Queensland
AGRICULTURAL JOURNAL

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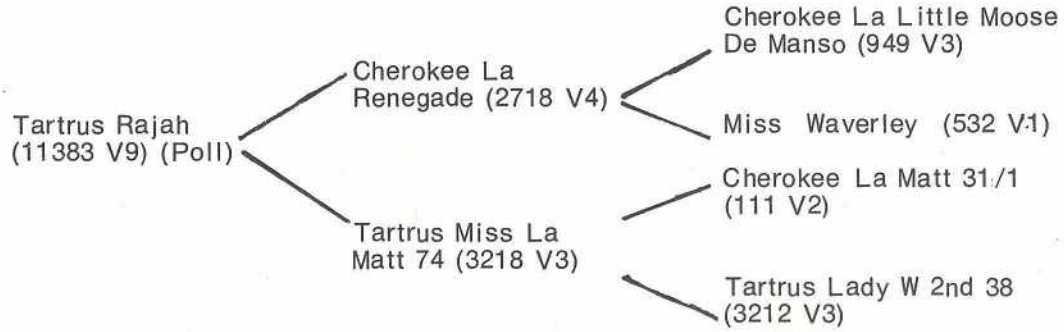
Top bull at Wacol

TARTRUS RAJAH (11383 V9) (Poll)

The Department of Primary Industries purchased 'Tartrus Rajah' at the 1974 at the 1974 'Tartrus' Brahman Stud Sale. His purchase price was $5,300, the top price paid at that sale. A full brother of 'Tartrus Rajah' was sold at the 1973 sale for $7,300 also the top priced bull at that sale.



'Tartrus Rajah' is a natural poll bull. His sire is a top breeding bull at 'Tartrus'.

Semen from this bull is expected to be available for the 1975 breeding season and will retail at $1.50 per dose.

For this issue, our cover picture shows one of the many top rating bulls from the Wacol A.I. Centre.

QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES.
William St, Brisbane.

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Controlling Mastitis . . . a case history

by D. H. BRICE,
District Adviser
and R. HARTWIG,
Adviser,
Dairy Field Services

For Boonah dairyman Peter Yarrow, a programme worked out with the help of his local dairy adviser has helped control a severe mastitis problem in his herd.

SUCCESSFUL control of mastitis in a high producing herd in the Boonah district has been the reward for Messrs. M. A. Yarrow and Sons following a three year detection and control programme.

In July 1971 clinical mastitis was a severe problem in the herd.

The extensive use of flood and spray irrigation on the property and the poor drainage of stock laneways created boggy conditions for the greater part of the year. The majority of the herd of 90 cows were suffering from cracked and chaffed teats.

As a first step, Mr. Peter Yarrow discussed the problem with local Dairy Adviser, Mr. Bob Hartwig. They decided to investigate further the severity of the problem.

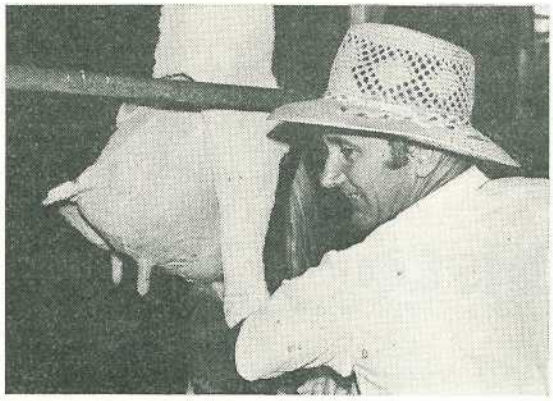
Testing of individual quarters of cows with a Rapid Mastitis Test kit indicated that approximately 50% of the quarters in the herd were affected with sub-clinical mastitis. (Udder inflammation not causing visible abnormality in the milk).

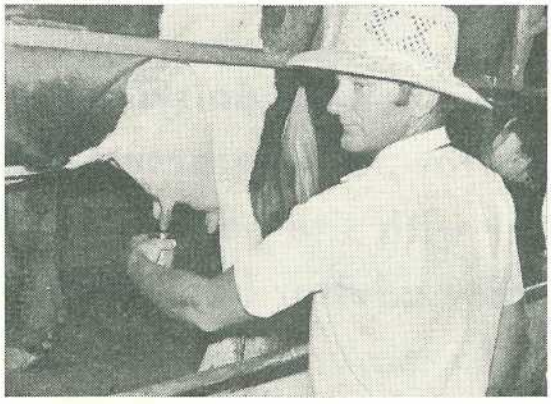
A shed performance study indicated that over-milking was a problem, so the milking machine was checked to see that it was operating correctly.

Control programme—first year

In view of this they agreed that the following control programme be implemented.

- Continued use of running water for washing the cows udders.
- Installation of back flushing equipment (to flush any infected milk from the teat cups after milking each cow).
- Rearing replacement stock or purchasing heifers in place of buying replacement cows.
- Testing of milk from infected quarters to determine bacteria type and sensitivity to antibiotics.
- Antibiotic treatment for clinical cases of mastitis during the lactation.





Top: A mechanically sound milking machine and correct use is important to good mastitis control.

Middle: Spraying the udder with water ensures effective removal of sources of infection and stimulates milk let down.

Below: Dipping of teats in approved sterilising solution at the end of milking will minimise infection.

- Checking milk from treated cows for antibiotic residue (carried out by the factory laboratory) before including milk in the bulk milk supply.
- Checking the physical condition of the udders at drying off by palpation to determine whether to cull the cows.
- Use of long acting "dry cow" antibiotics on cows with a history of sub-clinical mastitis or on cows having clinical mastitis during the lactation.
- Cull cows that do not respond to antibiotic treatment.
- Alter the milking routine to reduce overmilking.
- The Department agreed to carry out regular Rapid Mastitis Tests to record quarters affected with sub-clinical mastitis. A record was kept of clinical mastitis as a basis for treating cows at the end of lactation.

Results

There was no significant improvement in monthly Rapid Mastitis Test results on individual quarters during the first year after this programme was adopted.

FIGURE I

1971–72 R.M.T. RESULTS

Month	Negative	Suspicious	Positive	Factory W.M.T. Score
	%	%	%	
July 1971 ..	51·8	22·1	26·1	..
August	46·5	22·4	31·1	..
September ..	58·0	11·8	30·2	..
November ..	45·8	23·3	30·9	..
December ..	62·9	15·9	21·2	..
January 1972 ..	53·8	25·6	20·6	..
February ..	45·3	19·0	35·7	..
March	43·8	19·4	36·8	..
April	58·3	10·9	30·8	..
May	59·3	9·3	31·4	3
June	74·3	9·4	16·3	9

Treatment—
Dry cows 32
Lactating cows 20

Culling—
Mastitis 16

(15 cows failed to respond to dry cow therapy)

During the first year of the programme 20 cows were treated for clinical mastitis during the lactation.

Thirty two cows were treated at the end of the lactation with "dry cow" antibiotics. Sixteen cows were culled. Most of these were cows that failed to respond to antibiotic treatment.

Second year programme

The initial programme was adopted for the second year with the following changes:

At the end of the first year cracked teats were still a major problem in the herd. It was decided to make use of udder soap (with a lanoline base) when washing the udders and to use udder cream on cracked teats after milking.

The soil in boggy laneways and gateways was stabilised with slaked lime. This produced a hard surface and reduced contamination caused by previously boggy conditions.

In addition to R.M.T. results, information on the cell content of herd milk became available on a monthly sample through regular testing by the Wisconsin Mastitis Test (W.M.T.) procedure. Results "below 15" are regarded as satisfactory. Cow-side examinations were changed to W.M.T. procedures in March 1973.

Results

During the second year there was a considerable reduction in the level of sub-clinical mastitis. The Rapid Mastitis Test results indicated that now only about 20% of quarters were affected (fig. 2).

However clinical mastitis still remained a problem with 23 cows treated during the second year of the programme.

Forty-one cows were treated in one or more quarters at drying-off with a long acting antibiotic and six cows were culled. Two cows died from a Pseudomonas infection—a particularly difficult bacteria to control.

The problem of sore teats was overcome with the use of udder soap and udder cream.

FIGURE II

1972–73 R.M.T.—W.M.T. RESULTS

Month	Negative	Suspicious	Positive	Factory W.M.T. Score
	%	%	%	
July 1972 ..	78·3	6·5	15·2	6
August	82·2	2·6	15·2	15
September ..	76·1	5·3	23·9	7
October ..	80·4	11·6	8·0	7
January 1973 ..	83·2	3·8	13·0	7
February ..	82·4	6·3	4·3	15
W.M.T. ..	<15	15·25	>25	..
	%	%	%	
March	60·0	17·0	23·0	9
April	63·0	17·0	20·0	13
May	75·0	10·0	15·0	17
June	77·0	10·0	13·0	10

Treatment—

Dry Cow 41 (Orbenin–Neodry)

Clinical .. 23 (Pencommas S–Blue)

Culling—

Mastitis .. 6

FIGURE III

1973–74 W.M.T. RESULTS

Month	<15	15–25	>25	Factory W.M.T. Score
July 1973 ..	..	..	..	22
August	82·2	8·7	9·1	12
September ..	80·0	6·5	13·5	11
October ..	..	..	..	5
November ..	72·0	14·0	14·0	6
December ..	85·0	7·0	8·0	9
January 1974 ..	..	..	..	6
February ..	88·0	7·0	5·0	5
March	..	..	..	8
April	84·0	3·0	13·0	8
May	..	..	..	8
June	87·0	7·0	9·0	6
July	..	..	..	8
August	91·0	4·0	5·0	11
September ..	..	..	..	5
October ..	92·0	3·0	5·0	7

Treatment: Dry Cow—59 (Pencommas S—Dry Cow)

Third year programme

The following change was made to the programme adopted during the third year—In view of the continuing problem of clinical mastitis it was recommended that all cows in the herd be treated at drying-off, with a long acting antibiotic (penicillin/streptomycin). Sensitivity tests indicated that all mastitis organisms isolated with the exception of Pseudomonas, were sensitive to this antibiotic.

All cow-side examinations during the third year were done with the W.M.T. procedure. This gave a more direct result of the number of cells in the milk.

Results

Cell count results showed a continuing reduction in the level of sub-clinical mastitis (fig. 3). In October, 1974, only 8% of quarters were affected with sub-clinical mastitis and measured by the Wisconsin Mastitis test.

The average W.M.T. results for the herd milk for the previous twelve months was 7, a very good result.

Only a small number of clinical cases of mastitis occurred during the year.

Production

Although many factors will affect annual average production per cow, the following figures do show some of the influence that mastitis has had on production.

Year	Number of Cows	galls/cow	Total production
1968–70 ..	88	344	30,237
1970–71 ..	89	317	28,209
1971–72 ..	61	427	26,025
1972–73 ..	71	496	35,229
1973–74 ..	69	499	34,429

Mr. Yarrow's experience has shown that the control of severe mastitis problems is not always easy or rapid. The effectiveness of the programme may only be as good as the weakest link.

It was not until muddy conditions were reduced and udders treated for sore teats that improvement was obtained.

The advantage of using dry cow antibiotic therapy on all quarters when mastitis is a problem, was also demonstrated.

To utilize the full potential of a new portable ultrasonic livestock grader, a group of five Central Queensland pig producers have got together to form

An electronic pig selection syndicate

by E. A. W. HANNAY, Pig Section

THE syndicate headed by Mr. Bob Duckett of Capella aims to further improve the quality of members' breeding stock by using the instrument as a means of selection of gilts from positive measurements.

The District Adviser in the Pig Section of the Department of Primary Industries has been given complete charge of the apparatus, and testing routines have been implemented. This has simplified organisation, standardised measurement, and eliminated any duplication of equipment.

Mr. Bob Duckett shows how, with the pig restrained, the probe is held in the correct position to obtain a reading. Backfat thickness is recorded in millimetres on the face of the instrument.

Basically the aim is to select the leanest of the fastest growers, because the consumer has shown a preference for lean pork and bacon with good meat content. There is a direct correlation between back fat thickness and the amount of lean meat in pigs.

As fast growing, lean pigs convert food efficiently, the producer also benefits. Selection of breeding stock for highly heritable characters gives rapid genetic improvement, and carcass quality is highly heritable as can be seen from the accompanying Table.

Space research advantage

The grader can measure backfat thickness precisely. It also has the advantages of a light weight of only 5 kg, and small size, making it very portable. It is capable of battery operation, using nickel cadmium rechargeable batteries as developed through space research. Consequently it can be used where mains electricity is not available.

These machines are a development of echo sounding. A flat-surfaced hand held "probe" transmits pulses of inaudible ultrasonic sound waves into the pig when placed in contact with the skin.

Echos, or reflected pulses, are returned from changes in tissue—either from fat to muscle, or flesh to bone, etc. The pulses are displayed visually as deflections on a cathode-ray tube screen, and the measurement is read easily in millimetres of backfat in the pig's case. Thus it gives an accurate assessment of the likely carcass quality, without any pain or damage to the live animal.

Mr. Duckett said that he had been testing boars at the D.P.I. Rocklea Pig Test Station for several years, but felt that there was also a need for an instrument capable of effectively measuring his pigs on the farm, especially females.

Selection

Final selection of the syndicate members' potential breeders is by direct comparison, within each group, of daily gain over a minimum of ten weeks, and of backfat thickness. Therefore batch farrowing is practised to give as large a choice of progeny as possible within the group from which selection is to be made.

Backfat is measured at a point 65 mm out from the mid line of the back, in line with the head of the last rib, for both pork and bacon weight pigs.

To bring out their potential pigs are "full fed" or at least fed above normal rates—say about 2·5 kg (5·5 lb.) meal per day to 90·7 kg (200 lb.) liveweight.

Since conditions vary from farm to farm, and even on any one farm over time, comparisons between farms or even groups should not be made. Thus minimum standards should not be set; the required number of animals above the group average form the basis for selection.

On the other hand there may be occasions when, for no obvious reason, the overall performance of a group is either particularly bad, or particularly good, in comparison with the normal standard on the farm. In this case some discretion is used with more or less animals being selected. Sometimes none may be considered good enough.

Basic requirements

Some basic requirements are necessary to avoid any confusion in obtaining accurate results:

- Batch farrow.
- "Full feed" the group for a minimum of 10 weeks.
- Weigh pigs at end of test period. It is convenient to measure the backfat whilst the selected pig is in the weighing machine.
- Provide a place for the instrument, and other equipment necessary to be held, convenient to the weighing machine.
- Keep a record of the age of the pigs.
- Earmark all pigs on test.

Comparison

To allow an accurate comparison between animals of differing weights in a group, each is brought to 90·7 kg (200 lbs.) live weight equivalent. One millimetre of backfat is added or subtracted for each 4·5 kg (10 lbs.) below or above 90·7 kg live weight (e.g. 16 mm at 180 lbs. = 18 mm at 200 lbs. L.W.).

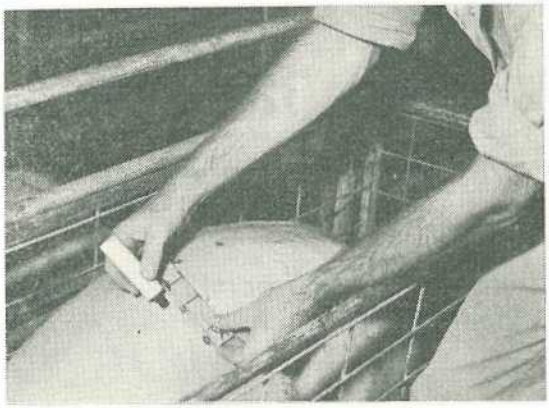
Several members of the syndicate have noticed quite surprising variations in measurements from seemingly similar animals. These producers feel that they will recoup their total investment in the machine in a relatively short time.

Improvement in the quality of their breeding herd and subsequent better growth performance and carcass quality of progeny must benefit both themselves and the consumer in the future.

TABLE OF HERITABILITIES

Character	Heritability
Birth Weight	Low
Litter Size at Birth	
Litter Size at Weaning	
Weaning Weight	
Milk Production	
Growth Rate	Moderate
Feed Conversion Efficiency	
Teat Number	
Backfat Thickness	High
Carcass Length	
Loin eye area	
Percentage Ham	
Percentage Shoulder	

Selection of breeding stock for highly heritable characters gives rapid genetic improvement. Carcass quality is highly heritable.



At the Rocklea Pig Test Station the electronic grader has been in use for several years. The pictures show marking of key points on the pig's back (top), placing the probe on each of these markings (middle) and reading of data from the machine (bottom).

Of particular interest

Items of news recently released by the Minister for Primary Industries, the Hon. V. B. Sullivan, M.L.A.

Increase in Meat Inspection Fees

Some meat inspection fees will be increased as from 1st August 1975.

Costs have greatly escalated since the last increase in fees in 1971 and it is necessary to raise fees again to maintain the services provided by the Slaughtering and Meat Inspection Branch of the Department.

The new fees are necessary to ensure that basic standards of meat inspection and hygiene can be met so that clean and healthy meat is always available to the public.

The decision to raise fees has been taken with great reluctance but even so, the new fees will still be substantially below those for similar services in southern States.

This is clearly evident from a comparison of a proposed Queensland fee and those currently charged in New South Wales and Victoria.

There will be no increase in inspection fees for a number of items. These include prescribed meats such as bacon, ham and pigs kidneys, tails or fillets; or for animals killed for the pet food trade.

Milk Plant Franchise

The franchise held by The Atherton Tableland Co-operative Dairy Association Ltd. for the supply, from its plant at Townsville, pasteurised milk and cream within prescribed areas, has been extended for a period of 10 years.

The current franchise period is due to expire on October 1 this year.

An application by the Association for the extension has been heard by the Milk Pasteurisation Tribunal, which gave its decision on July 4.

There were no objections to the application.

Veterinary Surgeon's Board Appointment

Mr. L. G. Newton, Deputy Director in the Department of Primary Industries' Division of Animal Industry, has been appointed President of the Veterinary Surgeons' Board of Queensland.

Mr. Newton will replace the Divisional Director, Mr. A. L. Clay, who has been President since 1965.

Mr. Newton, before being appointed as Deputy Director of the Division in 1968, has served firstly as Director of the Pathology Branch and then as Director of the Veterinary Services Branch.

The cattle crate in operation.

Cattle crate reduces bruising

By B. C. TOON,
Regional Information Officer

A cattle transport crate, designed and built in Central Queensland, has been responsible for a saving of 29 per cent in bruise numbers over a series of three trials.

THE crate was built by Calliope stock carrier Mr Claude Streeter with design assistance from grazier Mr Ian Park of Alarm Creek, Calliope.

Mr Park is chairman of the Central Coastal Graziers Association Bruising Liaison Committee.

Main features of the crate are the smooth-surface marine ply walls and the sectional dual-purpose doors.

Mr Park said the high-level marine ply walls meant that cattle entering or being transported in the crate were not frightened by outside activity, because the area was kept dark.

The crate, lined with sheets of 4 ft by ¾ inch hardwood marine ply, was built for about $1,500, which was about $300 more than a conventional float.

Mr Streeter decided to build the crate because of increasing attention being given to the bruising factor during transport. As well as showing that a well-designed crate could reduce bruising significantly, the exercise could indicate to graziers that there were other aspects besides transport which caused bruising, and over which the grazier had some control.

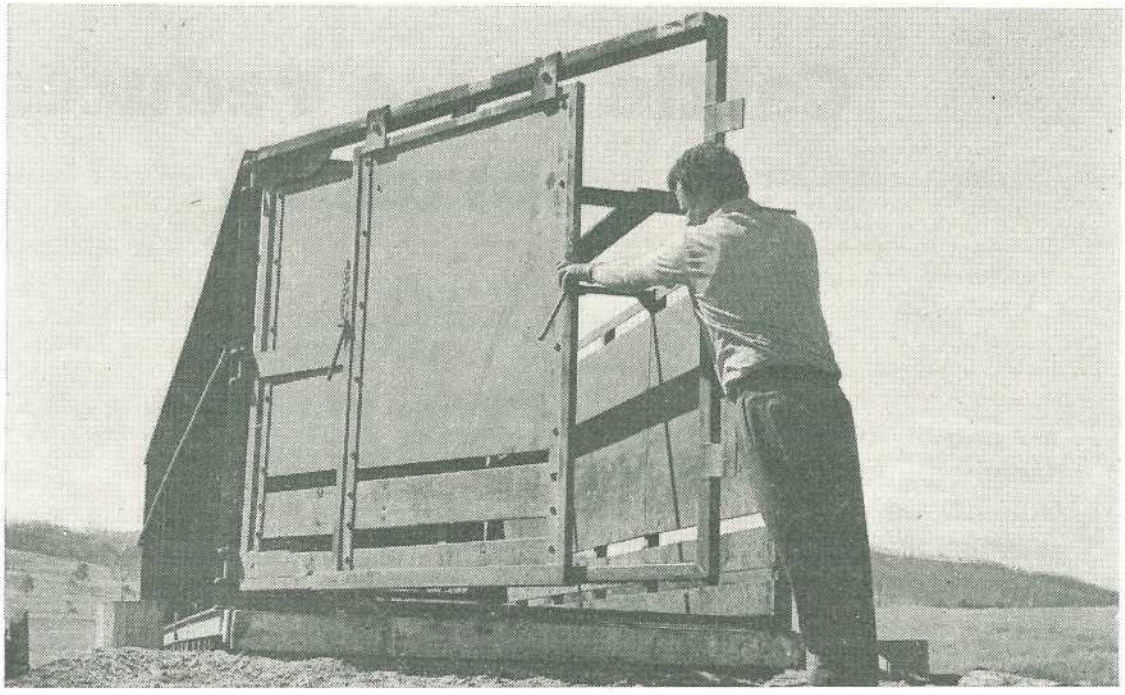
These included the education and handling of cattle, and the provision of adequate facilities.

The crate has attracted the interest of an increasing number of Central Queensland graziers and transport operators. Already some cattlemen have begun demanding that this type of crate be used to transport their cattle.

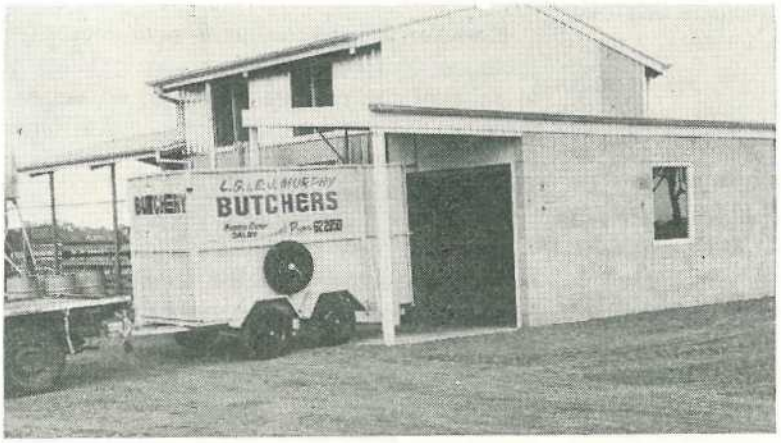
Mr Streeter has begun converting the remainder of his fleet of trucks to this type of crate.

Mr Park says the job of the Central Queensland Bruising Liaison Committee now was to convince cattlemen and transport operators generally that this type of unit was highly desirable, because it had a definite role in the reduction of bruising.

Below: High-level marine-ply walls and sectional dual purpose doors are a feature of the crate.



From the old



to the new

New regulations produce clean meat

by M. E. SCHMIDT, S.M.I.B.

These pictures show the changes that have taken place in slaughter-houses with the introduction of new regulations in January, 1974.

IN January, 1974, new regulations were introduced dealing with the improvement in design, construction and equipment of slaughterhouses, and procedures for the hygienic slaughtering and dressing of livestock for the production and processing of human food. These are proving most worthwhile in those premises throughout the State where compliance has already been achieved.

Most of the new regulations were formulated from the most desirable standards and procedures existing in the different and many slaughterhouses throughout the State, but seldom found incorporated in toto in any one premises.

Legislation covering the establishment and operation of a slaughterhouse had remained virtually unchanged for seventy-five years before the new regulations were introduced.

The old legislation was most likely conceived from original ideas and practices used since mankind first established the concept of a slaughterhouse. In most instances, the standard of the premises and daily hygiene practised in them was not in keeping with the demands of the consumer orientated society of this age in a State which boasts a high standard of living.

These new regulations mean that the past longstanding concept and belief of most people will quickly change as a result of the new regulations. No longer will a country slaughterhouse be a smelly and dirty little black and white battened building, where one or two people go to kill animals in the early hours of the morning so as to avoid the flies. It will be a clean, modern and aesthetically desirable place where human food is prepared.

Advances in technology over recent years and experience gained in other aspects of the meat industry have also been incorporated in the new regulations.

As with any new concept, it is not surprising in the early stages to find that there is some resistance to its introduction by many sections of society which it affects.

However, it is interesting to note, that where premises have complied with the new standards, in spite of the expense involved, no one has regretted the improvement or wanted to return to the old ways and the poor standards of hygiene associated with them.

Since the new regulations came into force many have argued that the seemingly radical change was completely unnecessary since there was no available evidence to show that the existing hygiene or structural standard was causing dire public concern or having a deleterious effect upon the meat.

The reason for this belief is largely because of an ill informed public and (as is the case within any industry) the normal reluctance to change.

The standard of hygiene required by the new regulations is simply the one found in normally clean household kitchens, or other food preparation premises, where all human food is prepared in an hygienic manner and all appliances and utensils together with the room or premises, are washed *clean* and kept *clean* after each usage, or at the end of each day's work.

Identifying insects

Cockroaches

(Order Blattodea)

by I. D. GALLOWAY,
Entomology Branch

THE cockroach is a well known and universally detested insect. In Australia its reputation as a pest has resulted from the activities of a number of imported species which have acquired an unpleasant attachment for the company of man and his dwelling.

IT is interesting to note that Australia has over 400 indigenous species of cockroaches which are restricted to their native bushland habitat and are rarely found in homes.

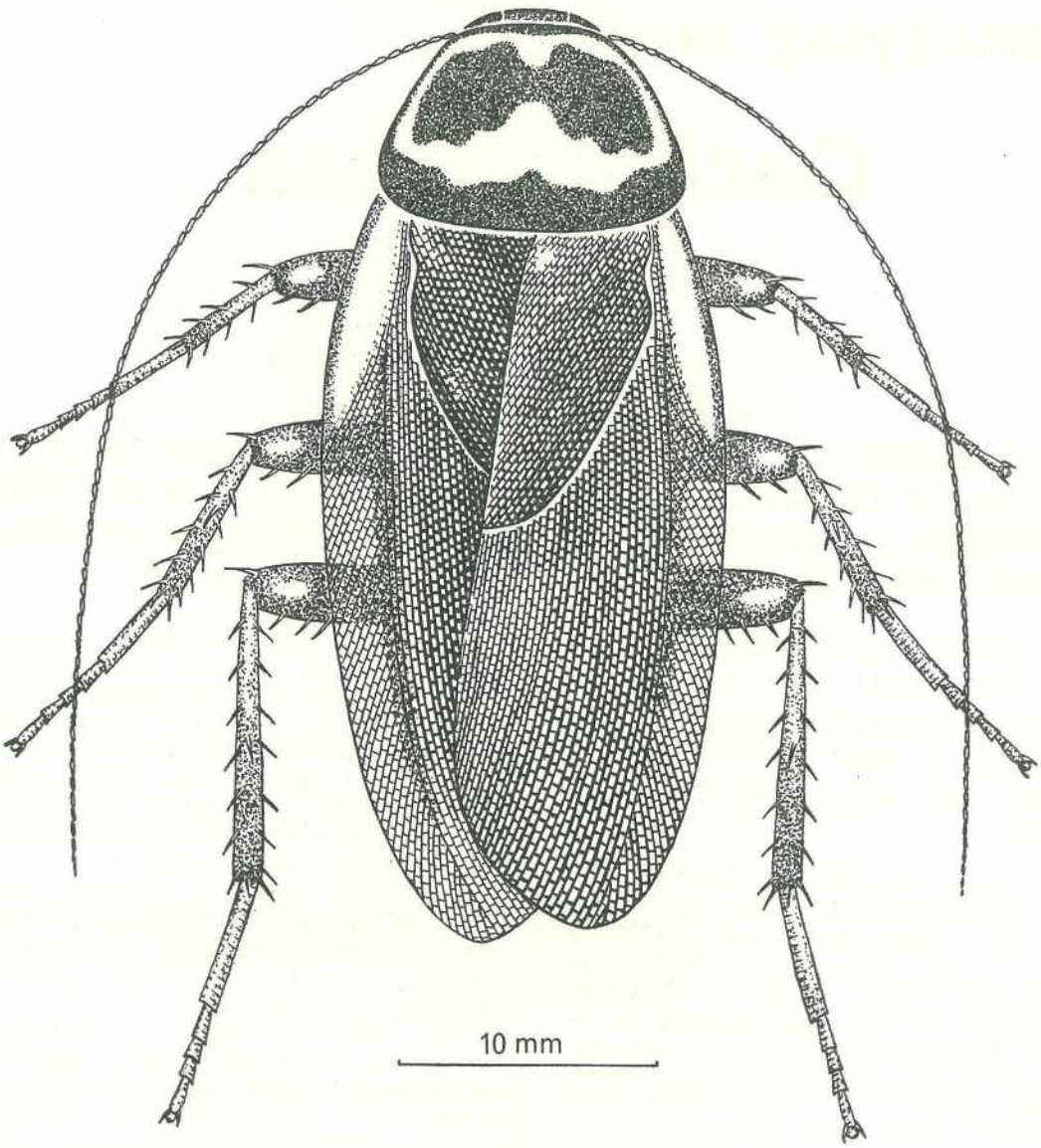
Most species of cockroaches are nocturnal, hiding during the day in cracks, crevices and under litter. They emerge only at night to forage for food. Cockroaches lay their eggs in a horny egg capsule or ootheca which may contain from 16 to 40 eggs depending on the species. This capsule may often be seen protuding from the extremity of the female abdomen, where it is carried before being abandoned in some warm sheltered situation.

When the young cockroaches or nymphs are ready to emerge the capsule splits along its dorsal ridge and pale, wingless miniatures of the adult emerge. As they grow the nymphs moult their skins until with the final moult they become the fully winged adult.

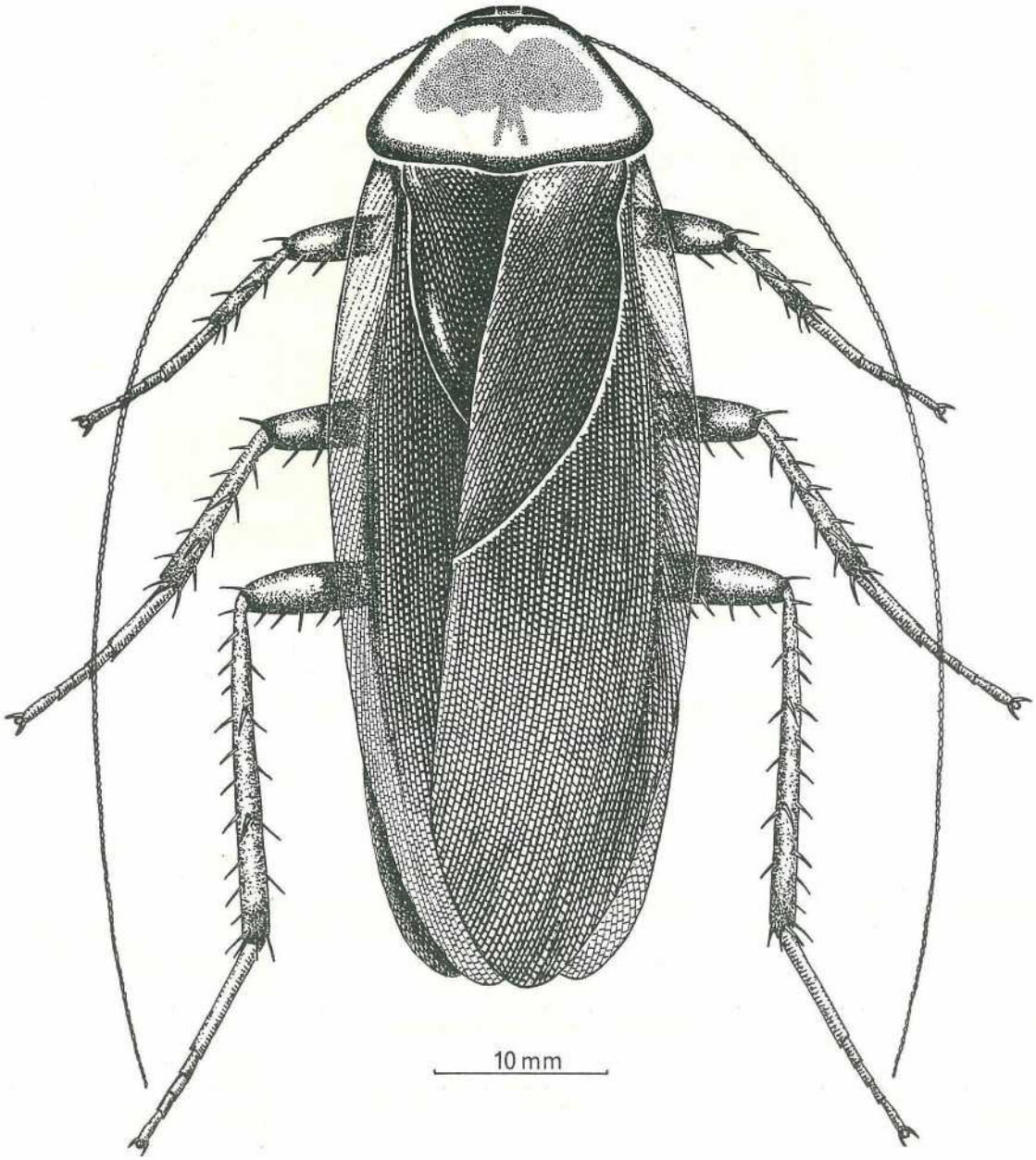
An adult cockroach has a flattened, oval shaped body with a small head that is bent under the body so that the chewing mouthparts project back between the forelegs. Directly behind the head is a large shield-like area known as the pronotum. The elongate forewings have been modified to form hardened wing covers or tegmina which overlay and protect the delicate membranous hind wings. The abdomen terminates in a pair of lateral, peg-like structures known as cerci.

There are four species of cockroach commonly found in homes in Queensland. They are the Australian cockroach (*Periplaneta australasiae* (Fabr.)), the American cockroach (*Periplaneta americana* (L.)), the German cockroach (*Blattella germanica* (L.)) and the brown-banded cockroach (*Supella supellectilium* (Serv.)). These insects contaminate food and leave a disagreeable odour wherever they crawl. Domestic cockroaches are general feeders, for in addition to most foods, they consume book bindings, stamps, paper and even starched clothing.

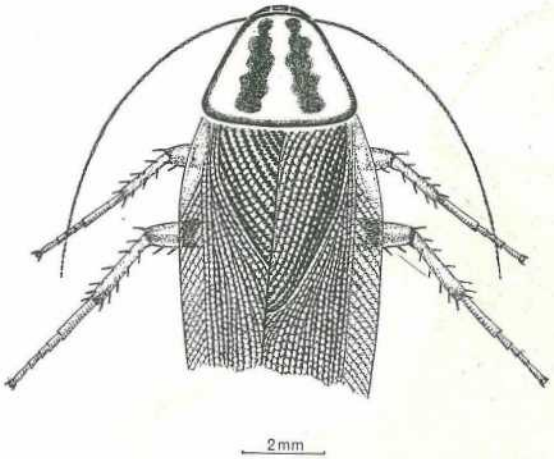
A fifth species of cockroach occasionally found breeding in birds' nests in homes is the speckled cockroach (*Nauphoeta cinerea* (Oliv.)). This species however is more usually associated with grain stores and fowl yards.



Adult, Australian cockroach Periplaneta australasiae *(Fabr.)*

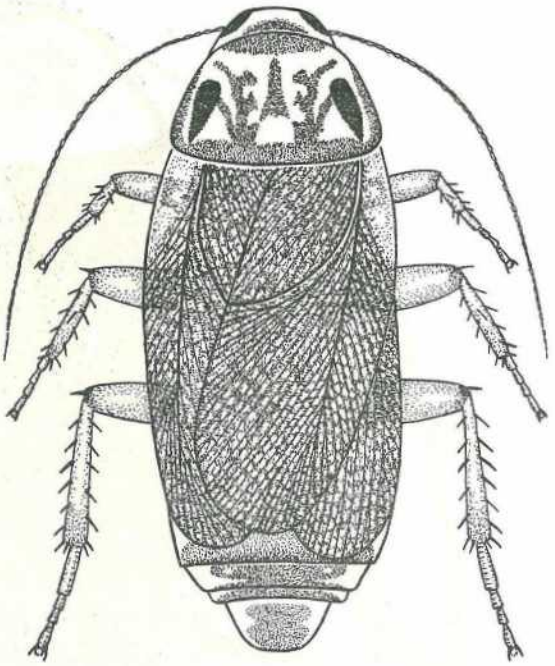


Adult, American cockroach Periplaneta americana *(L.)*



2mm

Adult, German cockroach Blatella germanica *(L.)*



Adult, Speckled cockroach Nauphoeta cinerea *(Oliv.)*

5mm

The following table lists characters which will distinguish the five species of cockroach found in Queensland homes.

Species	Length	Colour	
		Tegmina (Hardened wing cover)	Pronotum (Shield like area directly behind the head)
Australian cockroach .. .. (*Periplaneta australasiae* (Fabr.))	26–35 mm	Bright reddish brown with anterior edges streaked with yellow	Pale yellow with brown margins—posterior margin wider than the anterior margin. Two dark brown spots (often fused)
American cockroach .. .. (*Periplaneta americana* (L.))	31–42 mm	Bright reddish brown.. ..	As for Australian cockroach except markings not as distinct
German cockroach .. .. .. (*Blattella germanica* (L.))	14 mm	Dark yellow to light brown ..	Light brown—marked with two longitudinal dark brown stripes
Brown-banded cockroach .. .. (*Supella supellectilium* (Serv.))	12–13 mm	Yellow to yellowish brown with two incomplete transverse colourless bands near base	Light brown with transparent lateral and anterior edges—very narrow dark margin all round and a cental narrow yellow stripe
Speckled cockroach .. .. .. (*Nauphoeta cinerea* (Oliv.))	27–31 mm	Medium brown speckled with white	Medium brown with fawn lateral margins and two dark brown lateral stripes

Chemical Weed Control Guide

Summer crops—1975

J. E. RAWSON, J. M. T. MARLEY and S. R. WALSH
Agriculture Branch

THE following charts are a guide to the chemical control of weeds in summer crops.

Chemical weedkillers play a valuable part in weed control but for maximum effectiveness must be supported by sound cultural practices.

The same principles apply to weed control in summer crops as in winter crops that is, the choice of the most efficient chemical, timing of the spraying, rate and method of application and correct identification of the weed. Tolerance of summer crops to chemicals may vary with the stage of growth, therefore timing of spraying is important.

Some chemicals may be applied as either pre-emergence or post-emergence treatments, therefore care must be taken to follow the manufacturers' instructions printed on the label of the container.

Some subsequent crops may be affected by residues of a chemical applied to a previous crop. This must be considered in the choice of the chemical to be used.

When applying chemical weedkillers, producers should take care to avoid spray drift to adjacent crops that may be susceptible to these chemicals.

Because chemical costs change so frequently it has not been possible to give a cost per hectare of the various chemicals. Producers should check the prices before selecting chemicals from the chart; cost, efficiency and residual effects should be considered.

This guide is basic information only and further advice as related to your own farm needs should be obtained from your Agricultural Adviser. The adviser will also know the current prices of the various chemicals.

Attached to this guide is a list of common weeds and some general notes on the use of weedkillers. This should be read in conjunction with the charts for individual crops.

