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COVER PICTURE: Bagging Seedheads for Tobacco Seed Selection on Mr. Jack Gowen's Tobacco Farm at Glasshouse.

EDITOR: *E. T. Hockings*

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

A Guide To Costs Of Fodder Crops And Pastures

By N. F. FOX, Agrostologist.

The production of fodder crops and the establishment of sown pastures are the most popular means of supplementing native pastures during their season of low nutritive value.

Summer-growing fodder crops are grazed during December and January and again in April, May and June. Oats grow well on the land which produced the early crops and is available for grazing between June and September.

But costs are an important factor in supplementary feeding programmes, and should be given careful consideration when such programmes are planned. An attempt has been made here to set out a series of standard costs which may serve as a useful guide to the individual producer. Principal items are labour and capital costs of equipment. In the cost tables, labour with keep has been allowed for at £16 for a 40-hr. week and popular makes of machinery have been selected with depreciation and interest rates charged on the cost new. Many farmers or graziers will be able to work at costs below the standard costs calculated here.

The minimum equipment required is a medium-horse-powered tractor, a 7-ft. chisel plough and a seed-fertilizer box which may be mounted on the chisel plough.

Costs of popular makes are approximately—

	£
Tractor	1,348
Chisel Plough	265 (complete)
Seed-box	148
Total	£1,761

The necessary equipment for fodder crop or sown pasture establishment therefore, can be purchased new for about £1,800.

Tractor Operating Costs can be summarised as follows, assuming that the tractor and equipment have a life of 8,000 hours or 10 years.

	Per hour <i>s. d.</i>
Fuel—1 gal. diesel fuel per hr. @ 2s. 6½d.	= 2 6-5
Crank case oil—2½ gal. every 200 hrs. @ 10s. 3¼d. gal.	= 1-54
Air cleaner oil—1 pt. every 50 hr. @ 1s. 6d.	= 0-36
Element for oil filter every 500 hr. @ 16s. 4d.	= 0-39
Elements for fuel filter every 100 hr. @ 28s. 4d.	= 0-34
Top-up oil and grease every 10 hr. @ 1s. 6d.	= 1-80
New tyres and tubes every 3,000 hr. @ £180	= 1 2-40
Repairs and maintenance 5%	= 1 8-20
Depreciation at 10%	= 3 3-84
Interest on capital 5% on first year on £1,348 to 5% on £135 in the 10th year	= 1 1-0
Total	= 10 2-37
Tractor driver's wages and keep @ £16 a week	= 8
Total	= 18 2

Chisel Plough and Seed Box Costs. Capital cost is £413 and supposing they are used for the life of the tractor only.

	Per hour <i>s. d.</i>
Depreciation at 10%	= 1 0-4
Interest on capital at 5% flat rate	= 6-0
Repairs and maintenance @ 5% flat	= 6-0
Total	= 2 0-4

The cost of operating the tractor with attached chisel plough and seed box will be £1 0s. 2·4d. an hour.

The 7-ft. implement should work at the average rate of $2\frac{1}{2}$ acres an hour.

Cost per acre .. = £1 0s. 2.4d. $\div 2\frac{1}{2}$
= 0 8s. 1d. or say 8s. an acre

To prepare new Land after native pasture has been burned, three workings may be necessary on soils of light to medium texture.

	£	s.	d.
Cost of ploughing per acre ..	=	1	4 0
Cost of seeding	=		8 0
Cost of seed—			
10 lb. cowpea @ £2 5s. 6d.			
a bushel	=	7	7
6 lb. white panicum @ 9d.			
a lb.	=	4	6
Total	=	£2 4 1	

The cost of land preparation and planting = £2 4s. 1d. per acre.

The cost of planting an early January crop of cowpeas and sweet Sudan grass on new land would be:

	£	s.	d.
Three workings	=	1	4 0
Planting	=		8 0
Seed—			
10 lb. cowpea	=	7	7
8 lb. sweet sudan	=	15	4
Total	=	£2 14 11	an acre

The cost of planting an oats crop on land previously planted to cowpeas would be:

	£	s.	d.
One working	=	8	0
Planting	=		8 0
Seed, 1 bushel	=	15	0
Total	=	£1 11 0	an acre

The cost of planting a sown pasture mixture on land previously cropped to cowpea:

	£	s.	d.
Planting	=	8	0
Seed—			
scrobie £1 a lb.	=	3	0 0
phasey bean @ £1 a lb.	=	5	0
centro @ 6s. a lb.	=	18	0
Total	=	£4 11 0	an acre

	£	s.	d.
OR planting	=	0	8 0
Seed—			
green panic @ 6s. a lb.	=	1	4 0
molasses @ 8s. a lb.	=		4 0
phasey bean @ £1 a lb.	=	5	0
centro @ 6s. a lb.	=	18	0
Total	=	£2 9 0	

If a system were adopted whereby three crops were planted, and two paddocks were in use each year, costs would be as follows:

	£	s.	d.
<i>September–October</i> Cowpeas			
+ white panicum crop	=	2	4 1 an acre
<i>January</i> Cowpea + sweet			
sudan grass	=	2	14 11 an acre
<i>March–April</i> Oats crop			
following early planted			
crop	=	1	11 0 an acre

For 50 head of cattle, 25 acres in the *early paddock* and 25 acres in the *late paddock* may suffice.

	£	s.	d.
25 acres @ £2 4s. 1d.	=	55	2 1
25 acres @ £2 14s. 11d.	=	68	14 11
25 acres @ £1 11s. 0d.	=	38	15 0
Total	=	£162 12 0	

The cost of supplementary feed per cow = £162 12s. 0d. \div 50 = £3 5s. 0d. per head

In most years, dry stock would receive some benefit from the stubble grazing.

On most of the coastal soils, it may be necessary or at least desirable to use superphosphate at the rate of 2 cwt. an acre each year. To treat the 50 acres once a year, 5 tons would be required at approximately £16 a ton landed cost, a total of £80 of £1 12s. 0d. per cow. So that if superphosphate is used, the cost of supplementary feeding becomes £4 17s. 0d. for each adult beast on the basis of 50 acres and three crops for 50 head of cattle.

These are standard costs only, calculated on some 1959-60 costs. They will serve as a guide. On your property, you may be able to produce crops much more cheaply depending on the fertility of the soil, its texture, the cost of equipment and the allowance you make for wages.

