendance each day.

Ten girl members also attended for the purpose of taking part in the Australian Broadcasting Commission's annual "leadership" contest to select the champion junior farmer girl of Queensland for 1950. This coveted honour went to Mavis Sandilands, of the Warwick club, who defeated Audrey Taylor (Warra) and Ruby Gierke (Helidon), who tied for second and third places. The two remaining competitors in the final "test" were Marlene Fiedler (Gayndah) and Priscilla Smoothy (Crow's Nest), who tied for fourth and fifth places.

Among the boys attending the special R.N.A. "camp" at the showgrounds, Ron. Elliot, of the Monto Club, secured first place in the non-competitive dairy cattle judging competition for junior farmers, with Ron. Duffy (Malanda) and Wm. Balooda (Goovigen) being placed second and third respectively. In the official (or competitive) section open to all young judges, Jim Savage, a member of the Gayndah club, gained first place in the A.I.S. Section, as well as winning the "Phillip Frankel Young Judges' Extension" competition.

John Letchford, of the Theodore club, was selected to represent the Junior Farmer organisation at the ceremony of "Blessing the Plough," held in the early part of show week. Mr. C. V. Lilley (assistant organiser in Queensland), acted as camp manager and supervisor during the absence of the State Director (Mr. T. L. Williams) on this occasion.

Observations on the Management of Sheep Properties on the Central Highlands.

1. Sheep Grazing on Summer Crops.

J. N. REA and G. R. MOULE, Sheep and Wool Branch.

INTRODUCTION.

DURING the last decade there has been a gradual decrease in sheep numbers on the Central Highlands, which include the Emerald, Clermont, and Springsure districts. There are probably several reasons for this, including difficulties associated with shortage of labour, the prevalence of predators and of parasites affecting sheep, and deterioration in the natural pastures. Due to dry seasons, heavy stocking, and burning, the more nutritious grasses and ephemerals, which were dominant, are now less numerous in some pastures than mint weed, spear grasses, and other less useful species. In addition, the opinion is often expressed that the Central Highlands cannot be regarded as breeding country, and low lamb-marking percentages and retarded growth rates of young sheep are cited as evidence supporting this claim.

At the same time, it must be fully realised that the Central Highlands district is going through a transition stage. Agriculture is being practised more widely and many property owners are seeking ways of incorporating agricultural practices in the management of pastoral properties. The way in which this can be done is described in this article.

Summer Crops Grown by Mr. F. R. Vellnagel, Emerald Downs.

Emerald Downs is situated three miles north of Emerald and consists of about 10,700 acres of well shaded, undulating black soil downs, interspersed with loamy ridges of lighter textured soil. The principal trees are brigalow, box, coolibah, ironbark, and softwoods such as bottle tree, yellow wood, bauhinia and wilga. The natural pastures include button, star and barley grasses and some curly Mitchell, Flinders and blue grasses. White spear grass and feathertop are now the most common species and they are showing signs of increasing. The

ephemerals include carrot, pigweed, fat-hen and saltbush. These are predominantly summer species and feed is usually deficient in quantity and quality in the winter.

Apart from milking cows and working horses, the property is now carrying about 4,000 Merino wethers of mixed ages. Although the size of the flock has varied, the property has always been used for dry sheep.

At the present time about 1,145 acres are under cultivation and Mr. Vellnagel has concentrated on summer crops. In 1949 he grew 180 acres of Sudan grass and the remainder of the arable land was used for grain sorghum, which yielded up to 35 bushels per acre.

As the sorghum was essentially a grain crop, interest centres around the 180 acres of Sudan grass. This was sown at the rate of 5 lb. per acre in a 400 acre paddock from January 17 to January 19, 1949. Monthly rainfalls for that year and 1950 are set out in the following table:—

1949.	Points.	1950.	Points.
January	209	January	431
February	594	February	594
March	783	March	375
April	Nil	April	746
May	32	May	244
June	22	June (till 17th June)	129
July	5		
August	22	Total	2,519
September	77		
October	630		
November	288		
December	42		
Total	2,704		

Two germinations of Sudan grass seed occurred. In the first a 20 per cent. strike was observed and the balance germinated during the February, 1949 rains. A good number of young plants from this germination were lost, as they were grazed during the early stages.

The sheep had access to the whole of the 400 acre paddock whenever they were allowed to graze the crop. It included a light loamy ridge which carried very little feed during the winter and some black soil covered with star grass and feathertop.

The paddock was heavily grazed from the last week of February, 1949 until the spring. Three thousand five hundred wethers were on the crop from the last week in February to the end of March. A further two thousand were then added, and the whole flock was withdrawn during the third week of May. The paddock was then spelled for three weeks and was subsequently grazed by 10 house cows, the working horses and a smaller flock of sheep, whose numbers never exceeded 1,400, until September 10. The paddock was then spelled again for four weeks, when up to 1,700 wethers were re-introduced and were carried until the end of November.

During the later periods, that is, between June and November, 1949, various drafts totalling 1,700 aged, broken mouth wethers were fattened and sold. One draft, bought locally, dressed out at 48 lb., while another draft of 800 dressed out at 47 lb. in Rockhampton.

A further 3,500 wethers were grazed from the beginning of December, 1949, until the last week in April, 1950, when an additional 1,400 wethers were purchased and run with the flock, making a total of 4,900 sheep from the end of April till June 1.

At all times during 1949 when rain of sufficient quantity fell to endanger the crop by grazing with sheep, the stock were removed from the paddock and returned again when the ground had dried sufficiently. During the wet weather in 1950, the sheep were given access to a further 500 acres of grassland, but had to water in the paddock with the Sudan grass. They were continually brought in contact with the crop, with the result that the Sudan grass was eaten out completely.

On June 1, the mob of 4,900 were shifted to a 200-acre paddock of sorghum stubble, which was grazed until June 13, when the flock again returned to the Sudan grass paddock. During this time the Sudan grass had re-established and grown to a height of 12 to 13 inches as the result of the mild, moist winter. In some areas, it constituted a thicker stand than in the previous year.

The actual value of this 180 acres of Sudan grass would be hard to assess, as the sheep were being grazed during periods when the natural grasses in other paddocks were allowed to re-seed. The fattening of aged, broken-mouthed wethers during the dry, harsh winter of 1949 could certainly not have been achieved on natural pastures. The wool return from sheep fed a more balanced yearly ration, and the accessibility of the sheep during the severe fly wave in the summer and autumn of 1950, are also to be considered.

No internal parasite trouble was experienced during the whole period and on no occasion were the sheep drenched.

SUMMARY OF GRAZING RATES.

Period.	Number of Sheep.	Stocking Rate in Sheep per Acre.	
		Paddock. (400 Acres.)	Crop. (180 Acres.)
1949—February-March	3,500	8·8	19·5
March-May	5,500	13·8	30·6
June-September	1,400	3·5	7·8
October-November	1,700	4·2	9·4
December-January (1950)	3,500	8·8	19·4
		(900 Acres.)	(180 Acres.)
1950—January-April	3,500	3·9	19·4
April-June	4,900	5·4	27·2
		Sorghum Stubble. (200 Acres.)	
1st June-13th June	4,900	24·5	

Dehorning of Cattle.

R. W. HEWETSON, Assistant Husbandry Officer, and C. R. MULHEARN, Divisional Veterinary Officer.

DEHORNING has now become a recognised practice in a great number of dairy herds in Queensland. Whilst dehorning is accepted as good husbandry by most commercial dairymen, many stud breeders, though recognising the economic advantages of dehorning, claim that the removal of horns detracts from the appearance of show animals. In fact, a dehorned beast is rarely seen in the showring.

The presence or absence of horns should not be allowed to distract attention from the points which really matter—the production of butter and meat, neither of which has anything to do with horns.