WEED CONTROL GUIDE

SORGHUM

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE—					
Atrazine	Several 80% products	Rates and method of application as on manufacturers' registered labels	Post-planting, pre-emergence or split application (pre and post-emergence) as on the label	Most annual grasses and broad-leaved species. (Urochloa may not be completely controlled)	Refer to manufacturers' label for rates of application for different soil types. Under furrow irrigated conditions a light incorporation is desirable There is a risk of damage to susceptible crops such as soybeans, sunflowers, cotton, navybeans and peanuts planted in rotation. Double dropped winter cereals and oil seeds may also be damaged. Refer to manufacturers' labels
Propachlor	Ramrod 65	6·70 kg	At planting	Most annual grasses, including Urochloa, and some broad-leaved weeds	Incorporation is not desirable. No residual problems
POST-EMERGENCE—					
50% 2,4–D Amine	Several 50% products	1 100 ml	Post-emergence when crop is 10 to 25 cm. high and secondary roots have developed	Most broad-leaved weeds	*Some crop injury may occur. Do not apply* from misting machines and boomless jet nozzles as uneven spray application and consequent crop damage may result; drift hazard is also accentuated. Some hybrids or varieties are more susceptible to 2,4–D than others

SORGHUM—continued

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
POST-EMERGENCE— continued					
Picloram + 2,4–D	Tordon 50D	1 400 ml	As for 2,4–D	Full season control of *Datura* spp. Most other broad-leaved weeds including annual ground cherry and mintweed are controlled	For uniformity of application and reduction of drift hazard best results with ground-operated boom sprays. DO NOT sow lucerne for 8 months, or sunflowers, soybeans, navybeans, cowpeas or cotton for 18 months after treatment. If row cultivated avoid " throwing in " soil
Atrazine	Several 80% products	2·80–4·20 kg	Post-emergence when weeds are in the 3 leaf stage or less. The sorghum plants must be at least 3 leaf stage	Most annual broad-leaved weeds and some annual grasses. Some annual broad-leaved weeds including mintweed and black pigweed may be controlled at lower rates	Weeds should be sprayed as young as possible. Wetting agent should be used at the rate of one part of 50% to 60% product to 500 parts of spray mixture. For chemical residual effects consult manufacturers' labels
Dicamba	Banvel 200	700–1 400 ml	Crop height to 30 cm, 10 to 25 days after emergence	*Amaranthus* spp., mintweed, nightshade	Refer to manufacturer's label

Weed Control Guide

MAIZE

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE—					
Atrazine	Several 80% products	2·80 kg to 4·20 kg	Post-planting, pre-emergence	Most annual grasses and broad-leaved weeds. (Urochloa may not be completely controlled)	Refer to manufacturer's label for rates of application for different soil types. Under dry land or furrow-irrigated conditions, a light incorporation is desirable There is a risk of damage to susceptible crops such as soybeans, sunflowers, cotton, navybeans and peanuts planted in the rotation. Double-cropped winter cereals and oilseeds may also be damaged. Refer to manufacturer's label On the Atherton Tableland best results are obtained from split application 1·4 kg/ha pre-emergence followed by 1·4 kg/ha post-emergence
Propachlor	Ramrod 65	6·70 kg	At planting	Most annual grasses, including Urochloa, and some broad-leaved weeds	Incorporation is not desirable. No residual problems
POST-EMERGENCE—					
50% 2,4-D Amine	Several 50% products	1 100 ml	Post-emergence when weeds are small and maize is approximately 10 to 30 cm. in height and the secondary roots have developed	Most broad-leaved weeds	Avoid drift to nearby susceptible crops

MAIZE—continued

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
POST-EMERGENCE— continued					
Picloram + 2,4–D	Tordon 50D	1 400 ml	As for 2,4–D	Full season control of *Datura* spp. Annual ground cherry and other broad-leaved weeds may also be controlled	For uniformity of application and reduction of drift hazard, best result when applied from ground-operated boom sprayers Avoid "throwing in" of soil during subsequent cultivations. Do not sow lucerne for at least 8 months, and sunflowers, soybeans, navybeans, cowpeas or cotton for 18 months after application
Atrazine	Several 80% products	2·8–4·2 kg	Post-emergence. Weeds small up to 3 leaf stage	Most annual broad-leaved weeds and some annual grasses. Urochloa may not be completely controlled. Mintweed may be controlled at lower rates	Wetting agent should be used at the rate of 1 part of 50% to 60% product to 500 parts of spray mixture

Weed Control Guide

COTTON

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE—PRE-PLANTING INCORPORATED—					
Trifluralin	Treflan 40%	1 400 ml–2 800 ml	May be applied from a number of weeks before, to immediately before planting	Most annual grasses and some broad-leaved weeds. Bell-vine, bladder ketmia, sesbania, thornapple, mintweed, Bathurst burr and Noogoora burr are not controlled	Thorough incorporation is essential. Refer to manufacturer's label for incorporation methods and for rates required on different soil types
Nitralin	Planavin 75	1·50 kg–2·20 kg	As for Treflan ..	As for Treflan ..	Thorough incorporation is essential. Refer to manufacturer's label
Dinitramine	Cobex ..	4 200 ml	As for Treflan ..	Many annual grasses and broad-leaved weeds	Refer to manufacturer's label
PRE-EMERGENCE—POST-PLANTING—					
Prometryne	Gesagard 50	2·20 kg–4·50 kg	Post-planting	Some annual grasses and broad-leaved weeds. 4·50 kg/ha required to control bell-vine, mintweed and sesbania pea	Light rain or irrigation following application may improve results. Heavy rain following application at the high rate may cause crop damage
Diuron	Several 80% products	1·10 kg–2·20 kg	Post-planting	As for prometryne but not as effective against bell-vine	As for prometryne

COTTON—continued

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE—POST-PLANTING—continued					
Fluometuron	Cotoran 80 WP	1·50 kg–3·0 kg	Post-planting	Similar to diuron; 3 kg/ha required for sesbania pea	As for prometryne. Cotton injury may occur on light soils
POST-EMERGENCE—					
Diuron	Several 80% products	0·60 kg–1·10 kg	Apply as a directed spray after cotton is 15 cm tall	Some annual broad-leaved weeds if treated when weeds are less than 8 cm tall	Add one part of 50%–60% non-ionic wetting agent to 250 parts of spray mixture. Total application of diuron for season should not exceed 4·5 kg per hectare
Fluometuron	Cotoran 80 WP	0·80 kg–1·70 kg	As for diuron	As for diuron	As for diuron
Prometryne	Gesagard 50	1·10 kg–2·20 kg	As for diuron	As for diuron	As for diuron. (In the Callide district it is more likely to cause crop damage than diuron or fluometuron).
MSMA	Daconate 8 Nocweed MSMA 50%	2 800 ml 4 300 ml	Apply as a directed spray after the cotton is 7·5 cm tall and before first bloom opens	Some annual grasses and broad-leaved weeds. Top kill of nutgrass and Johnson grass may be obtained. Bathurst burr and Noogoora burr seedlings also controlled	DO NOT apply after first bloom. The addition of wetting agent is not necessary

For specialised control—(Lay-by, spot spraying) and general weed control on headlands, refer to "Weed Control in Cotton" W. H. Hazard. Queensland Agricultural Journal August 1973.

Weed Control Guide

PEANUTS

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-PLANTING—PRE-EMERGENCE—					
Vernolate	Vernam ..	3 000 ml	Pre-planting, must be soil incorporated	Most annual grasses and some broad-leaved weeds. (Including "wandering Jew")	Refer to label for incorporation details. Use only on red soils
Trifluralin	Treflan ..	1 400–2 100 ml	Pre-planting, soil incorporated	Most annual grasses Some annual broad-leaved weeds	With winter cereals in a double crop situation there is a risk of crop damage from chemical residue. Barley is more tolerant than wheat, with oats the least tolerant. Must be incorporated in the soil. Refer to manufacturer's label for details
POST-PLANTING—PRE-EMERGENCE—					
Alachlor	Lasso 50%	4 500 ml	Apply immediately after sowing. Peanuts should be sown at least 5 cm deep	Some annual grasses and broad-leaved weeds	Soil surface should be dry to moist NOT wet. Incorporate immediately after planting. Avoid "throwing in" soil during inter-row cultivation. North Queensland only
50% 2,4-D Amine	Shirweed 50	4 500 ml	Apply at or immediately after planting	Many annual broad-leaf weeds and grasses, including thornapple, summer grass and Urochloa	DO NOT incorporate. May be applied as a band over the row. NOT recommended in North Queensland. Heavy rain after spraying can result in some crop damage

PEANUTS—continued

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
POST-PLANTING—POST-EMERGENCE—					
MCPB 40%	Tropotox ..	1 400–2 800 ml	After crop seedlings have emerged but before crop flowers	Most annual broad-leaved weed seedlings	Not more than 1 400 ml at or after the crop flowers. Some symptoms of crop injury may appear
2,4–DB 40%	Embutox Selectone	2 100 ml	As for MCPB ..	As for MCPB. Also controls spiny emex	
Dinoseb 20%	Agrico Daturan Nufarm DNBP	5 600–11 000 ml	Must be applied before weeds are 15–20 cm in height	Some annual broad-leaved weeds including *Datura* spp., bellvine, wild gooseberry, mintweed	Desiccant type chemical. Follow manufacturers' instructions regarding spray volumes and safety of operator

Weed Control Guide

LUCERNE

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE—					
Benfluralin	Balan ..	5 600–8 400 ml	Pre-planting, incorporated	Most annual grasses and some broad-leaved weeds	May be applied from a few weeks to immediately before planting. Refer to manufacturer's label for incorporation methods and rates of application for different soil types
Chlorthal-dimethyl	Dacthal W75	11·20 kg	Post-planting, pre-emergence	Most annual grasses and broad-leaved weeds	Apply soon after planting lucerne and before weeds germinate. Follow with an irrigation (12–25 mm). May also be applied to emerged lucerne before weed emergence
POST-EMERGENCE—					
Atrazine	Several 80% products	0·70 kg	Post-emergence. DO NOT spray lucerne stands under one year old	Mintweed seedlings ..	Will kill existing seedlings of mintweed and provide some residual control. Repeat spray during summer may be necessary. Slight leaf yellowing of the lucerne may result
40% 2,4–DB	Several 40% products	2 800–4 000 ml	See remarks	Many annual broad-leaved weeds	*Seedling lucerne* should be sprayed when seedlings have from 1 to 8 trifoliate leaves. *Established lucerne* should be either mown or grazed and sprayed when the re-growth is up to 10–12 cm high. Lucerne should not be mown or grazed for about a week after application

LUCERNE—continued

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
POST-EMERGENCE— continued					
2,2–DPA	Several products—mostly 74%	5·50 kg	Established lucerne ..	Most annual grasses and seedling perennial grasses. Established perennial grasses such as Rhodes grass if treatment is repeated	Add a 50%–60% non-ionic wetter in the proportion of 1 part wetter to 1 000 parts spray. Repeat spray applications as required during the months November to February. Do not exceed two applications in any one summer. Lucerne stands should be mown or grazed before spraying. Some suppression of lucerne growth may occur.
		1·10 kg	Seedling lucerne ..	Seedling grasses up to 7 cm tall in *seedling* lucerne	Do not spray earlier than 2 weeks after emergence of lucerne. Add wetting agent as above

Weed Control Guide

SOYBEANS

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE—					
Trifluralin	Treflan ..	1 400 ml on light soils, to 2 800 ml on heavy soils	Pre-planting	Most annual grasses and some broad-leaved weeds	Thorough incorporation essential, follow manufacturer's directions. Residue damage may occur in winter cereals in a double crop situation. Barley is more tolerant than wheat and oats is least tolerant of all. Refer to manufacturer's label
Chlorthal-dimethyl	Dacthal W75	6·70 kg on light soils to 11·2 kg for heavy soils	Post-planting pre-emergence	Similar to Treflan ..	May be applied as a band over the crop row at proportionately lower rates per hectare of crop
Linuron	Linuron 50 Afalon	2·20 kg to 5·60 kg	Post-planting pre-emergence	Similar to Treflan ..	Beans should be sown at least 2 to 3 cm deep. If heavy rain falls after application some crop damage may occur. Do not re-sow other crops for at least 3 months. The best rate on Atherton Tableland is 3·4 kg/ha
Chlorthal-dimethyl .. .. **Linuron Mixture**	Shamrox W.P.	8·00 kg on light soils to 13·00 kg on heavy soils	Post-planting pre-emergence	Similar to Treflan ..	May be applied as a band spray
POST-EMERGENCE ..			None commercially available		

MILLETS and PANICUMS

HERBICIDE rates in millilitres or kilograms per HECTARE

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE			No pre-emergence chemicals commercially available		
POST-EMERGENCE—50% 2,4–D Amine	Some 50% products	1 100 ml	When crop is stooling and secondary roots have developed	Most broad-leaved weeds	Avoid spray drift to neighbouring susceptible crops

NAVY BEANS

Herbicide	Trade Names	Rate of Application (product/hectare)	When Applied	Weeds Controlled	Remarks
PRE-EMERGENCE—Trifluralin	Treflan ..	1 400 ml on light soils to 2 800 ml on heavier soils	Preplanting	Most annual grasses and some broad-leaved weeds	Incorporation is essential, follow the manufacturer's recommendations. Refer to soybeans
Chlorthal-dimethyl	Dacthal W75	6·70 kg on light soils to 11·20 kg on heavy soils	Post-planting pre-emergence	Most annual grasses and some broad-leaved weeds	May be applied as a band over the crop row
POST-EMERGENCE ..			None commercially available		

GUIDE TO THE SUSCEPTIBILITY OF COMMON ANNUAL WEEDS TO HERBICIDES USED WITH SUMMER GRAIN AND OILSEED CROPS

Botanical Name	Common Name	Pre-Emergence				Pre- or Post-Emergence	Post-emergence except peanuts	Post-Emergence		
		Trifluralin Nitralin Benfluralin Dinitramine	Vernolate	Propachlor	Alachlor	Atrazine	2,4–D amine	Dinoseb	Tordon 50D	2,4–DB MCPB
Emex australis	Spiny emex	R	—	—	—	PS	I	—	S	S†
Trianthema portulacastrum	Black pigweed	S	—	—	PS	S	I	—	I	I
Portulaca oleracea	Pigweed	S	R	S	S	S	I	S	S	I
Chenopodium album	Fat hen	S	S	S	S	S	S	I	S	I
Amaranthus cruentus	Redshank	S	S	S	S	S	S	—	S	S
Amaranthus macrocarpus	Dwarf amaranth	S	R	R	S	S	S	S	S	PS
Amaranthus retroflexus	Redroot	S	PS	S	S	S	S	—	S	PS
Amaranthus viridis	Green amaranth	S	PS	S	S	S	S	—	S	S
Sesbania cannabina	Sesbania pea	R	—	—	—	S	S	—	S	PR
Tribulus terrestris	Caltrop	I	R	R	R	S	I	S	I	—
Anoda cristata	Anoda weed	R	—	—	R	PS	—	—	—	—
Hibiscus trionum	Bladder ketmia	R	—	—	PR	S	I	S	I	—
Ipomoea plebeia	Bell-vine	R	R	—	R	S	S	S	S	S
Ipomoea purpurea	Morning glory	R	—	—	R	S	PS	PS	S	S
Salvia reflexa	Mintweed	R	PS	PS	S	S	I	S	S	R
Datura ferox	Fierce thornapple	R	PS	R	R	S	I	S	S	I†
Datura stramonium	Common thornapple	R	PS	R	R	S	I	S	S	I†
Nicandra physalodes	Apple-of-Peru, wild hops	R	—	S	S	S	S	S	I	S
Physalis angulata	Annual ground cherry	R	—	R	R	S	R	PS	S	R
Physalis minima	Wild gooseberry	R	—	R	S	S	R	S	PS	R
Acanthospermum hispidum	Star burr	R	—	S	—	S	S	S	—	S
Bidens pilosa	Cobbler's pegs	R	—	S	R	S	I	S	S	I
Galinsoga parviflora	Yellow weed	R	—	S	S	S	S	—	S	I
Tagetes minuta	Stinking Roger	R	—	—	S	S	S	—	S	S
Xanthium pungens	Noogoora burr	R	—	PR	R	S	S	—	S	S

Botanical Name	Common Name	Pre-Emergence				Pre- or Post-Emergence	Post-emergence except peanuts	Post-Emergence		
		Trifluralin Nitralin Benfluralin Dinitramine	Vernolate	Propachlor	Alachlor	Atrazine	2,4–D amine	Dinoseb	Tordon 50D	2,4–DB MCPB
Xanthium spinosum ..	Bathurst burr	R	—	PR	—	S	S	—	S	PS
Cenchrus echinatus ..	Mossman River grass	S	—	—	S	I	R	R	R	R
Digitaria adscendens ..	Summer grass ..	S	S	S	S	S	R*	R	R	R
Digitaria sanguinalis ..	Summer grass ..	S	S	S	PS	S	R*	R	R	R
Echinochloa colonum ..	Awnless barnyard grass	S	I	S	S	S	R*	R	R	R
Echinochloa crus-galli ..	Barnyard grass ..	S	I	S	S	S	R*	R	R	R
Eleusine indica	Crowsfoot grass ..	S	S	S	S	S	R*	R	R	R
Eragrostis cilianensis ..	Stink grass	S	PS	S	PS	S	R*	R	R	R
Themeda quadrivalvis ..	Grader grass	S	—	—	—	—	R	R	R	R
Urochloa panicoides ..	Urochloa grass ..	S	PS	S	S	R	R*	R	R	R

* These weeds are susceptible to 2,4–D as a pre-emergence treatment only (peanuts).

† Susceptible to 2,4–DB only.

S = Susceptible

R = Resistant

I = Intermediate (moderately susceptible)

— = Not known

PS = Probably susceptible

PR = Probably resistant

Susceptibilities are for the generally recommended rates of application and for post-emergence herbicides weeds should be young and growing vigorously.

Compiled by J. E. Rawson, Department of Primary Industries, Gatton Research Station in consultation with other Departmental Weeds Agronomists—March 1975.

IMPORTANT INFORMATION

1. Read and understand the manufacturers' instructions printed on labels of containers before opening containers, mixing chemicals and spraying crops.

2. Surfactants (wetters) are added when required at the rate of 1 part of 50% to 60% product to 500 parts of spray mixture in most chemicals (see remarks). Non-ionic types of surfactants are normally recommended for use with agricultural sprays. Do not add surfactants unless specifically recommended.

3. The ester formulations of 2,4-D are NOT generally recommended and must NOT be used in declared hazardous areas.

4. Sprays should be thoroughly mixed before applying.

5. When wettable powders are being applied mechanical or good by-pass agitation is necessary.

6. Misting machines and boomless jet nozzles are NOT recommended.

7. A number of summer crops (cotton, sunflowers, soybean, navybeans, lucerne) and many horticultural crops are highly susceptible to hormone type weedkillers—*avoid spray drift.*

8. Check growth stage of the crop before applying chemicals.

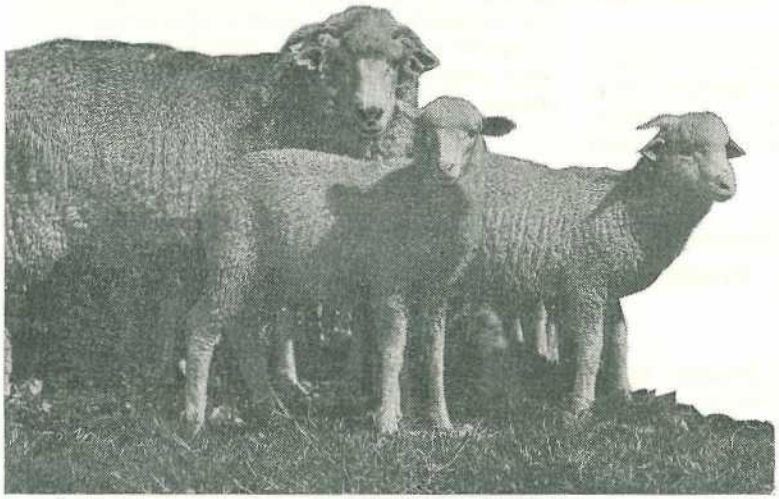
9. Comparison chart—

Millilitres/hectare	Pints/acre
700	$\frac{1}{2}$
1 100	$\frac{4}{5}$
1 400	1
2 100	$1\frac{1}{2}$
2 800	2
3 000	$2\frac{1}{10}$
4 200	3
4 500	$3\frac{1}{8}$
5 600	4
8 400	6

Kilograms/hectare	lb/acre
570 grams	$\frac{1}{2}$ lb
700 grams	10 ozs
840 grams	$\frac{3}{4}$ lb
1·1 kg	1 lb
1·5	$1\frac{1}{3}$
1·68	$1\frac{1}{2}$
2·24	2
2·8	$2\frac{1}{2}$
3·0	$2\frac{5}{8}$
4·2	$3\frac{3}{4}$
5·6	5
6·7	6
8·0	$7\frac{1}{8}$
11·2	10
12·0	$10\frac{3}{4}$

IODINE

Supplementation could mean better lambs



AN examination of blood samples from ewes in some areas of Queensland indicates that they could benefit from iodine supplementation. Animals need sufficient iodine for maximum production of meat, milk, and wool. Because these form the basis of animal industry, experiments were conducted at "Toorak" Sheep Field Research Station at Julia Creek to investigate possible economic advantages of iodine supplementation.

by G. KNIGHTS
and P. HOPKINS
Toorak Sheep Field
Research Station
Julia Creek

IODINE affects the animal by helping the thyroid gland produce maximum amounts of a hormone called thyroxine. This hormone is essential for the normal body processes associated with animal production.

In the "Toorak" experiments an iodine supplement was used since it is more economic to prompt an animal to make its own thyroxine than to administer thyroxine itself.

"Toorak" experiments were designed to study the effects of iodine supplementation to sheep on both high and low planes of nutrition. This was done because varying planes of nutrition are normally encountered in Queensland's sheep flocks.

How Iodine Supplementation Influences Sheep Production

Wool production

The development of wool follicles is an important phase of a lamb's overall development. This occurs during that period just before and just after birth. Any adverse effects on the lamb's development during this period can reduce wool production during that animal's lifetime. For sheep to reach their full genetic wool growing potential all follicles must contain a wool fibre.

We already know that this potential is extremely high in the Merino and we also know that if we repeatedly inject thyroxine into the developing lamb before birth we can make the lamb realize this potential. In these experiments iodine was administered to pregnant and lactating ewes to boost wool follicle development in the offspring and thereby maximize fleece density. Obviously, any change produced by this treatment would increase the wool production of these offspring throughout their entire lifetime.

Milk production

Thyroxine has a very strong action in producing milk. If milk production could be maintained at a high level by iodine supplementation then increased lamb survival or growth rate or both should result.

Meat production

Laboratory tests have shown that administering thyroxine influences carcase production in much the same way as it influences wool growth potential. So observations on the growth rate and carcase composition of lambs were included in these experiments.

The "Toorak" Experiments

One hundred mature Merino ewes were divided into 2 groups and grazed in suitable grassed paddocks to receive a high or low plane of nutrition from 90 to 110 days pregnancy. They were then further divided into four equal groups of 25, allocated to large pens and fed as follows:—

Group 1—high plane of nutrition plus iodine.

Group 2—high plane of nutrition.

Group 3—low plane of nutrition plus iodine.

Group 4—low plane of nutrition.

Groups receiving the high plane of nutrition were allowed to feed at will on a diet of good quality lucerne hay. Groups receiving the low plane of nutrition were fed a restricted intake of lucerne hay to maintain body weights at 30–35 kg. Ewes received their iodine supplementation from 120 days of pregnancy until their lambs were approximately 3 months of age. The iodine supplement used was potassium iodine and this was dissolved in water and given as a drench twice weekly.

During the course of these studies each treated animal received ½ gram, that is, approximately 1/50th of an ounce of iodine. Drenching would not be practical for most producers, but for this trial work it was desirable. In further studies a suitable form of supplement in drinking water, in salt licks, or in an injectable form will be used.

Effect on liveweight of ewes

The liveweights and feed intake of the pregnant sheep are shown in Figure 1. At the time of lambing the ewes in the high plane of nutrition groups weighed approximately 45 kg and were in forward store condition. Their counterparts in the low plane of nutrition groups weighed approximately 35 kg and were in poor condition.

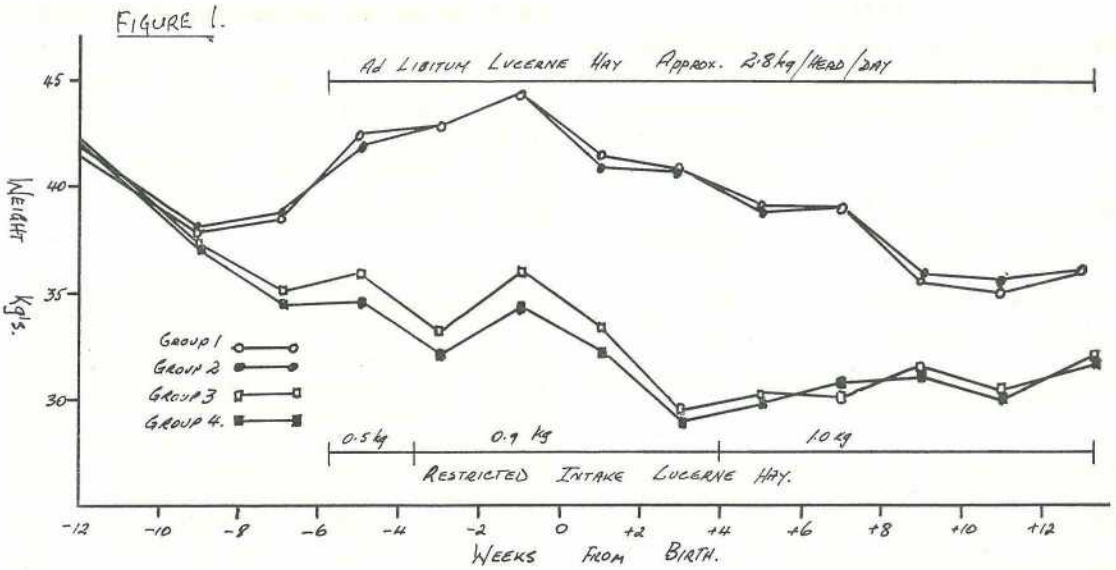


TABLE 1

THE INFLUENCE OF IODINE SUPPLEMENTATION TO PREGNANT AND LACTATING EWES ON LAMB BIRTH WEIGHT AND SURVIVAL

Treatment		Lamb Birth Weight	Lamb Mortalities†
		(kg)	
High Plane of Nutrition	Group 1*	4·2	0%
	Group 2	3·9	0%
Low Plane of Nutrition	Group 3*	3·6	16%
	Group 4	3·4	36%

* Iodine supplemented groups.
† Lamb mortalities resulting from starvation.

Iodine supplemented ewes which received the restricted intake were slightly heavier than the non supplemented ewes during the latter part of pregnancy. No differences were observed in the groups receiving an unrestricted intake.

Effect on lamb size and survival

Table 1 shows the birth weights of the lambs and deaths due to starvation. The birth weight differences although small were slightly in favour of the groups receiving iodine. While lamb deaths were 36% in the restricted intake group not receiving iodine, only 16% died in the restricted intake groups receiving iodine. Iodine supplementation apparently stimulated milk production and so increased lamb survival even though the ewes were in poor condition. There were no lamb deaths due to starvation in the unrestricted intake groups.

Effect on lamb growth rates

Figure 2 provides further evidence that the treatment was increasing milk production. Lambs born to iodine supplemented ewes had a much faster rate of growth than those born to unsupplemented ewes. This was apparent in both high and low intake groups. In fact, by 90 days of age, lambs in the low plane iodine treated group weighed 3 kg (6·6 lb) more than the untreated lambs. Similarly, animals in the high plane iodine treated group weighed 2·2 kg (4·8 lb) more than their untreated counterparts.

Effect on wool development

Table 2 shows the average greasy fleece weights of the lambs at 7 months of age. These indicate that iodine supplementation could have an effect on wool production. Examinations of sections of skin will have to be undertaken to determine whether the slight increase was

TABLE 2

THE INFLUENCE OF IODINE SUPPLEMENTATION TO PREGNANT AND LACTATING EWES ON THE WOOL PRODUCTION OF THEIR OFFSPRING

Treatment		Average Greasy Fleece Weight at 7 Months
		(kg)
High Plane of Nutrition	Group 1*	3·3
	Group 2	3·1
Low Plane of Nutrition	Group 3*	2·3
	Group 4	2·2

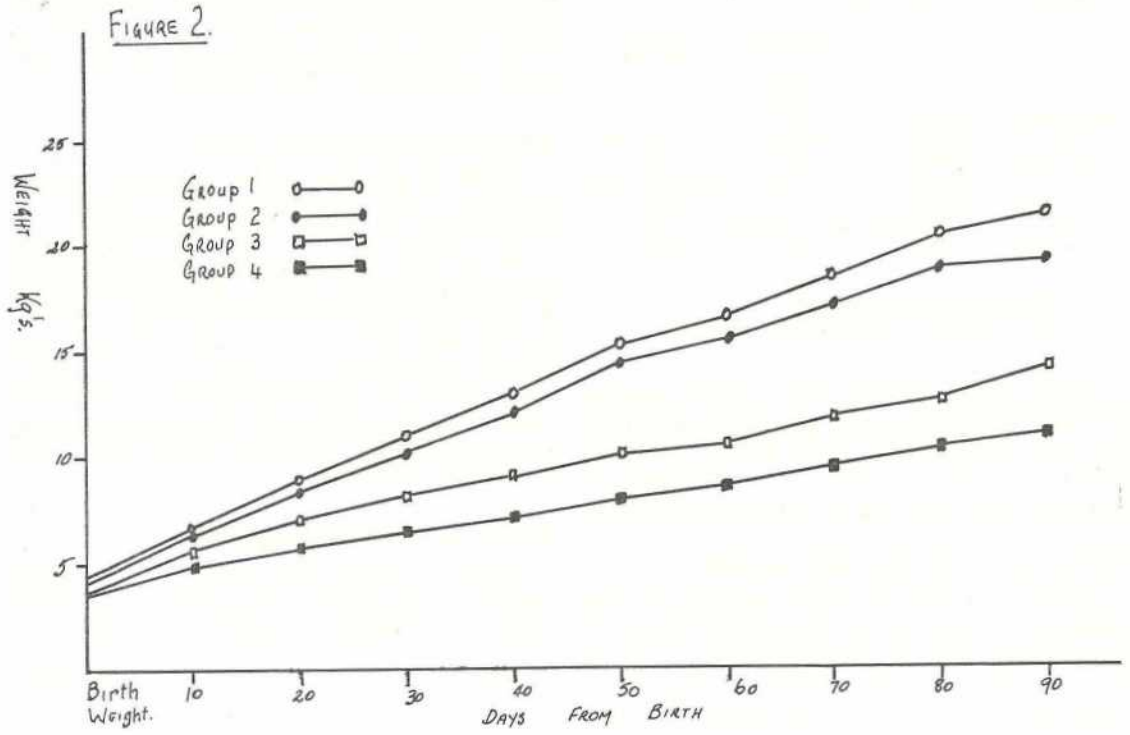
* Iodine supplemented groups.

brought about by an increase in fibre density or fibre length. Follow up observations at subsequent shearings will have to be undertaken to assess the magnitude of any long term effects on wool production.

Effect on carcase composition of the lambs

Carcase composition studies were undertaken on 6 lambs from each group when these animals reached 14 weeks of age. Although the lambs in the iodine supplemented groups did not contain a higher proportion of fat in their carcase, they were considerably heavier than the non-supplemented lambs.

A survey conducted in the southern sheep raising areas of Queensland showed that lactating ewes in the Charleville, Roma, Goondiwindi and Warwick districts had low thyroxine levels. This suggests iodine supplementation may be of benefit in these areas. The survey will be extended to include the Central and North West regions in the near future. These experiments undertaken at "Toorak" suggest that sheep producers in these regions may also benefit from the use of iodine supplementation.



Cost

The cost of the iodine supplementation used in the four month period of these studies was less than one cent per sheep.

Further Work

Results of this work, together with the evidence of low thyroxine levels, provides strong circumstantial evidence that ewes in a number of regions in Queensland will show a production response to iodine supplementation. The low cost of supplementation and likely economic responses warrant an increasing emphasis on this work and a number of studies are in progress or are being planned for "Toorak" and other sites in Queensland. These include:—

(1) Work at "Toorak" on suitable forms of supplement and the mechanics of supplementation under the different systems of production prevailing in Queensland. Methods examined will be supplementing in drinking water, licks or as an injectable compound.

(2) Work at "Toorak" to confirm the responses found in the initial experiment under both pen and grazing conditions and continued monitoring of lambs through life to see if the initial advantage persists.

(3) Experiments and demonstrations with co-operating graziers in some of the areas where low thyroxine levels have been found in sheep. Graziers who are interested in determining the effect of iodine supplementation in their flock should contact their nearest Sheep and Wool Adviser so that a trial to compare supplemented and non-supplemented can be set up.

(4) Studies on thyroxine levels in lactating dairy and beef cattle are also in progress.

ADVANTAGES

The advantages of iodine supplementation to pregnant and lactating ewes are:—

(i) increased lamb survival in cases where ewes are in poor condition at lambing.

(ii) possible increased wool production of lambs.

(iii) increased lamb growth rates and saleable meat.

(iv) subsequent benefits arising from the increased lamb growth rates (e.g., time of first lambing, etc.).

CHANGING YOUR ADDRESS?

Please let us know as soon as possible if you intend changing your address.

Because the addressed wrappers and journals are printed separately, changes cannot take effect until the next batch of wrappers is printed.

This means that, in some cases, subscribers will receive the next issue at their old address.

If possible, two months notice should be given to ensure your journal is sent to the correct address.

Lucerne pest control at a glance

Entomology Branch Officers

THE following tabulation summarizes the recommended insecticides for pest controls in lucerne in Queensland. Chemicals should not automatically be applied to lucerne even when pest numbers are obviously high. Management, particularly early cutting, may offer a more economic approach to minimizing losses. Further details when required should be sought from extension officers of the Department.

Pest	Description of Pest	Damage to Crop	Control Pesticide dosage Rates are active constituent	Notes
Cutworms .. .. .. *Agrotis* spp.	Larvae—grey-green to dirty dark brown, soft bodied, up to 35 mm long	Larvae chew through stems of seedlings and mature plants, thinning stands and causing defoliation	Trichlorphon 550 g/ha	Occasional pest only
Lucerne leaf roller .. .. *Merophyas divulsana*	Larvae—translucent green with black heads, sheltering in leaf rolls. Moths—light yellow with irregular dark markings on forewings	Larvae web terminal leaves together, sheltering within and feeding on the leaves	Carbaryl 850 g/ha	A pest of spring and summer but occasional infestations occur during autumn. Early cutting of infested crops may be used as an alternative to chemical control
Lucerne jassids .. .. *Austroasca* spp.	Adults—small green to greenish-yellow, sap-sucking insects, up to 3 mm long. Nymphs similar but wingless	All stages suck the sap from leaves, sometimes causing a white stippling. Leaves may yellow and fall and plants may be stunted	Dimethoate 150 g/ha Carbaryl 850 g/ha	Control necessary only when extremely large populations cause obvious yellowing, most likely in rain-grown crops. Regular mowing normally controls populations
Native budworm .. .. *Heliothis punctigera*	Larvae—pale green to dark brown with longitudinal stripes of different shades up to 35 mm long. Moths—stout-bodied, wings-spread of 35 mm. Forewings reddish-pink and hindwings creamy yellow with large, marginal smokey area	Larvae cause defoliation by feeding directly on lucerne leaves and terminals	Carbaryl 1 100 g/ha	Heavy infestations rarely persist in lucerne due to disease epidemics

Lucerne crown borers .. *Zygrita diva* *Corrhenes stigmatica*	Adults—*Zygrita*—medium sized beetles, 10–15 mm long, with long antennae, orange with two black spots on elytra *Corrhenes*—similar but colour is a mottled grey Larvae—yellow, legless with large brown head	Larvae tunnel in stems and may cause death of plants	Not available ..	As infestations usually occur in older weakened stands, ploughing out and replanting is advised
Lucerne blue butterfly .. *Lampides boeticus*	Adults—small smokey-blue butterflies which fly actively over the crop during the day Larvae—green, slug-like	Larvae feed on foliage ..	Not recommended ..	Populations rarely warrant control
Red spider or two-spotted mite *Tetranychus urticae*	About 0·25 mm long with four pairs of legs and colour varying from shades of brown to green and red	Mites extract sap from the leaves which will gradually turn yellow	Not recommended ..	Occasionally important in rain-grown crops only. Early cutting or grazing is recommended

QUANTITY OF INSECTICIDE TO OBTAIN RECOMMENDED DOSAGES

Insecticide	Strength of Product	Quantity per hectare	
		Active Constituent	Product
Carbaryl	80% Wettable Powder	850 g 1 100 g	1 050 g 1 375 g
Dimethoate	30% Emulsifiable Concentrate	150 ml	500 ml
	40% Emulsifiable Concentrate	150 ml	375 ml
Trichlorphon	80% Wettable Powder	550 g	700 g
	60% Emulsifiable Concentrate	550 ml	920 ml

Withholding Periods

An important consideration in the correct usage of any insecticide is the observance of the withholding period. In the context of lucerne it is the shortest interval between application at the rate recommended and grazing or cutting for feeding to livestock needed for the residue of the spray to diminish to an acceptable level.

Withholding periods for the insecticides as listed above are:—

Trichlorphon	2 days
Carbaryl	1 day
Dimethoate	7 days

Report on Boar Performance

May, 1975

THE following boars were approved during May, 1975. Average boars score 50 points for Economy and 50 points for Carcass. Point scores can be compared only with those of boars of the same breed.

Large White Boars

Breeder	Ear Number	Q.A.R. Number	Points Score		
			Economy of Production	Carcass Quality	Total
N. J. Cotter, P.O. Box 23, Goomeri, 4601	Sire: Sedgenhoe Field Marshall 2 Dam: Olaroy Pride 310				
	306	686	75	34	109
	307	687	85	51	136

Landrace Boars

J. A. & M. A. Clegg, Karooma Stud, Box 148, Mundubbera, 4626	Sire: Rondel Sinatra 5408 Dam: Tarua Alison 371				
	248	684	87	25	112
	249	685	85	42	127

June, 1975

THE following boars were approved during June, 1975. Average boars score 50 points for Economy and 50 points for Carcass.

Large White Boars

Breeder	Ear Number	Q.A.R. Number	Points Score		
			Ecomony of Production	Carcass Quality	Total
K. N. Mathiesen, Naiken Stud, P.O. Box 138, Gayndah, 4625	Sire: Naiken Field Marshall 337 Dam: Maiken Jewel 187				
	919	688	50	65	115
	920	689	58	61	119

MAIZE VARIETAL RECOMMENDATIONS for 1975-76 season

MAIZE varieties recommended for planting in the 1975–76 season are on pages 428 to 430.

The varieties have not been ranked in order of preference. Those listed "for trial" should only be sown in limited areas to evaluate their performance.

Complied by
S. R. WALSH,
Agriculture Branch.

Plant Populations

The planting rate will be governed by environment, soil moisture, soil type, planting time, and whether irrigated or raingrown; the rate should be varied according to the conditions. A 10% loss in field establishment can normally be expected.

Maize seed sold by the major seed companies is of high quality and is required to have a minimum laboratory germination of 90%.

Seed is available commercially in a range of shapes and sizes. Selection from this range can be made to suit the type of planting machinery being used.

The size usually ranges between 2 600 to 4 500 seeds per kg.

APPROXIMATE PLANTING RATE KILOGRAMS PER HECTARE FOR A GIVEN PLANT POPULATION

Plants/ha	Seed/kg ha			
	Seed Size (Seeds/kg)			
	2 500	3 000	3 500	4 000
15 000	6·5	5·5	4·75	4·0
20 000	9·0	7·5	6·0	5·5
30 000	13·0	11·0	9·5	8·0
50 000	22·0	18·5	15·8	14·0
60 000	26·0	22·0	19·0	16·5

Most commercial seed companies mark on the container the seed count per kilogram.

Disease

The main diseases affecting maize are leaf blight, head smut and maize dwarf mosaic.

Common Leaf Blight

The fungus *Drechslera turcica* produces grey or light-brown large spindle-shaped leaf spots commonly up to 15 x 2 cm in size. A description and colour plate of this disease appeared in the August 1974 edition of the *Queensland Agricultural Journal*. Late maturing varieties have effective blight resistance. These include the QK, PQ and GH varieties. Early maturing varieties with good resistance to the disease are Q 739, XL 389, XL 81 and DK 805A.

Maydis Leaf Blight

The incidence of maydis leaf blight (*Drechslera maydis*) was extremely low throughout south Queensland during the 1974–75 season due to the almost exclusive use of seed with N cytoplasm. Race O of the pathogen, which attacks varieties with N cytoplasm, is restricted to North Queensland.

Head Smut

In North Queensland and certain areas of the South Burnett district, head smut caused by *Sphacelotheca reiliana* is prevalent. Grain yields may be seriously reduced in crops with a heavy infection because the grain is replaced by a mass of fungal spores.

Seed treatments may destroy externally borne spores on the seed but will not protect a crop against infection from smut in infected soil.

Varieties least susceptible to this disease are XL 81, XL 389, Q 692, Q 739, Q 1280 and GH 128.