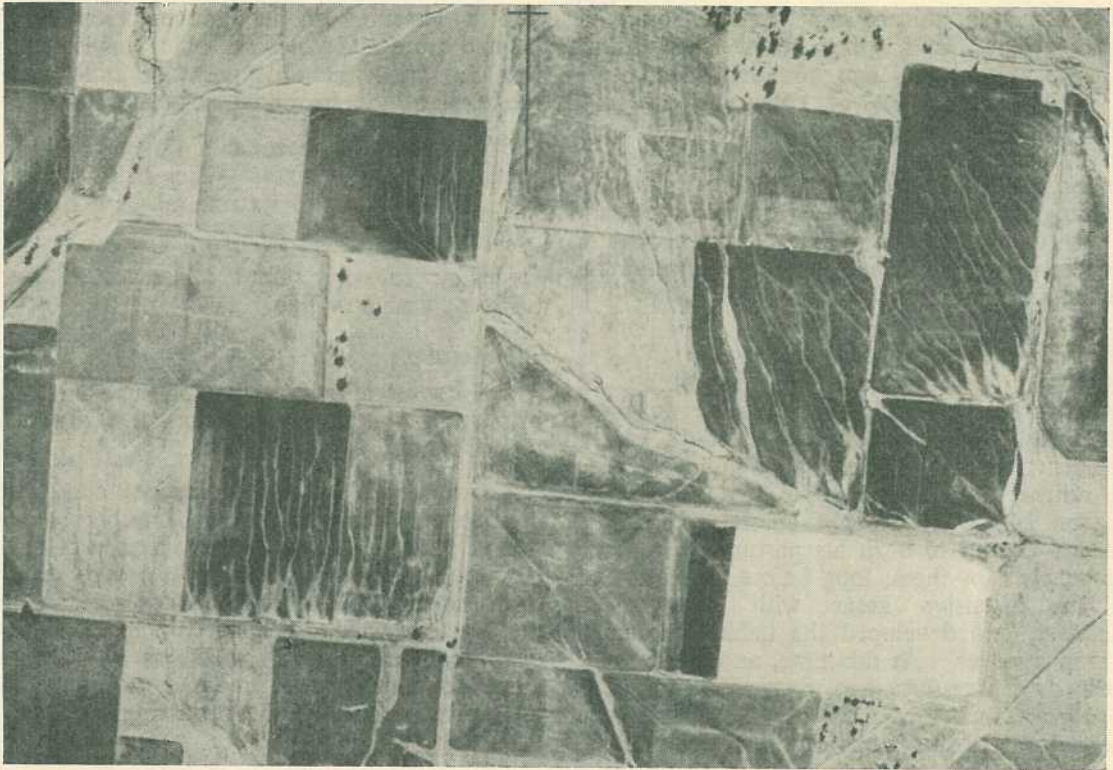


Plate 1: **Serious Erosion on the Eastern Darling Downs.** Problems like these can only be resolved by co-ordinated action.

The Catchment Approach To Soil Conservation

By J. E. LADEWIG, Chief Soil Conservationist.

The individual farmer can do much to reduce erosion losses on his property by applying soil conservation measures. This applies particularly to the correction of defective land use. But the situation frequently exists where a successful outcome depends on a joint attack on the community problem through the simultaneous and co-operative action of groups of adjoining farmers whose properties are situated within a common drainage area or catchment.

A torrent of run-off water moving down the slope does not respect property boundaries or roads. In areas which are farmed intensively, soil erosion on a property may be as much the result of run-off water flow from other farms as from flow accumulating on the farm itself.

There is an increasing recognition of this fact and farmers in the Darling Downs, Burnett and Atherton areas are joining in group schemes to deal with their erosion problems. In these districts integrated water disposal systems aggregating hundreds of miles have been constructed by landholders in over 30 catchments.

Departmental officers now prepare soil conservation plans on a group basis because they recognise that catchment boundaries delineate the immediate spheres of community interest with respect to erosion problems. Authorities responsible for public utilities such as roads and railways are also aware of the importance of providing the cross-drainage structures necessary for the co-ordinated disposal of run-off water from catchment areas in which soil conservation schemes are being implemented.

Before Settlement

In order to appreciate the desirability of catchment soil conservation schemes, we must look at the situation back in the days before settlement; before man erected buildings, roads and railways, felled the scrub and established pastures; before he brought animals on to the land and started to burn his pastures to provide a green pick for them; long before he started to cultivate extensive areas with high speed machinery, and developed the habit of burning his crop residues. At this time, and it was only a little over a century ago, dense vine scrub or native grasses covered most of the hills and the valleys down to the banks of the rivers and the creeks.

The vegetation absorbed the impact of falling rain, slowed the movement of water down the hill and held the soil together. Soils were rich in organic matter and the slow-moving water was readily absorbed into the friable virgin soil.

Streams ran clear for the most part and without the sediment we now find choking them.

Only the heavier rains caused flooding but a lesser proportion of the rainfall reached the streams and they were able to carry greater flows of water than is the case at present. Flooding was not so widespread as if the same storm came along now. The run-off which made the flood, started at the crest of the catchments and gradually increased in volume as it moved down-slope following the fall of the land. There were no roads, fences or crops to impede it or divert it and the water carried very little silt.

Land Development

Since settlement, many things have changed because of the need for increased productivity but the run-off flow still follows the basic natural laws. Reduction of the soil's protective cover

and a lessening in its inherent stability has created more and faster run-off. Unwise cultivation has left vulnerable areas of cultivation in the path of the increased run-off water.

This water has become a potent weapon of destruction which carves gullies in its efforts to find its way back to its natural path of travel.

It may be diverted temporarily by roads, fences or crops but sooner or later it will return to its natural flow line.

The Solution

Soil conservation measures aim to gain control of run-off water before it assumes destructive proportions.

Commonsense farming practices can restore the natural balance and ensure improved absorption of rain. The systematic collection of run-off over the entire catchment and its orderly disposal from the moment it commences to accumulate is the practical way of dealing with it. But this is only possible where all members of the catchment community are prepared to apply their respective sections of the programmes.

The catchment approach, therefore, provides a basis for the systematic planning and implementation of soil conservation measures. It has many desirable features:

- (1) It enables technical officers to prepare co-ordinated plans for lands within a catchment area. It facilitates the integration of water disposal systems and also enables provision to be made for co-operative action by local authorities and Government departments.
- (2) Landholders are able to visualize not only the plan for development and protection of their own farm but also its place in, and contribution towards, the whole scheme.
- (3) Construction work is facilitated and costs reduced because of a reduction in contractors' travelling time. The opportunity is also presented to seek finance on a group basis for the implementation of programmes.
- (4) Problems in integration can be resolved at meetings of the interested farmers.