Farmers become accustomed to the sight of dehorned stock and soon appreciate the ease of handling and the freedom in moving among their dehorned cows. Breeders of polled cattle would not think their cattle improved if horns were grafted on. It is not horns which give Ayrshires a high place in the milk world, but good udder conformation and their ability to produce milk.

In the showring, attention should be concentrated on economic points, for after all, farming is a business. If the dehorning of cattle leads to greater production of milk and decreases the risk of injury in the yard, then dehorned cattle should not lose points when being judged in the showring.

It is claimed, by those opposed to the practice, that dehorning of adult cattle is cruel and for that reason should not be undertaken. Pain is certainly inflicted at the time of dehorning, but this pain, though acute, is fleeting and in no way as severe or as dangerous as that inflicted by cows ripping each other with sharp pointed horns. It is only necessary to see animals severely horned and trampled during trucking to realise the cruelty of enclosing aggressive horned animals in confined yards or trucks.

It is surprising that dehorning has not become a general practice throughout the world, as it has practically everything in its favour and if properly carried out, little against it.

ADVANTAGES OF DEHORNING.

The advantages of dehorning are summarised in this section.

More cattle can be kept in the dairy yard; they can be handled with less risk of personal injury; and the food is used more economically.

Cows are quieter in the yard when they are not expecting a horn "poke," and milking becomes quicker with less trouble in bailing up.

More cows can be put onto a limited grazing area, and strip grazing is more easily controlled. When the "boss" cow has horns she will frequently corner and rip a timid beast, and if this bullying goes on there will be a resultant depression of milk yield in some cows. Bullying is not unknown amongst hornless cattle, but usually with the loss of their horns, horned breeds lose their fighting instincts.

Plate 169.
Dehorned Dairy Cows Reclining Contentedly After Feeding.

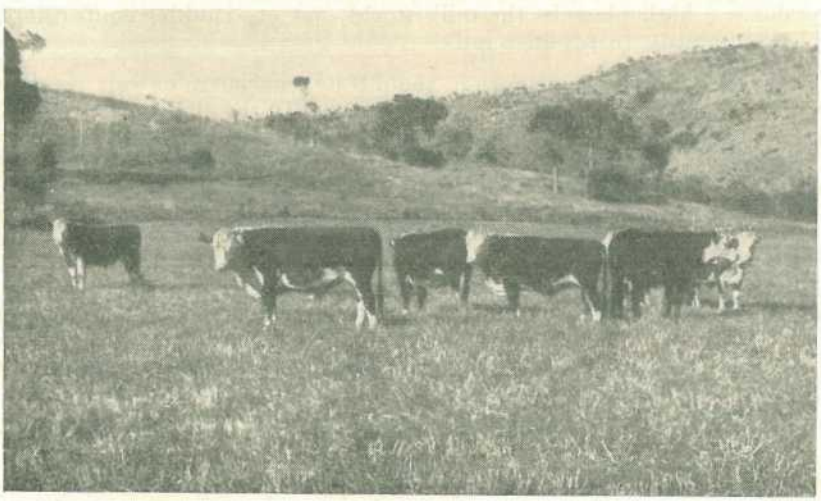


Plate 170.
Dehorned Hereford Steers Grazing in a Small Oat Paddock.

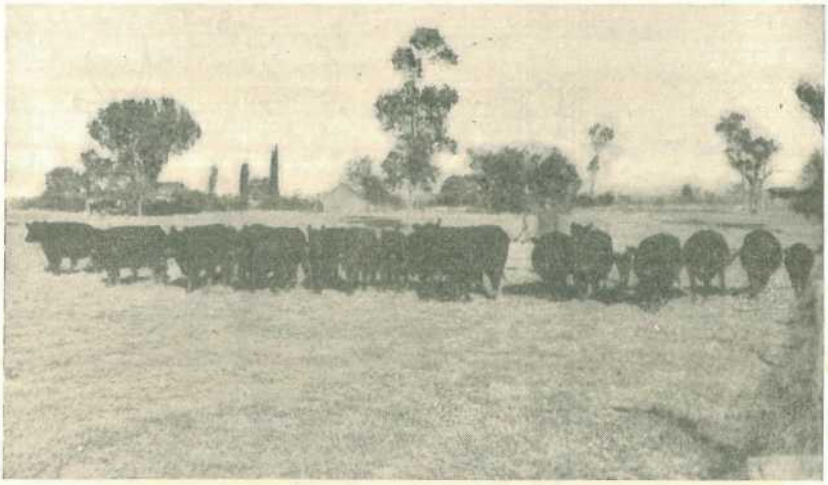


Plate 171.
An Easily Controlled Group of Dehorned Aberdeen Angus Cows and Calves.

When limited troughing space is available, it is frequently noted that some animals, as soon as they have satisfied their thirst, promptly attack their neighbours, causing injury to other cattle and to the troughing. This is eliminated if stock are dehorned.

During trucking of fat cattle, horning will cause marked depreciation of value of the carcases consigned to abattoirs, apart from losses due to tears in the hides. When trucking, it may be possible to include one more animal once they have been dehorned. Dehorned cattle can move their heads freely in a truck without the possibility of horns entering other cattle, with resultant injury.

As previously mentioned, a loss of horns causes an immediate change in temperament. Dairy cows, once dehorned, on being turned into a crop graze like sheep. They keep their heads down until they have eaten sufficient feed and then retire to the shade to ruminate.

Close concentration of cattle on a similar area allows more efficient grazing of pasture at its most nutritious stage of growth.

Bulls are a constant source of danger, particularly on dairy farms, where it is frequently necessary to work them through milking yards. Some breeds of dairy bulls, too, are temperamental and for that reason more dangerous than beef breeds. The removal of horns has a remarkable influence on the temperament of even the most vicious bull. For this reason dehorning of bulls in all dairy herds is strongly recommended.

ELIMINATION OF HORNS BY BREEDING.

The most satisfactory way of getting rid of horns is to breed them off, and this can be achieved, with beef cattle, if a certain breeding programme is followed.

Polledness is strongly dominant and polled sires will throw a large percentage of polled calves when mated to horned females. The first cross will all be polled. The second generation, if interbred, will produce roughly three polled calves to every one horned calf. This is represented diagrammatically in Plate 172.

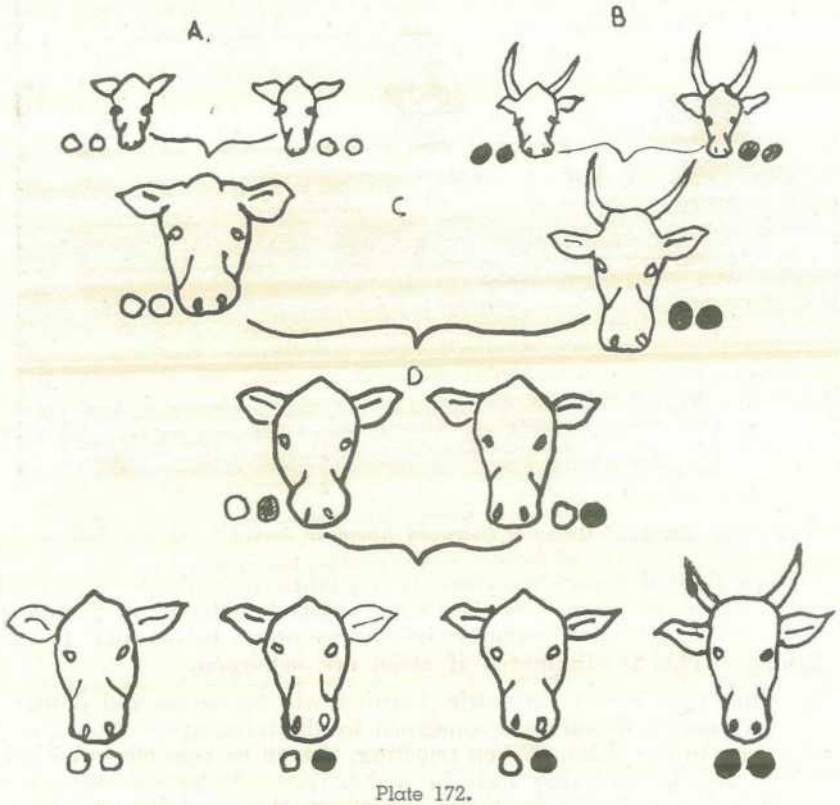


Plate 172.