Maize dwarf mosaic

This disease has been troublesome in many South Queensland maize crops during recent years. Maize dwarf mosaic is caused by infection with the Johnson grass strain of sugarcane mosaic virus which is transmitted by aphids.

Infected plants of susceptible hybrids show conspicuous stripes or mosaic and ringspot patterns. Severe stunting may result, particularly when plants are infected early. The virus is maintained between seasons in Johnson grass and stand-over fodder sorghum.

Disease control cannot be effectively achieved with insecticides and Johnson grass cannot be economically eradicated in all situations. Control of the disease is achieved by sowing resistant hybrids. Recommended hybrids with resistance to maize dwarf mosaic are listed below:

HIGHLY RESISTANT—Q 692, Q 739, QK 217, QK 231, GH 128, Q 1280.

MODERATELY RESISTANT—Q 23, GH 390, PQ 500, XL 306, XL 81, XL 389.

Maturity

Varieties may vary in maturity depending on the environment in which they are sown.

The recommendations are basic information only and further details should be sought from your local Agricultural Extension Officer.

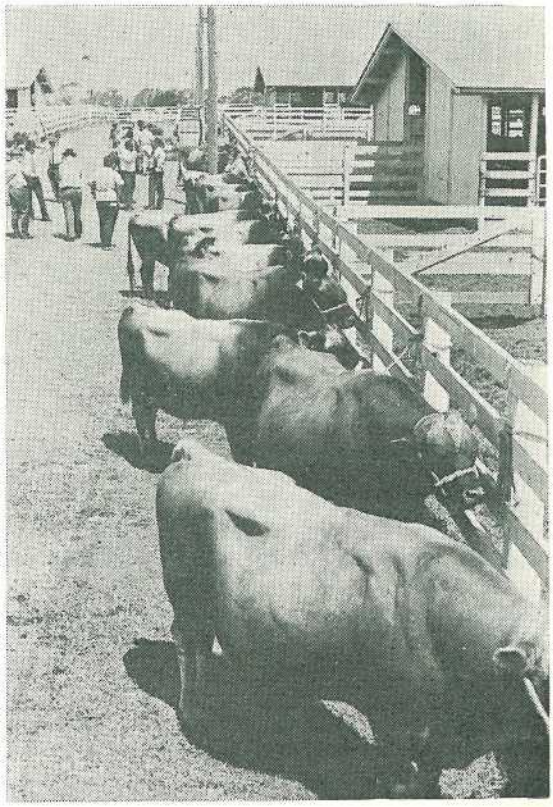
MAIZE RECOMMENDATIONS 1975–76

REGION (DISTRICT OR SHIRES)	PLANTING TIME	VARIETIES L = Slow maturing ML = Medium slow M = Mid season ME = Medium to early maturing E = Early maturing	PLANTING RATE (plants/hectare)
Far North Queensland—			
Mareeba, Cooktown, Peninsula	Dec.–Jan.	M QK 217, QK 231	35 000
Atherton Tableland	Dec.–mid Feb.	M QK 217, QK 231, QK 487 (QK 487 for severe head smut areas)	35 000
North Queensland—		IRRIGATED	
Townsville, Ayr, Millaroo, Bowen	Mar.–July	ML XL 389 M XL 81, DK 805A	XL 389, 70 000 Others 60 000
Capricornia—			
Central Coast—			
Rockhampton, Dalma and Boyne Valley	Dec.–Jan.	L Q 692, Q 23, GH 128, Q 1280 M PQ 500 ME Q 739	20 000–25 000
Callide–Dawson—			
Biloela, Theodore, Moura, Baralaba, Goovigen, Bauhinia, Wowan	End Dec.–end Jan.	L Q 692, Q 1280, GH 128	20 000–30 000
		For trial L GH 390, XL 389 M XL 81	
	Early Feb.	M Q 739	
Burnett—			
North Burnett—			
Monto–Eidsvold	Mid Nov.–early Jan.	L Q 1280, GH 128, GH 390 ME DK 805A, XL 81, Q 739	18 000–30 000
		For trial L XL 389	
Central Burnett—			
Gayndah, Biggenden, Mundubbera	Mid Nov.–early Jan.	L Q 1280, GH 128, GH 390 ME XL 81, Q 739	18 000–30 000
		For trial M XL 389	
Coastal Burnett—			
Bundaberg, Maryborough	Late Aug.–early Jan.	L Q 1280, GH 128, Q 23, GH 390, GH 134 M DK 805A	
		For trial M XL 81 L XL 389	
South Burnett—			
Kingaroy, Nanango, Goomeri, Murgon, North Rosalie	Mid Nov.–mid Dec.	L Q 1280, GH 128, GH 390 M XL 81, Q 739	22 000–30 000 27 000–30 000
Near North Coast—			RAINGROWN
Gympie, Cooroy, Kilkivan, Eumundi, Pomona	Nov.–Jan.	L XL 389, GH 390	30 000
		M XL 81	IRRIGATED 50 000

REGION (DISTRICT OR SHIRES)	PLANTING TIME	VARIETIES L = Slow maturing ML = Medium slow M = Mid season ME = Medium to early maturing E = Early maturing	PLANTING RATE (plants/hectare)
West Moreton—			
Lockyer, Beaudesert, Brisbane, Fassifern Valleys	Sep.–Dec.	L Q 692, Q 23, Q 1280 GH 128, PQ 500, GH 390	RAINGROWN 25 000–40 000
		ME Q 739, XL 81	IRRIGATED 50 000
Darling Downs—			
Northern Downs—			
Chinchilla, Wambo	Sep.–Nov.	L Q 692 M XL 81, PQ 500 ME Q 739, XT 664 E XL 306	15 000–25 000
	Oct.–Dec.	M XL 81, PQ 500 ME Q 739, XT 664 E XL 306	15 000–25 000
Central Downs—			
Jondaryan, Pittsworth, Rosalie (South), Crows Nest, Millmerran (east of Condamine River)	Oct.–Dec.	ML XL 389 M XL 81, PQ 500 ME Q 739, XT 664 E XL 306 *For trial* M RX 404	20 000–30 000
Central Downs—			
Millmerran (west of Condamine River)	Oct.–Dec.	L Q 692 M XL 81, PQ 500 ME Q 739, XT 664 E XL 306 (Late varieties October)	15 000–25 000
Southern Downs—			
Clifton, Cambooya, Allora, Glengallan, Rosenthal	Oct.–Dec.	ML XL 389 M XL 81, PQ 500 ME Q 739 E XL 306 *For trial* M RX 404	20 000–25 000
Stanthorpe	Nov.–Dec.	M DK 805A	20 000–30 000 Heavier rates on eastern section
All Districts	Oct.–Dec.	IRRIGATED L Q 692 ML XL 389 M XL 81, PQ 500 ME Q 739	50 000–60 000

Artificial Breeding...

a special feature



prepared by officers of the Department of Primary Industries

ARTIFICIAL breeding is playing an increasingly important part in the development of Queensland's cattle industries. This feature looks at some of the work done by farmers working in co-operation with the Department's Artificial Breeding Centre at Wacol—work that is paying dividends in improved herd quality and production.

Guide to artificial breeding

Artificial insemination is the physical act of using instruments to inject semen into the reproductive tract to induce conception. In other words, artificial insemination is a means whereby cows may conceive without physical contact with a bull.

The technique reputedly dates back to the 14th century but has been used in Queensland only since the late 1950's.

A world wide survey taken in 1970 showed that artificial breeding was being used in 39 countries and that some 48 million cows had been inseminated that year. The major users showed an increase of 30% over the number of cows inseminated in 1960.

Country	Total Number of A.I. Cows
U.S.A.	8 580 000
France	7 310 000
Poland	4 740 000
West Germany	3 780 000
Great Britain (MMB)	2 240 000
Czechoslovakia	1 870 000
Japan	1 820 000
Rumania	1 630 000
Denmark	1 390 000
Netherlands	1 320 000

WHY A.B.?

Herd Improvement

Production recording and the use of genetically superior sires are recognised as the most effective tools for long term herd improvement. While the two techniques must be seen as being complementary, production recording can be readily implemented. However, the reliable identification of sires which can transmit genetic characteristics of breed and economic importance is beyond the resources of most dairymen.

The great advantage of artificial breeding is that it facilitates progeny testing programmes. Teams of bulls can be used to produce daughters on a large number of farms with a range of environmental conditions and husbandry practices. The performance of the daughters can be used to select the sire which will improve production.

Wide Use of Superior Sires

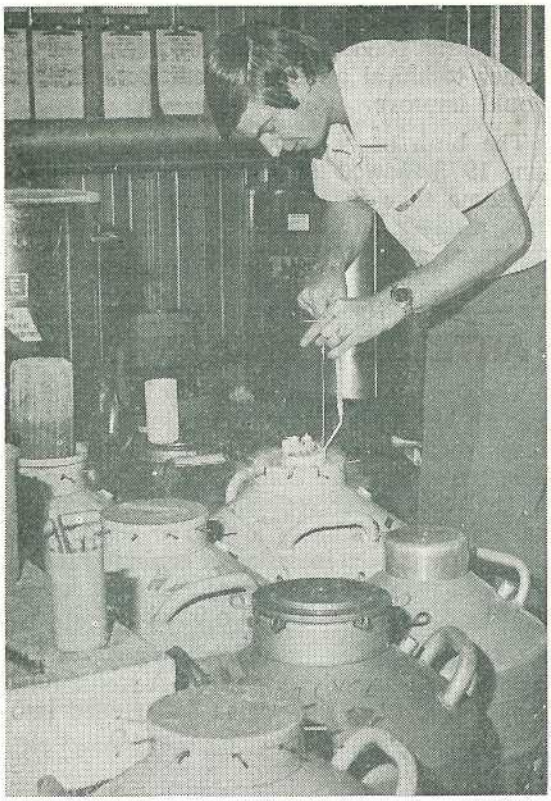
While a bull may produce several hundred calves by natural service, the same animal used for artificial breeding can sire several hundred thousand. Reliable identification and optimal utilization of superior sires are the keys to herd improvement.

Disease Control

One of the main reasons for introducing A.B. into Queensland was to help in the control of reproductive diseases, particularly the venereal diseases, vibriosis and trichomoniasis. Preventing the introduction of exotic diseases is now of great importance. Since 1969 semen has been imported from overseas permitting the introduction of new breeds and bloodlines without the risk associated with the introduction of live animals.

Insurance

Many breeding programmes have been disrupted because of the premature death or loss of fertility of a bull. Should some disability prevent mating, semen can be collected to ensure continuation of the programme by artificial breeding. The livestock owner can have semen collected from bulls on his property or he may send them to licensed or unlicensed semen production centres. Modern processing techniques ensure that the semen of most bulls can be stored for several years.



Unpacking a consignment of semen which has arrived from the United Kingdom.

Improved Husbandry

Artificial breeding can eliminate the need to maintain bulls, and so reduce the risk to the safety of farm personnel and damage to equipment and facilities. The feeding and maintenance of bulls can be costly. By using A.B. this expenditure can be diverted to the cows. For an artificial breeding programme to work efficiently, permanent identification of cows and accurate breeding records are essential. A consequence of this is that herd fertility problems can be identified much more quickly and easily.

Crossbreeding

Most A.B. centres can offer semen from a range of selected and performance or progeny tested sires representing 8 dairy and 22 beef breeds. The livestock owner can select the superior bulls best suited to his environment or he may choose to evaluate several breeds at the same time without the expense and management problems associated with maintaining separate herds.

A.B. IN QUEENSLAND

In 1955, the Queensland Department of Agriculture and Stock began a progeny testing scheme with chilled liquid semen from Jersey bulls at the Husbandry Research Farm, Rocklea. By 1961 there were three artificial breeding co-operatives operating in the State. Today, eighty licensed semen distribution centres and some three hundred qualified inseminators serve the livestock industries.

Emphasis has swung from progeny testing and disease control in dairy herds to a balanced herd improvement approach in both the beef and dairy industries. The introduction of Charolais and other exotic semen in 1969 heralded a new era for artificial breeding in the State. The location of beef properties resulted in livestock owners having to conduct their own artificial breeding programmes. A number of private inseminator training schools were established and management techniques were modified to suit Queensland conditions. With constantly rising costs, the age of "Do it Yourself" artificial breeding has arrived and an increasing number of property owners are inseminating their own stock.

Changes in the organization and administration of artificial breeding have been matched by rapid technological progress. It is only twenty years since bovine semen was first frozen successfully. Since then inseminators have used a number of packaging methods including glass ampoules and "straws" of different dimensions. The refrigerant first used for freezing semen was alcohol and dry ice which gave a temperature of $-79°C$. Liquid nitrogen is used exclusively today giving long term storage at a temperature of $-196°C$.

THE FUTURE

A commercial dairyman running 130 surplus grade Friesian breeders decides to take advantage of a particular demand for exotic breeds of cattle. After consultation with his herd improvement adviser he decides to implement an artificial breeding programme which will

produce fifty pure bred Meuse-Rhine-Issel bull calves and one hundred pure bred Marchigiana heifers.

After the usual pre-programme preparation, the cows are treated with compounds to synchronize their breeding cycles. The inseminator arrives several days later and implants single male Meuse-Rhine-Issel embryos in each of sixty Friesian cows and two female Marchigiana embryos in each of the remaining cows. Blood samples taken four weeks later indicate that fifty-five of the male and one hundred and ten female embryos have implanted successfully.

Then, 260 days later, the cows are split into five groups and treated with other drugs so that equal numbers will calve daily over the next five days. The programme produces 52 pure bred M.R.I. bulls and 105 pure bred Marchigiana heifers most of which are twins. There are no calving losses because the synchronized calving has permitted close supervision of the cows.

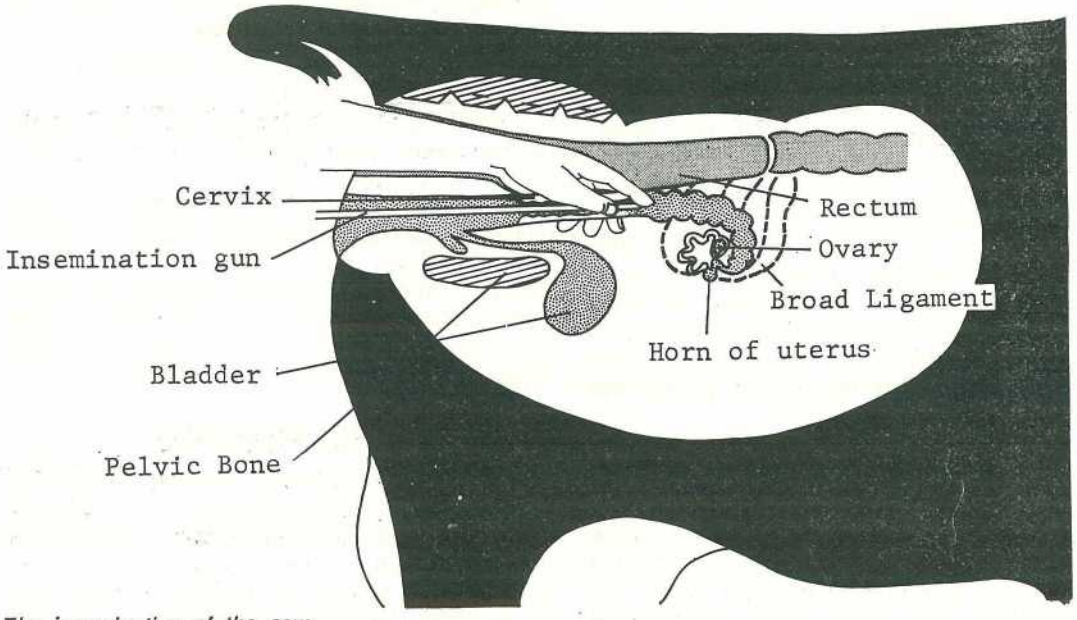
This example may appear futuristic but in fact most of the procedures are already in use to a limited extent. The results are not always particularly good and costs are high, but as further technical advances occur both factors should improve.

The birth of "Frosty II" at Cambridge in June 1973 showed that embryos can be stored for some time in the deep frozen state and still produce a normal calf after being implanted into a foster mother.

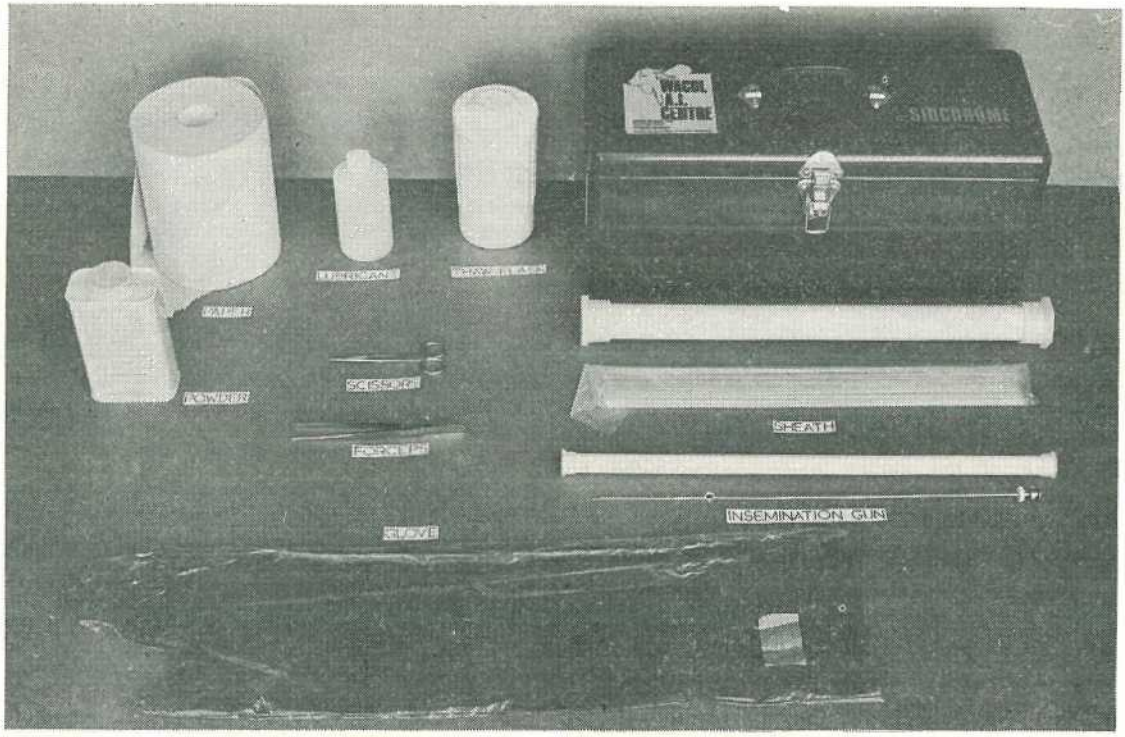
ARTIFICIAL INSEMINATION

The first attempts at artificially inseminating animals involved placing semen in the vagina. Fertility was usually low unless very large doses of semen were used. Some improvements were realized with the introduction of the speculum method. By introducing a glass or plastic tube into the vagina the inseminator could locate the mouth of the cervix and place a dose of semen into the cervical canal with a fine bore pipette.

Conception rates are much better when the recto-cervical technique is used. A sterile tube is passed through the vagina and guided into



The insemination of the cow.



The inseminator's kit.

the cervix by a gloved hand in the animal's rectum. Some skill is required but this method does permit accurate deposition of a small dose of semen in the uterus.

THE INSEMINATOR'S EQUIPMENT

In addition to the inseminator's semen storage container, several other items of equipment are used in artificial breeding. Most inseminators use rubber or plastic disposable gloves to reduce the risk of transferring infections from one cow to another. The glove also protects the inseminator from infectious organisms.

The disposable sterile plastic sheath which fits over the insemination gun and straw ensures that the equipment does not become contaminated and also prevents cross-infection between cows.

THE PREPARATION OF FROZEN SEMEN

Collection

The aim in semen collection is to get the largest possible volume of good quality semen in the shortest possible time. Procedures are designed to minimize stress factors which can reduce semen viability.

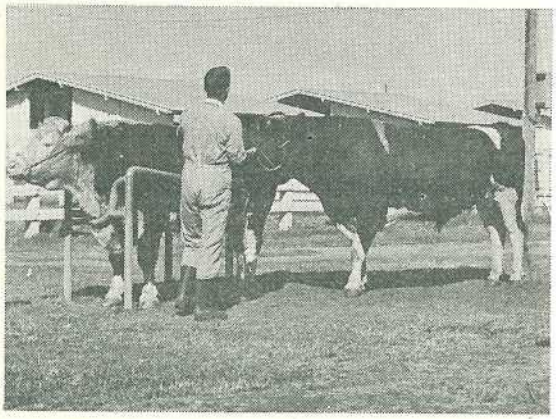
Two collection methods are used routinely at production centres:

- **The Artificial Vagina**
- **Electroejaculation**

The artificial vagina (A.V.) employs stimulation by temperature, pressure and friction to obtain an ejaculate when the donor bull mounts a decoy or teaser animal.

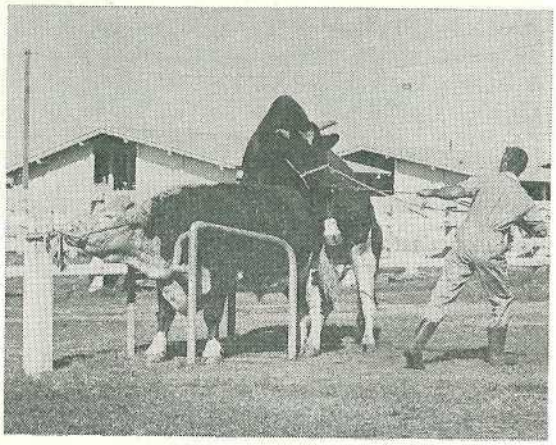
For consistent results, a preparation and collection routine must be established.

Washing the underline before collection to reduce the risk of the semen being contaminated by harmful organisms.

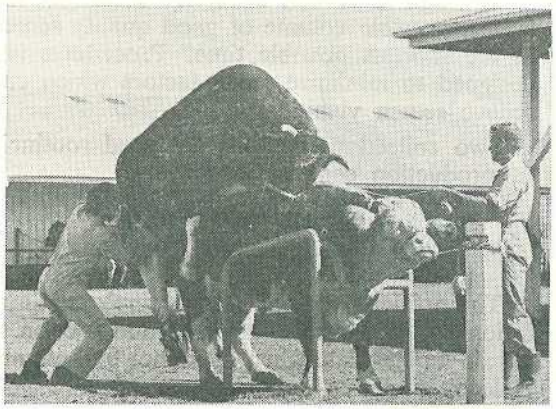


Pre-collection stimulation using a tethered steer as a teaser.

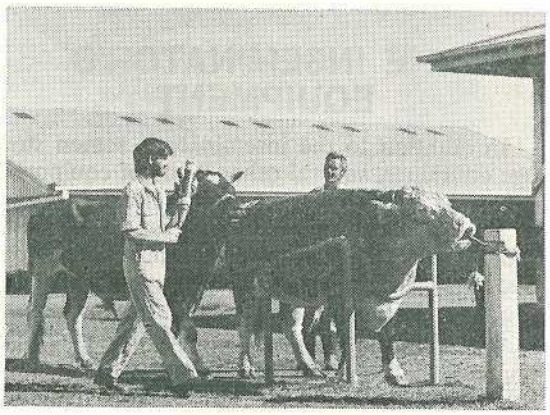
Preparation of the A.V.



False mount to increase stimulation.



Collection by deflecting the bull's penis into the artificial vagina.



Semen taken into the laboratory for evaluation.

Bulls are worked according to the demand for their semen. Popular sires may be collected twice weekly producing a total of four ejaculates. An average mature bull should produce about 25 000 doses of semen a year if worked at this rate. A dose of semen is the quantity required to perfom one insemination.

Where bulls are unable to mount because of injury or some other factor, semen may be collected by "Electroejaculation". In this method, the release of semen is stimulated by passing a fluctuating current between two electrodes on a probe placed in the bull's rectum.

Processing

To produce conception through artificial insemination, about 10 million actively moving spermatozoa must be placed at the correct site in the reproductive tract of a cow which is at the correct stage of the breeding cycle.

The aim when producing a dose of frozen semen is to ensure that the required number of spermatozoa are revived when the dose is removed from liquid nitrogen and thawed to body temperature.

Processing includes:

evaluation
dilution
cooling
packing
freezing
evaluation
storing

How is semen evaluated?

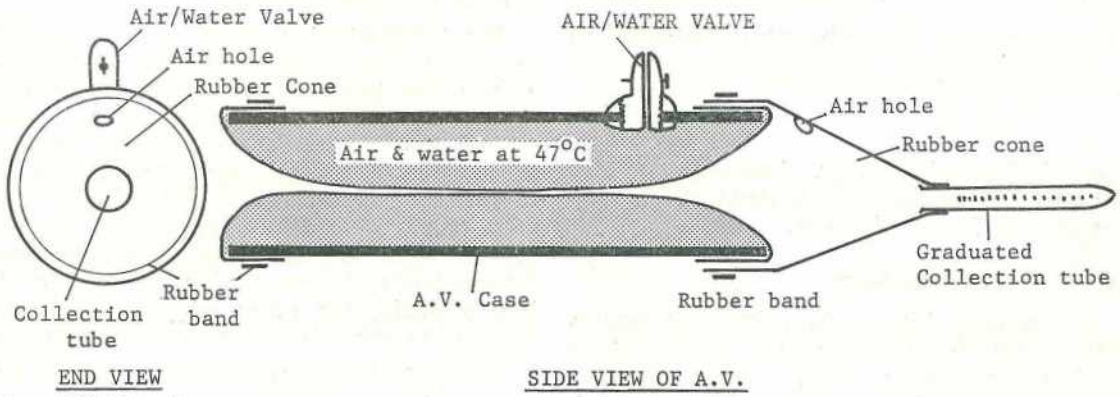
After examining a drop of raw semen under low power on a microscope to obtain an estimate of the concentration and activity, samples are taken for detailed assessment. One drop is placed in a test tube with a special stain to determine the percentage of the spermatozoa which were alive and of normal conformation at the time of collection. Another drop is used to count the number of sperm per millilitre of the raw semen, this is done by using a spectrophotometer to measure the amount of light passing through a sample of semen diluted at a particular rate. By multiplying the volume of the ejaculate by the concentration and the percentage of live sperm, the total number of live sperm in the ejaculate can be determined.

Why is the ejaculate diluted?

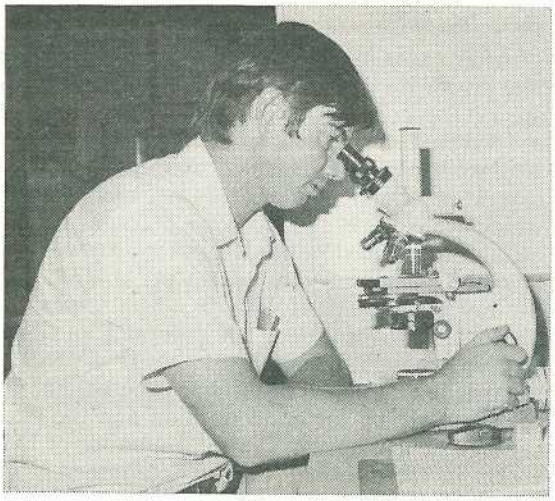
An average ejaculate may contain 5 000 000 000 sperm in 5 millilitres of raw semen.

By natural service this could only produce one calf. By diluting the ejaculate with a specially formulated solution, the raw semen can be stretched out to give 200 individual 0·25 millilitre doses each containing 25 million live sperm. While only ten million sperm are required for conception, double this number are placed in the straw to allow for losses during freezing.

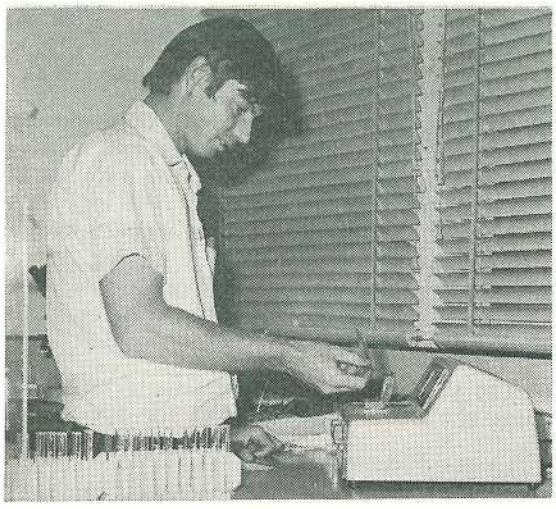
The solution used to dilute the semen contains chemicals which protect the sperm and



The artificial vagina.



Examining semen quality by observing a sample under a magnification of 800.



The concentration of the ejaculate is measured with a spectrophotometer. An average sample may have 1 000 million sperm per millilitre.

provide them with energy. Antibiotics are also included to destroy any bacteria which may be present in the ejaculate.

How is semen packed?

More than 160 artificial breeding centres throughout the world use the Cassou Straw system for packing semen. Glass ampoules were used originally and are still popular in some countries. The evolution of the "Straw" concept has been a gradual one. Before 1965, a 1·2 ml straw which was frozen in carbon dioxide was in limited use. The medium straw with a volume of 0·5 ml was introduced in 1965, to be replaced with the "mini-straw" in 1969.

The mini straw is a polyvinyl chloride tube 133 mm long with a diameter of 2 mm and a volume of 0·25 ml. It is plugged at one end with a sealing powder which is retained between two cotton plugs. By applying a vacuum to the plugged end of the straw, semen can be drawn into contact with the sealing powder. As soon as the powder becomes wet it turns into a gel to provide a very effective seal. The open end can be sealed using the same type of powder.

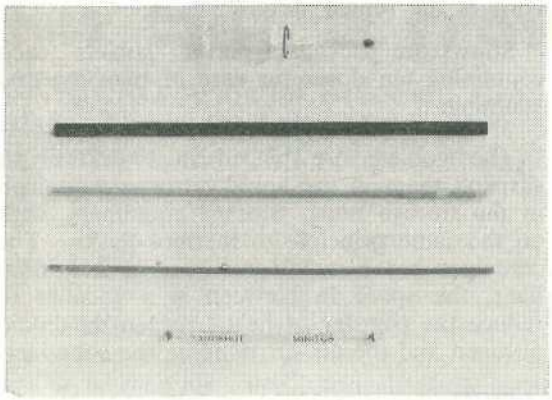
Why freeze the semen?

At body temperature sperm swim about very rapidly and exhaust their energy reserves after a relatively short time. With any chemical reaction, the rate of reaction depends on the temperature at which the process is taking place. If the temperature is reduced, the rate of reaction is also reduced. Cooling semen to about freezing point slows the sperm down and extends their life for several days if they are protected by suitable chemicals. By cooling further, activity can be virtually stopped to give the sperm an indefinite life. Some of the sperm will be killed in the freezing process but if processed correctly, most will be revived on thawing.

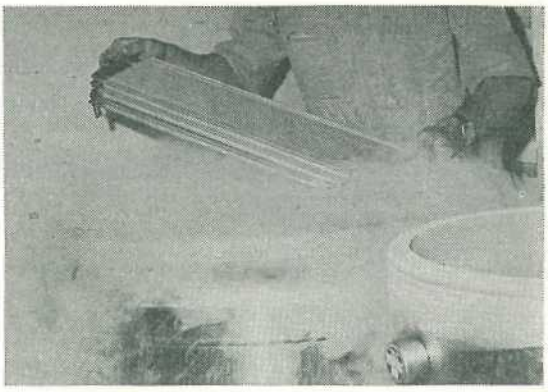
How is the Semen Frozen?

The temperature at which semen must be held if it is to retain the ability to fertilize is far colder than the temperatures maintained in domestic deep freeze refrigerators. The critical temperature is 70°C below freezing point. Liquid nitrogen has a temperature of —196°C or in other words the liquid boils at a temperature 196°C below the freezing point of water. Liquid nitrogen is manufactured by cooling and compressing air to turn it into a liquid, the other gases can then be removed to give relatively pure liquid nitrogen.

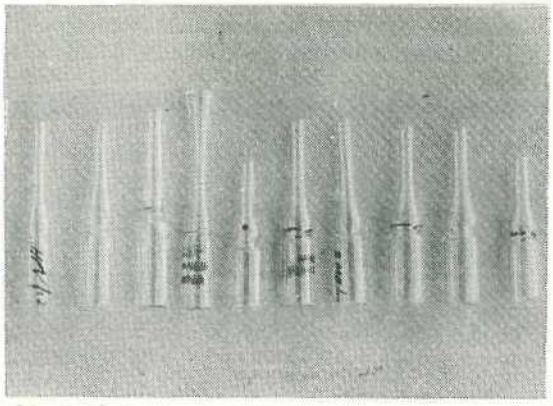
Straws are frozen by suspending them in the vapour from liquid nitrogen.



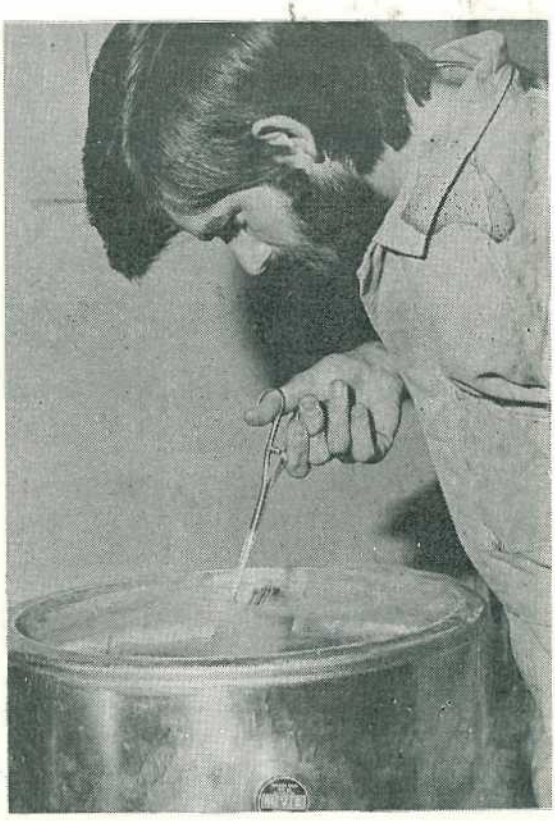
From top: 0·7 ml ampoule, 1·2 ml straw, 0·5 ml straw, 0·25 ml straw (mini) 0·3 ml Landschutt mini tube.



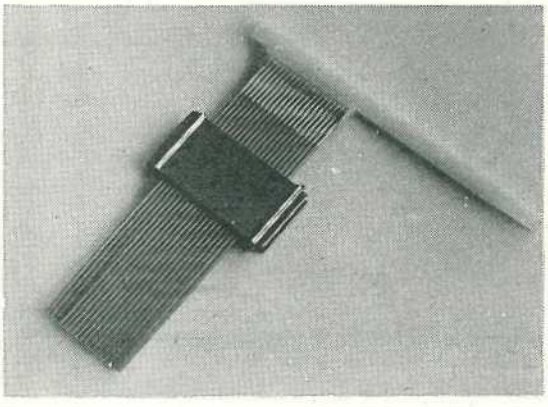
Technician lowering freezing rack into the unit.



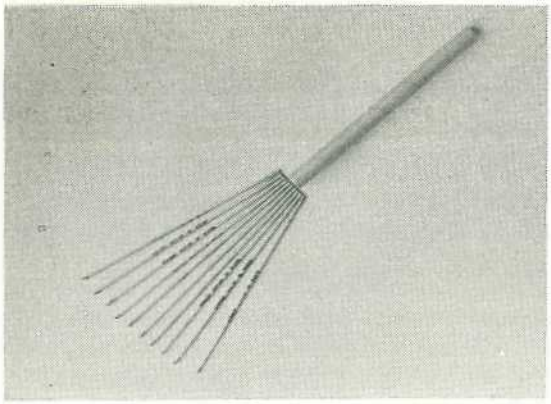
Range of glass ampoules.



Once they have been frozen, the straws are maintained in liquid nitrogen.



Vacuum comb attached to a clip of 20 mini straws.



Straws are packed in plastic "goblets" for ease of handling and counting.

How is the semen stored?

Straws are packed in plastic "goblets" each containing ten doses for ease of handling and counting.

The goblets are placed in "buckets" to suspend them in the liquid nitrogen contained in the storage unit. Storage containers work on the same principle as thermos flasks. The container has a metal outer casing and inner liner, the space in between is a vacuum to reduce the transfer of heat between the liquid nitrogen and the air surrounding the container.

There are a number of different types of container on the market. They vary in the amount of liquid nitrogen held, the capacity for storing semen and the rate at which liquid nitrogen is lost. Some models can hold semen safely for four months between refills of refrigerant.

The large storage tanks each hold 250 litres of liquid nitrogen and can accommodate up to 80 000 doses of frozen semen.

His tally is growing . . .

DAYBORO Artificial Breeding Group, one of the oldest and largest in the state, has been operating since 1961. The Manager of this group's operations, Mr. Cliff Wilding, though not the oldest technician in the state, is certainly the most practised.

Cliff can claim to have inseminated more cows than any other technician in Queensland—and his tally is still growing. Trained originally in Britain in 1949, Cliff has inseminated over 50 000 cows since coming to Queensland, all of them in the Dayboro area.

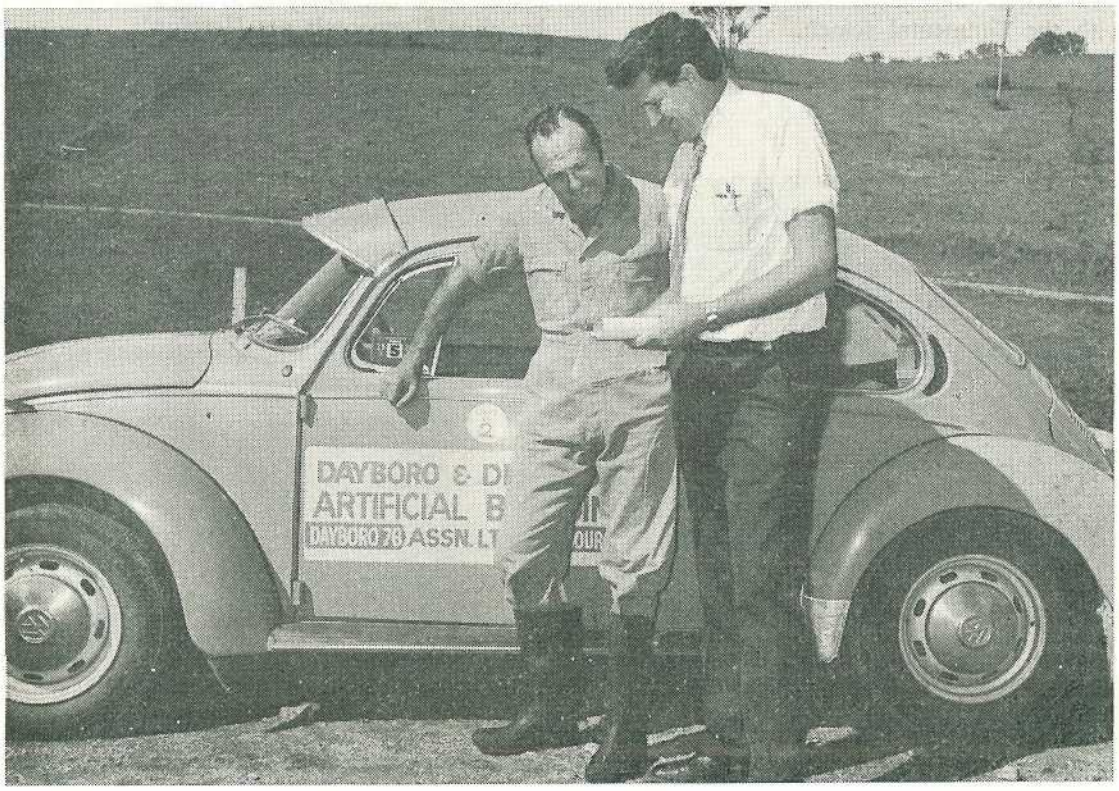
His interest in Artificial Breeding is such that it does not stop with inseminating cows. By visiting as many as possible of the Artificial Breeding Centres in Australia each year, Cliff is able to keep his group informed of the qualities of bulls available.

Overseas bulls are assessed on brochure information and much solid enquiry. Advice such as this to the group's clients is, in Mr. Wilding's opinion, part of the job.

Asked for advice to give a new inseminator, Cliff will invariably reply "There aren't any short-cuts to successful insemination, only practice, attention to detail, and a genuine liking for stock will turn an inseminator into an A.B. Technician".