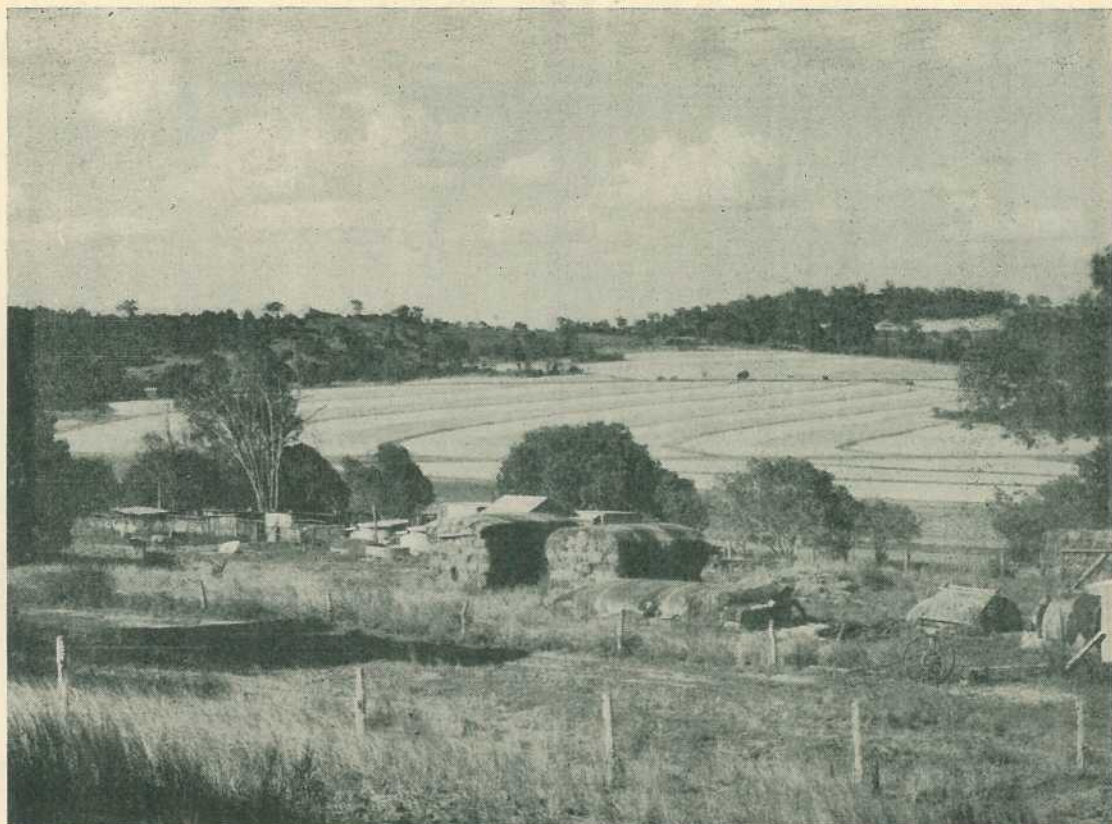


Plate 2

A Typical Soil Conservation Scene on the Darling Downs. Effective erosion control has resulted from joint action on two adjoining farms.

South Burnett, Darling Downs and Atherton farmers have provided a lead in this regard by establishing catchment committees which assist in the resolution of difficult problems.

How a Group Plan Commences

Where a request is received for the planning of soil conservation works on any property it is the practice to consider the needs of adjacent properties and the associated common drainage area. This may include another two or more farms and in some cases as many as 20 properties may be involved. It is usually not long before the other farmers take an active interest and proceed to implement their portion of the plan.

As staff permits, an attempt will be made to plan catchments in advance of actual requests

from farmers for the provision of technical services. This has the effect of stimulating interest and it is not unusual to find at least 50 per cent. of the farmers in such catchments who wish to immediately implement the first stages of a programme.

Advance planning also ensures the complete co-ordination of plans before any drainage work commences, and facilitates the solution of the water disposal problems confronting road and other authorities. Planning is currently proceeding on more than 30 catchments with an aggregate area of 160,000 acres.

Co-ordination Committees

Co-ordination of plans has also been assisted by the establishment of District Soil Conservation Committees in the Darling Downs, South

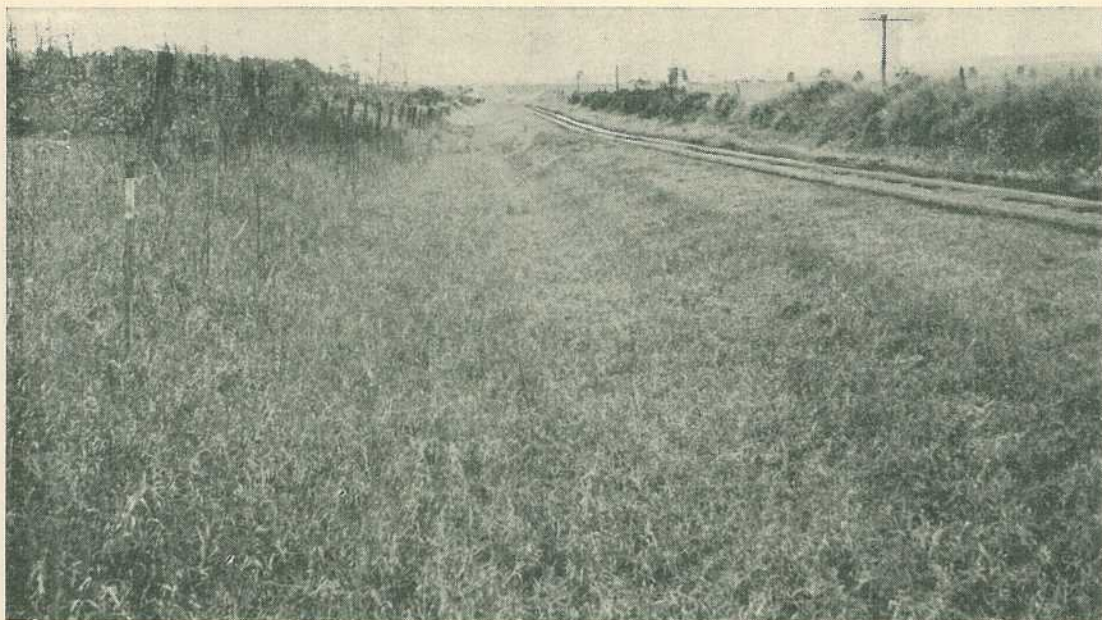


Plate 3

A Stable Waterway Protected by a Cover of African Star Grass. This is one of a network of 30 miles of waterways constructed on the Bones Knob-Mapee catchments at Atherton.

Burnett and Atherton districts. These committees comprise representatives from interested Government departments and from local authorities and their purpose is to resolve planning problems and to ensure the co-ordination of water disposal systems.

The American Precedent

The United States of America has provided the lead in catchment work. Programmes there are well established and by early 1957 work was proceeding on 35 watersheds or catchments aggregating 2 million acres. A further 246 watershed areas were in course of being planned. A feature of these programmes is the insistence by the Government that the first moves by a catchment project must be made by the local

sponsoring agencies, and the control of the work remains with the local organisation.

How to Stimulate Programmes

Catchment work is here to stay because it provides the opportunity for people to work together for the better co-ordination of soil conservation and associated activities. It not only facilitates co-operative action by groups of farmers and other agencies in resolving their common problems of water disposal but also enables a joint examination of other problems in land utilisation.

If you wish to sponsor catchment soil conservation activity in your community have a chat with your neighbours and then approach your nearest soil conservation officer.



STOCK FOODS.—Make sure the stock foods you buy are recognised brands which are correctly marked and labelled.

Whether you are interested in prepared mashes or pellets for your poultry, manufactured meals for your pigs, calves or dairy cows, cubes or nut

rations for your sheep, or meals for your stock generally, these products are required by law to be correctly marked and to carry labels setting out constituents and chemical analyses so that their worth may be assessed at a glance. Also included in this group are additives such as antibiotics, trace elements and vitamin supplements.

Scours Stopped When Movable Farrowing Pens Were Used

By C. PORTER, Senior Adviser, Pig Branch.

In some piggeries, one reason for small litters of undersized weaners is scours. In fact, this problem occurs so often that any reasonable means of curing the trouble would be worth considering even if it included some extra labour.

Mr. E. Black, of Coolabunia, in the Kingaroy district, had this problem and was fully aware that his piggery profits were less than they should have been. He found that the trouble was not caused by bad feeding but by germs picked up from contaminated soil in his farrowing pen yards, so he built two movable farrowing pens for a test.

He now has six of these pens and has not had any sign of scours in suckers since he started to use them. Timber is now on hand for building two more pens.

The pens are by no means elaborate as they do not have floors. However, Mr. Black is fortunate in having a good sward of kikuyu for it was found that this grass made a warm, comfortable bed.