Diagram Showing how Polledness is Transmitted.—The character for polledness is represented by an open circle and that for horns by a filled circle. At the top, two polled animals are mated to give a polled animal and two horned animals to give a horned animal. If these two animals are mated, they give polled offspring. Two such polled progeny when mated give three polled animals and one horned in every four on an average. Two of the polled offspring have the character for horns as well as for polledness, and though polledness is dominant in them, some of their progeny are likely to be horned.

However, if a sire which is pure for polledness is regularly used, all his progeny will be polled. Unfortunately, there are no recognised pure polled breeds of dairy cattle in Australia, and dehorning is necessary with this type of animal.

ANATOMY OF HORN AND POLL.

Before considering methods of dehorning, it is desirable to give some attention to the anatomy of the horn and poll. (Plates 173 and 174.)

Just below and on either side of the frontal eminence or poll is a "processus cornus," or horn core, for the support of the horns. Horn cores vary in size, shape, length and direction and are of elongated conical form.

The external surface is rough and porous, and marked by numerous grooves and holes for blood vessels. In the fresh state it is covered by the horn-forming cells, or corium, of the horn.

The interior is excavated to form a number of irregular spaces divided by bony walls and communicates with the frontal sinus, the whole space being lined with mucous membrane.

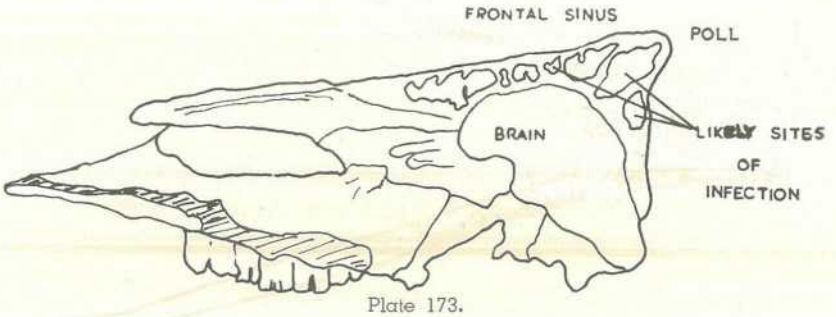


Plate 173.

Diagram Showing the Location of Sinuses in Relation to the Poll.

The nerve supply to the horn is by a branch of the lacrimal nerve which emerges from a foramen opening in the skull (Plate 174) above the eye and runs below a ridge running up to the horn, where it divides just under the skin.

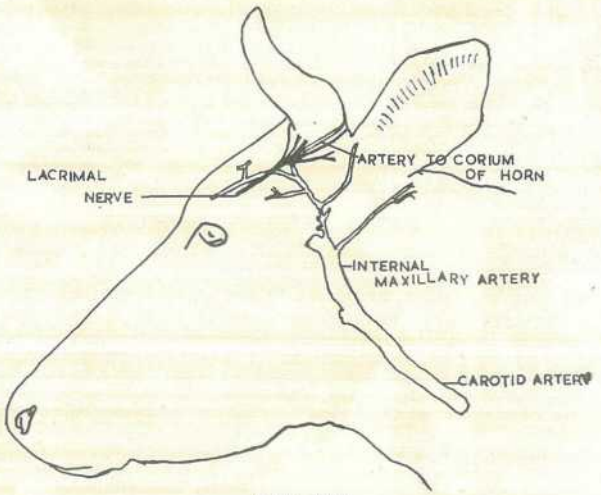


Plate 174.

Diagram Showing the Position of Nerves and Arteries.

The blood supply to the horn (Plate 174) is supplied by a special artery, the artery to the growing area of the horn, which is a branch of the internal maxillary.

The growing area of the horn can be compared to a similar growing area, the coronet, on the horn of the hoof. Once either of these is injured there will be no further growth of horn. If the growing area is not removed with the horn, it will result in ugly stubs growing later.

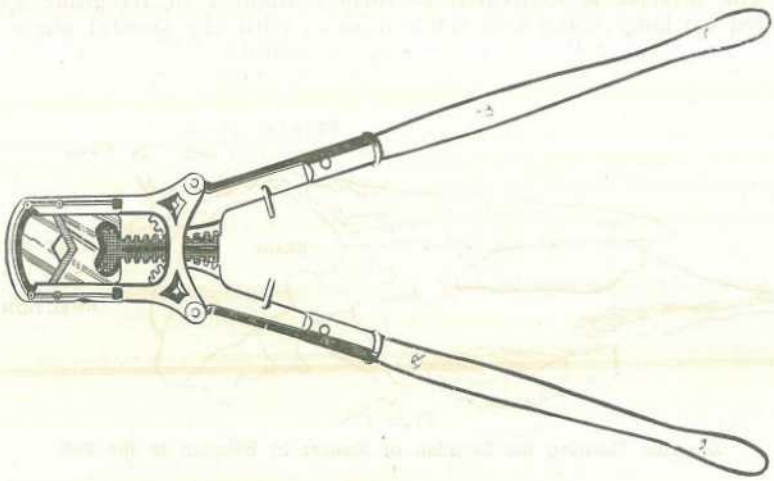


Plate 175.

A Suitable Dehorner for Adult Cattle.

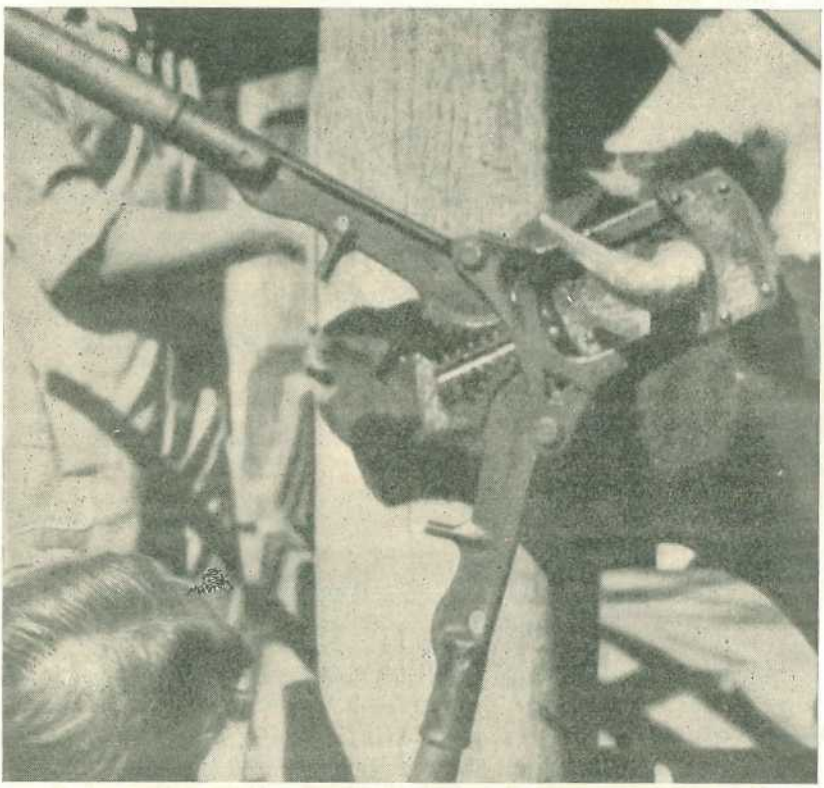


Plate 176.