Being a successful A.B. Technician is Mr. Cliff Wilding's proudest boast. After 50 000 cows he should have earned that right.

Mr. Cliff Wilding, and Mr. Gordon McCormack of the Wacol Centre discuss semen availability. Dayboro A.B. Group obtains a large proportion of its semen requirements from Wacol Sires.



From A.I.S. to Simmentals

AN interesting grading up programme has been started by Mr. Keith Batts, "Belle Villa", Kilkivan, using Simmental semen on A.I.S. base cows.

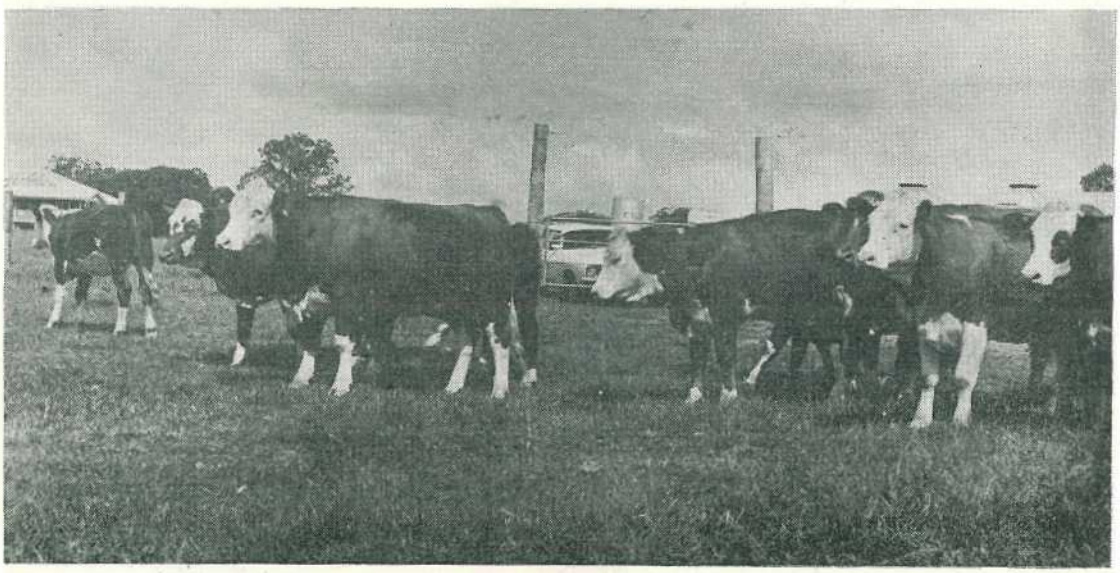
Mr. Batts, a dairyman for many years, gained his original interest in the Simmental breed after his brother had returned from Europe with glowing reports of the Simmental cattle. Already considering the change from dairying to beef production, Mr. Batts decided to undertake the Simmental programme.

Fifty doses of semen were ordered from the first shipment of semen to arrive in Australia and insemination of his A.I.S. herd commenced. By way of a small experiment, Mr. Batts also purchased six purebred Poll Hereford heifers and these too were inseminated with the Simmental semen.

Initially no scope existed for bull selection so semen from all bulls available was used. As semen became available from a greater number of bulls, Mr. Batts concentrated on selecting bulls with full eye pigmentation. Little attention has been paid to calving ease with bulls used on the A.I.S. cows, though Mr. Batts feels that some care may be needed in selecting bulls to use on Poll Herefords.

The first eighty-eight cows inseminated with Simmental semen calved without one cow needing assistance. Mr. Batts has had only two dead calves in 190 births.

From his own experience, and from knowledge gained in discussion with other breeders, Mr. Batts has concluded that the A.I.S. cow is the ideal base cow from which to breed Simmentals. He has found that calves from A.I.S. cows are heavier boned, have shorter hair covering, and heavier birth weights than calves from Hereford cows. The absence of a white face on some of the Simmental–A.I.S. calves does not worry him. As he says, he is breeding Simmentals not Herefords.



At Kilkivan, Simmental semen is being used in a grading up program on A.I.S. based cows.

The average recorded birth weights of calves from the Poll Herefords and A.I.S. are as follows:—

Simmental–A.I.S.—average birth weight: 37·6 kg.

Simmental–Poll Hereford—average birth weight: 32·6 kg.

The progeny of A.I.S. cows also grow faster and were 34 kg heavier at weaning age. This factor Mr. Batts attributes to the heavier milk supply of the A.I.S. dams.

Having settled on the A.I.S. cow as the ideal base dam, Mr. Batts has negotiated a contract with another A.I.S. breeder in the district to contract mate Simmental semen on more A.I.S. cows. This will provide additional first-cross heifers for the programme and will allow Mr. Batts to increase his selection intensity in the first generation. As soon as sufficient first generation females are available, the A.I.S. base cows will be phased out. The first cross females calved in April.

Mr. Batts has some sound advice for those breeders intending to commence such programmes.

"Select big-framed base cows, select Simmental bulls on their merit, not their price, and pay careful attention to the condition of the cows at calving. Then consider a contract-mating programme with the view to increasing the number of first cross heifers available so that you can increase your selection intensity on the first generation."

With the considerable knowledge gained over the last three years, Mr. Batts is now mating his first-cross heifers with Simmental bulls which have produced progeny significantly better in his judgement than those of other bulls. Careful consideration will be given to the pedigrees of the bulls used to avoid inbreeding, but this factor will be easily met because of the wide range of bulls available.

Beef production with Simmentals is now well established on this previously successful dairy farm.

His bulls were a problem

THE frustration of keeping a bull on the property was the main reason why Mr. Keith Porter of Pittsworth changed to A.B. eight years ago.

The decision to sell his bulls was made because of continual fighting amongst bulls and the need to be regularly repairing fences. The bulls were always where they shouldn't be and were a constant annoyance.

All female stock, including heifers, are now artificially bred. Mr. Porter could see no sense in keeping a bull for the heifers and a few cull cows. With good management and careful oestrus observation a 73% conception rate has been achieved with the heifers.

Faced with the problem of building bull yards to hold his herd bulls with safety, Keith Porter chose the easier and safer way of restraining bulls—he leaves the job to the Wacol A.B. Centre.

Not only has he saved himself this problem, but the heifers his A.B. programme is putting in his herd have the udder type he wants, and fit close to his idea of a good type of dairy cow.

New facilities for custom collection

MANY Queensland cattlemen have used the processing facilities of the Wacol A.B. Centre for "Custom Collected" Semen. This is a simple and inexpensive way of placing semen from their own sires in storage for use in their own herds.

THE insurance against death or injury of a sire or the wider use of that particular sire in their herds, which this storage provides is the reason for the interest.

Now the service has been extended. Under the old and tried system, the centre processed semen collected on your property by your own Veterinarian. This service is still available, and to it has been added the establishment of an unlicensed semen production area at Wacol.

Bulls can now be housed in this area on the Centre and the complete semen collection and processing service provided. The semen produced in this "A.B. Motel" is not licensed for sale. Such licensed semen can only be produced from bulls which have passed the health tests which entry into the Licensed Semen Centre demands. However, this "Motel" will be particularly useful to stockowners whose properties are remote from a regular veterinary service.

How it works

If you choose to have semen collected on your home property, your private veterinarian will arrange to take some tests to ensure that the bull is free from diseases which may be transmitted through semen. He can then make the collections either by having the bull serve an Artificial Vagina or as in the majority of cases, by Electro-ejaculation. The facilities needed for this process in either case need not be elaborate. In fact, the average modern property has adequate crush and yards which can be used without any modification.

Your private veterinarian will then send the semen packed in ice to Wacol in a kit provided by the Centre. Distance from Wacol is no real barrier as some veterinarians have sent semen by plane to Wacol from places as far away as the Atherton Tablelands. On arrival at the Centre the semen is tested for its suitability for processing. If the semen is suitable it is processed in the normal way.

If the semen processes satisfactorily, a charge will be made for this service. No charge applies if the semen fails; i.e. your veterinarian will only be charged for processing of semen which can be used in your herd.

The normal processing fee is 40 cents per dose successfully processed and stored.

If you choose to use the Department's A.B. Motel to board your bull while semen is collected and processed, Departmental veterinary staff are available to do the complete job. The same health tests are needed as if the semen was collected on your own property. These tests may either be done at your place by your private veterinarian, or if you prefer, can be made at standard veterinary rates after the bull arrives at Wacol.

The charge for collection and processing under this arrangement is $1.00 per dose, and again, this only applies to semen processed successfully. The monthly agistment costs for your bull are $50 ($2 per day if he is there for only part of a month).

Storage

Because the costs of collection and processing are relatively low, owners frequently have more semen collected than they actually need. Storage, although not a costly item, is wasted effort if the semen is eventually destroyed. The cost involved, if you wish to provide your own container and have Wacol staff maintain it, is $5.00 per month plus the cost of nitrogen used, at 50 cents per kg. These containers will cost you upwards of $350, which would apply to a container holding about 2 000 straws of semen. A modern storage area, completely equipped, is available as part of the Wacol Centre facilities. Should you prefer, storage can be arranged in Centre containers. The cost in this case is 4 cents per straw per month.

If you would like to know more about this valuable service, your local veterinarian or D.P.I. officer will be able to help. Alternatively, a letter or call direct to the Officer in Charge of the Wacol A.B. Centre will meet a prompt response.

The Wacol Centre has been geared to produce semen which is eligible for sale in its licensed semen collection area. It now has the facilities to produce unlicensed semen of the same high standard. The difference between the two types of semen lies in the degree of health testing to which donor bulls are subjected before collection. Because "Custom Collected" semen is taken from sires which have only been health tested to minimum standards the use of this semen must remain restricted. *Its sale or distribution is completely illegal.*

A.B. Success at R.N.A.

They say that it is results that count. If the 1975 Royal National Exhibition is any indication, semen production from top sires at the Wacol A.B. Centre will have to be stepped up even further. Some details of the successes achieved by progeny of Wacol A.I. Bulls were:

A.I.S.

"Sunny View Princess Mario" had the major success. One of his daughters Wilmington Plum owned by L. W., M. J. & G. F. Peters of Oakey was shown in the 3 to 4 years in milk class. She won this class, and went on to be champion A.I.S. cow, and supreme champion dairy cow of all breeds.

In the 48 hour production tests on the showground this "Mario's" daughter continued on her winning way and was also the Champion milk, butterfat and total solids producer. She created new ground records for total solids and for 3 and under 4 butterfat yield.

Third to Wilmington Plum in the type class was another daughter of "Sunny View Princess Mario", Cerana Gentle Lady.

Glenwarrah Empress another further daughter of this outstanding sire, won the class for heifers 12 and under 18 months.

Jersey

The Wacol proven sire Westwood Royal Spot had success in the Jersey ring. One of his daughters, "Caboonbah Melissa" won the class for heifers under 2 in milk and was later awarded the purple ribbon for Junior Champion heifer. Her owner is Lloyd Granzien of Kalbar.

"Adadale Opals Emperor" a bull owned by Stan and Maureen Paulger first privately owned Jersey bull at Wacol, also had outstanding success.

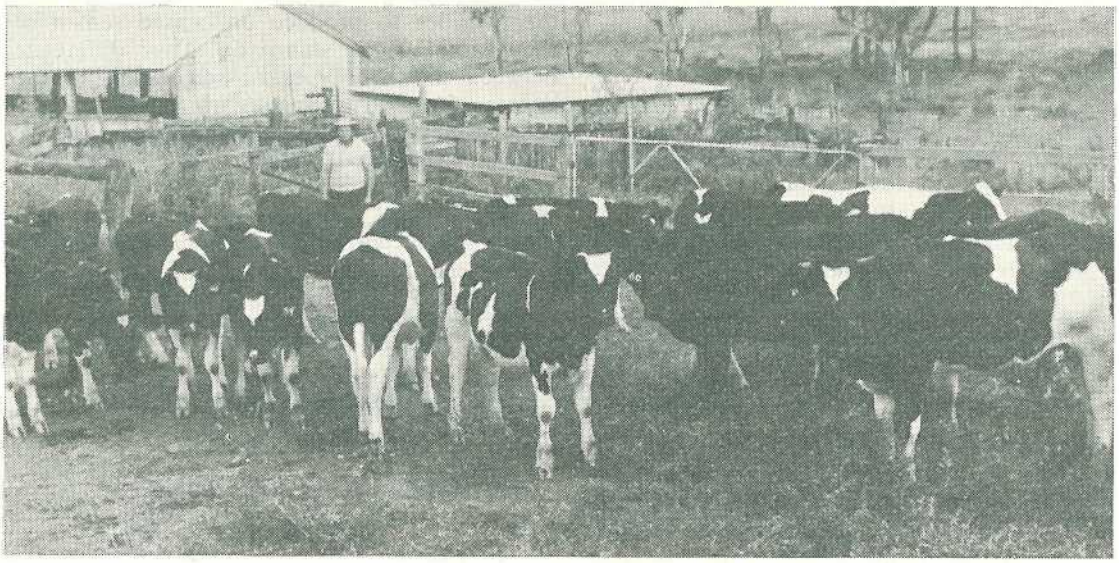
First placing in the 3 and under 4 in Milk Class went to Adadale Opal's Primrose 5th, one of his daughters. A further daughter won the 4 to 5 in milk class and went on to be Senior Champion Jersey cow.

The "sire and progeny" award also went to this bull, while three of his daughters won the sires progeny stakes for type and production.

Wacol bulls leave offspring that have type as well as production.

They aim for improved herd production

TWO very successful farmers who see a place for the use of young unproven bulls in their overall breeding programme are Ken and George Wheildon of Cressbrook near Toogoolawah.



A group of bull proving heifers on the Wheildon's Cressbrook property

After acquiring a number of high grade Friesian cows at the "Good Luck" dispersal sale in 1972, Ken and George embarked on their breeding programme, using a wide range of Australian, British and Canadian Friesian sires. No bulls are kept on the property.

In 1973, some 35 cows were offered for mating to young bulls in the Department's Friesian bull proving team. Some 15 heifer calves resulted from these matings, with all bulls in the team being represented by at least 2 heifers.

In addition to these 15 heifers, 13 heifers sired by other Australian and imported bulls, were reared at the same time.

As an aside, an unusual method of calf rearing is practiced on the Wheildon property. Two calves of similar size are coupled together with a hobble chain and foster mothered using the cull Friesian cows. The property of some 164 ha is large enough to allow this practice to be carried out.

Ken and George, using this method of calf rearing, now have 28 very well grown heifers which will be suitable for mating at 15 months of age to calve at 2 years.

Their aim is not to increase herd size but rather to improve herd production. (The average production of the herd of 60 cows in the 1972–73 season was 170 kg B/F). Both fully appreciate the need for farmers to use the young bulls in proving teams, and after seeing the quality of calves which resulted from the 1973 bull proving matings, they submitted another 50 cows for the 1974 matings.

Small A.B. groups do work

1975

"Our small A.B. Group has worked well," says Don Brookes, Chairman of the Kalapa A.B. Group.

1972

"SMALL A.B. Groups CAN WORK," says Department of Primary Industries.

"OUR small A.B. Group has given excellent service to our thirteen members during the last three seasons," said Mr. Brookes of Kalapa.

"From a standing start in 1972, this Group now has a Credit balance of $268.00, and owns all of its operating equipment. Its first service charge of $3.45 plus semen has increased less than other Queensland Groups in recent years."

Dairy adviser Mr. K. L. Norman (left) discusses the sires available from the Wacol A.I. Centre with Kalapa group secretary Mr. Norm Acutt and chairman Mr. Don Brookes.

The Kalapa Group was one of the first of the small (300–400 cow) A.B. Groups formed in Queensland.

Because all the farmers it services live within a ten mile radius of its centre of operation, Kalapa Group has been able to keep the travelling cost part of its service charges very low. This is a major reason for its continued popularity with dairymen and beefmen in this area.

Another reason for group popularity is the high standard of service given by Mr. Dave Egerton—the Group Inseminator. A district farmer who obtained his certificate of competency as an A.B. Technician following training at the Wacol A.B. Centre in 1972, Mr. Egerton works under contract to the group. For the year ending February 1975, only 63 cows of the 335 serviced have returned for a second insemination. This represents an outstanding 81% first service performance.

The initial nine members of the Kalapa Group has now grown to thirteen. Three of these farmers have used the service to maintain a two-breed herd for greater flexibility.

It was thought that 300 cows would be offered for service in the group's operating area each year. However the 1974 year saw 453 cows inseminated. Declining beef prices have reduced this number in the current year. Using beef semen over dairy cows not needed to breed replacement heifers produced some very profitable bobby calves until beef prices dropped.

Mr. Brookes suggests that the present healthy bank balance of the group reflects the care taken in planning. Each year the group budgets charges to provide for replacement of equipment as it wears out. The money in the bank is intended to provide for this equipment purchase when it is needed.

Service charges have been increased twice since the group started. These adjustments ensure that all costs are met realistically. Working on co-operative lines the group does not budget to make a profit over operating expenses and depreciation provisions. Several accounting checks are built into the record keeping system the group uses. These checks keep the group executive constantly informed of movements in operating costs and receipts.

When Kalapa group started, its members realized they would pay more for service than A.B. users in more intensive dairying areas. However, because of high mileage costs, charges have had to be raised in these other once low-cost areas. The Kalapa service is little dearer. The real strength of the small group in its compact area is thus paying dividends.

Two other similar groups in the Rockhampton district—Marmor and Dululu—have repeated the success of the Kalapa group on a smaller scale. These groups have provided an effective service to stock owners at a moderate price.

The combination of good management, enthusiastic membership, competent technicians, and a compact operating area are the ingredients in this mixture which makes small A.B. Groups work so well.

A.B.—An easy way to change breeds

The C. L. Smith & Sons partnership at Monto is one of several bull proving herds in Queensland in which Do-it Yourself A.B. is the "in" thing. Mike Smith was trained as an inseminator in 1974 and claims definite cost savings from the project.

An A.B. Programme was established on the Smith property to control a Vibriosis outbreak in 1967. Then came the swing to bulk milk in the Monto district and A.B. provided an easy way to change breeds. The A.I.S. breed was selected for the production ability of the females and the potential of the male stock as vealers.

After the 1974 Monto Dairy Festival the local herd recorder showed Mike a copy of the Bull Proving Catalogue. The production backing of the bulls in the proving group was so impressive that the Smiths decided to co-operate in the proving scheme.

By doing his own A.B. Mike feels he can mate cows at the optimum time. Cows showing signs of oestrus at the afternoon milking are mated in the morning and vice-versa.

The partnership see their involvement in bull proving as another method to boost interest in record keeping and to enable long term evaluation of different bulls. It also ensures proven bulls for the future to all dairy farmers.

WACOL CENTRE OFFERS DAIRYMEN

* semen from A.I. Proven Bulls in the Friesian, A.I.S., Jersey and A.M.Z. breeds.
* semen from Guernsey and Ayrshire bulls selected on the production record of their dams.
* semen imported from Britain, Canada, and New Zealand and other Australian States.
* Wacol Dairy Bulls are Registered with the appropriate breed society.
* progeny bred by A.I. from Wacol Dairy semen are eligible for Registration in individual Breed Society Registers on the same basis, as if bred by natural service.
* the benefits of a Proving system used to assess Wacol Proven Bulls which is recognized as one of the best in the world, and ensures strong production improving ability in A.I. Proven Bulls.
* semen from outstanding Beef Bulls priced for use over tail-end cows to breed better selling bobby calves.

WACOL OFFERS OWNERS OF LICENSED BOVINE SEMEN

* facilities for storage of approved semen in the owner's container.
* competent staff who will maintain and service the unit while in storage.
* storage facilities in Wacol containers, available by arrangement.

WACOL CENTRE OFFERS OWNERS OF OUTSTANDING BEEF OR DAIRY BULLS

* facilities on the Centre which are available for collection and processing of semen from Privately owned bulls which can meet entry health requirements.
* this semen is licensed for sale in Queensland and any other State (Approvals necessary Vic. and Tas.).
* semen collected on Wacol Centre can be exported to any country for which the Health status of the bull makes him eligible.

Dairy sires from Wacol

NEW PARK GAY KING
Sire: New Park Apex (32279)
7 Dtrs. 13 lacts. 5210 milk 3.8% 198 fat
Dam: New Park Queenie 20th (41187)
3 lacts. 17377 kg milk 4.2% 739 kg fat

The dam of 'Gay King' also produced 'New Park Queenie 21st' classified Ex. (91)

WOODLIN CHARON NOBLE
Classification: Vg (86 points)
Sire: Rurik Charon
A.B. Proof:+111gals.
Dam: Meadow Glen Noble Fay 2nd.
3 lacts. 24308 kg milk 3.6% test. 868 kg fat.

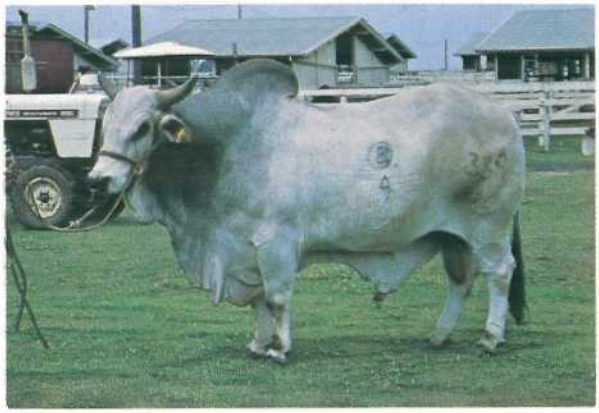
This bull has excellent hind quarters.

GLEN ERIN GOLDEN SOVEREIGN
Sire: Mayfair Sovereign 4th
A.B. Proof:+185 kg milk 7 kg fat.
Dam: Glen Erin Golden Daphne
4 lacts. 12 716 kg milk 5.2% test 660 kg fat.

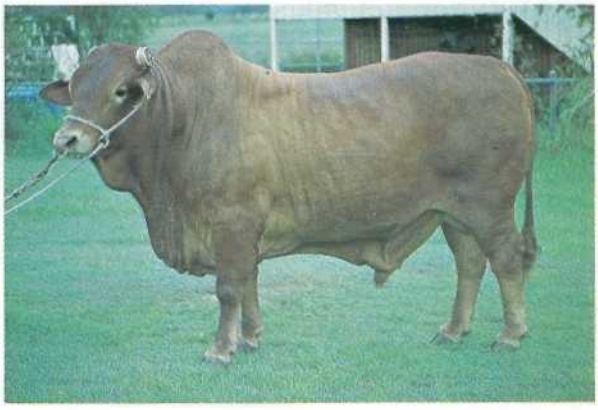
A beautifully proportioned bull showing good dairy type.

Dairy sires from Wacol

Beef sires from Wacol



WAVERLEY HUDSON DE MANSO
Sire: Waverley Noel De Manso
Dam: Waverley Ester De Manso
Regarded as top Brahman sire in A.B. in Australia.



LANSDOWNE 2060
Sire: Strathfield Escalator
Dam: Mungalla 879

Top bull for vealer production — rated as D4 Bull.

CLIFTON JADE
Sire: Clifton Champ
Dam: Clifton 241

At 12 months 'Jade' had a 1.37 kg per day weight gain. His sire has an impressive show ring performance.

Beef sires from Wacol

WACOL CENTRE OFFERS ALL STOCKOWNERS

* the use of the Wacol Custom Collection service which enables an owner to have semen collected from his own bulls for use in his herd. Semen collection is made by Private Veterinarians who forward it to Wacol Centre for processing. Semen collected in this way is neither eligible for sale nor distribution.

WACOL CENTRE OFFERS TECHNICIANS

* Training and refresher courses.
* arrangements for Examination for an Artificial Inseminators Certificate, irrespective of where training was obtained.

WACOL CENTRE OFFERS BEEF PRODUCERS

* semen from Performance recorded sires in the Angus, Droughtmaster and Brahman breeds.
* semen from National Breed Champions in the Poll Hereford, Braford and Brahman breeds.
* semen from high quality Sahiwal, Droughtmaster, Poll Hereford, Hereford, Murray Grey, Santa Gertrudis, Brahman, Charolais, and Africander sires.
* some Breed societies accept registration of progeny by A.I. Where this registration is allowable Wacol has Sires which may be used.

WACOL CENTRE WELCOMES VISITORS

* and each year more than 2 000 people visit us, either as individuals or in organized groups. Remember that an appointment will ensure that staff are available to make your visit a worthwhile experience.

Simmental . . .

will they measure up?

MESSRS. Royce and Neil Jensen of Quinalow and Mr. and Mrs. Abraham of Boodua near Toowoomba are Darling Downs farmers who decided independently in May, 1972 that they wanted a suitable dual purpose breed of dairy cattle, capable of good milk production as well as providing suitable calves for the dairy beef market.

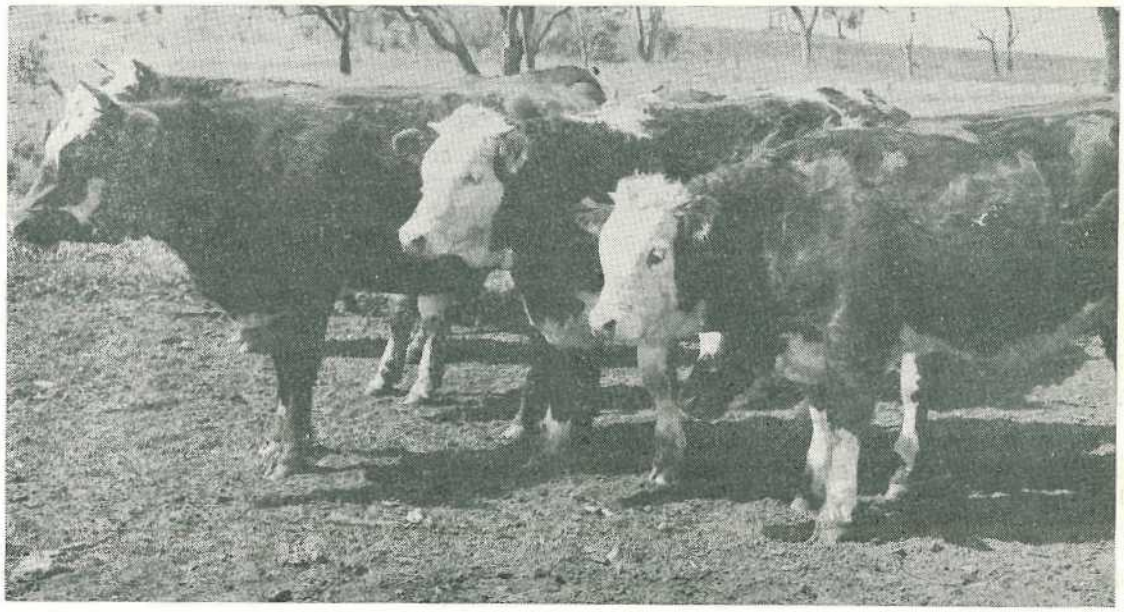
They selected the Simmental breed, well known in European countries for their good milk production and excellent fleshing qualities.

Both farms currently milk a herd of about 80 cows consisting of A.I.S., Jerseys and some Friesans. Their grading-up programme, made possible by the use of A.B., consists of using imported Simmental semen over the higher producing A.I.S. cows in the herd.

It will take 10 years to get the first purebred Simmental heifers into milk production, providing everything goes to plan.

The Abrahams have about two dozen Simmental A.B. heifers ranging in age up to 18 months and are confident that these animals

Group of Simmental/A.I.S. cross heifers, approximately 9 month's old on the Jensen's property, Quinalow.



will maintain their herd average of about 150 kg of butterfat.

The Jensen Brothers also have a number of first cross Simmental x A.I.S. heifers approximately nine months old, which are showing excellent growth and development. It appears that they will be capable of being mated at 15 months of age.

Herd recording figures from Switzerland show that Simmentals can produce in excess of 4 082 kg milk a lactation with a 4% butterfat test in that country.

However different climatic and feeding conditions make it extremely difficult to predict what the production will be under Queensland conditions.

There is no doubt from looking at both of these sets of calves that the Simmental breed does have excellent fleshing qualities and produces calves with high growth rates.

To date neither farm has experienced any calving problems and both are very pleased with the strong healthy calves being dropped. Calf weights usually range from 36 to 45 kg.

The main problem in this breeding venture on both properties is the lack of dairy production detail available on these imported sires. At this stage most of the information available relates to beef production.

However this problem is being rectified with more detailed information becoming available.

Both the Jensens and Abrahams have both embarked on ambitious programmes, and are confident that the Simmental will live up to their expectations as a suitable dual purpose breed.

Increase Milk Production

Mr. and Mrs. Chesley Priebbenow of Greenmount on the Eastern Darling Downs have increased milk production by 60% by the use of artificial breeding.

The Priebbenows claim that using A.I. has enabled them to establish a controlled mating programme to calve two thirds of their herd for winter production and the remainder for production during the summer months. They aim for a continuous milk supply to the factory.

Better herd management, higher conception rates and disease control at no extra cost are the "side-benefits" of using A.B. on the whole herd. Top bulls, otherwise unavailable, have been used without the constant danger of having a bull on the farm.

Mr. Priebbenow says that the savings in not having to purchase and keep a bull pay for the cost of A.B.

Helps with Planning

Mr. Allan Oehlman of "Rose Hill", Warwick, is one Darling Downs farmer who is enthusiastic about Wacol A.B. Centre sires. Over 95% of his present herd of 70 Pure Bred Friesian cattle have been bred from these bulls.

To Allan Oehlman the main advantages of A.B. are the access it gives him to Proven Sires, the wide selection of genetic material it offers, and the ease with which calving plans can be made and carried out.

As well, there is the reduction in breeding cost compared to that of buying and keeping bulls of the quality A.B. gives him, while the absence of bulls on the property means a herd free of transmissable fertility diseases such as Vibriosis.

Cull cows are inseminated with Hereford semen, and for Mr. Oehlman this is an added advantage even today when beef prices are so low. If these cull cows are bred to dairy bulls, the temptation is frequently strong to keep a replacement heifer from them. A beef calf is not likely to find its way into the dairy herd.

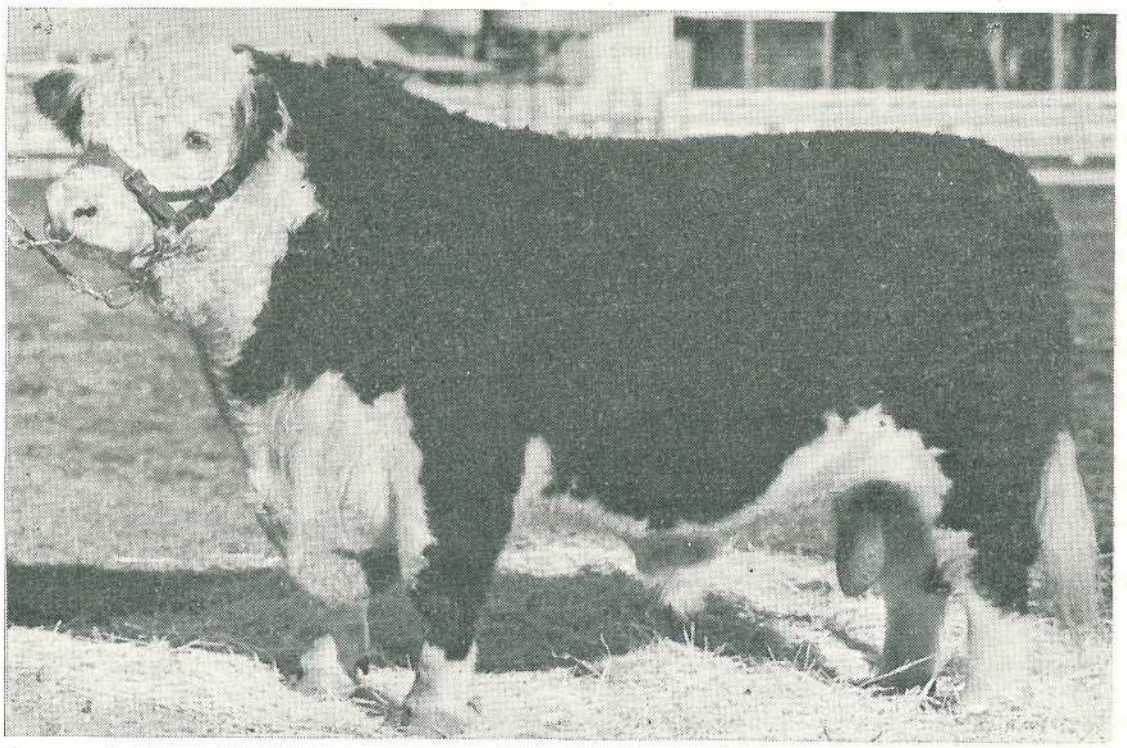
This herd is averaging 4 425 kg of milk per cow at a 3·9% test. After 12 years of continous A.B. use, and intensive selection of herd replacements using Herd Recording results as a guide, the Oehlman herd not only looks good, but has shown it can provide the production.

Privately owned A.B. Sires

SINCE 1971, facilities at the Department of Primary Industries Wacol Artificial Insemination Centre have been available for the production of licensed semen from outstanding privately-owned bulls. Semen produced at the A.B. Centre can be distributed throughout Australia and to some overseas countries, allowing superior genetic material from Queensland to be used more widely.

Before any animal can enter the Centre, it has to pass stringent health tests. Mature bulls must be examined by a veterinarian for breeding soundness and temperament. Once the introduction requirements have been satisfied, the bull may enter the quarantine area at the Centre for more comprehensive testing.

In most cases semen is collected with an artificial vagina and is processed in ¼ ml straws. A summary of the costs involved in having the bulls collected in this way is outlined below. As an example the costs cover a six month stay at the Centre during which 1000 doses of semen are successfully processed.



Jenderwarra Gallan—Poll Hereford Sire of the Year in 1969 and again in 1971. Owned by the Anderson Pastoral Company of Yandilla. Semen licensed for general use was collected from this sire at the Wacol Centre.

	$
Agistment @ $50.00 per month for 6 months	300.00
Disease testing	150.00
Processing charges (1 000 doses at $1.00 per dose)	1 000.00
Incidentals (cartage etc.)	100.00
	1 550.00

Or $1.55 per dose of semen.

The semen is stored free of charge while the bull remains at the Centre and for six months after his removal. The Department does not make any additional charge for selling and dispatching the semen, but to encourage sales of this semen owners usually have suitable promotional material prepared once adequate stocks of semen are on hand.

The owner sets his own retail price for the semen in consultation with departmental officers. Royalties on the registration of progeny are also determined by the owner.

The Department of Primary Industries is helping the local, interstate and overseas promotion of Queensland studs by making facilities for the production of licensed semen available at the A.B. Centre, Wacol. It is also helping the stock owners who use this semen, by providing the industry with top class bulls.

GRADING UP — JERSEYS TO FRIESIANS

TO a Jersey fancier, the need for a change of breed is hard to become reconciled to. But in the Miva–Theebine area, the change-over from cream to whole milk supply has confronted two dairymen with this dilemma.

Both Mr A. Hiron of Miva and Mr R. Sexton of Theebine owned particularly good Jersey herds, and both decided to grade up their Jerseys to Friesians.

They made the decision after realising that the Jersey cow, while ideally suited to cream production, has shortcomings as far as supplying whole milk is concerned.

Also, the Friesian offers a bonus when considered from the beef production angle. Even when beef prices are low, the Friesian calf is worth more than the Jersey.

Using artificial breeding, since it became available in the area eight years ago, has made it easier for these two dairymen to register their Friesians. The Friesian handbook produced by the Queensland Branch of the Friesian Cattle Club of Australia sets out the following requirements for registration:

- The appendix to the herd book is available for the grading up of female cattle to the numbered section of the herd book.
- *Appendix* 4: As from June 30, 1973, any animal having the conformation, type, colour markings of the breed, if sired by a registered bull which has been classified as good plus or better, may be entered in appendix 4.
- *Appendix* 3: Open to the female progeny, sired by registered bulls from cows and heifers in appendix 4.
- *Appendix* 2: Open to the female progeny by registered bulls, from cows and heifers in appendix 3.
- *Appendix* 1: Open to the female progeny by registered bulls from cows and heifers in appendix 2.
- The female progeny, sired by registered bulls, from cows and heifers in appendix 1 are eligible for entry in the numbered section of the herd book.

Bull Proving Bulls DO Raise Production

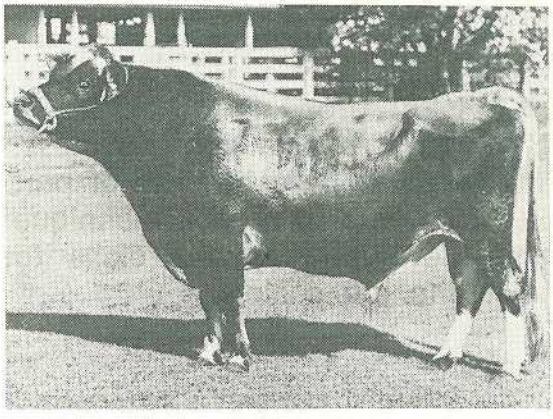
DAIRY farmers in the Nambour area have increased production by using the Jersey bulls selected by the Department of Primary Industries Wacol A.B. Centre for bull proving teams.

This increase in production was shown using the "contemporary comparison method" developed by Dr. Alan Robertson, (U.K., 1956) and now widely used in the U.K., Canada, Israel, N.Z. and Australia.

The first lactations of the daughters of bull proving sires were compared with those of "contemporaries" on each farm. The "contemporaries" were the daughters of any other bulls (including proven bulls) which had been used by the farmers.

In every comparison the butter-fat production of "bull proving daughters" was greater than that of contemporaries. The increases ranged from +3·6 kg BF to +43 kg BF (Average +18 kg BF).

It should be noted that all the "contemporaries" on the +3·6 kg BF farm were daughters of the A.B. Proven Sire "Westwood Ludo", and their dams were specially selected.



Brook Lodge Brilliant's Chief—a second generation Wacol Proven Sire.

These results indicate that the Department of Primary Industries programme of contract mating A.B. proven sires into top producing herds is producing young sires of superior genetic quality for bull proving teams.

A.B. Popular in Mackay Area

ARTIFICIAL Breeding came to Mackay later than most of Queensland—it is only two years since the first cows were inseminated at Crediton on the Eungella plateau.

However, in that two years, the Crediton-Dalrymple Heights area has developed the largest concentration of A.B. users (and inseminators) in Queensland. Of the 26 stock owners on the plateau 14 have used A.B.

Philip Chamberlain was the first technician to operate there, and he and the Crediton A.B. Group can take the credit for the popularity of Artificial Breeding on Eungella. When district stockowners realized how uncomplicated the actual job of insemination is, several others soon enrolled in training courses.

Now, because of problems of movement during the wet season, the Group is sponsoring further courses in A.B. training to be conducted at Crediton. Conducted with Departmental assistance, these training arrangements will allow almost all stockowners in this isolated community to learn the basic skills of inseminating.

Thanks to the Crediton A.B. Group, Artificial Breeding is now on Eungella to stay.

Running A.B. Programmes

ARTIFICIAL breeding in beef herds is a very specialized business. Graziers who have bred all or part of their herds using the technique have developed special skills to make the job easier.

Planning

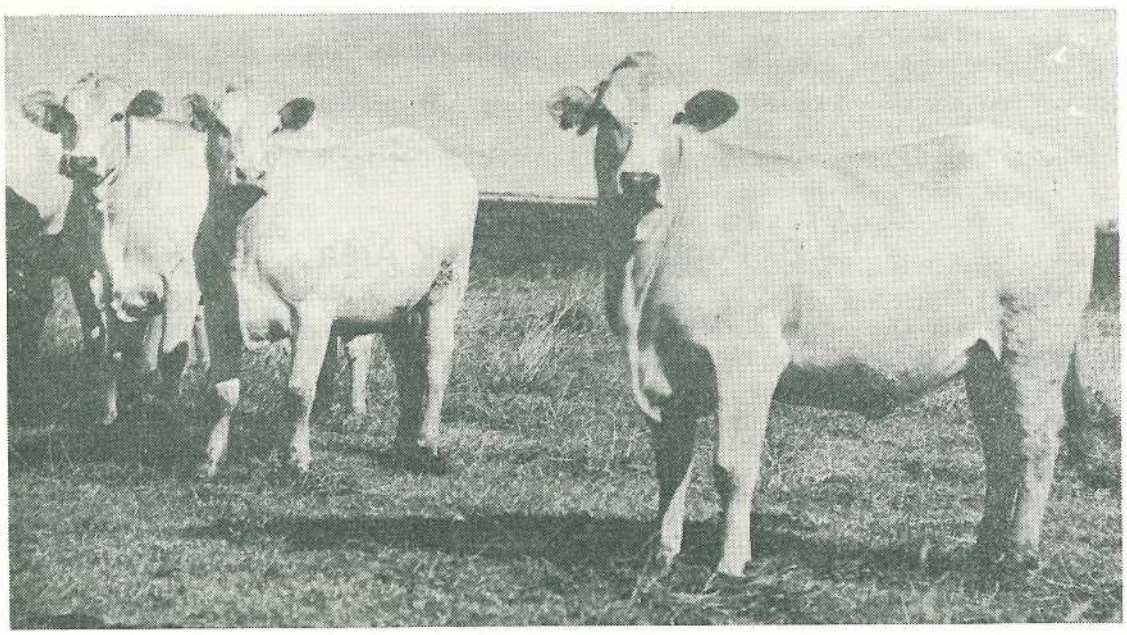
Most successful programmes are organized around the feed requirements of the cows. In planning, sufficient flexibility should be retained so that the programme can be postponed if the feed situation deteriorates rapidly.