The pens are approximately 16 ft. long by 9 ft. wide, with the iron roof 5 ft. high. Variations in size have been tried but this seems

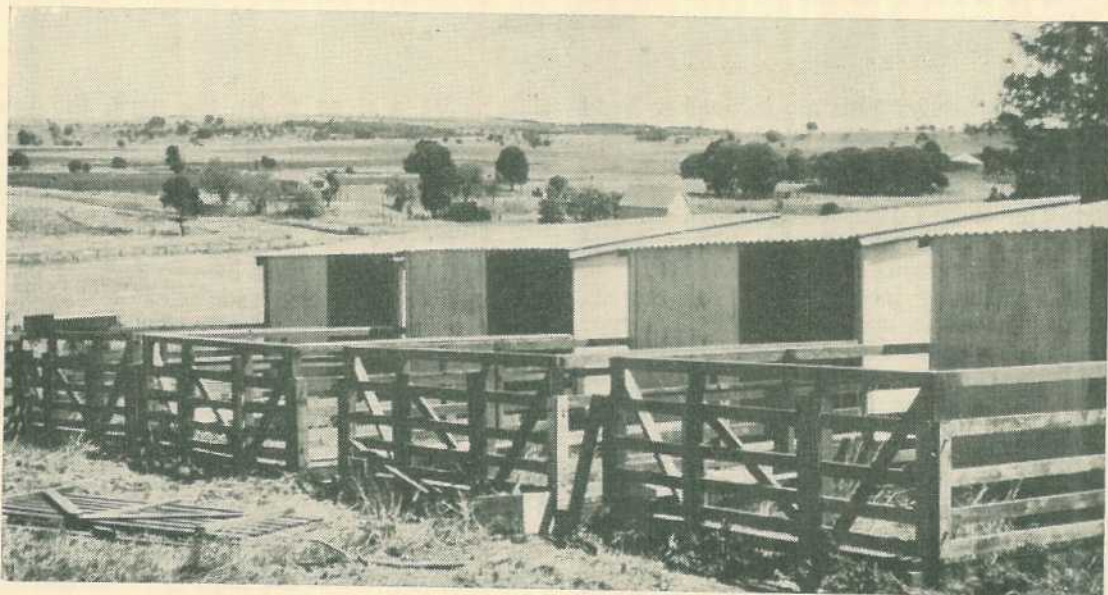


Plate 1

Four of the Six Movable Farrowing Pens on Mr. E. Black's Piggery at Coolabunia, in the Kingaroy District.

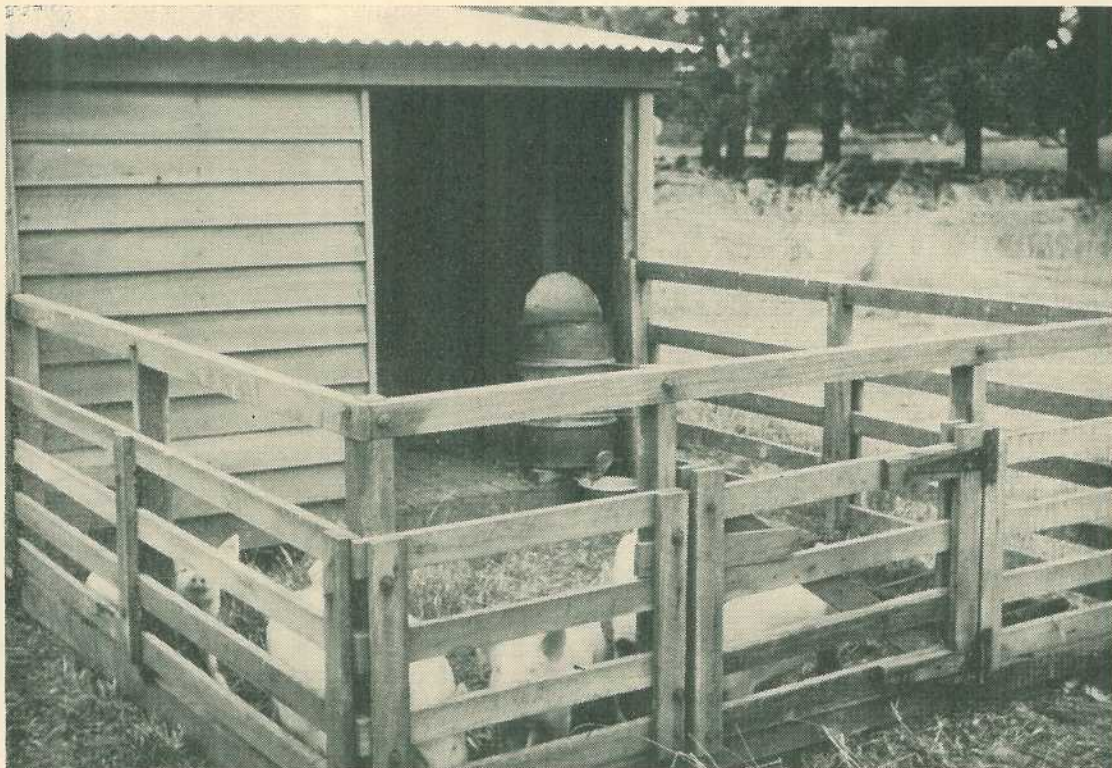


Plate 2

A Close-up of One of the Movable Farrowing Pens Which are Credited with the Avoidance of Scours in Sucking Pigs.

very suitable. Longer pens are inclined to bend when being moved.

The cost of materials for each pen was as follows: Timber £12 10s.; 7 sheets of 8-ft. iron £5 15s.; nuts, bolts and nails £2; a 6-ft. metal trough £3 5s.; giving a reasonable total of £23 10s. excluding labour. Four of the six pens have automatic waterers of the float type at an extra cost of £4 10s. per pen. These have proved so satisfactory that waterers will be attached to the others as soon as possible.

Mr. Black's method of providing water to these pens is to fit a 44-gal. drum with an outlet tap as near the bottom as possible. This drum is placed on an ordinary farm slide. Garden hose runs from the tap to a T piece attached to the first waterer. More hose, connected to the other end of the T piece, gravitates water onto the second pen and so on. Provided the

slide is on a slope above the pens, the water gravitates in sufficient quantities to provide the sow and suckers with all they need.

Water storage could be increased by joining two drums together with a flexible coupling.

Another method, used by two farmers in the Cloyna district, is also satisfactory. The pens, in these cases, have wooden floors under the roofed section. Automatic waterers are attached to 12-gal. drums placed on the outside edge of the floor and secured to one wall by two metal bands or heavy wire tightly twitched.

For and Against

Now this system of housing sows just before and after farrowing has both advantages and disadvantages. Here are some of the advantages:

The movable pens can be faced to suit the weather.

Being confined to the pen, suckers will be easily caught for castration and ear marking if the sows are quiet.

If any sows are touchy, a hurdle (the width of the pens) will afford protection for the man and make a smaller space for the suckers to move about in.

The absence of scours is a definite advantage.

Initial cost of the pens will be lower than concrete floored pens.

Now for the disadvantages:

To get the best results the pens must be moved at intervals depending on the pasture and weather conditions. This means that sometimes the tractor will have to be started up for this job only.

Occasionally the pens will be a fair distance from the main piggery or feed shed, so there will be extra walking at feeding times.

The drums on the slide will have to be refilled periodically or water carted to the 12-gal. drums in the pens.

It is up to you to decide whether increased profits from good weaners will offset the bit of extra time spent in managing the movable pens.

A couple of extra points to give you a clear view of the whole picture: Troughs can be secured to the side of the pen by a simple method that will cut out having to pick them up when moving, yet allow them to be tipped over should rain fill them. Mr. Black weans from movable pens to concrete finishing pens. The pigs remain in these pens till the last 2 to 3 weeks when they have access to a kikuyu run.