Dehorning with a Guillotine Dehorner.

DEHORNING OF ADULT CATTLE.

Guillotine Dehorner.

Best results are obtained when dehorning is undertaken on calves under six months old. At times it may be considered advisable to dehorn mature cattle, and a special large type of dehorner is necessary for this operation. Many dehorners are on the market, but only those which are massive and strongly built, and lend themselves to a prompt, clean removal of the horn in one movement, should be used. There is only one type of dehorner (Plate 175) which can be considered suitable for adult cattle. It is constructed on the principle of a guillotine and the blades, one of which is fixed, are in a frame. When the blades have been placed in the correct position, a quick purchase is obtained by closing the handles, which operate a rack and pinion gear. The blades overlap when closed and the horn comes off quite evenly.

Some form of restraint is necessary to ensure adequate control of the animal, and if a large number of beef cattle are to be treated, a special dehorning bail is essential (Plates 177 and 178).

When a horn is being removed, the anatomy of the region should be kept in mind and the dehorner so placed that approximately a quarter of an inch of hair and skin is removed with the horn. This destroys the growing area and ensures that there will be no regrowth of the horn. Bleeding may appear to be severe following dehorning of mature cattle, and although usually not considered dangerous, it is objectionable and may alarm the inexperienced operator. The bleeding can be controlled by the application of a ligature, tied around the base of the horn and across the top of the head and then twitched tightly by drawing the two pieces of the cord together across the top of the poll. This method of control should be employed with dairy cattle, but it is seldom used with beef cattle, owing to the necessity of re-yarding the animals to remove the ligature.

If the arteries are still spurting an hour after the operation, the animal should be caught and the haemorrhage stopped. This can be done by applying the ligature or by taking up the arteries with forceps and tying them off with cotton. If a sufficient amount of horn is taken, it is relatively easy to pick up the arteries with artery forceps and twist them off. Pliers will stop a spurting artery. If the ligature is not applied, the bleeding can be controlled to a certain extent by the searing iron, or by the use of a suitable powder. A dry dusting powder has been found more satisfactory for use immediately after dehorning than one with an oily or tarry base. Satisfactory application of the latter dressing is difficult. A suitable dusting powder may be prepared by mixing one part of boric acid, one part of zinc oxide, one part of powdered alum, and six parts of powdered starch.

Tipping.

Tipping is often practised as an alternative to dehorning in mature cattle, particularly bulls, dairy cows and forward steers. Tipping consists of the removal of about two inches from the tip of the horn, so that the "quick" or sensitive portion becomes exposed. It can be carried out with ordinary dehorners or with a saw. As a result of this operation, the extremity of the horn becomes tender for a considerable time and the animal will refrain from using it. Even when the tenderness disappears, the animal is less likely to be aggressive and cause ripping or bruising.

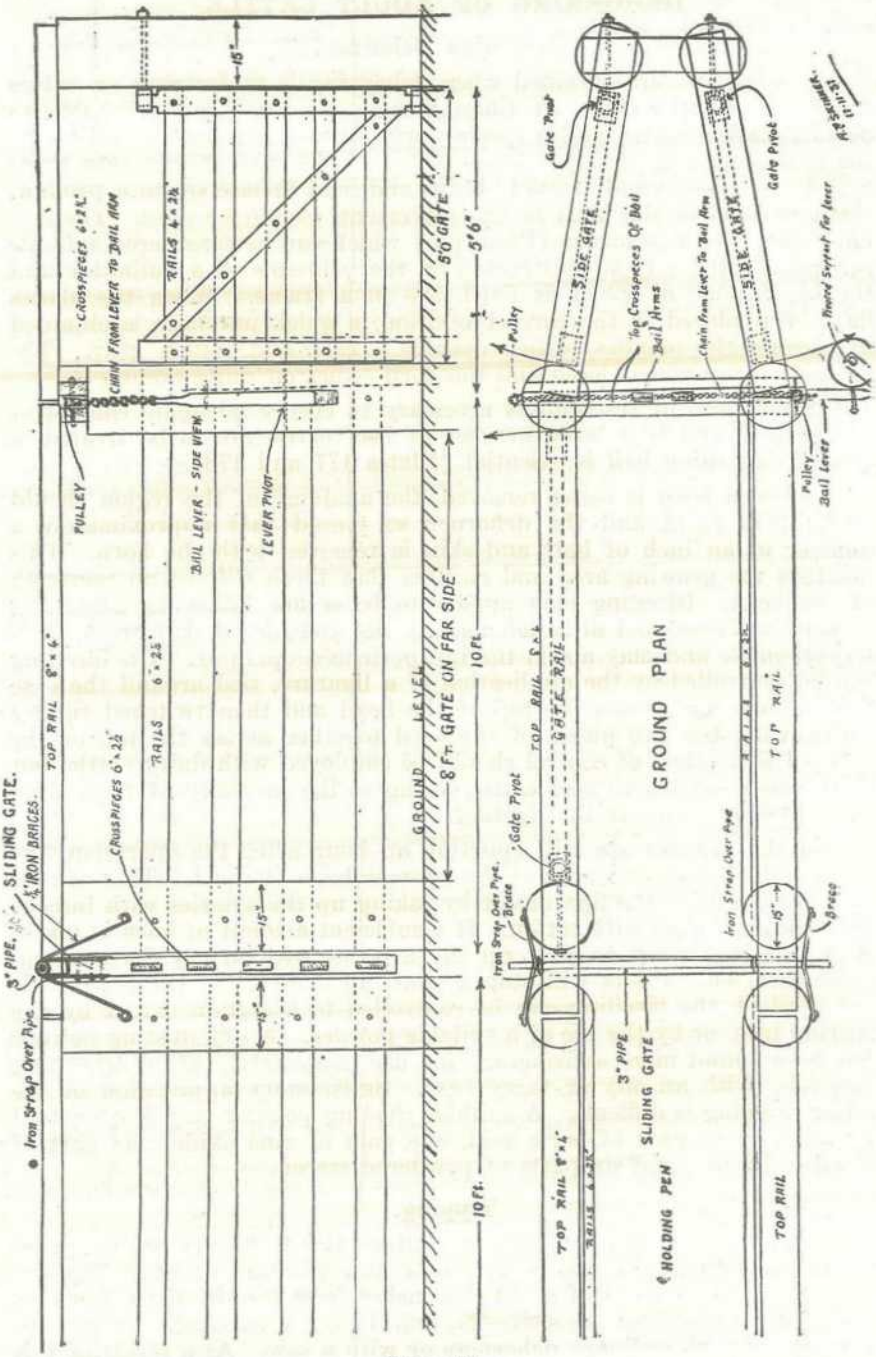


Plate 177.

Plan of a Dehorning Bail and Crush.

Time to Dehorn.

Dehorning is best done in the cooler months of the year when the fly population is at a minimum. Fly strike often follows dehorning in the hotter months when flies are bad.