Poor nutrition is the main cause of the failure of artificial breeding programmes in Queensland.

The provision of staff to conduct the programme, small paddocks near good yards, a shaded A.B. crush and teaser animals should be considered in the planning.

Preparation of cows

This phase should begin at least six weeks before the start of insemination. Breeders should be gaining between ¼ and ½ kg daily from the time of calving to the end of the breeding season. Some experiments have shown that only 85% of cows which



Correct conditioning of heifers improves conception rates at "Deloraine" Charolais Stud, Jimbour.

were losing weight after calving showed signs of oestrus in the first 20 days of the breeding season while 95% of those gaining weight were noted "in season."

First calf heifers which are being re-inseminated should be given special treatment as most problems will occur with this group.

If there is any doubt about the health status of the herd, tests for infertility diseases such as brucellosis and vibriosis should be carried out. As leptospirosis may cause infertility, vaccination should be part of the normal herd health programme in some areas.

A veterinary examination of all the cows in the programme will enable the grazier to remove those animals which are pregnant or have abnormal reproductive organs.

Cows must be permanently identified to facilitate heat detection and the maintenance of accurate records.

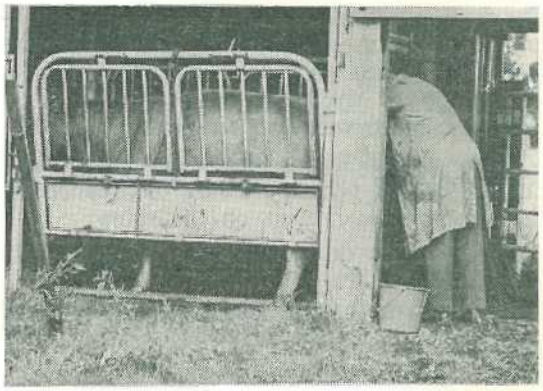
Bulls which are capable of service should be isolated from the breeders.

Heat detection

Inaccurate heat detection is the second most common cause for the failure of A.B. programmes in Queensland. It is generally agreed that careful observation is the best method for detecting those animals which are ready for breeding and most successful users allow at least two hours, night and morning, for observation. Cows may be observed in the paddock by a person on horseback. More often, the animals are observed in the yards. With small groups, cows mounting those which are in season can be used for detection. Teasers are generally considered essential in large mobs. "Sidewinder" bulls, hormone treated steers or cows, and vasectomized bulls are used in that order of preference.

"Sidewinder" bulls

These are young bulls which have had their penises surgically relocated towards the flank thereby rendering them incapable of service. Their inability to serve also eliminates the risk of spreading venereal diseases. Sidewinders should be used at the rate of 6%, with half working and half being spelled on alternate weeks.



Covered insemination crush avoids sunlight damage to semen and improves working conditions.

Treated steers

Implants or injections of male hormone will stimulate male behaviour in steers. They will start working three days after treatment and should remain active for three weeks. As retreatment may not be successful they should be replaced with fresh animals. Treated steers should be used at 6% with an additional 3% added after 3 weeks.

Steers are also unable to spread disease and are readily available on most properties.

Vasectomized bulls

These are bulls in which a section of the tube which carries sperm from the testes to the penis has been removed to render them sterile. They retain the ability to serve and can spread disease unless part of the penis is amputated.

Heat detection equipment

The "chinball harness" is used widely and is recommended particularly when Brahman cows are being inseminated. The harness straps on the head of the teaser to secure a container of dye under the chin. Pressure on a ball in the container releases dye over the back of the animal mounted. Use of the harness simplifies heat detection as marked cows are easily seen and those animals with short heat periods are also marked. In some instances animals with short heat periods will be missed during the morning and evening

observation periods unless some form of mechanical aid is used. Only animals which are well dye-marked should be inseminated as a single dob of dye may be the result of a chance contact with the teaser.

Other aids include heat detector pads which change colour when pressure is applied to them, and plastic paint on the rump.

It is wise to draft off those animals which show standing heat. Teasers may remain with particular cows and neglect those which come into season during the day.

Insemination procedure

The importance of correct insemination procedure must be stressed if high conception rates are to be achieved. Breeders must be handled quietly to avoid stress and must be inseminated at the correct stage of the heat cycle.

The most common procedure is to draft off cows which are in season in the morning and inseminate them in the afternoon. Cows which are on heat in the afternoon are inseminated the following morning.

To help detect those cows which return to service, all cows inseminated during each week of the programme should be marked with paint or dye. The colour of the paint should be changed each week. In the fourth week of the programme only those cows which were marked in the first week and those remaining unmarked will have to be observed closely. Cows with abnormal cycles will also be recognized more easily.

Poor cycling

Poor nutrition is the main reason for cows failing to cycle. In most cases money will be saved by postponing the programme until any nutritional problems are overcome.

Brahman cows and heifers of all breeds may not show standing heat until 2–3 weeks of the programme have elapsed. By extending the programme to six weeks all cows should cycle at least twice.

Cows with calves at foot may not cycle because of the drain on their reserves of energy and because of hormonal factors. Temporary weaning during the day with supplementary feeding may stimulate sexual activity as early as three days after it is introduced. Some graziers wean all calves at the beginning of the programme and as long as the calves receive some special attention they will not suffer much of a setback.

Success in an artificial breeding programme depends on thorough planning and adequate preparation of facilities and animals. The key factors are nutrition, heat detection and disease control.

If used wisely artificial breeding can be a valuable tool for the improvement of your herd.

A.B. PROGENY TOPS IN CALF CLUB DAYS

CLUB days or mini shows are the "in thing" with branches of the Friesian Cattle Club. At these days, local breeders can display their younger animals with the minimum of interruption to the farm routine.

Two recent club days showed that artificial breeding is having a big influence on the Friesian breed.

At a day held at Nambour by the North Coast Branch, first prize winners in all six classes were sired by A.B. bulls.

Dairy farm records

Mr. Harrison operates a successful dairy and beef property near Beaudesert. The simple cash-record systems he uses help make a successful business out of a successful farm.

OTHER than a daily diary the records kept on a dairy farm should be those which can help in planning and management.

Cattle Records

All calves should be tattooed so that the calf's age and its sire and dam can be recorded. From this the best cow families can be determined and the performance of sires can be checked.

Calving dates, heats and services, either by A.B. or bulls, should be recorded to determine breeding performance and to check on breeding disease problems.

All cows should be production recorded and the figures for each cow recorded in such a way that her feed requirements and her consistency and worth in the herd can be quickly checked.

One simple system to record the above data is to have a numbered 15 cm x 10 cm (6″ x 4″) card for each cow, with her birth date, tattoo, sire, dam and vaccinations on the top and under this her successive calving dates, heats and services together with the sex of each calf and its tattoo if reared as a replacement heifer. On the back of the card the production for each lactation is recorded, with a remarks column in which any abnormal circumstances are noted. At a glance these cards can tell you if a cow is breeding regularly, if she is due for service, what her production record is and if she has any progeny in the herd.

Paddock Records

Similar cards can be kept for each cultivation and pasture paddock to record planting dates, drill settings, fertilizer applications and yields from harvested crops. One's memory is seldom good enough to retain this type of information accurately.

Do your own Artificial Breeding

BE your own Artificial Breeding technician . . . Why not? Many other stockowners are servicing their herds this way.

The cost of artificial breeding, where service has to be purchased, has steadily risen over the years. Generally, this does not mean that the technician providing the service is making more money than before. His costs, particularly travelling costs, have almost doubled in the last five years. Besides, the other expenses which he would have would also relate to your own operation. Thus the major saving to you, by doing the inseminations yourself, will be in not having to pay travel costs.

Insemination services in Queensland are usually provided in the dairying areas by community service groups. Because the stockowners in each of these groups live close together, travelling is not a costly item. Very careful checking of the costs involved would be needed before a dairy farmer should attempt to do his own artificial insemination work in such a case.

However in some beef and dairying areas where distance is a problem, do-it-yourself A.B. could be very profitable.

Mr. David Price of "Deloraine" Jimbour, was trained as an A.B. technician at the Wacol Centre in 1972. Since then he has inseminated his high-grade Brahman herd with Charolais semen each season. His programme is designed to grade up to a pure-bred Charolais herd. Mr. Price estimates his inseminating costs at $30 per calf. He includes the cost of semen, and the capital cost of his equipment in these charges. Mr. David Alexander—a neighbour for whom Mr. Price provides an A.B. service—shares the costs of liquid nitrogen coolant and freight, thus reducing these items.

On this combined grain growing–cattle raising property, inseminating time frequently clashes with planting, adding considerably to work pressure. Mr. Price is adamant that the main reason for his success is his attention to oestrus detection. Knowing his herd well makes this task easier, but it still takes up at least two hours of his morning.

Because there is no other technician living near his property, Mr. Price would have to employ a man full-time to do this inseminating work during the mating season. Apart from this saving, there is a lot of flexibility in breeding to be gained by artificially inseminating the herd himself.

David Price gets a good deal of personal satisfaction from the complete control of his breeding programme.

Most do-it-yourself A.B. Technicians are in the beef field. Mr. Les Furnival of Ipswich is one dairyman who liked the idea, and after two successful years is very happy with the result. The Furnival property is operated by Les and his father Mr. Harry Furnival. Les inseminates the whole of their 80 cow Friesian herd. He claims that the 82% first conception rate he gets results from careful oestrus detection and more importantly, insemination at the correct stage of the breeding cycle.

Training in the art of inseminating is provided by the Department of Primary Industries at Wacol and occasionally in country areas. Four or five courses a year, each training about 12 people, will be held in future.

The courses are designed to satisfy two different types of need. For the person who wishes to service his own herd, the five day Herdsmen Inseminator Course will be adequate. However if a technician wishes to attain a higher level of competency for registration as an A.B. Technician, a further 5 days of intensive training is provided, followed by an examination.

Before undertaking either course it is necessary to complete preliminary theoretical training equivalent to a three day course.

No special educational background is needed for success with these courses. The theoretical part of the training, is grasped easily by anybody with a practical knowledge of stock. This theory section is provided as a correspondence exercise which a trainee can study in his own time before attending for the practical sessions.

The charges for these services are as follows.

(a) 3 day theoretical training (including text book)
—by correspondence $30.00
—on course $25.00

(b) 5 days Herdsman Inseminator Course $100.00

or

(c) 10 days Certificate level course $200.00

The charges include all the operating equipment, such as rubber gloves. The trainee is expected to provide his (or her) own rubber boots, protective clothing and accommodation. There are good hotels and motels close to Wacol which fill this role. Transport is provided for the trainees to and from Wacol Railway Station if needed.

The main disadvantage which a herdsman artificial inseminator suffers is lack of confidence. Because of insufficient practical experience on a wide range of cows, his expertise may not equal that of the professional inseminator. However, the people who do their own insemination claim that this is balanced by better oestrus detection because they are more aware of its need, and insemination at the correct stage of the breeding cycle through personal knowledge of their stock.

The majority of these herd owner-inseminators are getting the same results as professional technicians. However, make sure that the savings you will make by doing your own will reimburse you for the time it is going to take. David Price and Les Furnival are very enthusiastic about their use of A.B. However they both emphasize strongly that you have to give the job the time it needs to get the best results.

A.B. MOTEL

A NEW approach to the business of inseminating cows is working well at Hannaford on the Wetsern Darling Downs. Here Mr. Bill Summerville of "Kiama" has set up an A.B. Motel for cattle.

For a nominal fee, cows are agisted on Kiama, and inseminated at the correct stage of oestrus with semen of the owner's choice.

Since November 1973, 1 100 cows have "rested" at the Motel. Started to help a few close neighbours, the business now accepts cattle from a wide area.

Programmes are not conducted on a regular basis, but rather as weather conditions permit, and the supply of feed is adequate. Strict disease control is essential to success of such an arrangement, and all cows must be tested negative for tuberculosis and brucellosis before reaching the property. After arrival they are vaccinated for leptospirosis and vibriosis as an added precaution. The owner is charged the cost of vaccine only for this service.

Agistment and service charges are $4.00 per head for a six week stay on "Kiama". Semen from sires of the owner's choice is supplied either by the owner, or from Mr. Summerville's stocks. Normal retail rates apply. No charge is made for storage of semen supplied by owners.

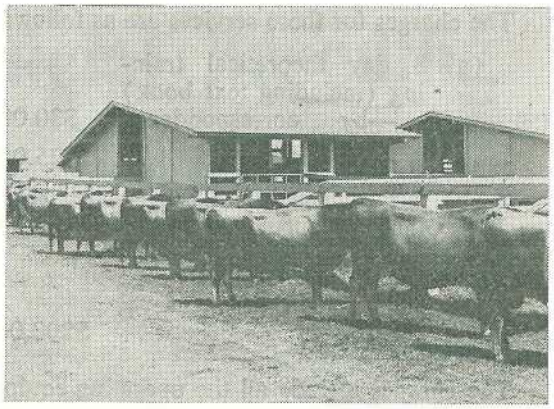
It has been found desirable to have cows on the property at least a week before inseminations begin. This allows them time to settle, and usually results in increased conception rates. A very reasonable charge of $1.00 per head is made for this extra service.

The 80% conception rate which Mr. Summerville averaged last year shows how successful this arrangement can be. If demand continues, the operation will be expanded in future and this will help to contain rising costs.

The success of this Bull Motel idea shows that there is a real need for the service it offers. Perhaps other technicians could find a similar demand exists in their own district if they chose to put up the "Vacancy" sign.

Bull Proving

THE Queensland Department of Primary Industries Bull Proving Scheme started in 1955 with a team of four Jersey bulls specially selected from Queensland herds.



Group of Jersey proving bulls on display for inspection at Wacol.

The scheme operated for some 7 years with a selected team of bulls being used each year. At the end of this 7 year period some 30 individual bulls of the Jersey breed had been mated in bull proving herds and these bulls formed the first generation of Jersey sires to be tested.

Bulls from the AIS and Friesian breeds were included in the scheme in 1958 and 1965 respectively. At the end of the 1975 bull proving year, some 86 Jersey, 75 AIS and 46 Friesian bulls will have been used in Bull proving teams.

The method used to select the proven bull of each team is the contemporary comparison system. A brief explanation of how the scheme operates is as follows:—

- A team of four to six bulls is selected, the individual members being the progeny of top producing cows in stud breeders herds.
- Semen is collected and used to mate equal numbers of cows to each bull in a wide range of dairy herds in the State (usually 300 cows for each bull).
- The heifer progeny of these matings are reared, mated at 15 months and calved down at 2 years of age—it is important that at least one daughter of each of the team members is retained in each herd.
- The productions of each bull's daughters are averaged and the bull with the highest producing daughters is selected as the proven sire of that year—the other members of the team are sold for slaughter.

It is important to note that daughters of each bull are compared with their contemporaries in the same herd in the same year. No comparison can be made between proven bulls of different years as the environmental conditions under which the daughters of the bulls produced were most likely different. It is also important to note that the first lactation productions only are used as no culling for low production will have taken place.

Inclusion of semen from the proven sire with that of his sons in their test year is a further improvement. Similarly, Breed Society nominated bulls are included in proving groups as a check.

One of the real reasons for using artificial breeding is to gain the advantage of progeny tested sires. The Department's Proving Scheme provides the machinery for this to happen. However, it requires co-operation by farmers, A.B. Technicians and Departmental staff to make it a reality. The industry owes a considerable debt to the group of people the scheme involves.

Why do I use Artificial Breeding in my herd?

by G. KENMAN, Chairman, Dayboro and District Artificial Breeding Association

MY first inclination is to answer "for economic reasons" and leave it at that. Economics is one of those in-words which cover just about anything. Many people when presented with the offer of an A.B. service baulk at the concept of an "out of pocket" cost of $4.50 per cow in calf. In my view, artificial insemination offers the opportunity to improve the cost structure of a dairy farm, in both what one might refer to as a negative and a positive way.

If we examine the cost of purchasing, feeding and husbanding a bull against the possibility of using the capital spent for feed and time on an extra cow, we see a fair contribution to herd insemination costs. If the cow gives 6 000 lbs. of milk which can be sold at say 25 cents nett per gallon, we have $150 or 33 inseminations at $4.50.

Anyone who has been associated with the dairy industry in the near Brisbane area during the last 20 years will be well aware of the problem of infertility which had developed in many herds at the start of the 1960's—the time when A.B. first began as a commercial proposition in the area.

I believe artificial breeding offers what is still the most effective method of controlling many of the venereal diseases affecting dairy cattle. This, together with strain 19 inoculation and a significant improvement in feeding over the last 10 years, has, in my case at least, made an effective forward planned breeding programme possible. From my association with an artificial breeding service group I am aware of a comparable improvement in most group herds which have been consistently bred by A.B.

Here I would emphasise the word "consistently". We have seen farmers improve their herd conception rate with A.B. and return to natural service only to encounter the same problem in a short time. I am not implying that it is impossible to control breeding disease in a natural service system, but I suggest that given the limitations of my, and I believe most, farm management, A.B. is by far the most effective method of achieving this control.

My third point is what I consider the really positive utilisation of an artificial breeding programme. It's used to breed stock of "superior quality". Here of course is a phrase with many different interpretations. To be true to a long line of Scotch ancestry I define prime quality as an "increase in production".

I am aware that only some 20 per cent of production difference between dairy animals is due to genetic factors. However, with all our fixed costs covered or not covered by the herd production norm, it is this area of increased production ability of offspring to which we must surely look for an improvement in profit.

In this regard artificial breeding offers me the use of production proven bulls for use as herd replacement sires—the cost of which is beyond my resources and an almost unlimited number of breeds from which to choose. Like most other dairymen in the "milk zone", I made extensive use of Friesian sires from A.B. centres in a change to that breed. I am able to breed to any one of seven (7) dairy breeds and twenty (20) beef breeds or variants, available from my A.B. group.

As herd production has improved I have become increasingly aware of other significant factors in herd replacement considerations. "Temperament", "Machine Milking Ability", "Udder Shape and Attachment" and type. All these factors are important in the economics of dairying; controlling as they do time spent in her milking, and the length of time a cow remains a productive unit in the herd.

If I can increase the effective life of a herd from eight to nine years, this allows a 12 per cent decrease in herd replacements, or better still a higher production culling level. I believe this is one of my most important problems of the next ten (10) years and I note with satisfaction the considerable amount of evaluation data on A.B. proven sires now available from both Wacol and interstate.

I have left "type" until last. In this area I am very much a layman and discussions on the fine points of this go over my head. Whether what is referred to as "body conformation" has or has not a bearing on production I refuse to argue. I like to grow roses and I get a real satisfaction from a fine animal. Everything cannot be measured in dollars and cents and that is something for which to be grateful. A.B. centres can offer some of the best sire material available in Queensland, interstate, New Zealand, Canada or United Kingdom.

I would hate to go back to a bull.

Editors Note

This is the text of a speech Mr. Kenman delivered at a Dairy Field Day at the Wacol A.I. Centre in 1972. Costs have been amended to present values. Mr. Kenman still does not keep a bull.

WHAT DOES AN A.B. DAIRY CALF COST?

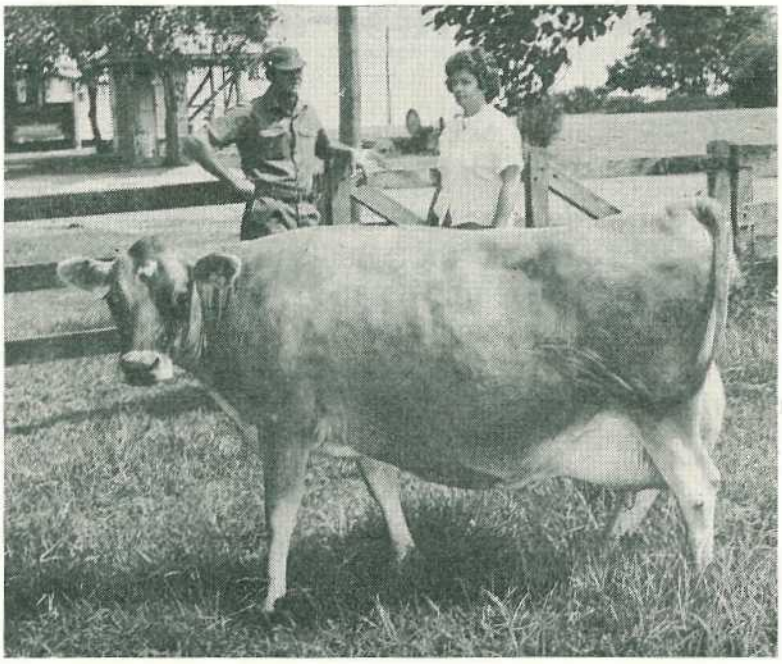
A.B. Service charges throughout Queensland Dairy areas vary from Group to Group. Much of this variation relates to the geography of the area the Group services, and local costs.

However a recent survey shows that Group Service charges (not including semen costs) vary from $3.50 to $4.50 (most usual charge $3.75) per cow. Such charges usually include one or two free repeats.

On these figures, if semen from Wacol Proven Sires is used, a cost of $5.50 to $6.00 per cow in calf would apply.

Thirteen years of A.B.

Artificial breeding is a well established practice on the 160 hectare (401 acres) Murgon dairy farm of Col and Faye Carsburg.



Col and Faye Carsburg with Zippy—8 years and 6 lactations—by Brooklodge Lorna's Chief out of Buttons.

"The only bull we've had on the place since 1962 has been the one in the inseminator's container" said Col. In those thirteen years, herd management problems have been reduced and record keeping has improved.

An outbreak of vibriosis was the major factor in the Carsburg's decision to try artificial breeding in 1962. Successful control of this disease has been achieved and all herd replacements are now bred by artificial insemination.

Herd recording figures are used for the selection of high producing cows for breeding herd replacements, and proven bulls are selected from the stocks available at the Wacol A.I. Centre. The South Burnett Co-operative Artificial Breeding Association which services the Carsburg herd provides a six day a week insemination service. Col and Faye have found that the breeding season can be successfully confined to the five months, August to December, with no ill-effects from this six-day service. First service conception performance is 78%.

The milking herd totals 82 Jersey and Jersey Friesian cross cows. Total production last year reached 10 577 kgs (23 269 lbs.) of butter fat —an average of 129 kgs (284 lbs.) per cow. The total was down on the year before as thirteen fewer cows were milked. At present the herd comprises 75% Jersey blood.

"We'd like to increase the Friesian blood content to 50%", said Col and Faye. "This situation would appear to best suit our particular market where payment is based on butter fat. Our top cow last year was a Jersey with 177 kgs (389 lbs.) of butter fat and second was a first cross Friesian with 176 kgs (387 lbs.)."

Feeding, breeding and management are the factors contributing to Col and Faye Carsburg's success. Artificial breeding has provided an inexpensive means of using the best proven bulls available.

Redlands—a centre for semen export

RIGHT beside the strawberries and cabbages at the Redlands Horticultural Research station at Ormiston is the small pocket of land occupied by the Department of Primary Industries Redlands A.B. Export Centre. Only semen from those bulls held in the isolation of this centre is eligible to be exported from Queensland to the United States of America.

Following the first major exports of dairy and beef semen to the U.S.A. in 1969, there was a four year lull while the American Government considered animal health regulations. Three day sickness is unknown in the U.S.A., and America, which like Australia jealously guards the health status of its national herd, was concerned about the risk of this disease entering in semen.

In response to requests from the American Shorthorn Breeders, the American Government finally approved entry of semen from Australian sires known to be free of this disease. To keep such bulls free, a place isolated from other cattle was needed. So the A.B. Centre at Ormiston was established in 1973.

Besides freedom from three day sickness, the bulls entering Redlands must be tested to ensure that they are free from Brucellosis, Vibriosis, and Leptospirosis—standard requirements for bulls on Queensland centres. Three day sickness is transferred by small midge (sandfly) type insects, hence Redlands bulls are housed to protect them from these disease carrying insects. The fact that the severe outbreak in Southern Queensland late in 1973 left the Redlands Centre untouched suggests that the system will work.

To satisfy the American Government requirements, all semen collections, processing and health testing of the twenty bulls on the Redlands Centre must be supervised by a Veterinary Officer of the Australian Government.

Bulls of the A.I.S., Sahiwal, Sindhi, and A.M.Z., breeds have been housed on the Centre so far. Because of the intensive and demanding system under which these bulls are held, their stay on the Centre is kept as short as possible. As soon as sufficient semen is collected to meet likely export requirements they are moved to the Wacol Centre.

The honour of breeding the A.I.S. bull whose semen was the first exported from Redlands, goes to a N.S.W. breeder, Mr. A. W. Downes of Jamberoo. His bull, "Roo View Falcon" was purchased by the Department of Primary Industries and entered the Centre in March 1973. However since that time, noted Queensland A.I.S. Studs such as Trafalga and Cerana have been represented in despatches to the U.S.A.

Because very few Queensland cattle reach maturity without being exposed to three day sickness, usually only young bulls are able to pass the stringent health tests Redlands entry requires. Thus most of the young bulls in the Department's A.I.S. Proving Scheme make their first semen donations at Redlands. This semen is then transferred to the Wacol Centre for distribution to Bull Proving co-operators throughout Queensland.

Queensland semen in America is handled by the original group of Shorthorn breeders. This group have now registered their breed society as the International Illawarra Association, thus perpetuating the name of this famous Australian breed.

The first calves have now been born in America from semen forwarded in 1973. The breeders of these cattle, members of the International Illawarra Association, recently visited Redlands Centre and were free with their praise for these calves, and daughters of the sires whose semen went to America in 1969—bulls such as "Sunny View Minerva's Echo" a Wacol A.I. Proven Sire. These cows are proving very successful in American Shorthorn herds in which they are milking.

Semen from Sahiwal Bulls as well as A.I.S. has now been exported to America, and it is planned that semen of the Sindhi and A.M.Z. breeds will soon follow.

Redlands A.I. Export Centre has made it possible for the A.I.S. Breed to be extended to America, and no doubt its influence will spread further.

The knowledge gained in meeting this export challenge will help other breeds. Semen from Australian Beef and Poll Shorthorns, Poll Hereford and A.I.S. cattle is expected to meet a ready demand in Britain now that a suitable health test formula for entry to that market has been determined. Other export markets will follow.

The Redlands A.B. Export Centre will provide the facilities to meet these markets as they develop.

A gift from Australia

Pakistan Airways Flight 236 of January 28 1975 was very important to Charles Smith and Mohammad Rafiq Raja of the Islamabad Dairy Project in Pakistan. On that flight, 30 hours out from Sydney there was arriving 5000 doses of semen from Pure Bred A.I.S. Cattle—an Australian Government Gift purchased from the Wacol A.B. Centre.

As Director of the Pakistan Government Dairy Project (previously an Australian Aid Adviser) Charles had arranged the importation to Pakistan of some pure bred A.I.S. Cattle two years ago. Now he is following it up with semen not only to use on these cattle, but also to introduce new genetic material into other Government herds in Northern India and Pakistan.

Export shipments such as this are becoming a regular part of the Artificial Breeding Services provided by the Department of Primary Industries.

A.M.Z. semen to Trinidad, Malaysia and Burma; Droughtmaster and Braford to Burma, Malaysia and Fiji; Friesian and Sahiwal to Fiji, New Guinea and Hong Kong; A.I.S. and Brahman to New Zealand.

Government livestock agencies and private stock breeders in those places have all been involved with these exports.

Semen from Queensland sires will help upgrade local cattle in countries where assessment and selection programmes can not be implemented because of the small numbers of native cattle. The intensive selection which is applied by Queensland Breeders of beef and dairy cattle and the performance testing which backs our A.I.S., A.M.Z., and Friesian bulls makes the Wacol Centre an important source of genetic material for upgrading these herds.

Supplying this semen to overseas countries is important to Queensland semen users also—the premium price which these countries pay helps to keep down the cost of producing semen for domestic sale.

Semen is supplied for Queensland use at prices far below those ruling in other states.

Stocks of Semen are held on consignment at Wacol A.B. Centre from the following Agencies

Artificial Breeding Board of Western Australia

Animal Breeding Services (Aust.) Pty. Ltd.

Dalfarm A.B. Services—Corhan Golden Genes

Dairy Industry Authority of New South Wales

Victorian Artificial Breeders Co-op. Society Ltd.

Milk Marketing Board of England and Wales

New Zealand Dairy Board

Semex (Canada)

Semen has been procured through Wacol from the following Production Centres

Australia

Artificial Breeding Board of Tasmania

Bovine Semen Pty. Ltd.

King Ranch Pty. Ltd.

Australian Artificial Breeders Pty. Ltd.

Overseas

Avoncroft Cattle Breeders

Cambridge Cattle Breeders

Hampshire Cattle Breeders

Scottish Milk Marketing Board

As semen from other centres, either local or overseas, becomes available for sale in Australia and is required by Queensland stock-owners it will be obtainable through Wacol.

Supplies of semen and liquid nitrogen are available direct from Wacol Centre or from Distribution Centres operating in Queensland. Local stocks are held at Tablelands A.B. Co-op., and will soon be available at Rockhampton and Mackay.

Bracken Fern Poisoning

OF the ferns known to be toxic to farm animals, those most commonly implicated in poisoning are bracken (*Pteridium* spp.) and rock fern (*Cheilanthes* spp.). This article looks at the problem, and suggests methods of control.

BRACKEN fern is commonly found in regions of high rainfall from Tasmania to North Queensland. In these regions poisoning occurs as a sporadic disease, highly fatal in cattle.

Since considerable quantities of fern need to be eaten to produce illness, losses are usually light, although there have been some cases of heavy mortalities. Possibly the losses are heavier than is realised, as affected stock generally die suddenly with little forewarning and no external signs.

Rock ferns have also been suspected of causing similar sudden death in cattle and sheep.

In horses, bracken fern induces a thiamine (Vitamin B^1) deficiency which can lead to inco-ordination and death.

The toxic factor for cattle in bracken fern has not yet been identified. Experiments have shown that large amounts of plant (in excess of 100 lbs.) must be eaten to cause illness in cattle and that the toxicity of the plant varies with the stage of development.

Immature fronds are more toxic than mature fronds, while underground stems are much more toxic than the young fronds. This needs to be taken into account when cattle have access to recently ploughed ground.

Most cases of poisoning in the field are due to cattle eating bracken fern when other feed is in short supply.

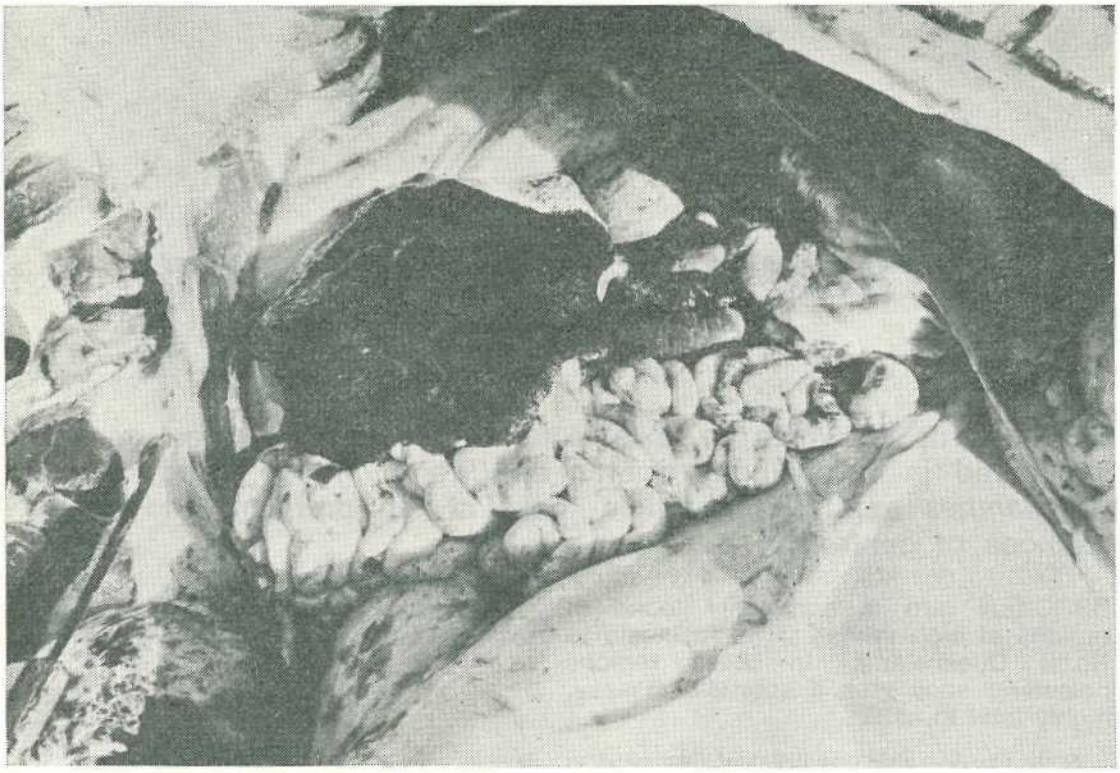
SYMPTOMS

Although bracken fern is essentially a slow process, death often occurs suddenly without symptoms being shown. Affected animals are dull, have a poor appetite, high temperature and blood stained dung. There may be bleeding from all natural body openings and the urine may be coloured dark brown. Some animals develop a swelling in the throat region.

POST MORTEM

The most spectacular and characteristic changes are seen on post mortem. There are often large multiple haemorrhages under the skin and on the surface of the lung, heart, rumen, intestines, liver and kidneys. Usually there is a severe haemorrhagic gastro-enteritis with blood in the intestinal tract. In young calves the evidence of haemorrhages may be less obvious.

by R. W. BENNEDICK,
formerly Veterinary Officer,
Atherton.



Large multiple haemorrhages seen here are typical of bracken fern poisoning on post mortem examinination.

Haemorrhages may vary in size from a pin head to broad sheets several inches in diameter. Two types of change may occur in the fourth or true stomach. In most cases the folds are of normal size, but contain numerous shallow ulcers, while in other cases the folds of the lining membrane are greatly swollen and distended with fluid.

The lesions associated with bracken fern poisoning result from a depression of bone marrow activity. There also appears to be an anti-clotting factor involved which is responsible for the haemorrhages observed.

TREATMENT AND CONTROL

In overseas countries the treatment of affected animals has been aimed at the stimulation of bone marrow activity with batyl alcohol. However this drug is not presently available in Australia. Blood transfusions can be used in valuable animals which are affected, but these must be given in the early stages.

Therefore every effort should be directed towards preventing bracken fern being eaten in sufficient quantities to be harmful. If possible, paddocks containing fern should be used only when pasture feed is plentiful. The development of improved pastures may help to limit the spread of fern and the advice of agriculture advisers should be sought on this matter.

Phosphorus supplements such as sterilised bonemeal based licks should be provided, while overstocking of bracken infested paddocks should be avoided.

As the disease tends to be seasonal, ensure that young stock, which are most susceptible, are supplied with adequate feed during spring and autumn months.

CHAROLAIS X BRAHMAN CATTLE

by P. L. CORLIS and T. H. RUDDER,
Beef Cattle Husbandry Branch.

AT two different locations in Central Queensland Charolais X Brahman cattle produced greater weight per day of age than high grade Brahman cattle.

The crossbred cattle had a more uniform equable temperament when compared with the Brahman cattle, which were generally good by breed standards.

Their tick resistance was marginally lower, but their superior growth rate indicated that the crossbred cattle had sufficient resistance for the particular environment.

Since semen has become available, Central Queensland graziers have been exploring the merits of the large European breeds. To date, the Charolais has attracted most attention, and in this region is usually used to produce Charolais X Brahman cattle.

The purpose of this article is to report the comparative growth rate and temperament of Charloais X Brahman cross breds and high grade Brahmans. Data were collected from two different locations, namely "Greenfields", Jambin and "Tartrus", Marlborough.

"Greenfields" is about 60 km south of Rockhampton, where the cattle grazed pastures of primarily Green panic, and Buffel species. Stocking rate during the pre-weaning period was approximately 1·6 ha per breeding unit.

Growing cattle were stocked at about 1·2 ha per head. Long term rainfall averages 674 mm annually with a predominantly summer incidence.

The Charolais X Brahman cattle were produced by inseminating primarily ¾ Brahman ¼ Hereford cows with Charolais semen. It follows that the crossbred progeny contained 4/8 Charolais 3/8 Brahman and 1/8 Hereford. Brahman cattle used for the comparison were primarily 15/16 Brahman and 1/16 Hereford. Three Charolais and five Brahman sires were represented in the progeny.

During the pre-weaning period both male and female progeny of each breed were grazed together in each paddock. After weaning the sexes were segregated.

Weights, shown in table I, were recorded at average ages of 6 and 18 months.

TABLE I

EFFECT OF BREED, AND SEX ON WEIGHTS AT 6 MONTHS AND 18 MONTHS OF AGE, AND GAIN 12 MONTHS POST WEANING (kg)*

	Heifers		Bulls	
	Charolais X Brah.	Brah.	Charolais X Brah.	Brah.
Number	14	77	21	82
Weight at 6 months	248	187	263	215
Weight at 18 months	426	339	493	400
Gain Post Weaning	178	158	230	185

* Weights are arithmetic mean of weight corrected to 6 and 18 months.

This table shows that the Charolais X Brahman cattle were markedly heavier at both ages and grew faster during the post weaning period. An analysis showed that the initial weight did not influence post weaning gain.

The temperament of the Charolais X Brahman cattle was better than that of the Brahmans. This difference was primarily due to the absence of nervous animals in the crossbred group.

Casual field observations indicated that the Charolais X Brahman group were slightly more susceptible to tick infestation than the Brahman cattle. In this particular environment the apparent difference in tick resistance was not reflected in growth, and is therefore of little importance.

"Tartrus", 113 km north west of Rockhampton, has an average annual rainfall of 561 mm, most of it falling during summer.

The Charolais X Brahman bulls were produced by inseminating cows of approximately 7/8 Brahman 1/8 Hereford breeding with semen from seven Charolais bulls. During the pre-weaning period these cattle were bred and raised on pastures which are primarily black spear grass. Brahman bulls were straight bred, and were reared on Green panic pastures during the pre-weaning period. They were the progeny of five Brahman bulls.

From an average age of 10 months both groups of bulls were grazed on improved pasture on brigalow country for the following 11 months. Initial and final weight, and gain during the trial period are given in Table II.

TABLE II

MEAN GAIN OF CHAROLAIS X BRAHMAN AND BRAHMAN BULLS (kg)

—	Charolais X Brahman Bulls	Brahman Bulls
Number	34	25
Initial Weight (10 months) ..	216	249
Final Weight (21 months) ..	491	428
Gain (11 months)	275	179

This table shows that the Charolais X Brahman bulls gained faster than the Brahman bulls during the trial period. Initial and final weights cannot be compared because of the difference in pasture during the pre weaning period.

Separate analysis showed that initial weight affected gain. The total difference of 96 kg can be divided into 9 kg attributable to difference in initial weight, and 87 kg attributable to difference in breed.

The temperament of the crossbred bulls was more uniform than that of the Brahman bulls. Consequently, as a mob the Charolais X Brahman bulls were quieter than the Brahman bulls, which have better than average temperament for this breed.