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Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crooke, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D., "Wamba", Chinchilla
Dennis, L. R., Diamondvale A.I.S. Stud, Mundubbera
Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
Evans, E. G., Lauraven A.I.S. Stud, Maleny
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Moore, S. R., "Sunnyside", West Wooroolin
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O'Sullivan, Con., "Navillus", Greenmount
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Power, M. F., "Barfield", Kapaldo
Messrs. Mitchell and Mulcahy, Rosenthal
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Radel, R. R. & Sons, "Happy Valley", Coalstoun Lakes
Roche, C. K., Freestone, Warwick
Sanderson, W. H., "Sunlit Farm", Mulgildie
Schloss, C. J., "Shady Glen", Rocky Ck., Yarraman
Scott, M. E. & E., "Wattlebrae" A.I.S. Stud, Kingaroy
Scott, W. & A. G., "Walena" A.I.S. Stud, Blackbutt
Shelton, R. A. & N. K., "Vuegon" A.I.S. Stud, Hivesville, Murgon
Estate Sokoll, A. H., "Sunny Crest", Wondai
Sperling, G., "Kooravale", Kooralgin, Cooyar
Sullivan Bros., "Valera", Pittsworth
Sullivan, D., "Bantry", Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Thompson, W. H., "Alfavale", Nanango
Webster, A. H., "Millievale", Sabine, via Oakey
Wieland, A. W., "Milhaven", A.I.S. Stud, Milford, via Boonah

Ayrshire

Dudgeon, C. E. R., Marionville Ayrshire Stud, Landsborough
Dunn, T. F., "Alanbank", Gleneagle
Goddard, B., Inverell, Mt. Tyson, via Oakey
Holmes, J. L., "Benbecula", Yarranlea

Mathie, E. & Son, "Ainslie", Maleny
Scott, J. N., "Auchen Eden", Camp Mountain
Zerner, G. F. H., "Pineville", Pie Creek, Box 5, Post Office,
Gympie

Friesian

Behrendorf, E. C., Inavale Friesian Stud, M.S. 786, Boonah
Macdonald, S. E. G., "Freshfields", Marburg
Morrison, E. J., Cedar Creek, via Closeburn
Naumann, C. H., "Yarrabine", Yarraman

Paech, P. B., Grasmere, M.S. 544, Clifton
Pender, D. J., Lytton Road, Lindum
Stumer, A. O., Brigalow, Boonah

Guernsey

Doss, W. H., Degilbo, via Biggenden
Fletcher, A. B., "Cossart Vale", Boonah
Holmes, C. D. (owner Holmes L. L.), "Springview", Yarraman
Johnson, G. L., "Old Cannindah", Monto
Miller, G., "Armagh Guernsey Stud", Armagh, M.S. 428,
Grantham

Ruge, A. & Sons, "Wooonga", via Biggenden
Scott, C., "Coralgrae", Din Din Rd., Nanango
Swendson, A. C., Coolabunia, Box 26, Kingaroy
Wisseman, R. J., "Robnea", Headington Hill, Clifton

Jersey

Beckingham, C., Trout's Rd., Everton Park
Birt, W. C. M., Pine Hill Jersey Stud, Gundiah
Borchert, Mrs. I. L. M., "Willowbank" Jersey Stud, Kingaroy
Burrows, R. N., Box 23, Wondai
Bygrave, P. J. L., The Craigan Farm, Aspley
Carpenter, J. W., Flagstone Ck., Helidon
Conochie, W. S. & Sons, "Brookland", Sherwood Rd., Sherwood
Crawford, R. J., Inverlaw, Kingaroy
Farm Home For Boys, Westbrook
Fowler, P. & Sons, "Northlea", Coalstoun Lakes
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Johnson, H. G., Windsor Jersey Stud, Beadesert
Lau, J. F., "Rosallen", Goombungee, Toowoomba

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McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
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Noone, A. M. & L. J., "Winbirra", Mt. Esk Pocket
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Sengreen, A. L., "Tecoma", Coolabunia
Seymour, B. T., "Upwell" Jersey Stud, Mulgildie
Smith, J. A. & E. E., "Heatherlea" Jersey Stud, Chinchilla
Tatnell, W. T., Cedar Pocket, via Gympie
Toowoomba Mental Hospital, Willowburn
Verrall, F. W., "Coleburn", Walloon
Weldon Brothers, "Gleneden" Jersey Stud, Upper Yarraman

Poll Hereford

Anderson, J. H. & Sons, "Inverary", Yandilla
Hill, W. W., Mathalla
Hutton, D. R. & M. E., "Bellgrath", Cunningham, via Warwick
Maller, W., "Bore View", Pickanjinie

Maller, W., "Bore View", Gowrie Junction
McCamley, E. W. G., "Eulogie Park", Dululu
Wilson & McDouall, Calliope Station, Calliope

Poll Shorthorn

Leonard, W. & Sons, Welltown, Goondiwindi

Yamburgan Pastoral Company, Noondoo

These Drugs Pose Problems In Chickens

By P. D. RANBY, Veterinary Officer.

A new approach to the use of coccidiosis-preventing drugs is suggested.

Coccidiosis-preventing drugs, or coccidiostats as they are called, are being widely used for rearing chickens on the ground. Supplied continuously, these drugs act by hindering the development of the coccidia in the intestine of the chicken. With the advent of the newer coccidiostats, it was even thought that coccidiosis was at last "beaten", but it has since been found that they are not a complete answer to the coccidiosis problem. Special problems have arisen, both in table chickens (broilers) and chickens to be reared and kept as adult fowls.

The problem in table chickens was discussed in a previous article: "New Drugs Aid Rearing of Table Chickens" (August, 1960). The problem in chickens to be reared to maturity for egg production and breeding is rather different from that in table chickens.

In the case of chickens to be reared to maturity, the coccidiostat used should be suited to the husbandry methods employed, or alternatively, husbandry methods changed to suit the drug used. The production of immunity against coccidiosis is important in these chickens but not in table chickens. Too often these drugs are not used correctly. In particular, the newer coccidiostats can work for you or against you.

Infection with Coccidia

Coccidia are minute parasites which undergo a complicated life-cycle in the intestine of the chicken. These organisms survive on the ground or in the litter in the form of minute, egg-shaped oocysts (see Plate 1). Following

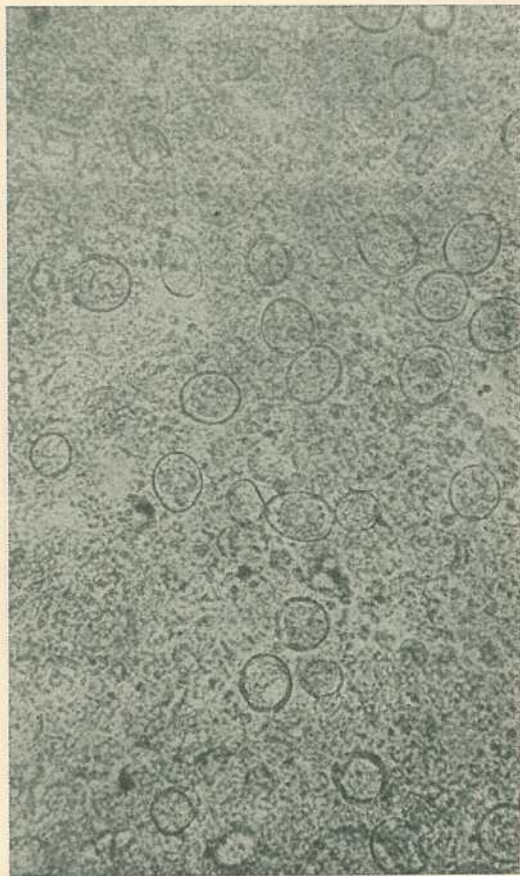


Plate 1

Coccidial Oocysts in Intestine of a Chicken.
(Microscoped approximately 400 times.)

ingestion by a chicken, one oocyst reproduces several hundred thousand or so, depending on the species of coccidia involved. The coccidial cycle is completed in one week and so a rapid build-up of oocysts can occur.