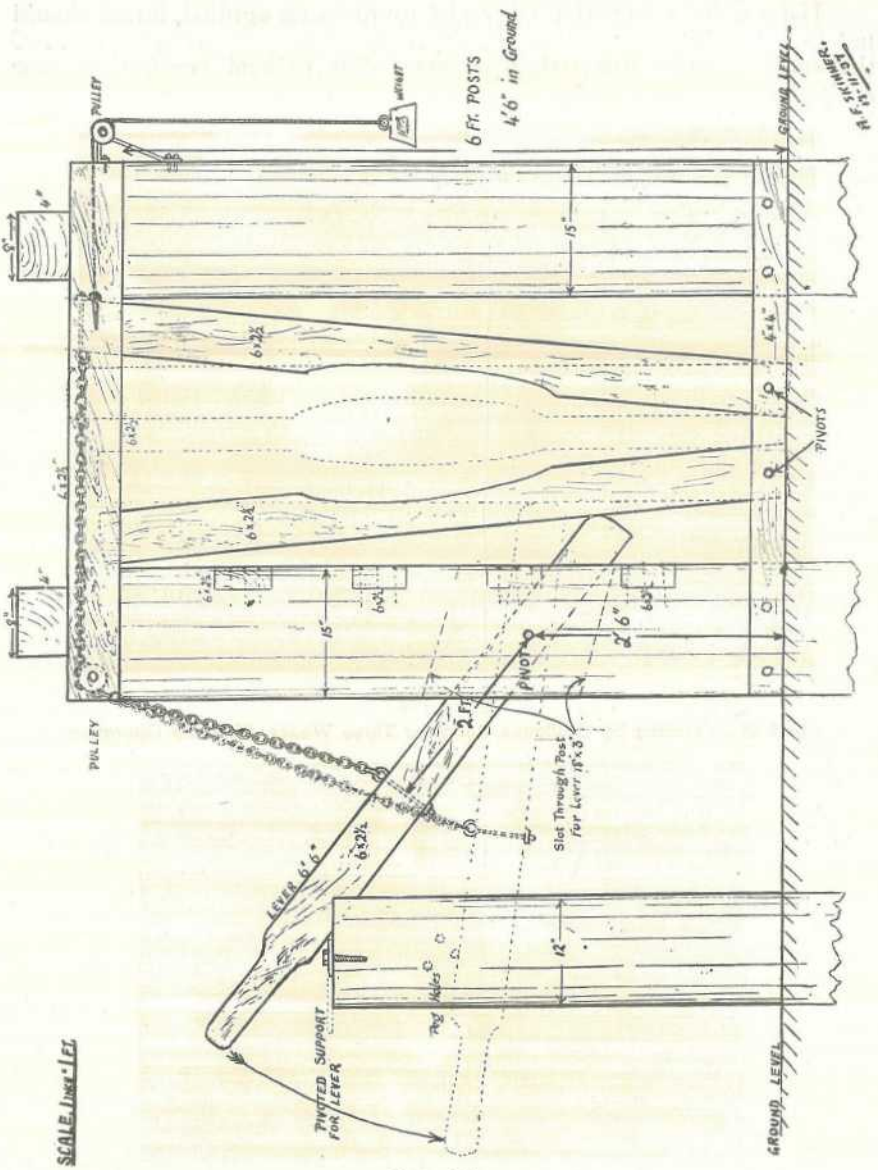


Plate 178.

Front View of the Dehorning Bail Shown in Plate 177.

Precautions and Aftercare.

Lysol is probably the best antiseptic to use. Instruments should be soaked for some hours previous to dehorning in 10 per cent. solution of lysol. A bucket of 2 per cent. lysol or dettol should be kept handy so that the dehorners can be immersed therein between operations. Suitable fly-dressings are B.K.B. and B.T.B., both of which are produced commercially, and oil of citronella, which has long been used as an insect repellant.

If fly strike is experienced, and a fly dressing applied, liquid should not be allowed to enter the sinus because of the risk of infection. If the sinus becomes infected, it is very slow to heal because of poor drainage.

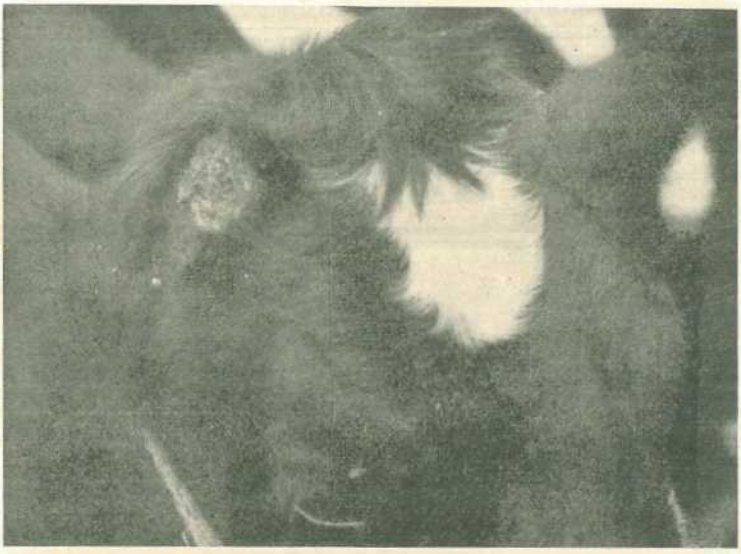


Plate 179.
Result of Dehorning by Guillotine Dehorner Three Weeks After the Operation.

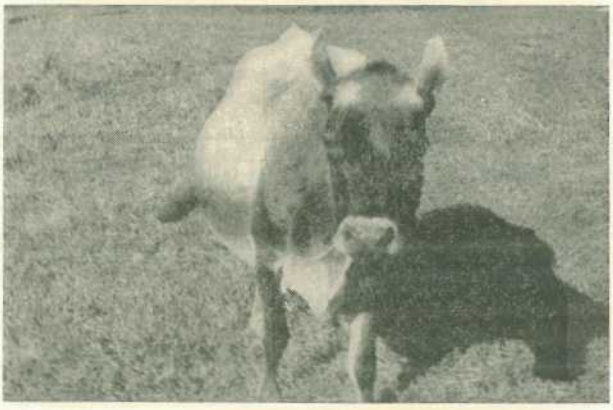


Plate 180.
A Typical Poll After Dehorning.

If, as sometimes happens when conditions are not ideal, fly strike is experienced, the hair around the horn should be clipped with scissors. It may be necessary to syringe out maggots with a weak antiseptic solution, tilting the head to make sure of drainage. A fly repellant is then applied.

DEHORNING OF CALVES.

There are three methods of dehorning calves, namely, chemical, cautery or hot iron, and mechanical.

Chemical Dehorning.

Caustic Sticks.—Calves up to two weeks can be treated with caustic soda or caustic potash. The latter is preferred, since caustic soda suffers from the disadvantage of having a tendency to spread, and thus to injure the surrounding tissues.

An area the size of a two shilling piece should be clipped over each "button"; a ring of vaseline about one inch wide is next smeared around the clipped area to check the caustic from running into the calf's eyes. The caustic stick is then moistened and rubbed over the button with a gentle rotary motion and the rubbing continued until blood just starts to seep through the seared spot.

Too little rubbing will leave unsightly "scars." On the other hand, too much caustic may cause excessive burning and scarring of the head. The caustic should only be applied to the area of skin covering the horn bud.

Plate 181.
Calf Dehorned at Birth With a Caustic Stick.

It must be borne in mind that caustic is injurious to skin and clothes and the user should either wear rubber gloves or use a paper wrapping for safe handling.

Afterwards, the calf should be tied up for at least six hours in a place where it cannot get wet. This will prevent scratching and rubbing of the treated area, which is likely to cause burning in other places and blindness if the caustic gains access to the eyes.

Antimony Trichloride.—In recent years, antimony trichloride in a solution of flexible collodion has been found to be a very satisfactory dehorning agent.

The solution can be made up by any chemist from the following formula:—

	Per cent.
Antimony trichloride	28
Salicylic acid	7
Flexile collodion	65

The material is easy to apply and the solution dries quickly into a firmly adhering flexible film which destroys the underlying tissue with much less pain than caustic sticks. Added to this, there is no danger of weeping fluid running into the eyes with resultant blindness.