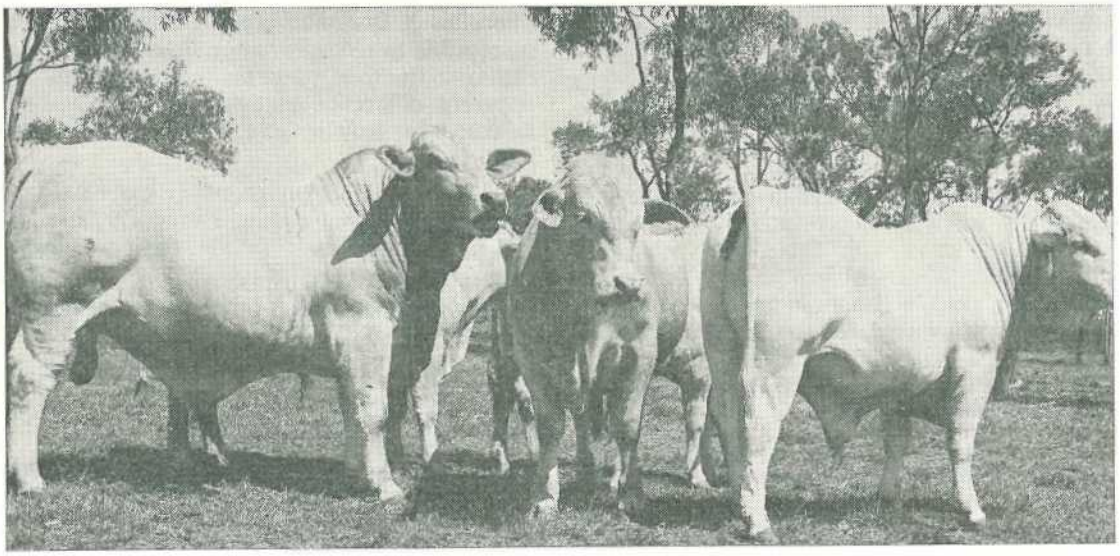
The data collected implies that from the viewpoint of growth, Charolais X Brahman cattle will perform better than high grade Brahman cattle. However, it must be remembered that this work was done on improved pasture on brigalow country.

Temperament of these crossbred cattle was more satisfactory as a mob because there were no nervous animals represented. By contrast the Brahman group contained odd nervous animals.

While the crossbred cattle appeared to be less resistant to ticks growth differences suggested that the difference was not important. Tick susceptibility is important only when it affects performance.

The authors gratefully acknowledge the contribution made by Mr. R. F. Maynard, "Greenfields," Jambin, and Mr. G. E. McCamley, "Tartrus," Marlborough for again making cattle and labour available for studies on animal performance.

Charolais X Brahman bulls in Central Queensland.



A Guide to the Control of External Parasites of Poultry

Prepared by J. A. GORDON, Veterinary Services Branch

AT some time or other external parasites are a nuisance factor or an economic factor on most properties where poultry are kept. Deaths resulting from parasite infestation are rare but production losses often occur because of irritability stresses which are placed on the birds.

As well the transmission of disease organisms such as spirochaetosis may occur under a fowl tick or red mite infestation.

IF farm employees and fowls are to give of their best, it is important that parasites do not cause discomfort to either.

While there are a number of species of external parasites affecting poultry, these can be generally divided into four groups. These are—lice, mites, ticks, fleas.

Regular checks for parasite infestation are done on the majority of layer farms. If both sick and healthy birds are checked at random through the property from time to time then it is unlikely there will be parasite infestation to the point of economic loss or staff discomfort.

Lice

Lice can be identified as wingless insects which are flattened. They are light straw-coloured, and some are able to move very quickly.

There are several species of lice that are known to infest fowls. As they spend the whole of their life on the bird, they are probably the most easily found and controlled of all external parasites. The different species of lice appear, in many instances, to inhabit specific parts of the body, so that they are commonly known and classified according to where they are found. For example, the head louse is found on the head of the bird, and likewise for fluff louse, body louse, wing louse and shaft louse.

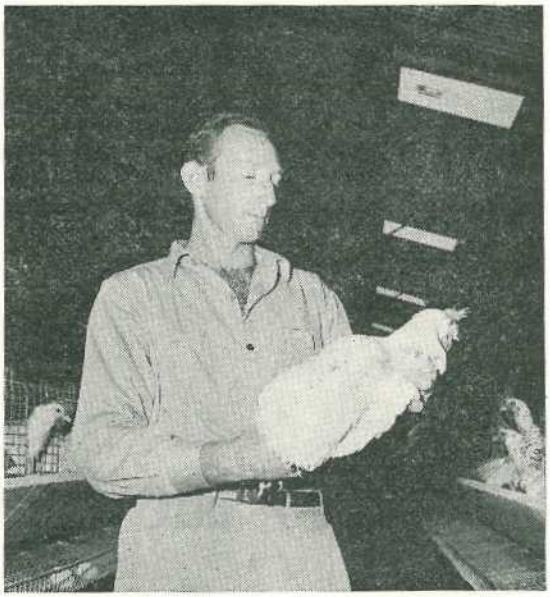
Life Cycle

The life cycle of the louse occupies about 2 to 3 weeks and the whole period is spent on the host. One pair of lice may produce as many as 120,000 descendants in a period of a few months. The eggs are attached to the feathers in clusters, and hatch to produce offspring similar to the adult. The louse matures after three moults, all stages resembling the adult louse.

The normal life span of lice is several months, but they die if isolated from the host for more than 5 to 6 days. Their food consists of pieces of cast-off skin and feathers.

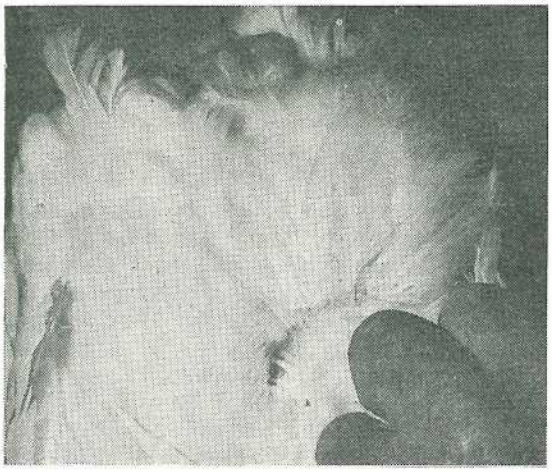
Effect on Birds

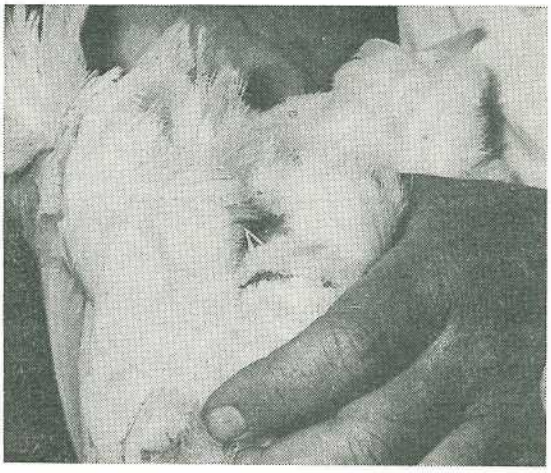
The two most important lice are the head louse and the body louse. The head louse is usually found on the heads of young chickens where they cause serious irritation, characterised by flicking and shaking of the head, while in severe cases the lice may be seen on the bare areas of the face. Heavy infestations of head lice have been known to cause deaths in young chickens.

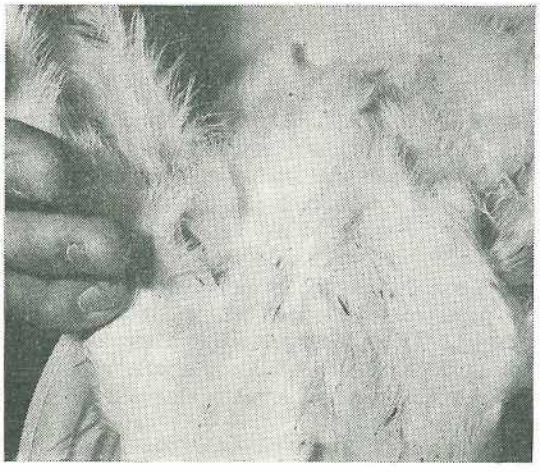


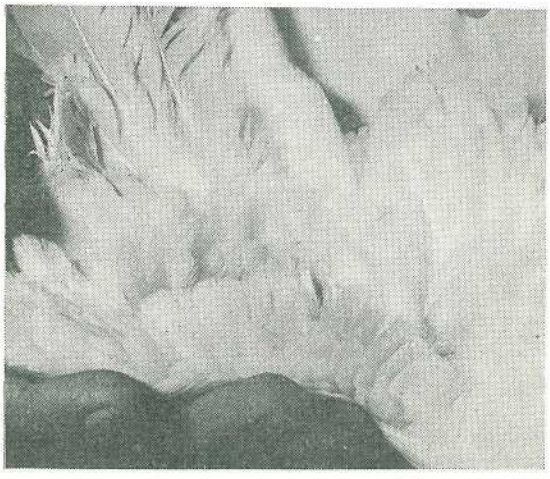
Above: Egg production drops when birds are submitted to stress from lice and mite infestation.

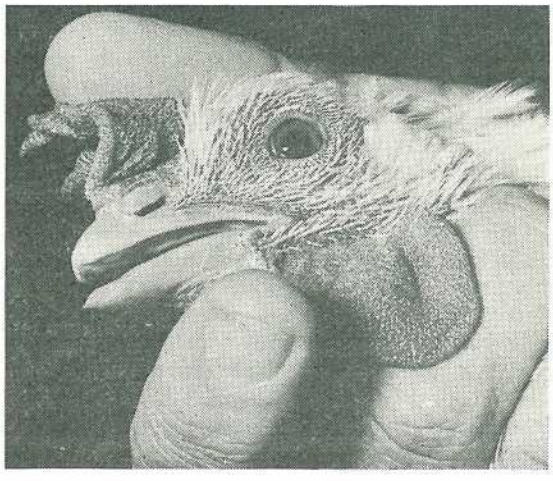
Below: Farm staff are likely to be more contented if not plagued by lice and mites.



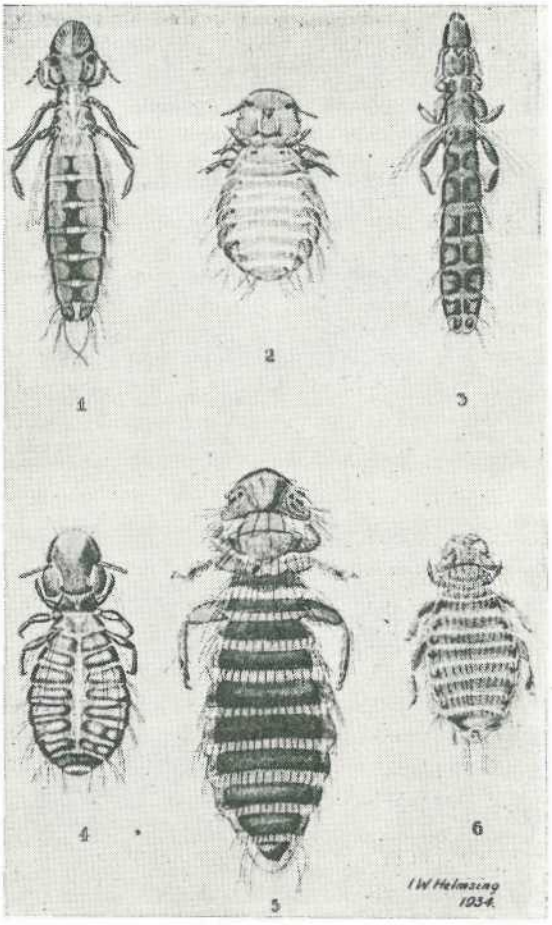








Regular checks for parasites prevents infestation. Farmer is seen inspecting layer in back area (top left), vent area (top right), thigh area (middle left), in wing area (middle right) and in head/face area (below right).



Poultry lice (all enlarged 24 times) (1) Wing louse; (2) fluff louse; (3) slender pigeon louse; (4) head louse; (5) body louse; (6) shaft louse.

The body louse occurs mainly on grown birds, and is a cause of serious irritation which results in a reddened scabby skin, ill-thrift and a decrease in egg production. The body louse has been known to eat the skin at the base of the feathers and to live on the blood that oozes out.

If lice are suspected, their presence may be confirmed by an individual inspection of the birds. The feathers on the more protected portions of the bird's body (for example, under the wing and fluff on abdomen) should be parted and the skin inspected. If lice are present they will be seen moving quickly from the exposed area.

Where infestation is heavy, matted clumps of lice eggs may be found attached to the feathers around the vent and wings.

Mites

Though there are a number of species of mites that may affect domesticated fowls, there are only a few types found in Queensland. Some species of mites, though present on the bird, seem to do little harm. The following three types, however, are of significant economic importance: red mite, tropical fowl mite and the scaly leg mite. Parasitic mites in general are barely visible to the naked eye. The adult mite has an unsegmented body with eight legs, while the larval stages have only six legs.

Life Cycle

The life cycle of a mite may take as few as 7 days to complete. The adult female lays her eggs in the birds' surroundings such as cracks and crevices in the buildings and equipment. She does this within 12 to 24 hours after her first meal of blood. Under good conditions, the eggs hatch in 48 to 72 hours. They produce six-legged larvae which moult within 48 hours to produce the first stage blood-sucking nymphs. These become adult after two more moults, about 24 to 48 hours apart. All stages except the first six-legged stage are blood sucking.

Tropical Fowl Mite

These mites, which are also known as "sparrow lice", are most prevalent in tropical and sub-tropical climates. Wild birds (such as sparrows and doves) which can be infested with tropical mites are important in the transmission of the parasite from farm to farm.

The tropical mite resembles the red mite with the exception that it may be found on the birds both day and night. The mites are vicious blood-suckers and birds affected become anaemic, a condition shown by paleness of the comb and wattles. A drop in production follows in laying birds and death may occur in very young stock. Sitting birds may leave the nest, and laying stock may refuse to lay in infested nests.

Spraying for mite control between batches in brooder room.

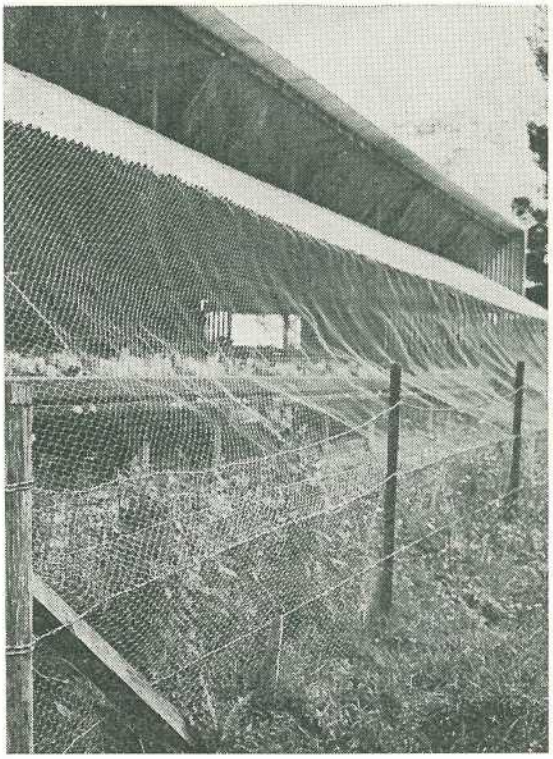
If the birds exhibit these symptoms, they should be inspected for parasites. This mite will be found in greatest numbers below the vent, about the tail or sometimes on the neck. A heavy infestation gives the feathers a dirty appearance and the skin becomes irritated and scabby. When heavily infested birds are being handled, the mites will crawl onto the body of the poultry farmer and cause severe irritation.

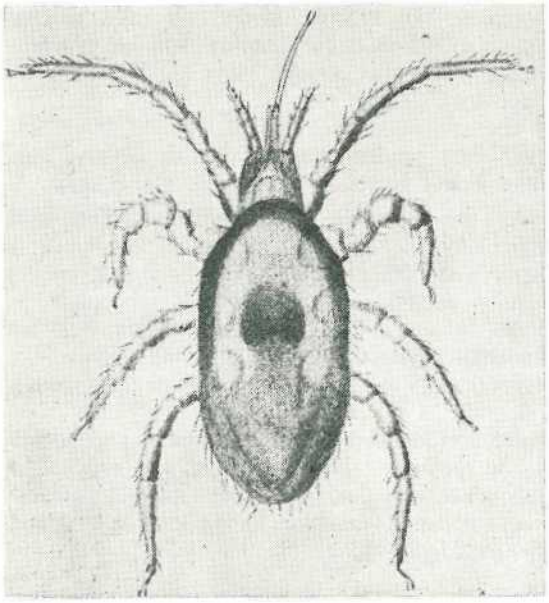
Red Mite

Though the red mite has a world-wide distribution, it is not very common in Queensland. It occurs in the cooler temperate climates such as the Darling Downs. It is about as big as a pin's head, being coloured grey in the unengorged state but becoming increasingly reddish as the blood content in its abdomen increases. In mature birds this mite causes anaemia with a severe drop in production while young stock and broody hens may die due to blood loss. It may also act as a vector (carrier) of the spirochaete organism causing fowl tick fever. As poultrymen know, this disease can cause heavy losses in fowls, ducks and turkeys.

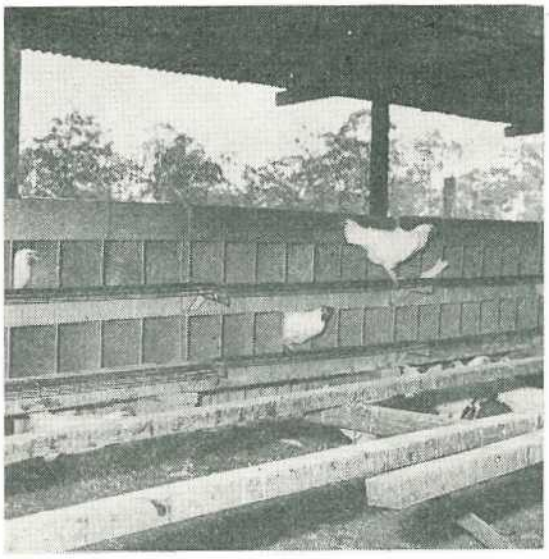
As the red mite feeds only at night and retires by day to the shelter of cracks and crevices in the poultry house and equipment, it may easily be overlooked. Care must be taken in searching the buildings as well as the birds. Where red mite is suspected a night inspection of the birds may be advisable. Better still, take a piece of stiff wire or blade of a knife, scrape and prod the cracks and joints in the walls of the sheds, and the cracks in equipment and perches. If you find blood and pieces of insect sticking to the wire when it is removed from the cracks, this will confirm the

Bird proofing of poultry houses is sound management in areas where sparrows and starlings are a problem. Mites are prevented entry to the poultry.



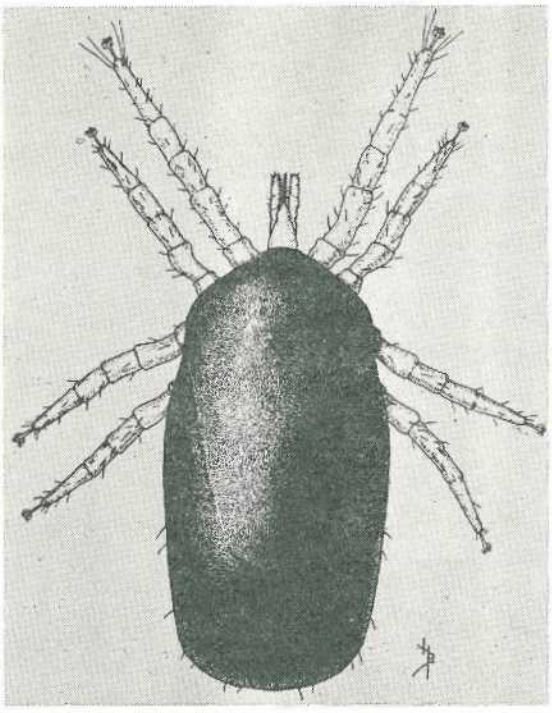


Tropical fowl mite (much enlarged).



Laying birds are reluctant to sit in infested nests.

presence of red mite or fowl tick. The presence of large larval ticks (3 mm across) firmly attached to the breasts of the birds will distinguish fowl tick infestation from red mite infestation.



The Red Mite (much enlarged).

Scaly Leg Mite

These mites occur more commonly in older birds. They are barely visible, spherical mites with short legs. Lesions are produced on the unfeathered portion of the host's legs and occasionally on the skin of the comb and wattles. The mites burrow in tunnels, and cause the scales to lump up and form crusts. Infestation starts between the toes, and works up the legs of the bird. In severe cases the birds become lame, walk with difficulty and may lose condition.

The active life cycle occurs under the skin of the host. Transmission is mostly by contact with infected birds and their surroundings. As the trend in commercial poultry husbandry is to keep birds for only one laying season, this parasite has assumed less importance than in earlier years when birds were kept longer.

Control of scaly leg mite should begin by culling and isolation of affected birds. All additions to the flock from other farms should

be inspected for lesions. The houses should be sprayed with a chemical similar to that used for the other mites, for example, malathion.

The legs of the affected birds should be washed in warm soapy water and then covered freely with some grease or oily product such as vaseline or old sump oil to cut off the air supply to the mites. Treatment should be repeated within 1 month if the distorted scales are not shed.

Depluming Mite

Infestation with depluming mite has been recorded in Queensland, but is certainly not very common. Loss of feathers has sometimes been attributed to this parasite, but in most cases this condition is due to cannibalism and feather picking. If the stumps of the feathers are examined and they are found to be surrounded with scales and crusts, then depluming mite may be suspected. If absent, then the loss of feathers is due to cannibalism or moulting. The depluming mite, being microscopic, cannot be seen with the naked eye.

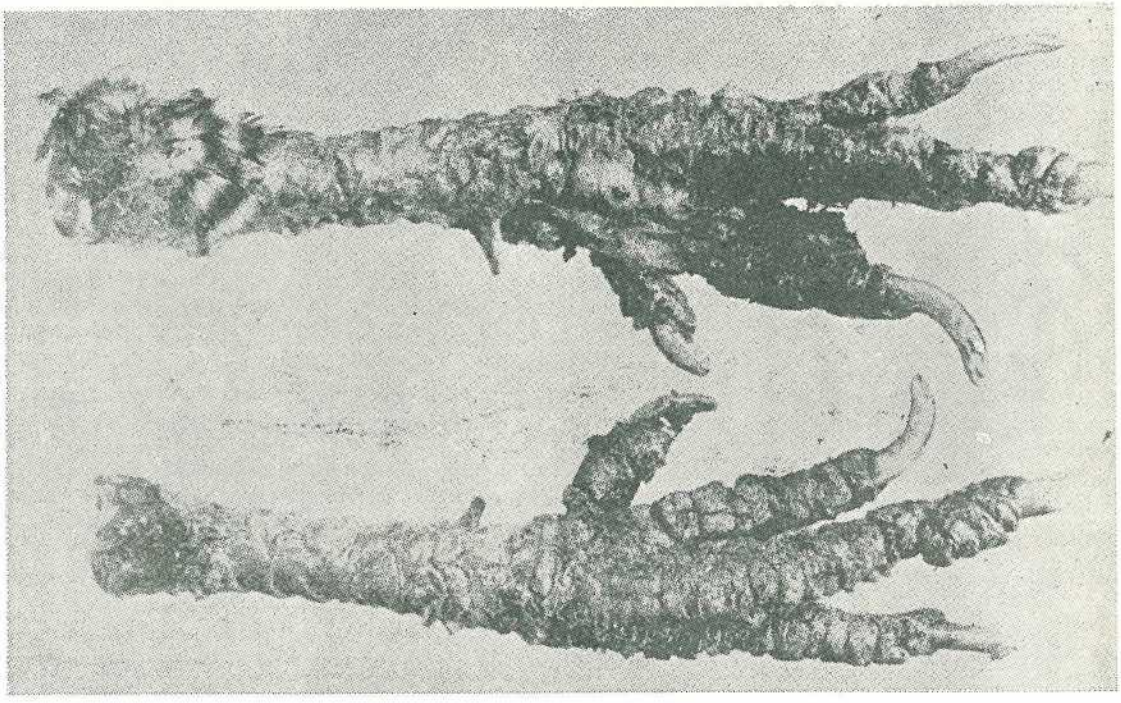
Ticks

Ticks are small blood sucking parasites which, like the red mites, feed only at night. They are flat, oval, brownish and about 5 mm long.

Life Cycle

Eggs are laid by the female tick in sheltered situations and hatch in 10 to 15 days. The six-legged larva emerges and attaches itself to the fowl, usually in the breast and thigh regions and under the wings. When fully engorged it drops from the bird and seeks a sheltered place, moults and becomes an eight-legged nymph. After two more moults it becomes adult. All eight-legged nymphs and adults feed only during the night and spend the daylight hours in crevices and cracks in the birds' surroundings.

The fowl tick is a powerful blood sucker so that a general symptom of infestation is anaemia. However, increased irritation and loss in production also occur. The fowl tick



Infestation of scaly leg mite.

is the principle vector for the spread of spirochaetosis (fowl tick fever).

If the presence of fowl tick is suspected, the birds should be examined on the breast and regions under the wings for the larval tick. The larval tick which is an almost spherical, blue grey insect with three pairs of legs, will be found firmly attached in these regions. A short piece of wire or blade of a knife scraped in the cracks in the walls of the poultry house and under the bark of trees, will indicate the presence of adult ticks in the same manner as described for red mite.

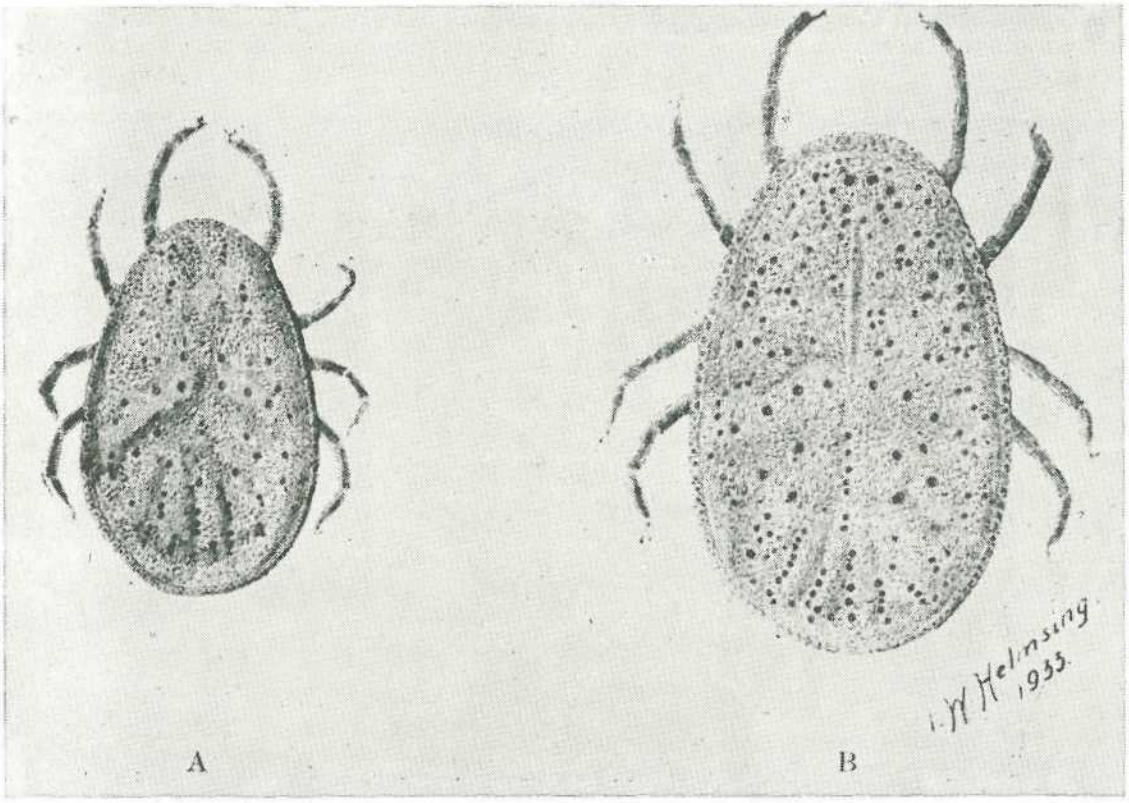
Fleas

A number of species of fleas has been found on poultry in Queensland. The most serious from the birds' point of view is the stickfast flea. Human, dog and cat fleas appear as brown-to-black-coloured, flat-sided insects which are able to move rapidly across the skin. The adult flea sucks blood one or more times a day.

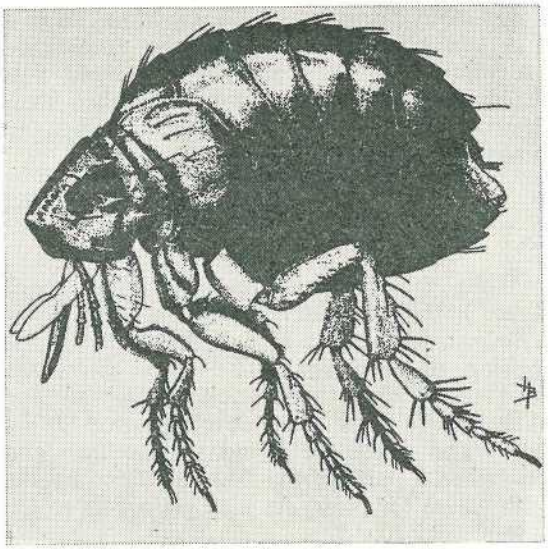
Stickfast Flea

The stickfast flea is gradually spreading to new areas of the State. Its eradication from poultry flocks is reasonably simple, however, if certain precautions are taken.

The stickfast flea of poultry was first discovered in Queensland in 1941 in the Boonah and Old Normanby Shires. Although an extensive quarantine and treatment programme by officers of the then Department of Agriculture and Stock contained the infestation within these areas for several years, it was found impracticable to confine the flea permanently as it is so easily spread by dogs, cats and even wild birds.



Poultry Tick (much enlarged); (A) male; (B) female.



Stickfast flea. The face, comb and wattles are areas on poultry where stickfast fleas are commonly found.

In recent years this parasite of poultry has spread along the coastal areas from Brisbane to Port Douglas, north of Cairns and many inland centres have also been infested.

The stickfast flea is a small, reddish brown, blood sucking flea and not unlike the common dog flea in external appearance. It has one distinguishing feature in that it attaches itself firmly to its host and remains attached for the period of its lifetime—hence the name.

The flea is found in clusters on the unfeathered portions of fowls such as the face, comb and wattles. In heavy infestations it may be found on other parts of the body as well. It will also attach itself to dogs, cats, domestic animals, wild birds and even man. On dogs and cats it is usually found between the toes, on the ears or on the soft skin of the belly. It can be recognised easily by the fact that it will not move when touched.

All blood sucking parasites are harmful in that they remove blood from the host and if present in sufficient numbers must consume blood in significant amounts. At the very least they are an extra stress factor with which the bird has to cope.

The stickfast flea can, in heavy outbreaks, cause deaths in young chickens and it can certainly cause lowered production in hens. Its effects are not always obvious and therefore are often underestimated.

The adult female flea, while attached firmly to its host, ejects one to four eggs in 24 hours on to the ground or litter on the floor of the pen. Under favourable conditions the eggs hatch in 4 to 6 days.

Eggs are normally laid at night while the host is resting, so that litter underneath perches or around dog kennels becomes very heavily infested with developing fleas.

A larva hatches from the egg and spends 2 to 3 weeks under the surface of the soil or litter before it pupates.

The young flea emerges from the pupa in approximately 2 weeks and then attaches itself to the host.

If conditions are unfavourable to the development of the young flea, the life cycle may extend over a period of months.

Easily spread

Because the stickfast flea is spread so easily, it is remarkable that it has not been found much more commonly. Dogs and cats are a serious hindrance to the control of the flea because these animals roam freely carrying the parasite from farm to farm. As well, many

people take household pets with them on journeys or holidays and these pets may be carriers of the flea.

It seems significant that around Brisbane, the flea has been found mainly at seaside resorts. The flea, it is presumed, was carried there by dogs or cats taken on holidays by their owners. Stickfast flea has been found in Manly, Cribb Island and Beachmere areas. Some years ago, a survey at Beachmere established that the flea is carried by doves and other wild birds.

Fowls are transported within the State either fowls are infested this can be a means of fowls are infested this can also be a means of spread.

Fortunately, so far, nearly all outbreaks of stickfast flea have been in household flocks. This may be due to the fact that the commercial poultry keeper pays more attention to the spread of such parasites. However, the flea is now spreading gradually throughout the State and commercial poultry keepers should be on the alert to prevent its entry to their farms.

With a knowledge of the life cycle of the flea, and how it is spread, it is not difficult to keep it off your property. The first step is to ban the introduction of any adult fowls or "started stock", dogs, cats or crates from infested areas. Any pets that are introduced should be examined and treated for the flea. Where possible, steps should be taken to prevent outside dogs and cats from straying onto the property.

Control

Because the larva and pupae are under the litter or soil, the spraying of such litter is usually not very effective. However, the spraying of small areas of litter or ground such as around dog kennels can be helpful in eradicating the flea.

Treatment should be started immediately the parasite is noticed, and carried out regularly until the flea is eradicated.

Even then, further treatments at intervals of 2 months should be given in order to protect the birds from re-infestation due to delayed development of larvae.

In poultry pens with cement floors, eradication will be helped by the cleaning out of litter from all infected pens. This litter should be disposed of by burning, as it will contain many eggs and developing larvae.

On many farms, cats are allowed to run wild and can be a hindrance to the eradication programme. If they are not household pets which can be caught and treated, then their destruction will simplify the eradication programme.

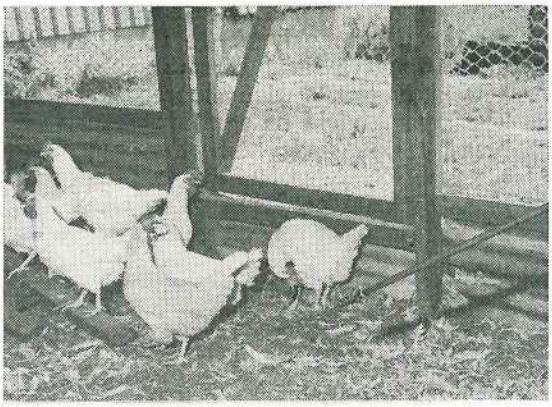
Mosquito

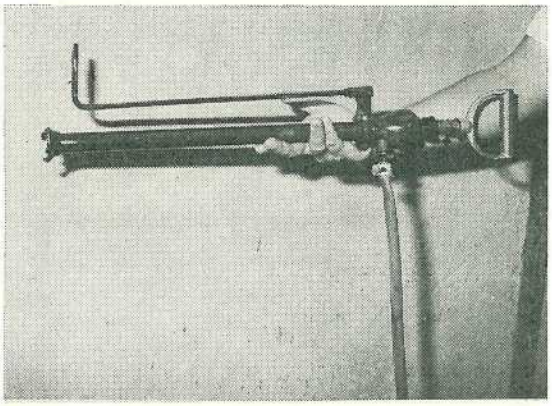
While the mosquito does not cause much direct harm to poultry, except to cause some irritation, it does act as a vector in the transmission of fowl pox. The virus enters the fowl's body when the mosquito bites it and the characteristic pox wart develops around the bite. The warts are found on the face and unfeathered parts of the body as these are the sites where the mosquito may get access to the skin to suck blood.

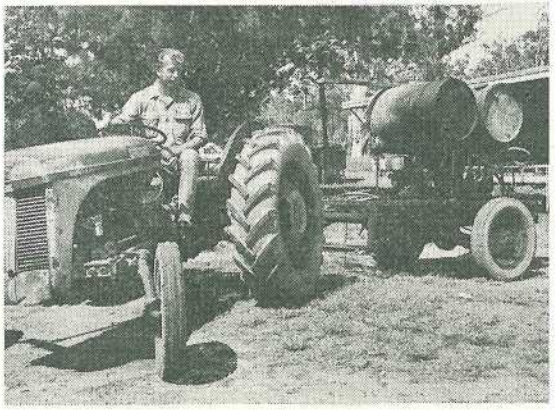
Where practical, the numbers of mosquitoes should be kept down by removing and destroying possible breeding areas. The disease, fowl pox, may be prevented by vaccination with either pigeon pox or fowl pox vaccines.

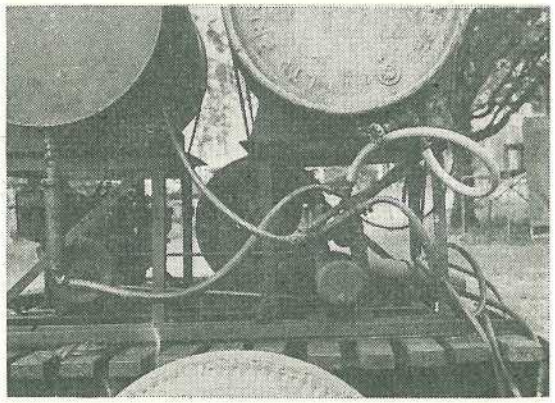
General Recommendations for External Parasites

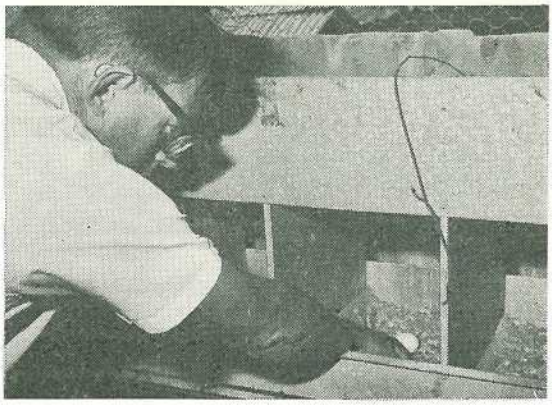
- Isolate introduced stock until you are satisfied that they are clean.
- If external parasites are found on the new stock they should be treated with a suitable insecticide.
- Used equipment, such as feed hoppers, being introduced to a property, should first be thoroughly treated with a suitable insecticide.
- Old crates used for the transport of poultry between properties should be treated with an insecticide.
- Where lice, or tropical fowl mite are the problem, it is of primary importance to apply the treatment to the birds. Sprays or dusts may be used. Dusts are useful for the backyarder who has the time to handle each bird. Dusts are applied to the bird by means of a shaker or puffer, care being taken that the dust penetrates well.











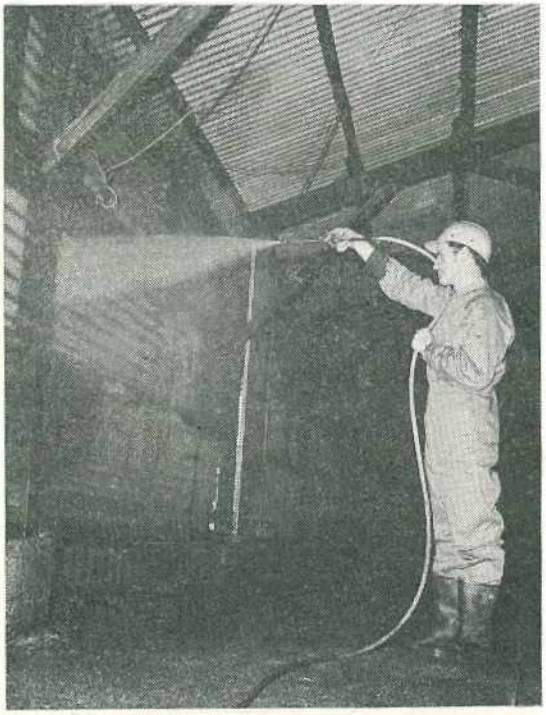
Above left: Backyard fowls being sprayed for lice control.

Above right: Stirrup pump used for spraying small flocks.

Middle left: Large Farms require large and more sophisticated equipment.

Middle right: Close up of plant as in middle left.

Below right: Applying insecticide dust to breeding flock nest boxes.

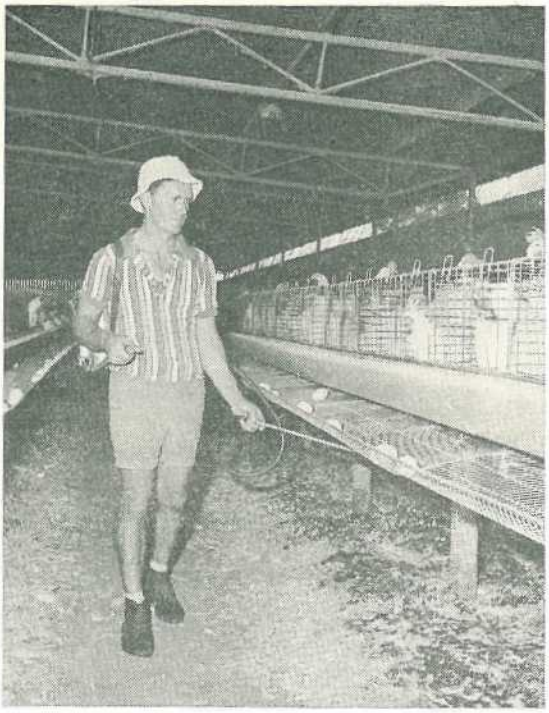


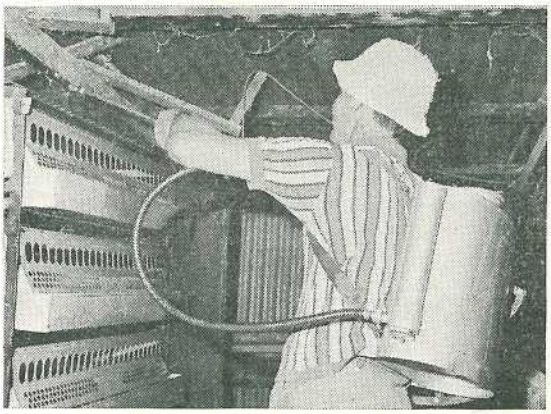
When spraying, it is necessary to make the birds thoroughly wet to obtain penetration. About 5 litres of spray solution per 100 birds should give the required result. The spray should be applied heavily in the breast region, under the wings and around the vent. Spraying finds its best application in commercial poultry farming where large numbers of birds require treatment.