All ground-reared chickens become exposed to coccidia sooner or later. However, if only small numbers of coccidial oocysts are ingested by chickens (up to 1,000 oocysts per day by each chick), immunity will develop without coccidiosis occurring. An attack of coccidiosis results when large numbers of oocysts are ingested by the birds in a short time. Under field conditions, it is usually difficult to regulate the intake of oocysts by the chickens. Outbreaks of coccidiosis may occur under most systems of management in Queensland. Hence the need for coccidiostats.

There are several forms of coccidiosis, depending on the species of coccidia involved. The main forms are caecal coccidiosis due to *Eimeria tenella* (see Plates 2 and 3), intestinal coccidiosis

Immunity Essential in Pullets

Where coccidiostats are used, it is essential that the chickens develop immunity during preventive treatment with drugs, because these drugs can be given for only a limited period. If a particular drug is too effective in blocking coccidial development, immunity may fail to occur. The birds are then exposed to coccidiosis when treatment ceases. Later, we will relate immunity development to the coccidiostat used and the husbandry methods employed.

Immunity depends mainly on the later stages of the parasite in the intestine of the chick. There is no cross-immunity between the various species of coccidia.

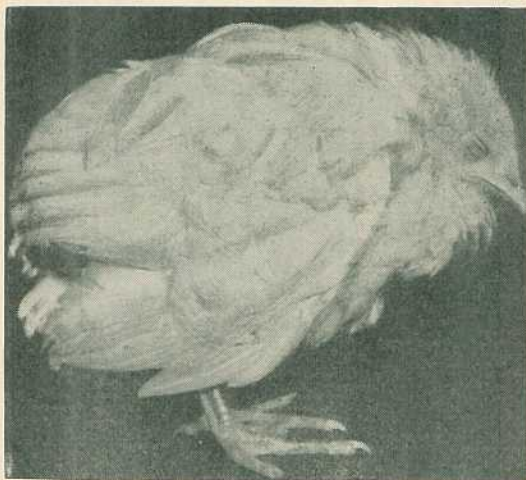


Plate 2

This Chicken is Affected by Caecal Coccidiosis Due to *Eimeria tenella*. Note the severe depression and drooping of wings which is typical of this disease.

due to *Eimeria necatrix* and duodenal coccidiosis due to *Eimeria acervulina*. Other species also exist but do not produce disease under ordinary conditions.

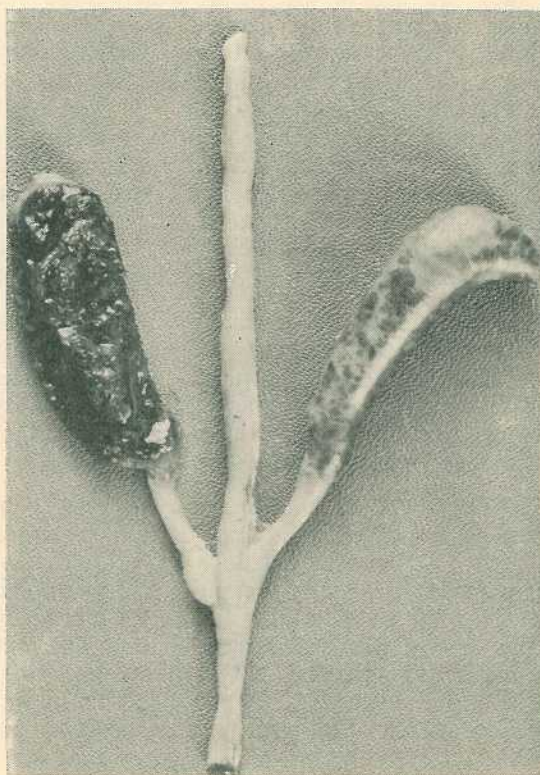


Plate 3

The Caeca (or Blind Pouches) from a Chicken Affected by Caecal Coccidiosis. The left caecum has been slit open and shows severe bleeding and blood clots. The right caecum is distended with blood.

Drugs Used

The following coccidiostats are used in Queensland:

(i) Nitrofurazone

Nitrofurazone has been used here for over three years for controlling coccidiosis. Although this drug is sometimes used for treating outbreaks, its main value is as a preventive. Results in the field here have been variable. The coccidia may "break through" this drug where a heavy build-up of oocysts has occurred. Nitrofurazone does not seem to interfere with immunity development at the levels used (0.01 per cent. in the mash). It is supplied in mash or drinking water.

Recently nitrofurazone has appeared on the market combined with furazolidone to which it is related chemically.

(ii) Nicarbazine

Nicarbazine has been available here for a little over two years. Supplied in mash or medicated crumbles (at a level of 0.0125 per cent.), the drug is highly effective in preventing coccidiosis but is of no value once outbreaks occur. It is not supplied in water. There is field evidence that nicarbazine sometimes blocks the development of immunity. The drug is cheaper than the other coccidiostats.

(iii) Zoalene

Zoalene is the most recent coccidiostat, appearing here late in 1959. Like nicarbazine, zoalene is highly effective as a preventive but has the additional value that it is also very effective (at a higher dose) for treating outbreaks. It is supplied in mash at the rate of 0.01 per cent.

(iv) The Sulphonamides

The sulphonamide drugs are used only occasionally as preventives but are commonly used for treating outbreaks. At low levels in the mash, these drugs are moderately effective but tend to produce undesirable side-effects after prolonged administration.

The drug arsenosobenzene recently used experimentally overseas with some success may not be marketed as it has no advantages over drugs already in use.

Preventive Treatment

Coccidiostats are supplied continuously in the mash (or sometimes in the drinking water) to chickens until they are about half grown (10 to 12 weeks old). Sometimes drugs are continued longer but the period of treatment is limited by (a) cost (in the case of nitrofurazone and zoalene), and (b) deleterious effects on egg quality (in the case of nicarbazine supplied to laying fowls).

How Breakdowns Occur

In the case of chickens, drug breakdowns are of two types:

- (1) Coccidiosis during treatment.
- (2) Coccidiosis soon after treatment ceases.

Outbreaks During Treatment

Outbreaks of coccidiosis during treatment with drugs would indicate that the particular coccidiostat used is not sufficiently active to control the heavy exposures of oocysts. Drugs such as nitrofurazone and low level sulphonamides come into this category. However, if outbreaks can be reduced in frequency and kept to mild proportions by these drugs, they may still be of value if followed by drugs suitable for treatment (sulphonamides, zoalene) when required.

Outbreaks during treatment with the more active coccidiostats (nicarbazine and zoalene) are rare. Where such outbreaks occur, one may find that hygiene is usually very poor or the birds are not receiving sufficient of the drug as a result of improper mixing in the mash or due to impaired appetite.