The procedure is simpler than the application of other caustics. The hair around the buttons is clipped, the button cleansed with methylated spirit, and the solution applied. Using a brush, the mixture is applied to the centre of the horn, to cover an area the size of a sixpence. The animal need not be tied up or kept out of the rain. Again a little practice is required before complete success can be expected.

The solution gives best results if applied in the first nine days of life. After this period, it can be used fairly successfully if the top of the button is cut off with a pair of sharp (curved) scissors.

An alternative method of dehorning young calves is by the application of a special searing iron over the horn bud. This has become a popular method overseas. It is simple, efficient, safe and only slightly painful. A special debudding iron is used for this operation (Plate 182).

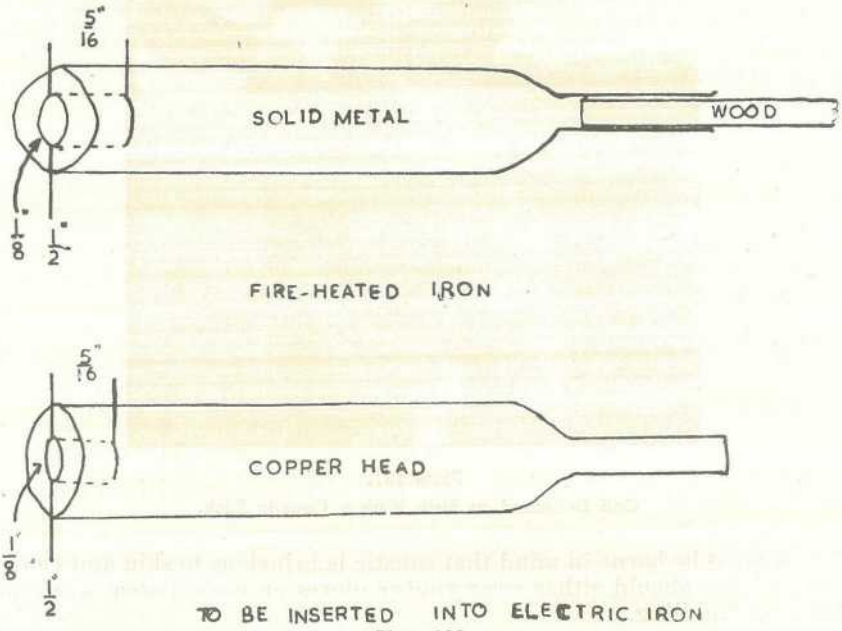


Plate 182.
Sketches of Debudding Irons.

The end of the iron is hollowed to form a dome shaped depression five-sixteenths of an inch deep in the centre and measuring half an inch across. This depression is surrounded by an outer ring of metal which is one-eighth of an inch thick and five-sixteenths of an inch deep, with an internal diameter of half an inch. The iron is mounted on a wooden handle for convenient use. If fire-heated irons are used, it may be found more convenient to have several irons with various sized cones suitable for calves of different ages. Whilst one iron is being used, the other iron could be in the fire heating. Dehorning by this method is best done at three weeks of age.

Electric soldering irons have been adapted to form efficient cauterisers (Plate 182).

With the calf suitably controlled, the iron, heated to a cherry red colour, is held over the developing horn bud to sear a complete ring

of tissue around it to prevent growth. It is here that the benefit of the wooden handle becomes apparent, for the iron is then turned completely around several times until the base of the horn is completely encircled by a copper coloured ring. The circulation to the horn is thus destroyed in less than thirty seconds and the horns drop off by themselves in due course.

There is no wound left for flies to enter and no risk of sinusitis.

Cautery would appear to be the best method.

Mechanical Methods.

Calves up to three months old may be treated by taking out the centre of the horn bud by means of a special instrument or a sharp knife. This may be followed with advantage by the application of a searing iron. When calves are approximately three months old, the horn core begins to grow out from the skull and horn removal then involves the opening of the frontal sinus. The size of the opening varies with the age of the calf, but it usually closes in from a week to a month, when the wound should be completely healed.

Special cup or scoop type dehorners are used and they are suitable for cattle up to 12 months of age.

The animal should be thoroughly restrained in a dehorning bail, or the special equipment used for branding beef calves, before the operation is attempted. The hair around the base of the horn should be clipped if it is long. The dehorner should be applied so that a quarter to a half inch of skin is taken with the "bite." The horn is removed in one movement by applying strong pressure on the handles of the dehorner. No dressing should be applied, except in a fly wave, when a fly repellant is used.

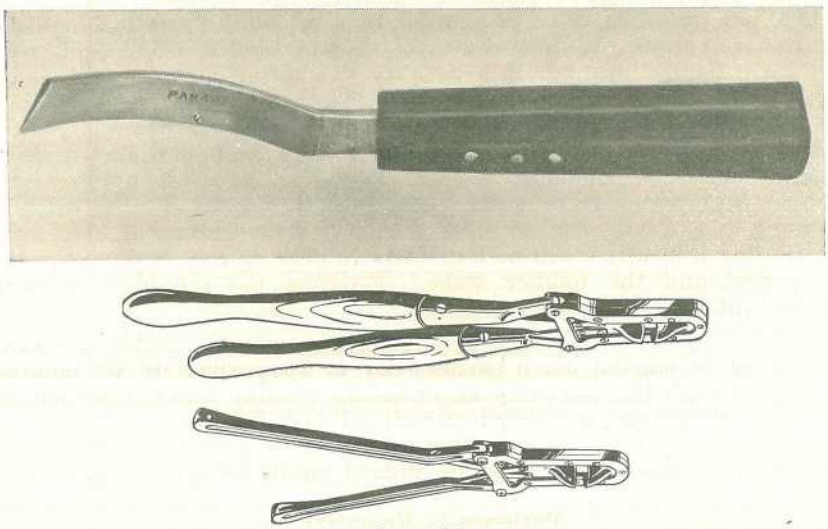
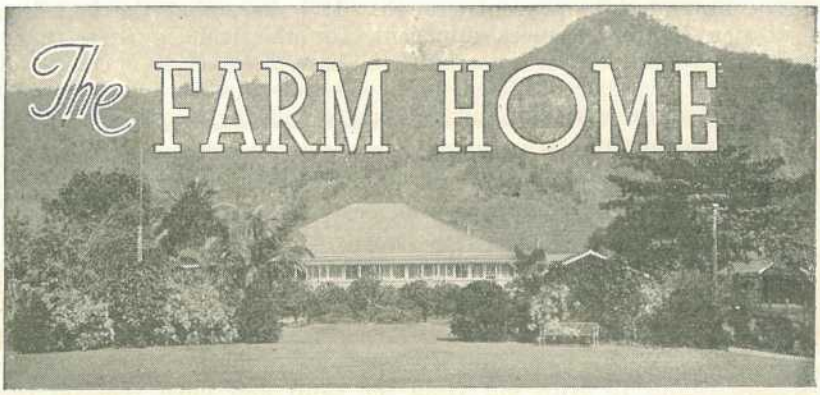


Plate 183.

Calf Dehorning Instruments—Curved Knife and Gouge Dehorners.

A specially adapted curved sharp knife (Plate 183) is used fairly extensively in beef herds. The horn bud is taken out with a clean cut of the knife.

Other mechanical means of dehorning include gouging forceps and gouging chisels, but these methods have nothing to recommend them when compared with cup dehorners.



Hints on Weaning.

WEANING means accustoming baby to new foods, or better still, helping baby to accustom himself to foods that have a different taste, sometimes a different smell and often a different consistency, from the milk he has taken previously; and the gradual substitution of these new foods for the familiar breast feeds.

The introduction of food other than milk into the diet of the baby marks an important stage in its upbringing, important alike to physical growth and to education, and it is of great benefit to baby if this process is accomplished gradually and smoothly.