- Where red mite, fowl tick, or fleas are found, the housing and equipment should be treated. Here again, sprays give the greatest penetration and would be the best commercial proposition. Dusts could be used to some advantage in the nesting areas. The spray concentrations used on the buildings are usually double that used on the birds. Greatest attention should be given to the penetration of the spray into cracks and crevices in the building and equipment. Avoid contamination of water and feed.

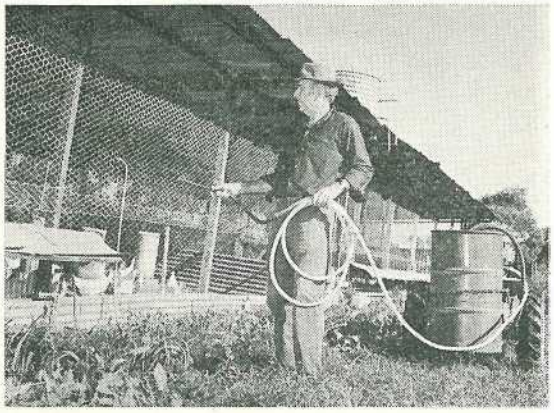
Contract spray operators are used extensively by larger farms.

Applying insecticide to both above and below the birds in the one operation appears to give the best kill of parasites. Farmer is seen here spraying down onto birds then up onto birds.



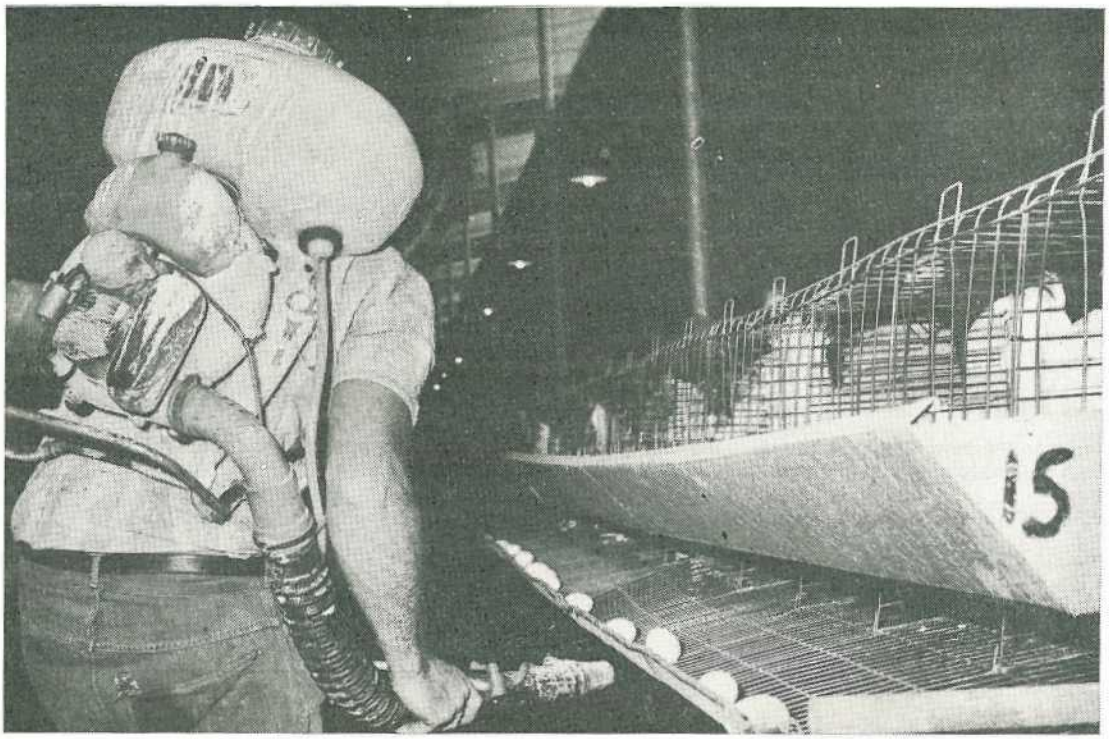


Knapsack sprays are still widely used but power units are becoming more popular.

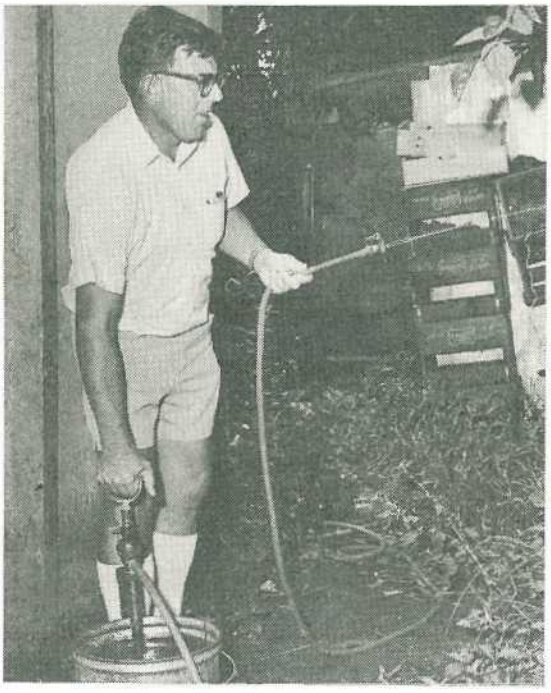


A handy unit operated off the P.T.O. of a light farm tractor.

Home made unit driven by electricity. Cheap to make. This unit serves 8,000 layers and 8,000 rearing stock.



Misters are becoming quite popular. Some models however have a tendency to vibrate thus tiring the operator.



- It is often a good policy to treat both the birds and their environment with an insecticide regardless of which external parasite is present.
- A repeat treatment should be carried out about 1 month after the first and further treatments carried out as required.

Chemicals currently used for external parasite control are considered to be quite satisfactory. Where hand operated knapsacks are used the job can be a tiresome one and one which is not welcomed. Where motor driven sprays are used the job is quite easy if done regularly. Investment in power units is money well spent. Spraying birds both from beneath and top appears to give the best kill.

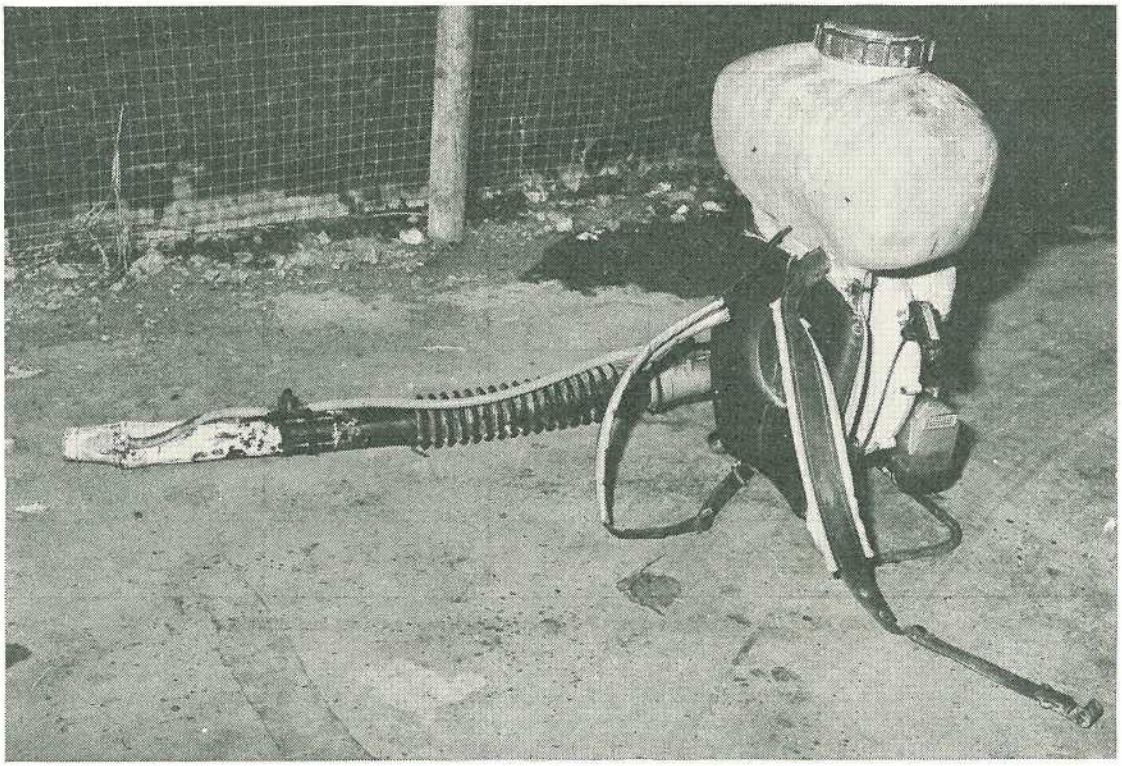
Hand operated pump (stirrup pump) suitable for use in smaller flocks. However it is being superseded by power units.

Generally speaking, farmers arrive at varying programmes suitable to their operation. Where severe outbreaks of parasites occur, it usually follows a breakdown or alteration in the routine programme.

Commercial preparations available for external parasite control on poultry include

Glencarbaryl	Dylox
Carbaryl 80	Dipterex
Opigal 50	Neguvon
Selleys Insect Powder	Malathion 50
Garden King Derris Dust	Malathion Poultry Dust
Nankor 40E	Malawash
Lanokil	Hydrol

The recommendations which follow are general. It must be remembered that there are a great variety of commercial preparations available using varying strengths of chemical. For the best and safest use of insecticides the directions on the label should be followed closely.



This mister services a 70,000 bird unit. One can expect misters to become very popular particularly those models which are light, versatile, maintenance free and vibration free.

Prevention	Where and When to Apply	Strength	Rate of Application	Remarks
Lice, Mites and Fleas				
Malathion	Applied directly to birds	4% dust ..	450 g per 100 birds	
		0·5% spray ..	5 l per 100 birds ..	
	Applied to Poultry houses	1% spray ..	9 l per 100 m² ..	Ensure thorough coverage
		4% dust ..	450 g per 4 m² ..	
	Roost Paint ..	3% solution	570 ml per 50 m ..	
Carbaryl	Applied directly to the birds	5% dust ..	450 g per 100 birds	
	Applied to Poultry houses	5% dust ..	450 g per 4 m² ..	..
		0·5% spray ..	7 l per 100 m² ..	
Fenchlorphos ..	Applied directly to birds	5% dust ..	450 g per 100 birds	Ensure thorough coverage
		0·25% spray	5 l per 180 birds ..	
	Applied to Poultry houses	1% spray ..	5 l per 100 m² ..	Spray sheds when empty
Trichlorphon ..	Applied to Poultry and poultry houses	0·1% spray ..	5 l per 40 m² ..	Ensure thorough coverage do not spray in water
Derris	Applied directly to birds	2% dust ..	450 g per 100 birds	Work into feathers
Phenol	Applied to Poultry houses	10% spray ..	Ensure thorough coverage	Spray pens when empty—leave pen vacant for two days before placing stock
Fowl Tick				
Malathion	Applied to infected poultry houses and equipment	3% spray ..	7 l per 100 m² ..	Ensure thorough coverage of walls, ceilings and floors
Carbaryl	Applied to infected poultry houses and equipment	2% spray ..	7 l per 100 m² ..	Ensure thorough coverage of walls ceilings, and floors
Phenol	Applied to Poultry houses and equipment	10% spray ..	Ensure thorough coverage	Spray pens when empty—leave pen vacant for two days before placing stock
Stickfast Flea				
Malathion	Applied directly to birds	0·5% spray ..	Ensure thorough coverage	Two applications of spraying at 5–7 days apart
	Applied to Poultry houses and equipment	0·5% spray ..	Ensure thorough coverage	
	Applied to nest and floor areas	4% dust ..	450 g per 2 m² ..	Two applications of dusting at 28 days apart

NOTE: Stickfast flea is best controlled by combination of spraying and dusting.

GRAIN SORGHUM VARIETIES for 1975-76 season

GRAIN sorghum varieties recommended for planting in Queensland in the 1975-76 season are listed on pages 489 to 493.

In the table, the varieties have not been ranked in order of preference by various regions.

The varieties listed 'for trial' should be sown in smaller areas for evaluation under your conditions.

It would be appreciated if farmers would advise their Agricultural Extension Officer of trial plantings as this will enable a wider evaluation of the performance of these hybrids to be made.

SOME hybrids appear to be closely related and are therefore interchangeable, for example Texas 626 and NK 212, and Goldfinger and NK 233.

The hybrid, Pioneer 846, and the open pollinated variety Alpha show a marked reaction to the insecticide monocrotophos and have not been recommended for districts which were heavily infested with spur throated locusts during the 1974–75 season.

Compiled by
S. R. WALSH,
Agriculture Branch.

Some hybrids react adversely to periods of stress and heavy lodging may result as the plants near maturity.

Where these varieties have been recommended it is assumed that they will not be sown unless adequate soil moisture would be available to the end of grain filling.

Some varieties, for example E 57, Sunlover I and Q 5161 lodge less than others.

Open-headed varieties are desirable in the more humid regions.

Planting Rates

The planting rates refer to desirable established plant stands, and will be varied according to available soil moisture, time of planting and soil type. Your Agricultural Extension Officer will provide further information on planting rates.

Grain sorghum seed sold by major seed companies is of high quality and is required to have a laboratory germination of 80% or higher.

Seed size varies with hybrids but is generally in a range of 20 000 to 35 000 seeds per kilogram: seed of Alpha is much smaller and generally ranges from 45 000 to 65 000 seeds per kilogram.

APPROXIMATE PLANTING RATE FOR GIVEN PLANT POPULATIONS

Plants/Ha	Planting Rate
50 000	2·5
75 000	3·75
100 000	5·0
150 000	7·5

Adjustments must be made for higher or lower populations and small size seed, e.g. Alpha. The efficiency of planting machinery is also variable.

Mosaic Virus

Grain sorghum varieties being grown commercially in Queensland are all susceptible to the Johnson grass strain of sugarcane mosaic virus. The virus is a aphid-transmitted and is maintained between seasons in Johnson grass or stand-over fodder sorghum crops.

Symptoms on infected sorghum plants depend on the variety and environmental conditions. Some hybrids show a conspicuous red striping when infected and early infection results in severe stunting. In the following tables, hybrids susceptible to the red stripe reaction are marked *.

Some other hybrids, after cool conditions, develop a red leaf symptom when infected by the virus. The mosaic symptoms change to red spots, streaks and areas of dead tissue. Hybrids susceptible to the red leaf reaction are designated † in the tables.

In some circumstances, the severe red stripe and red leaf diseases can considerably reduce yield. Resistance to sugarcane mosaic virus is being incorporated into some commercial breeding lines by the Department of Primary Industries. It can be expected that major seed producing companies will also incorporate this resistance in many commercial hybrids.

Head Smut

Head smut resistant hybrids are commercially available. Of the hybrids recommended the following are known to be head smut resistant:—

Texas 610SR, Texas 626, NK 212, Goldfinger, NK 233, Pioneer 846, Pacific 303, NK 300F, Texas 671, Dekalb E55e, NK 266, F 64a, Dorado E.

Known susceptible varieties and hybrids are:—

Alpha, E 57, Texas 610, Q 5161.

Rust

The relative resistance of varieties to sorghum rust (*Puccinia purpurea*) infection was obtained by field ratings during the 1974–75 season. The most resistant and most susceptible of the varieties are listed below.

MOST RESISTANT—Goldrush, Goldfinger, Dorado, Dekalb E57, Dorado E, Q 5161, Sunlover I, TE Y101.

MOST SUSCEPTIBLE—Alpha, PM 1, Texas 626, Dekalb E55e, Texas 610 SR, Pioneer 846, Dekalb C42t, Grainmaster.

GRAIN SORGHUM RECOMMENDATIONS 1975–76

REGION (DISTRICT OR SHIRES)	PLANTING TIME	VARIETIES L = slow maturing ML = medium slow M = mid season ME = midfast maturing E = fast maturing	PLANTING RATE plants/hectare
Far North Queensland—			
Mareeba, Cooktown, Peninsula	Dec.–Jan.	ML E 57 NK 300F	75 000–100 000
Atherton Table, Mount Garnet	Dec.–mid Feb.	ML E 57 NK 300F	75 000–100 000
North Queensland—		RAINGROWN	
Townsville, Ayr, Millaroo	Dec.–Mar.	ML E 57 Alpha ME Goldfinger NK 233 *For trial* ML NK 300F Pacific 303*	75 000
		IRRIGATED	
	Mar.–July	ML E 57 Texas 671 Pioneer 846 *For trial* L NK 300F Pacific 303*	250 000
Capricornia—			
Mackay—			
Nebo, North Broadsound, Mackay	Late Dec.–Feb.	ML E 57 Alpha Q 5161† Sunlover I† *For trial* M Goldrush	75 000
Central Coast—			
Rockhampton, Alton Downs, Raglan	Late Dec.–Feb.	ML E 57 Alpha ME NK 233 Goldfinger *For trial* ML Dorado TE Y101 NK 266 M Goldrush	75 000
Central Highlands—		RAINGROWN	
Emerald, Peak Downs	Mid Dec.–mid Jan.	ML E 57 Alpha Q 5161† Sunlover I† *For trial* M Goldrush	
		IRRIGATED	
	Sep.–Oct.	ML E 57 M Texas 610 SR *For trial* ML E 55e NK 266 M NK 212 Texas 626 M Grainmaster A ME NK 233 Goldfinger	200 000–450 000

* Varieties susceptible to the red stripe reaction of mosaic virus. (All other varieties when infected show mosaic symptoms, but are resistant to the red stripe reaction).

† Varieties susceptible to the red leaf reaction.

REGION (DISTRICT OR SHIRES)	PLANTING TIME	VARIETIES L = slow maturing ML = medium slow M = mid season ME = midfast maturing E = fast maturing	PLANTING RATE plants/hectare
Capricornia—continued			
Callide Dawson—			
Biloela, Theodore, Moura, Baralaba, Goovigen, Wowan, Bauhinia	Late Dec.–early Feb. (use mid season varieties in early Feb.)	ML Alpha E 57 Q 5161 Sunlover I†	75 000
		For trial M Goldrush	
	Mid Dec.–end Jan.	*Irrigated* L F 64a ML Texas 671 M Pioneer 846 Texas 626 NK 212 Texas 610 SR Grainmaster A	250 000
		For trial ML E 55e NK 266	
Burnett—			
North Burnett—			
Monto, Eidsvold	Nov.–Jan.	ML Sunlover I† E 57 Q 5161† NK 266 M Texas 626 Grainmaster A NK 212 ME NK 233 Goldfinger	75 000
Central Burnett—			
Gayndah, Biggenden, Mundubbera	Nov.–Jan.	ML E 57 Q 5161† Sunlover I† M NK 212 Texas 626 Grainmaster A ME NK 233 Goldfinger	75 000
		For trial L F 64a M Goldrush ME Dorado E*	
Coastal Burnett—			
Bundaberg, Maryborough	Sept.–Jan.	ML E 57 Alpha	75 000
South Burnett—			
Kingaroy, Nanango, Goomeri, Murgon, North Rosalie	Mid Nov.–mid Dec.	ML Sunlover I† Q 5161† E 57 M Texas 626 NK 212 Grainmaster A ME Goldfinger NK 233	80 000–120 000

* Varieties susceptible to the red stripe reaction of mosaic virus. (All other varieties when infected show mosaic symptoms, but are resistant to the red stripe reaction).

† Varieties susceptible to the red leaf reaction.

REGION (DISTRICT OR SHIRES)	PLANTING TIME	VARIETIES L = slow maturing ML = medium slow M = mid season ME = midfast maturing E = fast maturing	PLANTING RATE plants/hectare
South Burnett—continued		*For trial* ML E 55e NK 266 Dorado PM 2 TE Y101 M PM 1 Goldrush ME Dorado E*	
Near North Coast— Gympie, Kilkivan, Cooroy, Eumundi, Pomona	Mid Nov.–end Jan.	ML E 57 ME NK 233 Goldfinger	75 000
West Moreton— Lockyer, Brisbane, Fassifern Valleys, Beaudesert	Sept.–mid Jan.	RAINGROWN ML E 57 M Texas 610 SR NK 212 Texas 626 Grainmaster A E Pacific 001	RAINGROWN 100 000 IRRIGATED 250 000
Darling Downs— *Northern Downs*— Wambo, Chinchilla	Oct.–Nov.	ML E 57 Dorado TE Y101 NK 266 Q 5161† Sunlover I† ME Goldfinger NK 233	100 000 on plains soils 50 000 on other soils
	January	M NK 212 Texas 610 SR Texas 626 ME Goldfinger NK 233	
Central Downs— Jondaryan, Pittsworth, Rosalie (south), Crows Nest, Millmerran (east of Condamine River)	Oct.–Nov.	ML E 57 M NK 212 Texas 610 SR Texas 626 Grainmaster A ME NK 233 Goldfinger Dorado E* *For trial* M Goldrush PM 1	100 000
Central Downs— Millmerran (west of Condamine River)	Oct.–Nov.	ML E 57 Dorado TE Y101 NK 266 Q 5161† Sunlover I† M NK 212 Texas 610 SR NK 266 Texas 626 Grainmaster A ME Goldfinger NK 233	75 000
	January	Mid and early varieties only	100 000

* Varieties susceptible to the red stripe reaction of mosaic virus. (All other varieties when infected show mosaic symptoms, but are resistant to the red stripe reaction).

† Varieties susceptible to the red leaf reaction.

REGION (DISTRICT OR SHIRES)	PLANTING TIME	VARIETIES L = slow maturing ML = medium slow M = mid season ME = midfast maturing E = fast maturing	PLANTING RATE plants/hectare
Darling Downs—continued			
Southern Downs—			
Clifton, Cambooya, Allora, Glengallan, Rosenthal	Oct.–mid Dec.	ML E 57 M NK 212 Texas 626 Texas 610 SR Grainmaster A ME Goldfinger NK 233 *For trial* ML NK 266 M PM 1	100 000
Stanthorpe	Nov.–mid Dec.	ML E 57 M NK 212 Texas 610 SR Texas 626 Grainmaster A ME Dorado E* Goldfinger NK 233	75 000
Inglewood	Sep.–Oct.	ML E 57 Q 5161† Sunlover I† M NK 212 Texas 626 Texas 610 SR Grainmaster A ME NK 233 Goldfinger Dorado E*	75 000
Darling Downs (All Districts)—		IRRIGATED As for mid season group of varieties	250 000
Near South West—			
Waggamba	Sep.–Oct.	ML E 57 Sunlover I† Q 5161† M Texas 626 NK 212 Grainmaster A *For trial* ME NK 233 Goldfinger	75 000
Balonne	Dec.–Jan.	IRRIGATION M NK 212 Texas 610 SR Texas 626 Grainmaster A	250 000–360 000

* Varieties susceptible to the red stripe reaction of mosaic virus. (All other varieties when infected show mosaic symptoms, but are resistant to the red stripe reaction).

† Varieties susceptible to the red leaf reaction.

REGION (DISTRICT OR SHIRES)	PLANTING TIME	VARIETIES L = slow maturing ML = medium slow M = mid season ME = midfast maturing E = fast maturing	PLANTING RATE plants/hectare
Western Downs—			
Murilla, Tara, Taroom	Late Sep.–Oct. and late Dec.–Jan.	ML E 57 Q 5161† Sunlover I† M NK 212 Texas 626 Grainmaster A ME Goldfinger NK 233	50 000–75 000
	February	E Pacific 001	
		For trial M C42t ME Dorado E* E Quicksilver	
Maranoa—			
Bungil, Bendemere, Warroo, Booringa	Mid Sep.–mid Oct. or late Dec.–Jan.	ML E 57 Dorado TE Y101 Sunlover I† Q 5161† ME NK 233 Goldfinger	50 000–75 000
		For trial ME Dorado E*	

* Varieties susceptible to the red stripe reaction of mosaic virus. (All other varieties when infected show mosaic symptoms, but are resistant to the red stripe reaction).

† Varieties susceptible to the red leaf reaction.

Storing fruit and vegetables

TO keep fruit and vegetables successfully, it is essential to use only sound, mature produce.

Handling before storage should be kept to a minimum, and all cut, bruised or otherwise injured or malformed produce should be rejected and placed aside for immediate use.

For good results, the stored products should be examined frequently during storage. If any rotting or breakdown is noticed, the affected produce must be removed immediately.

Under no circumstances should any fresh vegetables be put in the deep freeze compartment unless they have been treated according to recommendations for quick-frozen vegetables.

Some fruits and vegetables should be wrapped in polythene plastic film or put in a sealed polythene bag before being stored. If the refrigerator has a crisper, wrapping will not be necessary.

What a station hand really costs

by Q. R. TOMES,
Agricultural Economist.

The true cost of a station hand varies throughout Queensland, depending on the Division in which he is employed, the type of property involved, i.e., whether it is a sheep or a cattle property, the cost of food and accommodation provided by the employer, etc.

The increasing cost of employing a man is one of the many issues, in these times of depressed prices for wool and beef and steeply rising costs, which necessitate a complete revaluation of its precise costs.

These costs may include actual wages, supplementary wage costs, food and accommodation which are part of the award conditions and taxes and insurances payable on the gross payroll.

There are many supplementary wage costs. Some of these are difficult to determine accurately. However, as these costs in total add a significant percentage to the wages paid, an accurate assessment should be made.

It is only on the basis of knowing the comparative costs and relative efficiency that management can decide whether to employ or continue to employ a station hand, or to engage contractors or to replace labour with labour-saving machinery.

During the past twelve months the award rates of pay for station hands employed under the Station Hands' Award have been increased considerably in order to keep pace with increases awarded in other Awards.

At present, the weekly rates of pay for adult male station hands are: South-east $88.10; South-west, $89.15; Mackay, $89; North-east, $89.15; and North-west, $91.35 with keep which is valued at $8.50 a week.

Where above Award wages are paid, some of the supplementary wage costs will be proportionately higher.

The major supplementary costs of employing a station hand are:

- Annual holiday pay: These are now four weeks a year at the rate applicable to the wages paid, plus keep. If the Award rate of pay is paid to a station hand working on a property in the Mackay Division, the weekly cost is $89 plus $8.50=$97.50.
- Holiday pay loading: In general, a loading of 17½ per cent. applies for those who go on holidays when yearly holidays are due.
- Sick pay: An employee is entitled to eight working days sick pay for each completed year of employment. For the purpose of this exercise, it is assumed that an employee takes five working days sick leave each year.
- Long Service leave: In general, an employee is entitled to 13 weeks' leave after 15 years service. For the purpose of this exercise it is assumed an employee is credited with one week of long service leave for each year of employment.
- Food: An employee is entitled to be supplied with food of sufficient quantity, sound and well cooked free of charge. In mid-1973, the U.G.A. conducted a survey on 32 properties in Queensland, to ascertain costs of providing "keep". Properties were asked to provide details of the cost per head per week per employee for meat, rations excluding meat, and cook's wages. The average cost per head per week revealed by that survey were:—

Meat	$3.27
Rations	$6.20
Cooking	$6.07
Total cost of food . .	$15.54

The highest and lowest cost per man per week indicated were $10.81 and $25.42.

- Accommodation: An employee is entitled to accommodation free of charge on the property of at least a certain minimum standard, as provided by the Workers' Accommodation Act.

- Electricity: An employee is entitled to free lighting.

- Payroll tax: This is payable on all wages paid—over and above a total of $20,800 a year. The current rate of payroll tax is five per cent. in all States. However, very few employers under this Award qualify to pay this tax at the present time.

- Workers' Compensation: Premiums for Workers' Compensation insurance have just been increased. The new rate is expected to be $3.78 for employees on sheep properties and $4.51 for station hands on cattle properties.

- Lost time: An allowance should be made for lost time owing to rest pauses, wet weather, etc.

Assuming no overtime is worked, the true cost of a station hand who is paid Award wages and is employed on a cattle property in the Mackay Division is:

	$
Award pay, 48 weeks at $89 ..	4,272
Annual holiday pay, four weeks at $97.50	390
Holiday pay loading, 17½ per cent. of $390	68
Food, 48 weeks at $12	576
Accommodation (repairs, maintenance, insurance, depreciation and interest on portion of quarters) 15 per cent. of $6,000	900
Electricity, 48 weeks at $2 ..	96
Workers' Compensation, 4·51 per cent. of gross earnings including value of keep, viz., 4·51 per cent. of $5,138.25*—(see below) ..	232
Total	$6,534

As the number of effective working weeks of 40 hours duration is reduced to 42 weeks by annual leave (four weeks), sick leave (one week), public holidays (two weeks), long service leave (one week) and lost time (say two weeks), the true cost of a station hand per effective working week is estimated to be $6,534 divided by 42—$155.57.

This represents a basic loading of $66.57 or 74·80 per cent. on the Award cash wage.

This calculation is based on the Award rate of pay plus moderate allowances for the cost of providing food and accommodation.

No allowance has been made for the cost of cooking and serving food.

If an employer provides further supplementary benefits such as fuel or use of a station vehicle for private use, the true cost of a station hand will be higher.

If an employer provides a married station hand with a modern, furnished house, the cost of accommodation may be much greater than the amount allowed for it in this exercise.

It is obviously necessary for an employer to know the true cost of an employee's labour and how to maximise its use.

Only an accurate cost analysis will enable management to judge whether, under current economic circumstances, the answer is less staff, further mechanisation, or contractors to handle the work load.

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*The value of keep is reckoned at not less than its actual value with a minimum of the allowance under the Award governing each worker. For station hands, the cost of keep taken by the Arbitration Court is $8.50 per week and this is the minimum rate at which keep should be declared for such workers.

Although the cost of keep per worker may exceed $8.50 per week, it is the accepted practice to include the cost of keep at the Award Rate, which is currently $8.50 per week.

Gross earning plus value of keep supplied is calculated as follows:—

52 weeks at ($89 + $8.50) + Holiday Pay Loading = $5,070 + $68.25 = $5,138.25

Whereas the Workers' Accommodation Act provides that an employee is entitled to free lighting, the amount of this cost is not included in the value of keep supplied for Workers' Compensation purposes.

The Wheat We Eat

by M. ALAM, Ag.Chem.

IN ancient times, man depended for a long time on meat diet by hunting. One of the factors that changed the primitive ways to more civilised way of life was the art of cultivation.

WHEAT has been through the ages, a very important crop for human food.

There are a number of chemical constituents present in wheat, but in this article we are concerned with carbohydrates. These are manufactured in the plants from carbon dioxide and water. The carbohydrates are the structural components of plants, food for animals and men and a source of energy after conversion to coal and peat.

Wheat carbohydrates are:

1. Simple Sugars — Monosaccharides, e.g. glucose, fructose, xylose, arabinose; Disaccharides, e.g. sucrose (cane sugar), maltose
2. Compound sugars—Oligosaccharides, e.g. raffinose
3. Polymer sugars or Polysaccharides — Cellulose, Pentosans, Starch

Simple and Compound Sugars

Although the total simple and compound sugars present in wheat flour amount to only 1–2%, these are regarded as important in bread-making during dough fermentation. Fermentation leads to the formation of carbon dioxide from simple sugars in the dough.

Polymer Sugars

Starch is the major component of wheat and other cereal flours. Starch occurs in the form of granules and these granules differ in size and shape so much so that these can be identified under a microscope.

In most cases the variety of wheat can be identified by this method alone. The starch content of the wheat is inversely related to the protein content. It also increases with the degree of refinement of flour.

Starch is composed of a large number of glucose units attached to each other in the form of a chain. This chain can be broken readily to give glucose. Starch is in fact a mixture of amylose and amylopectin. The proportion of amylose varies with the varieties of wheat. It is between 21–27% in the starch of 89 wheats grown in U.S. and between 17–29% in that of 61 wheats grown in other countries.

Role of Starch in Food Preparation

The role of starch in food products prepared from flour, has not received as much attention as the gluten-forming proteins, probably because its properties from different varieties are generally the same and are not affected by the growing conditions. This major constituent of flour is not just a filler in breads, but it has the following functions in bread making:

- Dilutes the gluten to a desired thickness.
- Absorbs water from gluten during mixing and so helps the gluten to be evenly distributed.
- Provides a surface where the gluten adheres firmly.
- Provides sugar for dough fermentation.

- During bread baking the gas cell walls stretch further due to the elasticity of starch which allows the gases to expand.

Cellulose

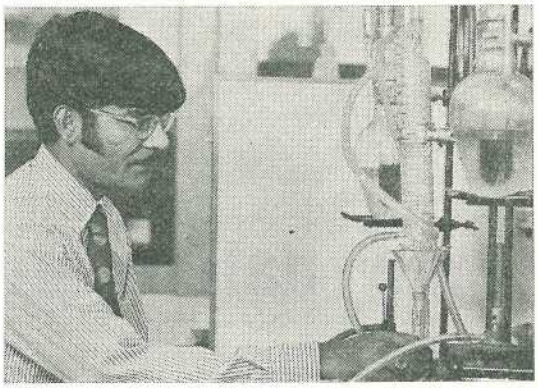
Cellulose is about 40–43% in wheat straw and about 35% in wheat bran. Only about 0·3% is present in the flour. It is inert in doughs and has been regarded as an undesirable component in wheat products.

Pentosans

The pentosans occur in association with cellulose. Like cellulose more pentosans are in straw and bran. These are present in small quantities in flour but they play an important role in the baking quality of flour. In the Queensland flour they are approximately 1·7%. These pentosans are of two types: (1) water-soluble and; (2) water insoluble.

Role of Pentosans

The water soluble pentosans have been found to improve the quality of bread. Bread doughs containing added pentosans are said to become softer, shape more easily and rise more rapidly. The water insoluble fraction is found to give poor baking characteristics of bread but they are found to be of good value on the baking qualities of cookies, cakes and biscuits. This fraction absorbs more water and gives increased volume to cakes.



The author at work in the Agricultural Chemistry Laboratory, Indooroopilly.

Although there is much published work on the effects of pentosans on the quality of dough and bread, there is no work reported where the amount of pentosans has been measured in different varieties of wheat and then related to the varietal differences in wheat and flour quality. The Agricultural Chemistry Branch is currently investigating this aspect of varietal differences of wheat and flour quality.

FOURTH EDITION—FARM MANAGEMENT BOOK

The fourth edition of this handbook is aimed at providing a ready reference to technical and financial data which can be used by educational institutions, extension officers, farmers, graziers and others concerned with property planning and development.

The handbook has been completely revised and converted to the metric system. It brings together reference data from numerous sources and presents it, for convenience, in a single publication.

To obtain your copy of the Farm Management Handbook, send $2.50 to: Director of Economic Services, Department of Primary Industries, William St., Brisbane, 4000.

Some native ground orchids

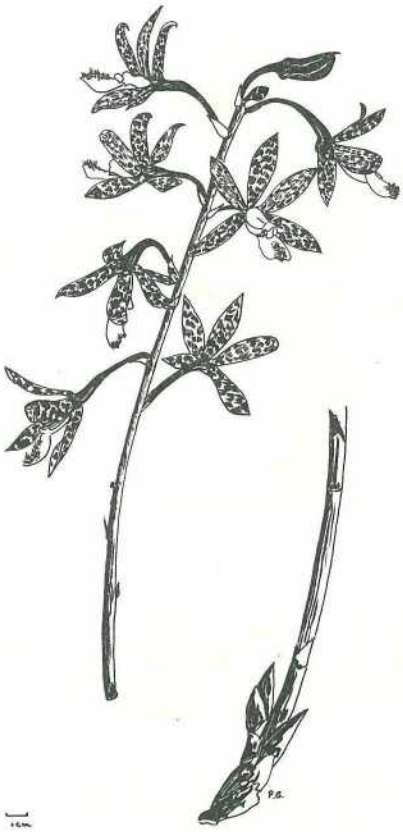
By BERYL A. LEBLER,
Senior Botanist

IN many respects an orchid flower is the most highly specialized of all the flowers. It has unique floral characteristics, together with extraordinary devices which have been evolved to ensure pollination by insects. Like other monocotyledons (most of which have floral parts arranged in multiples of three) it has six perianth parts. These are arranged in two whorls, and the sepals, the outer whorl, are often like petals in texture and colour.

Some orchids have six perianth parts, all much the same in size and shape. In most, however, one petal is modified, usually to a great extent, and differs in colour from the others. It is called the *labellum,* which means a little lip. Because it resembles a tongue rather than a lip it is sometimes known as the tongue of the orchid. It is usually brightly coloured, it can be fringed or bearded, and is often ornamented with brightly coloured *calli.* These are either columnar hair-like structures or small, flattened, raised discs. They are usually harder in texture than the surrounding surface. They often have glands that secrete juices attractive to the insects which cross pollinate the plants. The labellum provides a landing-stage for insects. This is its main function and it is sometimes modified and developed into astonishing forms to attract the right kind of insect and, if necessary, to repel other insects.

The lateral sepals which lie on either side of the labellum are identical in shape and size, but the dorsal sepal, which is opposite the labellum, is often larger, and can differ considerably in structure. Often it forms a hood, and in some orchids it is the most conspicuous part of the flower. The two lateral petals lie on either side of the dorsal sepal.

Other monocotyledons have three or six stamens in the centre of the flower, with a pollen-producing anther at the end of each filament. In an orchid flower, staminal finaments, anthers and style are combined into a single structure called the *column.* In some orchids this is very prominent, while in others it is very small and practically concealed by the dorsal sepal. A sticky swelling or disk on the side facing the front of the flower is called the *stigmatic plate.* This represents the stigma of other flowers. Above this, in a depression near the top of the column,



HYACINTH ORCHID *(Dipodium punctatum)*

is the sessile anther, consisting of two cells containing pollen grains. These usually stick together in masses known as *pollinia.* The anther breaks when touched, exposing the pollen. Unlike pollen from almost all other flowers it is not powdery but sticky.

The ovary is beneath the perianth segments. From the outside it looks like a slightly swollen portion of the flower stems. In some orchids the flower is reversed by a twist in the pedicel or the ovary, so that the labellum, instead of the dorsal sepal, is next to the main axis and the flower is then "upside down".

In most orchids the fruits are capsules which open in three valves or longitudinal slits. Orchid seeds are the smallest and least differentiated among all those of flowering plants and can only germinate under special conditions. They are minute, extremely numerous and resemble fine sawdust.

Hyacinth Orchid

(*Dipodium punctatum*)

The generic name of this plant is derived from two Greek words, *dis* meaning two, and *pous* meaning a foot. The name refers to the way in which the two pollen masses are attached to the stigmatic gland by short cartaliginous straps or *caudicles.* A Latin word meaning spotted is the specific epithet. This refers to the dark spots scattered over the sepals and petals.

DESCRIPTION. This is a leafless ground orchid with elongated, thick, fleshy roots. The leaves are reduced to a varying number of small, loosly imbricated, protective bracts at the base of the flowering stem. This grows to a height of 30 to 60 cm with a diameter of 0·4 cm. In Queensland the stems are usually green in colour. Sheathing pointed green scales are widely spaced along the stem.

As many as 30 or more flowers on slender spreading pedicels are loosely arranged in a terminal raceme, sometimes occupying a third of the stem. The pedicels are coloured purple and are about 2 cm long. The flowers vary in colour from pale lavender-pink to deep cyclamen pink. The sepals and petals are usually spotted with a darker colour, and the spots are more prominent on the outer surface.

The sepals and petals spread widely and are nearly equal in size and shape. They are 1·25 to 2·5 cm long and 0·4 to 0·9 cm wide. They end in blunt recurved points. The labellum is almost as long as the petals, spade-shaped and consisting of two parts. At the base is a thick, broad claw which is margined and is jointed to the longer, three-lobed lamina.