Outbreaks After Treatment

Outbreaks of coccidiosis occurring a few weeks after treatment would indicate that immunity to coccidiosis failed to develop while the drug was being administered. This situation sometimes arises with the newer drugs, nicarbazine and zoalene. Whether immunity develops or not during treatment with these drugs will depend on the degree of exposure of the chickens to coccidial oocysts. If the initial exposure or contamination of the litter with oocysts is small, nicarbazine and zoalene may prevent any appreciable increase in oocyst numbers.

Since outbreaks following the withdrawal of the drug will involve older chickens, they will be much more serious. Usually, but not always, it is the intestinal form of coccidiosis that has appeared under these conditions in Queensland. Some of these outbreaks have been particularly severe. The following five cases have come to notice:

Case 1

In October, 1959, a severe form of intestinal coccidiosis (*Eimeria necatrix*) appeared in 900 cross-bred pullets, 19 weeks old. Eighty birds became sick and died in three days. Only for zoalene treatment, which quickly halted the outbreak, it is expected that losses would have been much heavier.

These pullets had been brooded in a very clean environment on a wooden floor with fresh wood-shavings and later transferred to laying sheds which were also cleaned out beforehand. For the first 15 weeks of life, the birds had been given nicarbazine in the mash at the recommended level.

Case 2

On the same farm as case 1, 300 cross-bred pullets developed caecal coccidiosis when 15 weeks old. These birds were reared similarly in a clean environment and were given nicarbazine in the mash for the first 12 weeks of life.

The outbreak appeared three weeks after the drug was withdrawn and affected about 20 per cent. of the birds in a short time. Zaalene treatment at high level for 4 days halted the attack but birds started to pass bloody droppings again on the fourth day after treatment. Retreatment (for 11 days) again controlled the outbreak and no further cases occurred.

Case 3

At a farm close to Brisbane, intestinal coccidiosis appeared in 600 pullets on the point of lay in January, 1960. These birds were housed in a number of small pens each containing 20 birds on concrete floors and fresh litter. The pullets had been supplied zoalene as a coccidiostat for the first 18 weeks of life. The first cases appeared four weeks later and involved all pens within several days. Zoalene treatment soon halted the outbreak but overall losses were about 5 per cent.

Case 4

At Kairi, on the Atherton Tableland, a severe attack of intestinal coccidiosis affected a flock of 400 pullets which had been laying for over three months. These had been supplied nicarbazine in the mash for the first 16 weeks of life and had been housed intensively in a thoroughly clean environment using concrete floors. The disease appeared some 18 weeks after drug treatment. Treatment with sulphonamide drugs produced a response but many of the birds suffered a setback and some 60 deaths occurred (15 per cent.).

Case 5

At Zillmere, in January, 1960, severe intestinal coccidiosis started in 800 pullets 12 and 14 weeks old, one week after being placed on old, built-up litter in intensive laying pens. The birds had been reared in colony houses with wire floors but ranged out during the day. The birds had been supplied zoalene continuously from day old, treatment ceasing when they were transferred.

Altogether 150 pullets died, despite treatment with sulphonamide drugs.

Coccidiostats Adapted to Husbandry

Coccidiostats should not be used haphazardly. There is a definite relationship between coccidiostat, immunity and husbandry methods employed. This involves a completely new approach to the use of coccidiostats.

There should be two aims in view when using these drugs—

- (1) To ensure the development of immunity during treatment.
- (2) To prevent or considerably reduce coccidiosis outbreaks.

To some extent, these two aims are opposed to one another. Thus, if a particular drug is highly effective in blocking coccidial development in the intestine, immunity development may be poor or absent. Again, if immunity is ensured by a less active drug, there may be some danger of coccidiosis. This problem may be overcome by gauging the degree of exposure to oocysts in the litter, or alternatively, choosing a coccidiostat

to suit the degree of exposure to oocysts. The effect of environment is as follows:

(1) *The Clean Environment*

By "clean environment" we mean that the ground or litter contains relatively few oocysts. Some poultry farmers even disinfect the concrete floor before placing fresh litter down in preparing the pen to receive chickens. On most poultry farms, such an environment only delays the build-up of coccidia to a time when the chickens are older. Rapid build-ups may then occur at a later date. It is possible to slow down such a rapid build-up by means of litter management. Coccidial oocysts do not survive long if the litter is kept very dry. Exposure can be further reduced by periodic stirring of the litter to disperse or "dilute" the oocysts on the surface of the litter. But in practice, most examples of litter are not dry enough to hinder oocysts.

If highly effective coccidiostats such as nicarbazine and zoalene are used in conjunction with a clean environment, one can expect that immunity to coccidia species will fail to develop. The initial clean environment would explain the occurrence of coccidial outbreaks after preventive treatment with these drugs has stopped.

If less active coccidiostats such as nitrofurazone or a combination of this drug with furazolidone are supplied to chickens maintained in a clean environment, there will be a reasonable chance of some coccidial multiplication and hence the development of immunity.

(2) *The Contaminated Environment*

By contaminated environment we mean that the ground or litter contains a larger number of oocysts. Chickens placed in such an environment will become infected immediately. If the chickens are day-olds the rate of ingestion of oocysts will not be so heavy as in chickens brought down at say, four or five weeks old, from battery brooders since the latter eat relatively more litter. Such an environment is risky where chickens brooded in batteries are brought to the ground.

If highly effective drugs are supplied in this environment, there will be a reasonable chance of immunity against coccidiosis developing during the period of drug treatment at the pre-

ventive level. If less active coccidiostats are used, there is a danger that the coccidia may break through the drug barrier, particularly if the exposure to oocysts is heavy.

These Rules Suggested

1. If you prefer a clean environment containing a minimum number of oocysts, it may be preferable to use one of the less active coccidiostats such as nitrofurazone (with or without addition of furazolidone). Husbandry methods should aim at reducing or slowing down any coccidial build-up by keeping the litter dry and using a reasonable depth of litter (6 to 8 in.). The litter should be stirred at least once a week. A suitable drug such as zoalene or one of the sulphonamide drugs (sodium sulphamerazine or sodium sulphaquinoxaline) should be kept on hand to treat coccidiosis in case the disease appears.

2. If the environment used is relatively contaminated with oocysts one of the more active coccidiostats (nicarbazine, zoalene) should be used.

3. An alternate and somewhat intermediate method is suggested on theoretical grounds as follows:

Ensure early infection with oocysts by leaving a trace of the old litter when replacing it with fresh litter (about 1 lb. of old litter should be sufficient for 500 birds). Avoid using disinfectants as these only delay the appearance of oocysts. This slight contamination with coccidia will act as an "inoculum".

Use an effective coccidiostat intermittently, alternating 2 weeks of treatment with one week of no treatment. Thus, over a 12-week period, the birds are exposed to coccidia for three 1-week periods. A further modification of this scheme would be to start the drug when the chickens are 1 or 2 weeks old instead of from day-old. Zoalene may be thus be supplied intermittently in the drinking water for convenience. Where continuous drinking systems are used, however, it will be necessary to supply zoalene or nicarbazine intermittently in the mash. If a medicated mash (or crumbles) is used, be sure to use labels to distinguish it from the unmedicated mash.

These Points May Require Caution:

(i) *Absence of Some Coccidial Species*

In order to be fully effective, the "inoculum" used for immunizing the chickens must contain the three important coccidial species. If one or more species is absent, failure to develop immunity against these would result.