In the building up of the mixed diet there are certain factors to be borne in mind. Milk remains the staple food for the first nine months of life, but it is generally recognized that probably from six months, and certainly from nine months, milk, unsupported by solid food, will produce a flabby infant with a liability to anaemia. If baby is to be breast fed for 9 months (and this is the object to be aimed at) weaning will begin at eight months, and great changes during the weaning period should be avoided. If baby is already taking enough different solid foods in reasonable amounts, so that meals can be made up by eight months, weaning will be easier and smoother; the infant will be receiving a good mixed diet, including most of the essential nutrients, and feeding difficulties will be less likely to arise during both the weaning period and the toddler stage. Progress too should be almost uninterrupted.

In order to be increased to reasonable amounts, the individual solid foods must be started much earlier—say at approximately six months of age, although this is merely an arbitrary guiding line. Some babies may with advantage be started on soft solids before six months, while it may suit others if the introduction of mixed feeding is delayed a little longer. Each baby must be judged on its own merits, abilities and tastes.

Patience is Essential.

Now for a few helpful hints on the subject. *Be Patient*—It is all something of a surprise to baby, so do not be discouraged by early refusals. He may not dislike the new food: he just wonders about it and rejects it till he can decide for himself. You should not react emotionally to the refusal; you may firmly insist that one mouthful be accepted or you may postpone the attempt for a few days and try again.

Never *force* baby to take anything, for fights over food can in no way contribute to the feeling of well-being and the establishment of a normal appetite, which are two of the specific objects of any feeding programme.

Be Gradual—Allow him time to get used to one novelty before he starts on another.

Variety is Desirable.

Be Varied—in what you offer. A number of our own prejudices are due to the articles of food not having been introduced to our diet earlier or else having been abandoned after a first unsuccessful attempt. So are many of the feeding difficulties encountered in young toddlers. The more catholic the taste, the better. It is usual to start the mixed feeding programme with a cereal such as Farex, Oat Jelly, Groats, etc. and then to go on to bone and vegetable broth, sieved fresh vegetables (Nestle's pureed vegetables are also recommended), egg yolk and egg custards, milk puddings (such as ground rice, semolina, sago, cream of wheat, junkets, etc.), cheese, the pulp of baked or stewed apple or apple sauce, or mashed ripe banana. A rusk or baked crust may be given from the time baby gets his first teeth, but remember, never leave him alone with a rusk in case he chokes. Butter and vegetable extracts may be added to the rusk. Then steamed fish, liver and meat may be added to the diet a little later.

Milk, of course, is also an essential part of the diet and by nine months of age, if not earlier, baby should be able to tolerate whole cow's milk. However, it may be wise to start with a diluted milk mixture first of all—say two parts of milk to one of water and then increase the strength of the mixture fairly rapidly until whole cow's milk is being taken. Where cow's milk cannot be obtained dried powdered milks may be used.

If persevered with, babies like almost anything that is good for them. They will not want the things that are bad for them, if they have never tasted them. Do not let them get the taste for cakes or sweets, although a piece of plain or milk chocolate or a wholesome sweet after dinner is allowable. And do not add too much sugar to baby's food. It is bad for the teeth and the digestion.

Make Food Attractive—in itself and in the manner of serving. Don't give too large helpings. You won't go far wrong if you feed your infant according to its appetite, and a second helping can always be added if necessary. Remember, children's appetites vary as much as adult appetites.

When to Wean.

Choose the Time of Year—If baby is ill, and during very hot weather, it is better to postpone weaning, as he may be fretful, less likely to co-operate and more likely to be upset.

Choose the Time of Day—to start innovations. Morning and midday novelties are less likely to upset than those introduced for the first time in the evening. Weaning schedules vary to some extent, but the general principles are the same. One breast feed is usually omitted each week until baby is completely off the breast, the first omission usually being at the 10 a.m. or 2 p.m. feed, when a dish of cereals or sieved vegetables and a glass of milk are substituted. The first and last breast feeds of the day are omitted last; the 10 p.m. feed may even be continued until baby is ten or eleven months old, according to circumstances.

How to Feed.

Liquids—Feed from a spoon or allow baby to feed himself from a cup as soon as he shows any aptitude for this. Bottle feeding should be discontinued from the age of nine months, if not before. It is a slovenly and lazy habit to let baby continue with bottle feeding when he is quite capable of drinking from a cup.

Solids—Whenever possible, allow baby to attempt to feed himself—the fingers will be used at first. The child learns its table manners from the example of its parents, but it must be allowed to be messy during its second year. The aim is to encourage it to feed itself as soon as possible, a feat only to be learnt by trial and error, and feeding difficulties sometimes arise either because the child is entirely fed for too long, or if made to feed itself, is expected to do it neatly at too young an age.

And Remember—A child's appetite is usually a good guide to his needs.

The following moral could with advantage be carved on many a nursery mantel-piece.

The food your baby does not eat never does him any harm.

Any further information on this and other matters connected with children may be obtained by communicating personally with the Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane, or by addressing letters "Baby Clinic, Brisbane." These letters need not be stamped.

JUNIOR FARMER CLUB ACTIVITIES.

Junior Farmer clubs formed recently in North Queensland are making good headway, and reports received from all sources show a decided increase in both membership and activities.

The clubs at Mossman, Goondi (near Innisfail), Sarina, Bowen, Malanda, and Kairi had representatives for the first time at the Brisbane show as guests of the R.N.A. at a special "camp" arranged for their benefit on the showgrounds. They comprised George Quaid, Geoff. Dodds, Robert McKie, Keith Maclean, Ron. Duffy, and John Penigas respectively.

At the recent Atherton show, the Malanda and Kairi-Danbulla clubs each staged an exhibit, the former winning by the narrow margin of six points. As a result, the club's library fund at Malanda will benefit to the extent of £13. Club secretary Don Drury is proving a real live wire since his return from Brisbane last March, when he took part in the Australian Broadcasting Commission's annual "leadership" contest to select Queensland's champion junior farmer boy for 1950.

Sarina and Bowen clubs, two of the newest clubs formed recently in North Queensland by the State Director (Mr. T. L. Williams), are displaying much keenness and an increase in membership numbers and club activities. Eton North, where until recently there existed a Junior Canefarmers' Society, is now being numbered among the most active and progressive in the State. Recently, two of its members were invited to give evidence at the sittings of the Royal Commission enquiring into the sugar industry in Queensland, while a number of local bodies have included members of the club on their committees of management.

The club at Eungella (Dalrymple Heights) is also making headway and is strongly supported by members of the local branch of the Q.D.O. and interested farmers.

ASTRONOMICAL DATA FOR QUEENSLAND.

NOVEMBER.