The lateral lobes are narrow and the central lobe is much wider and is raised. Short white hairs form a broad patch down the centre of this raised portion. The column is creamy-white, as long as the claw of the labellum, and semi-terete. The stigma is a small oval patch placed transversely, with a small two-celled anther above it.

FLOWERING TIME. Summer.

HABITAT. It tolerates a wide range of soils but is invariably found in close association with large trees, chiefly eucalypts, either in woodland or heavily timbered forests.

DISTRIBUTION. It grows in all the Australian States except Western Australia, and is found only in Australia.

GENERAL REMARKS. It was once thought to be a parasite on the roots of trees near which it grew. It is, in fact, a saphrophyte, living on dead organic matter, in symbiosis with a fungus in the root system. The fungus supplies certain food materials to the orchid, thus disposing of the need for leaves on the plant. In return, the fungus is able to use some compounds from the orchid.

Dipodium Hamiltonianum

This species was first described in 1881 by F. M. Bailey from specimens collected at Stradbroke and Peel Islands in Moreton Bay by Mr. J. Hamilton, the superintendent of the Benevolent Asylum, Dunwich. It was named in his honour.

It is very similar to hyacinth orchid and has greenish spotted stems with thick obtuse basal bracts. Its flowers are usually larger than those of hyacinth orchid and are bright yellow to dull yellowish-green with red or purple spots, streaks or flecks. Both the labellum and column are longer than those of hyacinth orchid.

FLOWERING TIME. Mid-spring to the end of summer.

HABITAT. Usually in sandy soil in open forests at a variety of altitudes.

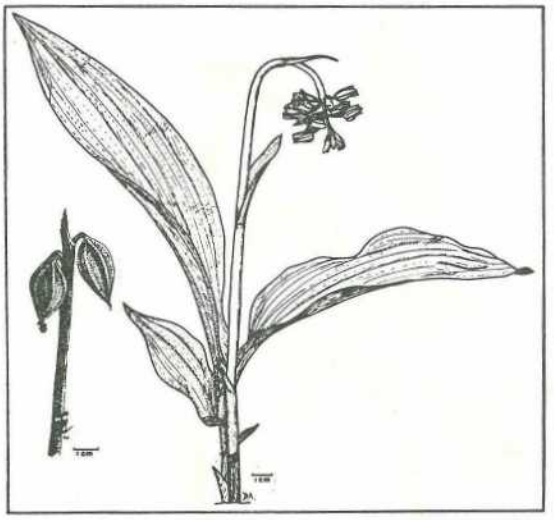
DISTRIBUTION. This rather rare species is distributed rather sporadically from Central New South Wales to the top of Cape York Peninsula.

Geodorum pictum

The generic name is derived from two Greek words, *ge,* the earth, and *doron,* gift.

The specific epithet is a Latin word meaning painted or brightly coloured and refers to the dark purple markings on the labellum.

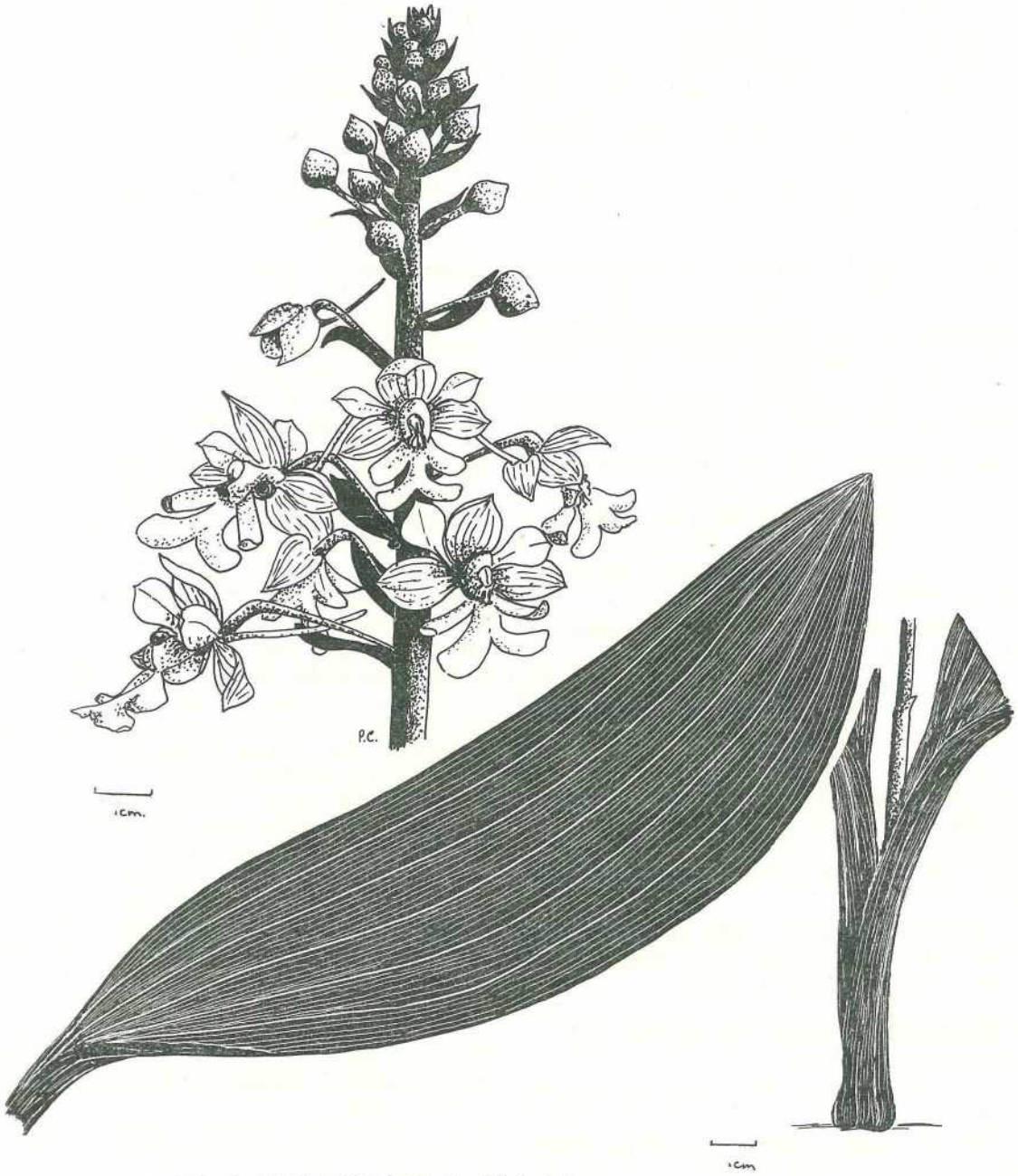
DESCRIPTION. This is one of the ground orchids with plicate or "pleated" leaves. As many as 14 parallel veins run the length of the leaf blade. This is pleated lengthwise so that alternate veins are prominent, first on the upper surface, then on the lower surface, resembling a partly unfolded fan. The plant has a short creeping rhizome with the dormant remains of the previous seasons stems (pseudobulbs) still attached.



Godorum pictum.

The base of the stout, firm, erect green stem is covered by two sheathing bracts, the lower about 2 cm long and the upper at least twice that length and curving out from the stem. This ends in 2 or 3 ovate-lamceolate leaves which are firm in texture. They can be 30 cm long and 10 cm wide at the middle and they have pointed tips. The base of the terminal leaf is sheathed by the leaf beneath, which is on the opposite side of the stem.

A leafless flowering stem (a scape) arises from the rootstock near the base of the leafy stem, or from the root itself. Usually only one inflorescence is produced by a plant in a flowering season, but on rare occasions two appear, one on each side of the leafy stem, and turned in opposite directions. The scapes are as tall as the leaves and are stout, firm and green. Three or four membranous sheathing scales up to 7 cm long are widely spaced on the scape. The flowers are spirally arranged at the end. When the scape first appears it is curved over at the tip like the handle of a shepherd's crook and it remains in that position until flowering has finished.



CHRISTMAS ORCHID OR SCRUB LILY *(Calanthe triplicata)*

Individual flowers are just over 1 cm long and less than 2 cm in diameter. Thick green pedicels hold the flowers away from the stem so they are parallel with the ground, with the throats of the lowest flowers pointing to the scape. The flowers are dusty pink in colour. The sepals and petals are identical in colour and are nearly the same size—about 1 cm long and half as wide.

The labellum is shaped like a scoop with a flattened pouched base 0·7 cm deep. Its outer surface is the same colour as the petals and sepals. The inner surface is strikingly marked and blotched with dark purple and these markings can be seen faintly on the outer surface. The labellum is slightly emarginate at the tip, with a golden callus like a blotch just in from the end. The column is white, 0·3 cm long and as wide as it is long. The texture of the flower is firm and rather waxy.

After fertilization the seed pods form and as they ripen the scape gradually straightens until it becomes erect, with the mature pods hanging down alongside the stem.

FLOWERING TIME. Erratic, but mainly in mid-summer.

DISTRIBUTION. From the Macleay River in New South Wales to the tip of Cape York Peninsula and across to New Guinea.

HABITAT. It grows under a wide variety of conditions from sea level to high mountains in the tropics, it is found in open forest, particularly in sandy soil close to beaches, but it can also grow on exposed ridges or in light rain forests.

GENERAL REMARKS. This plant formed an important article of diet to the aborigines who knew it as "Yeenga" or "Uine".

Christmas Orchid or Scrub Lily

(*Calanthe triplicata*)

Two Greek words *Kalos* meaning beautiful and *anthos* meaning a flower are combined to form the generic name of this ground orchid. A Latin word meaning threefold forms the specific epithet and refers to the three-lobed labellum.

DESCRIPTION. This is one of the largest Australian ground orchids. It has a shortly creeping rhizome with tufts of two or three leaves which sometimes form a very short stem or pseudobulb at the base. The leaves are 30 to 60 cm long, and 10 to 18 cm at the widest part, which is usually at the middle. They are dull green in colour and ovate-lanceolate in shape. They are plicate, like those of *Geodorum pictum*, with seven strong ribs channelled on the upper surface and prominently raised on the lower surface.

The white flowers are massed at the tip of erect, stout stems 30 to 120 cm high. These scapes arise from the axils of the outer leaves. Each flower is in the axil of the pointed green bract, about 2·5 cm long, which curves upward. The pedicel is white and 3 cm long and, in the young flower, lies along the bract. In older flowers it becomes recurved so that the flower hangs down below the bract. The perianth segments spread out so that the flowers are more than 2·5 cm across. The sepals are obovate-oblong, 1 to 2·5 cm long and 0·8 to 1 cm wide and have a sharply pointed green tip. The lateral petals are slightly shorter and more contracted at the base.

Because of the unusual shape of the labellum it is the most striking part of the flower. The lamina is broad and spreading and conspicuously three-lobed, with the middle lobe again divided into two diverging lobes. All the lobes are oblong in shape and are practically identical in size. At the junction of the lobes the basal portion of the labellum is joined to the margins of the short, stout column which arches upwards in an infolded curve. The single anther is concealed inside the hooded middle lobe of the column margins, (the rostellum). At its junction with the base of the column the labellum is usually produced on the lower side into a spur. This is slender, straight and cylindrical, about 2 cm long and lies parallel to the pedicel.

The flowers are pure white. In Queensland they are very sensitive to touch and turn purplish-black if handled or bruised by accidental contact or by wind. This sensitivity is lacking in plants growing in cooler climates. Under magnification a covering of very minute fine hairs can be seen on the outside of the flower. A few creamy-yellow to yellow calli can be seen on the upper surface of the labellum of the lower side of the column.

The ovary is white and slightly furrowed and after fertilization develops into an obovoid-oblong capsule about 4 cm long.

FLOWERING TIME. Summer to early Autumn.

DISTRIBUTION. From the Illawarra district of New South Wales through eastern Australia to Cape York Peninsula. It is also found through New Guinea, Indonesia, Malaysia, India and China.

Ladies' Tresses

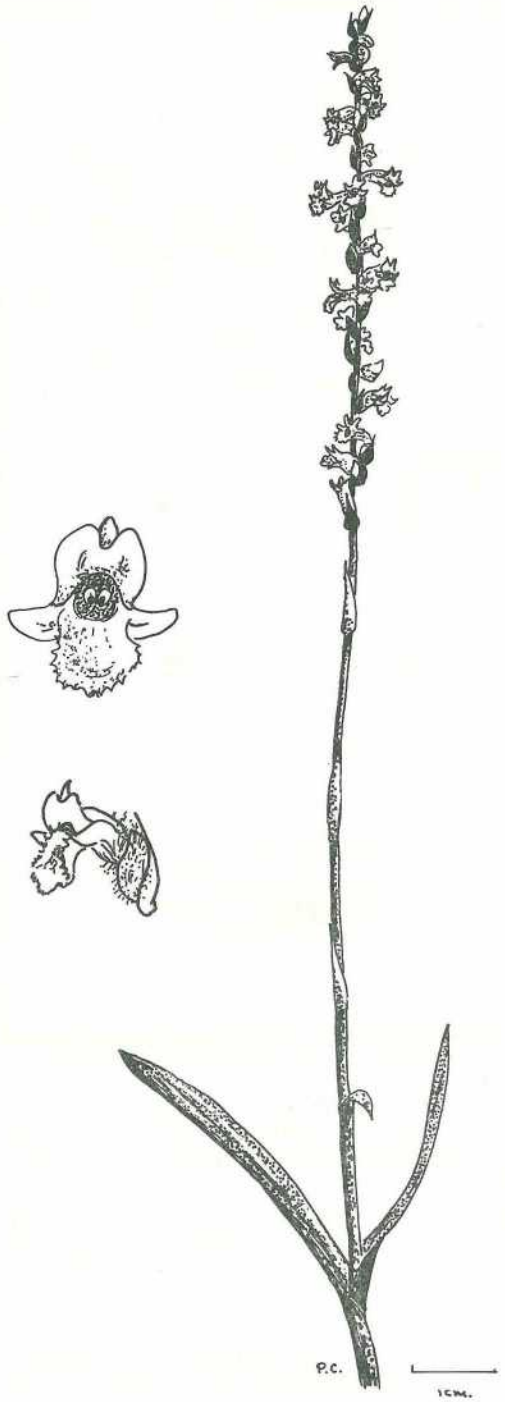
(*Spiranthes sinemsis*)

Two Greek words, *speira* meaning a coil and *anthes* meaning a flower, are combined to form the generic name for this orchid. It refers to the spiral arrangement of the flowers in the inflorescence. The specific epithet is a Latin word which means Chinese. The first specimen of the plant was collected near Canton in China in 1807.

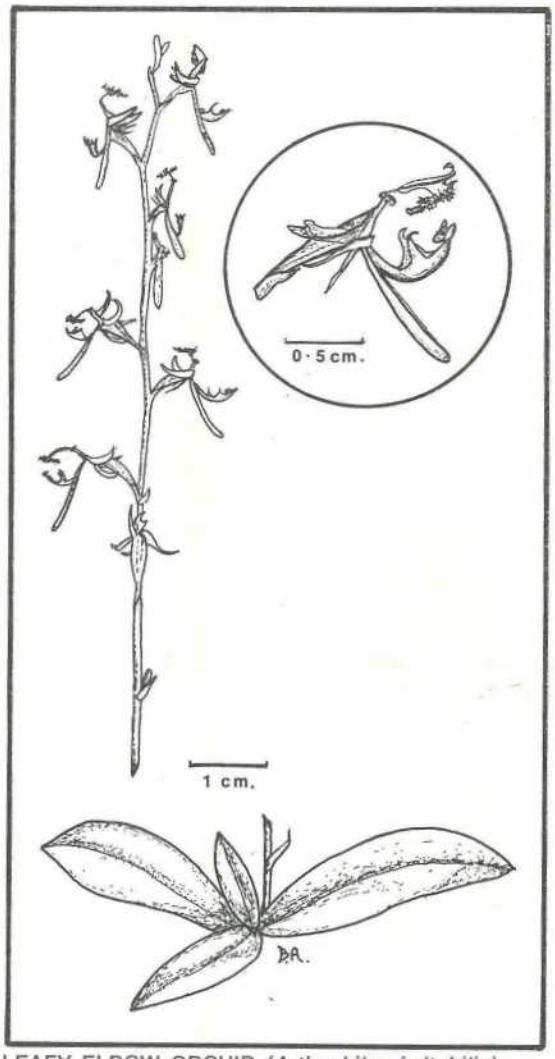
DESCRIPTION. This orchid has a slender wiry flowering stem up to 45 cm high, which rises from a basal tuft of 3 to 10 grass-like leaves. These are up to 10 cm long and are keeled. The scape is erect, firm in texture, and blue-green in colour. Sheathing bracts are scattered along the stem and, above the top bract, the stem is covered with minute glandular-tipped hairs. These can be readily seen when the stem is held against the light. They also cover the bracts beneath each flower and the green ovaries, which are as long as the bracts. The sessile flowers are arranged in an anti-clockwise spiral at the top of the stem. Each flower curves around the stem to the left.

The normal colour of the flower is pink, sometimes very pale, sometimes vivid purple-pink. Each flower is just under 0·5 cm long, and not as wide. Short, white, glandular hairs are scattered over the ovary and the lower half of the perianth segments. The dorsal sepal is concave and, together with the two lateral petals, forms a hood, with the tips of the three segments curved up and backwards towards the stem. The two lateral sepals are about the same length and curve out on each side of the labellum. This is longer than the other perianth parts and is white with a fringed or denticulate margin which is recurved. The tip of the labellum curves down out of the flower and back towards the green ovary.

The erect column is much shorter than the labellum and is not noticeable unless the



LADIES TRESSES (*Spiranthes sinemsis*)



LEAFY ELBOW ORCHID *(Arthochilus irritabilis)*

perianth parts are removed. The flowers are said to be fragrant and are pollinated by native bees.

FLOWERING TIME. Summer, but they can sometimes be found flowering in early autumn.

HABITAT. In moist situations, swampy ground or bogs.

DISTRIBUTION. In Australia it is found in the temperate parts of all the States except Western Australia and the Northern Territory. In Queensland it is confined to the south-eastern corner to as far north as Noosa Heads and as far west as Stanthorpe. It also grows in New Zealand, and spreads through Malaysia to Asia and Siberia.

Leafy Elbow Orchid

(*Arthochilus irritabilis*)

The generic name is derived from two Greek words *arthron* which means a joint and *cheilos* meaning a lip. The name describes the articulating joint like an elbow, which is part of the labellum. A Latin adjective *irritabilis,* meaning easily excited is the specific epithet. This also refers to the labellum which is moved readily by wind, but is not really irritable.

DESCRIPTION. In this ground orchid the flowering spike appears first and later the leaves appear to one side of the spike. This can be as long as 30 cm but is usually much less. It bears up to twelve contorted slender flowers.

The leaves first appear as a flat rosette of several dark green, broad lancelate leaves with a pronounced midrib and several less clearly defined parallel veins. They are usually about 3 cm long and 0·8 cm wide, and the ends are pointed. They can be shorter and broader and they persist after the flowering season.

This is an orchid in which the flowers are reversed by a recurving of the ovary. The freshly opened flowers and predominantly pale green with a purplish-pink flush along the margins and at the tips of the dorsal sepal, and the lateral petals. All the segments are very slender.

The dorsal sepal is more or less erect behind the column and is 0·8 cm long. The lateral sepals and petals are sharply reflexed on either side of the stem and are shorter. The column is about as long as the dorsal sepal and curves upwards from it and in towards the stem. A coloured triangular wing a little above the middle curves upwards on either side, with another much smaller pair near the end.

The labellum is the most conspicuous part of the flower. It is hinged at the point of insertion of the lateral sepals and petals and, in a freshly opened flower, is bent back abruptly from the rest of the flower. Above the articulation the labellum is narrow, straplike and green. The terminal portion of the labellum is peltate and densely covered by long, dark purple, club-shaped hairs. A green, long fine point curves downwards from the end of this portion of the

BROWN BEAKS *(Lyperanthus suaveolens)*

labellum and a dark purple hammer-like structure projects on the other side back towards the base of the labellum.

The labellum is readily moved by the wind, and flowers can be found with the labellum standing erect, bent back away from the flower, or in towards the column.

FLOWERING TIME. Summer to early autumn.

HABITAT. It grows in a wide range of conditions from sandy soil to steep rocky slopes in Eucalyptus forests, to swampy ground beneath tea trees, and can form large populations.

DISTRIBUTION. Mainly coastal, from as far south as Sydney in New South Wales to New Guinea. This species is the only one at present described from Queensland, but another species has been discovered and its name will be published in the near future.

GENERAL REMARKS. In the literature the name given to this plant is *Spiculea irritabilis*. A recent revision has shown that the name given in this article is the correct name.

Brown Beaks

(Lyperanthus suaveolens)

Two Greek words *lyperos* meaning mournful and *anthos* which means a flower, are combined to give this plant its generic name. Usually the flowers turn black as they dry, and this is the reason for the choice of this name. The specific epithet is a Latin adjective which means sweet scented.

DESCRIPTION. This orchid has a large globose tuber and white fleshy roots. It produces one erect, light green leaf, which is linear-lanceolate and about 20 cm long. The margins curve inward and five parallel veins form prominent ridges on the lower surface. The base of the leaf sheathes the flowering stems which can reach a height of 30 cm.

As many as 3 pink sheating bracts about 2 cm long, are spaced beneath the flower spike. This consists of 2 to 8 flowers each arising from the axis of a much wider pinkish bract 2·5 cm long and half that width. The flowers are yellowish-green.

The dorsal sepal is broader than the others, about 2 cm long, and its recurved tip forms a hood over the column. On either side is a narrow, erect, pointed petal just under 2·5 cm long and 0·25 cm wide. Their margins are incurved and the inner surface towards the base is tinged with pink. The lateral sepals are similar in size and shape and curve downwards towards the stem. Often they cross each other near the tips. The labellum lies between these lateral sepals. The basal portion stands erect for about 0·6 cm, and is white in the outer surface, and on each side is a short, blunt in curved lateral lobe.

The inner surface is marked with dark red to purple stripes. The tip of the labellum is recurved. This central lobe is creamy yellow in colour and the upper portion is covered with yellow calli. A double line of golden calli runs down the centre of the labellum to its base with smaller, with less pronounced white calli scattered over the remainder of the surface. It has been suggested that the function of the deep yellow calli is to act as guide lines to lead insects past the 2 celled anther and thereby cross pollinate the flowers. The anther is on the inner surface at the tip of the erect column. This is hooded and is white, speckled with purple. It stands erect inside the hooded sepal and can be seen between the erect lateral lobes of the labellum. The column is winged along its full length and is incurved.

FLOWERING TIME. Springtime.

HABITAT. It grows in open eucalyptus forests and occasionaly forms clumps at the base of trees.

DISTRIBUTION. Along the east coast of Australia from Tasmania to as far north in Queensland as Townsville and also in New Guinea. Although it is widespread it is not common.

GENERAL REMARKS. The colour of the flowers varies from yellowish green to red brown and in warm weather the flowers are very fragrant.

Looking back—

SOME interesting items that appeared in issues of the Q.A.J. 75 years ago, in July and August, 1900.

- Poultry farming was in its infancy, and there were fears that the Chinese would completely collar the egg market. *On 28th May, 3,215 dozen eggs arrived from Hongkong, and nearly 34,000 dozen from other China ports. A day or two later, a steamer arrived from Chinese ports with nearly 28,000 dozen eggs.*

- Farmers were urged to grow yams. *A well cooked yam is far superior to a sweet potato.*

- A mathematician working out the distance a ploughman walked in a day reckoned that he walked at least 18½ miles, and that, during the day, he'd lifted the equivalent of over 32 tons of shoe leather.

- A problem that is no stranger to today's primary producers. *A pig man gets about 2d. per lb all round for his produce; to make it into bacon, he knows, costs just about another 1d. per lb. Nevertheless, if he happens to want some bacon he finds he has to pay 9d. or 10d. per lb for it. And now he's trying to figure out where the difference goes—so far unsatisfactorily.*

- The average top prices for bullocks at the Enoggera Sales for June—£7. 18s. 9d. ($15.88.)

- A new "Alfa-Laval" separator went on the market, designed for the owners of one or two cows. It could separate milk at the rate of 9 gallons per hour, and cost only £5. 10s.

- *Some people say that there is no profit in pigs. Those who hold this opinion are quite right. There is no profit in pigs, housed and fed as they are on many farms. An evil-smelling, foul, sour, knee-deep-in-mud log sty, with a few pailings and a bundle of rotten straw for a roof, is not the sort of place out of which a profit is to be made by keeping pigs.*

THE FARM FAMILY

Wool — Australia's wonder fibre leads the world's fashion scene this year

Wool fashions of the world on show

WOOL has been taken up by the leading designers of Europe in a collection of 40 garments for a series of fashion parades which started at the Royal National Exhibition, Brisbane, this year.

The garments came from Germany, Italy, Spain, Portugal, Holland, France, Finland, Sweden, Belgium and England.

The Australian Wool Corporation, which is presenting its international fashion parades for the tenth consecutive year, asked Europe's leading designers to present a collection which was pretty, comfortable, easy to wear and suited to the Australian way of life.

From France: A tubular, tangerine wool evening dress, dramatically simple, shoulder-straps criss-crossed for embellishment, tops stitched along the seams and worn under a double-faced moufflon coat with a high front yoke and tie belt.

Again from France: Understated of course in a pale metallic grey shirt-dress, slimmer than last season's, falling from a gathered yoke. Side pockets and wide sleeves assist with ease of action.

Each creator followed his or her own personal style whilst still managing to design a collection that could inspire Australian manufacturers to copy garments for sale in this country in Winter '76.

The international collection was modelled by Cecile Grahame, a Dutch model of international repute now living in London. Cecile, who is shown modelling the garments in our photographs, is 5'10" tall, has red hair and blue/green eyes.

The trip to Australia will be something of a "home coming" for Cecile who is 27. She visited Australia in 1969 for the Royal Shows when she showed a collection of Dutch fashion garments. Before that trip she met an Australian, Hamish Grahame in London. After spending three months in Australia they met again on her return to Holland and were married in 1970. Their fifth wedding anniversary will occur during the trip to Australia.

Cecile was born in the small fishing village of Enkhuizen on the Ijselmeer (formerly known as the Zuider Zee). Before becoming a model she worked as a secretary in a transport firm where her four languages, Dutch, German, French and English were put to good use. In addition she has a smattering of Italian, Spanish and Greek.

Since becoming a model Cecile has travelled widely and her work has taken her to, apart from Australia, the United States, Germany, Italy, France, Tenerife, Morocco, Tunisia, Ireland, Scotland and Finland. (She's also been to Manchester.)

This time from Germany: The sportive, sunray pleated skirt in red and white pure new wool gauze with a matching, classical blouse.

Anne Cook's farm home

FOR many children, learning to spell words can become a chore that takes on nightmare proportions. In this issue, I'd like to share with you some games that can help make learning much easier.

There are many different word games that can be played that will also help with spelling. Amongst the most popular are those which involve jumbling up the word. The child has to sort out the puzzle, and spell the correct word when he has finished.

As a start, try jumbling the syllables—MARKET for example becomes KET–MAR. If that becomes too easy, try jumbling all the letters.

This has the advantage of making the child think about the words—and that's going to make them a lot easier to learn than if they're being chanted off, one letter after another, without too much thought going into it.

The advantage of learning through word games is that you can ring the changes quite often. That way, no one's going to get bored.

Another game involves giving the child the first and last letters of a word, and telling him how many letters are missing. It's then up to him to guess the word and spell it for you.

TRACING A DOTTED OUTLINE of a word can also be of help. Use large letters, more than an inch high, and make the dots lightly, in pencil. Then give the child a crayon and get him to trace over your outline.

When he has done that, ask him to write the word again, still using the crayon, but without the dots to help him.

This will help him learn the shape of the word. Because it has been written in such large letters, the word shape has been magnified, and he gets a much clearer idea of how this shape differs from other words in his list.

After he has written it in crayon, get him to write it in pencil, normal size, in his exercise book.

By this time, he'll have written the word three different ways. He's had to think about what he's doing each time, rather than writing the same word time after time while his mind wandered onto something else.

★ ★

From the Queensland Health Education Council comes some valuable advice on home safety.

Home accidents kill more children than traffic accidents, or any single disease. They constitute today's greatest child health problem.

The tragic aspect of these alarming statistics is that most of the accidents could be prevented. Child accidents don't just happen—they are caused.

Parents can play a significant role in reducing the chances of their children being injured in and around the home by following these basic rules.

- Make sure the home and surroundings do not have inbuilt hazards.
- Parents should develop safe habits.
- Educate children in safety rules.

Each room in the home can present its own special hazards. Many accidents happen in the kitchen. To check the safety score of your kitchen see how it measures up to the following safety hints.

- Saucepan handles should always be turned in when on the stove.
- Utensils containing hot things should always be placed in the centre of the table, out of the children's reach.
- Tablecloths should be arranged so there are no dangling ends for a small child to grab and pull heavy or hot items onto his head.
- Kerosene and other dangerous liquids, such as cleaning fluids, should be locked away out of children's reach.
- Matches should be stored where children cannot get at them.
- Knives and other sharp instruments should be kept away from the reaching hands of small ones.
- Electric cords should be arranged so they do not dangle.
- Pets should be kept out of the kitchen to prevent contamination of food stuffs, and cooking and eating utensils.
- Small children should be kept out of the kitchen when meals are being prepared, so they are not underfoot and likely to have hot foods spilled on them.
- LP gas or spirit stoves should be carefully guarded when in use and locked away when not.

The bathroom also holds many traps. Check your bathroom against this list.

- The floor should be non-slip, even when wet.
- Medicine chests should be "childproof".
- Unwanted or leftover drugs should be regularly disposed of, in a safe manner (flushing them down the toilet is one effective way).
- All cleaning preparations, such as caustic soda for cleaning drains, should be securely locked away.
- Cold water should always be put in a child's bath before the hot.
- Children should never be left alone in the bath.
- Children should be kept out of the bathroom when it is being cleaned.

★ ★

in our next issue:

- **Growing Garlic**—a feature on how to grow garlic; of special interest to farmers in the Lockyer Valley.
- **Building a Veterinary Crush**—valuable information on building a crush to help carry out veterinary procedures on a property.
- **A medicine chest is handy**—what to keep on hand to eliminate a large number of sheep losses that could be prevented.
- **Rotary dairy**—how a Queensland dairyman built his own, and saved money.
- **Farm home**—for the country craftswoman. How to turn your talent into cash.

Parmesan

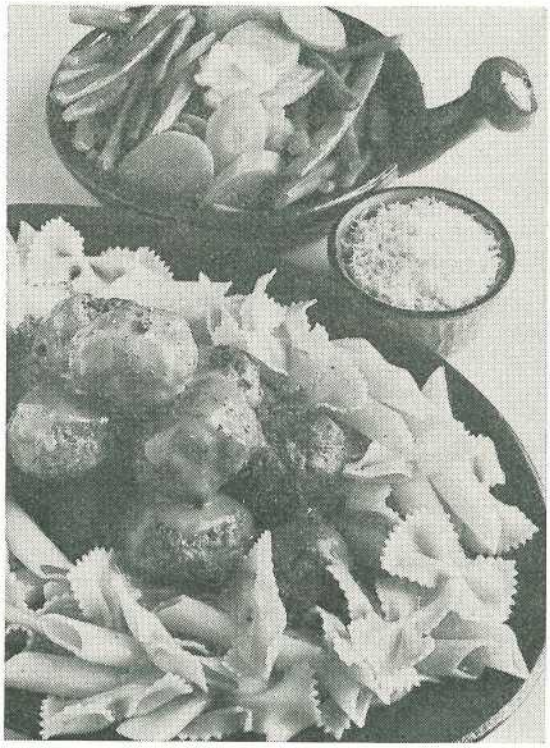
the great cooking cheese

THIS cheese is light yellow, hard and granular in texture and shows its versatility when teamed here with ground topside.

It is mixed with rice in oven baked peppers; tops a family style beef and leek pie; and zucchini pancakes stuffed with spicy beef; or is cleverly disguised in olive centred meatballs.

"Convenience" cellophane packs are readily available, but we recommend grating your own. Why? Because when freshly grated this great cooking cheese adds that superb piquancy to any cooked dish and eliminates the risk of flavour loss, often found in the prepackaged product.

In all recipes, a standard 8 oz. measuring cup is used and all spoon measurements are level.



Olive meatballs with pepper sauce.

OLIVE MEATBALLS WITH PEPPER SAUCE

4 oz. clarified butter

The meatballs

8 oz. raw potato, peeled, cooked and sieved
1 oz. butter
1 teaspoon salt
1 egg
1 lb. minced topside
¼ cup finely grated Australian Parmesan cheese
20 stuffed olives.

The sauce

1, 10½ oz. can cream of tomato soup
1 oz. butter
½ cup sour cream
1 tablespoon milk
¼ teaspoon garlic salt
1 tablespoon crushed black peppercorns.

Combine sieved potato with butter, salt, egg, cheese and minced topside. Shape mixture into 20 meatballs, inserting a stuffed olive in the centre of each. Refrigerate for 30 minutes. Melt butter in heavy based pan. When slightly smoking add meatballs and cook for 10 minutes, shaking pan occasionally to prevent the meatballs from sticking. Drain on absorbent paper. Keep warm whilst cooking remainder.

The sauce

Heat soup in a small saucepan till just boiling. Reduce to low heat. Stir in remaining ingredients till butter melts. Pour over meatballs and serve with buttered noodles and vegetables. Serves 4–6.

SAVOURY RICE PEPPERS

4 large green peppers
½ oz. butter
½ cup chopped bacon
1 medium onion, finely chopped
8 oz. minced topside steak
4 oz. chicken livers, roughly chopped
½ cup grated Australian Parmesan cheese
1 tablespoon flour
¼ cup finely sliced stuffed olives
⅓ cup rice, cooked in boiling salted water and drained
¼ teaspoon black pepper
1½ teaspoons salt.

Cut peppers in half lengthwise. Remove membranes and seeds. Place in a large saucepan with enough water to cover. Bring to the boil and continue boiling for 5 minutes. Drain thoroughly. Melt butter in a saucepan. Saute bacon and onion until onion softens and becomes transparent. Add topside steak and chicken livers. Stir constantly until meat has browned over moderate heat. Stir in flour then ¼ cup of the Parmesan cheese. Mix in remaining ingredients. Spoon mixture into pepper halves. Place in buttered ovenproof casserole. Sprinkle over remaining Parmesan cheese. Bake in a moderately hot oven (375°F) for 15–20 minutes. Serves 4.

STEAK BUBBLE PIE

The pastry

8 oz. rich shortcrust pastry or 1 packet flaky pastry mix
1 egg
⅓ cup water.

The meat filling

1 oz. butter
2 medium leeks, washed and sliced
Mix together in a bowl:
1 lb. minced topside steak
1 teaspoon salt
¼ teaspoon black pepper
½ cup tomato paste
1 egg.

The topping

Mix together:
1 cup rice bubbles
½ cup finely grated Australian Parmesan cheese
2 oz. butter, melted.

If using pastry mix, mix in egg and water. Knead dough till smooth on a floured board. Roll out to ⅛″ thickness. Line a 9″ pie plate. Decorate edges. Melt butter in pan. Saute leeks for 5 minutes. Spread half the meat mixture over pastry base. Spoon over leeks, press remaining meat mixture over top then finally sprinkle over the rice bubble topping. Bake in hot oven (400°F) for 10 minutes. Reduce to moderate oven (350°F) and bake further 35 minutes. Remove and stand for 10 minutes before serving. Serves 6.

SPICY ZUCCHINI PANCAKES

The batter

¾ cup flour
¼ teaspoon ground sweet basil
½ teaspoon salt
1 egg
1 cup milk
½ cup finely grated zucchini.

The topping

1 oz. butter, melted
½ cup finely grated Australian Parmesan cheese.

Sift flour and seasonings into basin. Beat egg and milk together. Stir into flour gradually to make a smooth batter. Stir in zucchini. Stand for 1 hour. In a 7″ butter-brushed pan, pour sufficient batter to cover base thinly. Brown lightly, turn and cook other side for a few minutes. Remove and make a further 7 pancakes in similar manner. Spread meat filling (see below) over each pancake and fold into a parcel shape. Place in buttered shallow ovenproof casserole. Brush over melted butter. Sprinkle with Parmesan cheese. Cover, bake in moderate oven (350°F) for 10 minutes or till heated through. Serves 4.

The filling

1 oz. butter
1 lb. minced topside steak
¾ cup claret
2 tablespoons flour
2 tablespoons finely chopped onion
½ teaspoon each garlic salt and black pepper
¼ cup finely chopped red pepper.

Melt butter in saucepan. Saute onions till softened. Add meat and brown quickly. Stir in flour and seasonings. Cook 1–2 minutes. Stir in claret. Bring to the boil. Simmer gently for 15 minutes, stirring occasionally. Add red pepper.

S. G. Reid, Government Printer, Brisbane

BACTERIAL SPOT OF PUMPKIN

BACTERIAL SPOT, caused by *Xanthomonas cucurbitae*, is currently the most important disease of pumpkins in Queensland. It causes extensive losses annually mainly in the Lockyer Valley area. The disease is transmitted on the seed.

Symptoms

Both leaves and fruit may be affected. Leaf spots are small (1–2 mm across), tannish-yellow in colour, and angular. Under wet conditions, they appear greasy on the undersides of the leaves. Where a number of leaf spots occur together, that section of the leaf may brown and die.

Fruit spots commence on young, immature fruit as small watersoaked areas with a pronounced light-brown ooze. Fruit at this stage is most susceptible being relatively soft and without the resistant wax layer on the surface which develops on older fruit. As the fruit enlarges, the ooze dries out to a raised, yellow crust covering the central area of the spot. Spots on mature fruit vary in size from a few millimetres to a centimetre or more across with a very obvious dark-green, greasy margin which stands out against the normal green colour of most pumpkin cultivars.

Severely affected fruit are unmarketable because of their appearance. Often secondary soft rots develop, resulting in complete loss. When affected fruit are cut open, the flesh immediately below the spots may be dark and water-soaked right to the seed cavity. Under such conditions the seed becomes heavily contaminated with the causal bacterium.

Spread

The seed is the most common way of carrying the bacteria from one season to the next and of introducing the disease into a new area. Plants grown from contaminated seed provide a focus of infection for neighbouring plants. Cool, damp weather favours the disease, the bacteria being splashed from plant to plant and from leaves to fruit by irrigation or rainwater. Under favourable conditions, spread can be extremely rapid, one or two affected plants being all that is necessary for extensive outbreaks to occur.

The bacteria can survive for long periods on affected self-sown pumpkin plants and trash, both providing a source of the disease for future crops.

Control

The most successful way of controlling the disease is to use disease-free seed. For this reason, growers are strongly urged to save seed for future crops only from pumpkins completely free from all surface blemishes.

Careful attention to crop hygiene is also important. Crop rotation should be practised so that successive crops are not planted in the same area. Self-sown pumpkins should be destroyed and crop trash turned in and decomposed as rapidly as possible.

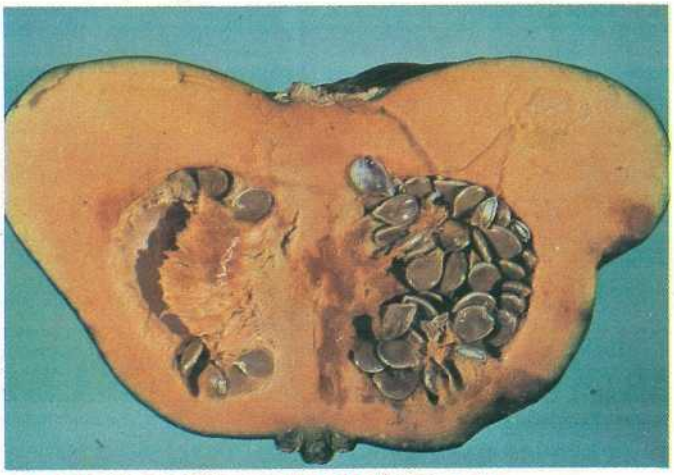
Compiled by N.T. Vock, Plant Pathology Branch.

(Further information including recommended fungicides may be obtained from your nearest Plant Pathology Branch office or by writing to the Director, Plant Pathology Branch, Department of Primary Industries, Meiers Road, Indooroopilly, Q. 4068.)

DISEASES OF CUCURBITS - 1

Bacterial spot of pumpkin

Leaf spots. The brown section is the result of severe spotting.



Cut section of diseased fruit showing internal development and seed contamination.

Spots on mature fruit. Note the dark-green margins and crusty centres.

Spots on immature fruit showing bacterial ooze.