Supplied by W. J. Newell, Hon. Secretary of The Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Day.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	4.59	6.05	Cairns	46	11	Longreach	43	28
6	4.55	6.09	Charleville ..	29	25	Quilpie	33	37
11	4.52	6.12	Cloncurry	62	38	Rockhampton ..	18	2
16	4.50	6.16	Cunnamulla ..	28	31	Roma	18	15
21	4.48	6.20	Dirranbandi ..	17	21	Townsville ..	38	11
26	4.47	6.24	Emerald	26	13	Winton	50	31
30	4.46	6.27	Hughenden ..	47	23	Warwick	3	6

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Day.	Rise.	Set.
	p.m.	a.m.
1	11.45	9.11
2	..	10.08
	a.m.	
3	12.26	11.08
		p.m.
4	1.04	12.08
5	1.38	1.08
6	2·11	2.08
7	2.43	3.11
8	3.16	4.17
9	3.53	5.26
10	4.34	6.39
11	5.23	7.53
12	6.20	9.05
13	7.23	10.09
14	8.31	11.04
15	9.39	11.50
16	10.45	..
		a.m.
17	11.46	12·28
	p.m.	
18	12.44	1.02
19	1.39	1.31
20	2.33	1·59
21	3.26	2.27
22	4.21	2.56
23	5.16	3.27
24	6.12	4.01
25	7.08	4·40
26	8.03	5.23
27	8.55	6.12
28	9.42	7.05
29	10.24	8·02
30	11.02	9.00

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Day.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	10	30	25	45	0	21	27	54
6	16	20	31	37	7	11	36	42
11	29	9	44	24	19	0	52	26
16	26	13	43	29	18	3	50	32
21	15	22	31	38	6	13	35	43
26	9	30	25	45	0	21	26	54
30	12	28	27	43	2	19	30	52

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Day.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	5	56	35	67	19	53	5	46
3	8	52	36	65	21	50	8	44
5	18	38	42	57	27	42	16	33
7	29	26	50	47	35	33	25	22
9	41	13	57	39	42	24	34	13
11	52	3	66	32	50	18	43	4
13	57	2	69	32	53	17	47	3
15	52	9	66	36	50	22	43	9
17	42	14	58	40	43	25	35	14
19	31	25	51	47	35	32	25	22
21	20	35	44	55	29	40	18	30
23	11	45	38	60	23	46	10	37
25	3	52	34	65	18	50	4	44
27	2	56	33	67	17	53	3	46
29	7	53	36	66	20	51	7	44
30	11	50	38	63	23	49	10	42

Phases of the Moon.—Last Quarter, 3rd November, 11 a.m.; New Moon, 10th November, 9.25 a.m.; First Quarter, 17th November, 1.06 a.m.; Full Moon, 25th November, 1.14 a.m.

On 15th November the Sun will rise and set 20 degrees south of true east and true west respectively, and on the 7th and 20th the Moon will rise and set very close to the respective true east and true west points.

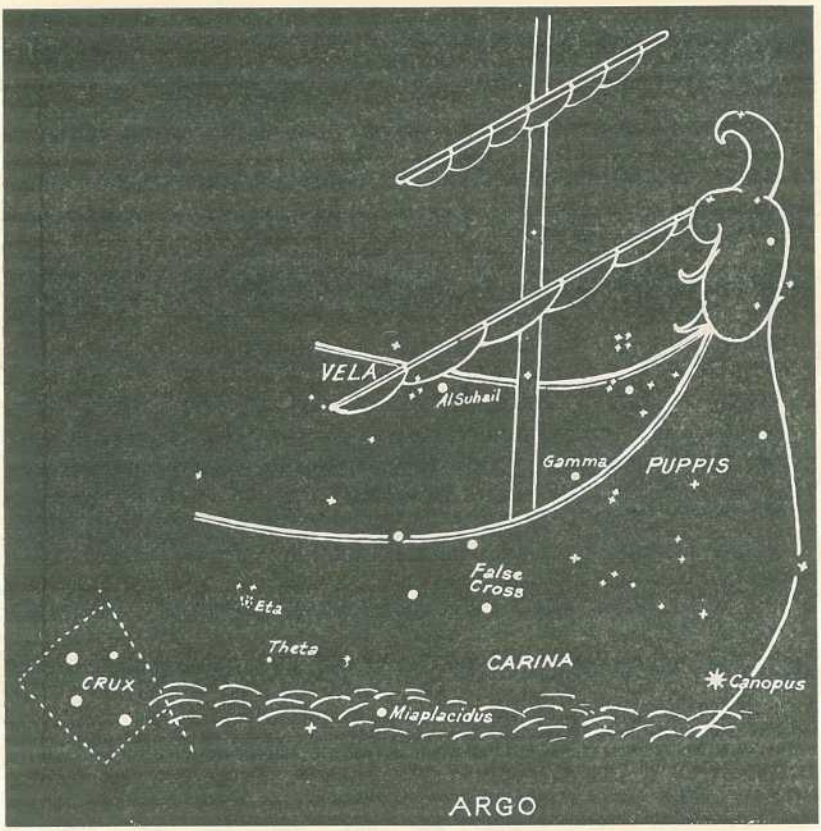
Mercury.—An evening object all this month. On the 1st, in the constellation of Libra, there will be only a few minutes difference between its setting and sunset, but by the end of the month, in the constellation of Ophinchus, it will set 1¼ hours after the Sun.

Venus.—In line with the sun on the 13th and so not visible during this month.

Mars.—In the constellation of Sagittarius, at the beginning of the month, will set between 9.50 p.m. and 11 p.m., while at the end of the month it will set between 9.30 p.m. and 10.30 p.m.

Jupiter.—Also an evening object, being situated in the constellation of Aquarius and about overhead at nightfall. At the beginning of November it will set about 2 hours after midnight, but by the 30th will set just before midnight.

Saturn.—In the constellation of Virgo, is now observable low in the east during morning twilight. On the 1st it will rise nearly 2 hours before the Sun and at the end of the month will rise soon after midnight.



CONSTELLATIONS.

Argo.

This is the largest constellation in the heavens, covering approximately 75° of arc, and is situated between declination 10 degrees south and 75 degrees south. Like most other constellations it bears little resemblance to the object it represents, the ship Argo. The reasons advanced for the name are varied. One story is that it was named after the ship built by Argo for Pelias, King of Iolcus, to carry Jason and his comrades, including Castor and Pollux, Hercules, Orpheus and Meliager, to Aea in Colchis to search for the Golden Fleece. When the voyage was over the goddess Athene placed the ship in the sky. Another legend says it was named for the first ship to sail the ocean—the ship which long before Jason's time carried Danaos and his fifty daughters from Egypt to Argus and Rhodes. Yet another legend says that it was the ark which carried Isis and Osiris across the deluge. The constellation as a whole contains some 800 odd lucid stars and for convenience modern star atlases divide it into various parts—Carina the Keel, Puppis the poop or stern, and Vela the sail—but the original sequence of letters and numbers has been retained so that we now often find Canopus referred to both as Alpha Argus and Alpha Carinae, or Eta as both Eta Argus and Eta Carinae, these stars being situated in Carina or the Keel. Old records do not show more than half a ship, the bow being missing.

Covering such a large area of the sky and being placed in the region of the Milky Way, it is natural that this constellation will contain many interesting objects both for naked eye observation and with optical aid. The brightest star of the group, Canopus, is the second brightest star in the heavens. It is a yellowish-white giant, many times larger than our sun, and has a surface temperature of 7,500°C., while its brightness is about 100,000 times that of our sun and its distance 650 light years. Argo also contains that group often mistaken for the Southern Cross and known as the false Cross. It lies about midway between Crux and Canopus, its relation to Crux being shown in last month's journal. Gamma Velorum, which to the naked eye appears as a single star, under magnification resolves into a group in the shape of an aeroplane. About half way between the Southern Cross and false Cross is the famous Keyhole Nebula, the dark patch in the centre being very much like a keyhole. On the edge of this Nebula is the noble star Eta. In 1677, Halley observed this star as of 4th magnitude. It oscillated between that value and 2nd magnitude until 1814, when it began to brighten, reaching 1st magnitude in 1827. It fell to 2nd magnitude for about 5 years and then rose to 0 magnitude in 1838, outshining Regel (Beta Orionis). It faded somewhat and then in 1834 rose to minus 1 magnitude (about as bright as Canopus). Thereafter it declined till it became invisible to the naked eye about 1867. It reached 7th magnitude in 1870 and has not altered much since.

The star Theta is known as the Southern Pleiades, several stars being grouped round a prominent star as in the Pleiades in Taurus.

The constellation rises in the south-east soon after sunset in November and is visible almost the whole night from November to February. In April it is "overhead" about 7 p.m. and from Queensland at any time of the year it is below the horizon for about only 5 or 6 hours during the day.