In general, *Eimeria tenella* (caecal coccidiosis) is associated with younger chickens (for example 1 month old) while *Eimeria necatrix* (intestinal coccidiosis) and *Eimeria acervulina* (duodenal coccidiosis) are associated more often with older chickens (for example 2 months old). This association would apply to chickens kept under reasonably hygienic conditions. Thus, if litter from young chickens is used as an inoculum, the chances are that *Eimeria tenella* may be present but the other two species (*E. necatrix* and *E. acervulina*) may be absent.

To overcome this problem, prepare the inoculum from litter used by chickens about 2 months old rather than 1 month old.

(ii) *Presence of Roundworm Eggs*

The number of roundworm eggs present in the inoculum would be relatively few providing the litter has not been used continuously between batches of chickens. In any case, the chickens should be de-wormed when half grown (about nine weeks old).

(iii) *Presence of Leucosis Virus*

One could suggest the contamination of used litter with leucosis virus. However, the contamination should be small because (a) faeces or droppings are not a potent source of virus and (b) the volume of the inoculum is only a fraction of the total volume of litter when fresh litter is added.

In any case, leucosis virus could be readily destroyed by the following method:—

Wet the sample or litter to be used as the inoculum using an alkaline solution. Such a

solution may be prepared by adding 1 teaspoon of washing soda to half a pint of water. Then spread the litter sample out for 24 hours to partially dry. Mix with an equal quantity of fresh litter (that is about 1 lb.) and sprinkle over the litter of the pen. The alkaline effect destroys virus but not coccidia or worm eggs.

Value

The probable value of an inoculum of coccidia during medication may be shown in the following case:—

A poultry farmer near Brisbane reared chickens to near the laying stage in efficient wire-floored colony cages. Owing to inability to equip his farm with laying cages, the pullets were brought to the ground late in 1959. The birds were placed in clean disinfected intensive pens with concrete floors and fresh litter, each pen holding 100 pullets. Zoalene at the preventive level was supplied to each flock for four weeks, continuously in the drinking water. Intestinal coccidiosis appeared regularly in each group 10 to 14 days after cessation of treatment but was readily controlled by treatment with zoalene (four days high level followed by seven days half level) in the drinking water. It was decided to change the method of pen cleaning in four pens by omitting the disinfection with Lysol and leaving a trace of litter behind when adding the new litter. Of the 15 groups thus brought to the ground and treated at the preventive level for four weeks, the four "contaminated" pens were the only ones which did not develop coccidiosis after withdrawing the drug.

Further observations on these methods using the newer coccidiostats are required to assess their value in practice. It is not expected that these methods will always be fool-proof but if they can reduce the coccidiosis problem to a minimum, they will be well worthwhile.



Cowpeas In A Cropping System For The Coastal Burnett

By N. F. FOX, Agrostologist.

Cowpea crops have long been used for improving soil fertility and this applies very well in the Burnett coastal districts. Each year there is fresh evidence of increased yields from the crops and sown pastures that follow cowpeas.

Cowpeas will grow on the poorer soils usually considered unsuitable for agriculture. They are legumes which add nitrogen to the soil. Grazed cowpea crops have improved soil structure, added organic matter, and improved the texture and moisture holding capacity of the lighter soils.

They are heat tolerant and resistant to drought conditions. They provide excellent high quality feed during the summer and autumn months. More important is the fact that they cover the soil during periods of high intensity rains and so protect it from the disastrous effects of erosion.

On the poorer coastal soils and on the sandy soils of the Eidsvold district, cowpeas have responded to applications of 2 cwt. of molybdenised superphosphate to the acre. Fertilizer has resulted in increased yields of cowpea and better following crops.

Varieties.—Poona is the most popular variety, although susceptible to stem rot. Reeves and Cristaudo are commonly planted. New stem rot resistant varieties such as Malabar are now in limited production.

When to Plant.—Plant on the first storm rains in the Spring—September or October—for December to February grazing. This is the early crop. The land may be worked again for planting to oats in March or April.

Plant cowpeas in late December or early January for April to June grazing.

For the early planting, drill in a mixture of 10 to 15 lb. of cowpea and 6 lb. of white panicum to the acre.

For the late planting in midsummer, change the mixture to 10 to 15 lb. of cowpea and 8 lb. of sweet sudan grass. Sudan grass will tend to make some regrowth in the cooler months and in the following spring.

Inoculate the cowpea seed to ensure that the most efficient nitrogen fixing bacteria are present in the roots. The nearest source of inoculum supply is the office of the Department at Bundaberg.

Land Preparation.—On new land, burn the native grasses in July and, using a chisel plough or other tined implement, work the land until native species have been destroyed. This type of implement ensures that as much organic matter as possible is retained on the surface and the land is left in a condition to absorb storm rains with a minimum of run-off.

Usually three workings will be required. Apply superphosphate at the last working so that fertilizer will be incorporated in the top soil prior to planting.



Plate 1

**A Well-Grown Crop of
Panicum and Poona Cow-
pea that is Ready for
Grazing.**

Plant immediately following the first good storm rains. A seed box mounted on a chisel plough gives satisfactory results.

Grazing Practice.—Graze at the rate of about 2 beasts to the acre. The early crop grazed during December and January will lift cream yields or pack the beef on bullocks.

The late crop provides excellent supplementary grazing during April, May and June. It will produce continued weight gains when native pastures are deteriorating and stock condition is starting to drop. It can be grazed until the oat crops are ready.

Preparation for Following Crops

Plant pastures or oats following the early crops. In January, plant pasture mixtures into the lightly cultivated surface soil. Again using the chisel plough, lightly work the grazed stubble,

dropping seed at the same time, so that the pasture mixture is barely covered with a mixture of surface soil and trash.

The following wet season rains should ensure satisfactory establishment, while the cowpea-white panicum crop stubble will prevent the soils from crusting and reduce soil temperatures during January-February heat waves. The chisel plough working will fracture the surface soils sufficiently and permit maximum penetration during the early stages of the summer rains.

If oats is to follow the early crop, continue light grazing until the end of February, then plant oats, using the same method as for pasture, except that two workings may be necessary.

If good rains fall in June or July, the late planted summer crops may be followed by barley for spring grazing. If not, use the stubble during the spring months.

TABLE 1
FODDER CROP GRAZING SYSTEM FOR 50 HEAD OF ADULT CATTLE

50 acres

<p style="text-align: center;"><i>Early Paddock—25 acres</i></p> <p>Sept.—Oct.—Plant cowpeas and white panicum Dec.—Feb.—Graze March—April—Plant oats June—Sept.—Graze</p> <p style="text-align: center;"><i>Repeat or</i></p> <p>Sept.—Oct.—Plant cowpeas and white panicum Jan.—Plant pasture</p>	<p style="text-align: center;"><i>Late Paddock—25 acres</i></p> <p>Dec.—Jan.—Plant cowpeas and sweet sudan April, May, June—Graze June—July—If good rains fall, plant barley If rains poor, graze sudan grass stubble in the spring</p> <p style="text-align: center;"><i>Repeat</i></p>
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A Cropping System

Grazing crops should produce high quality feed in those periods of the year when native pastures are of low nutritive value. Adopt the philosophy that fodder crops and sown pastures are supplements to the native pastures. Native pastures deteriorate rapidly after the end of March. Even in good years, native pastures may be checked by December-January heat and dry conditions.

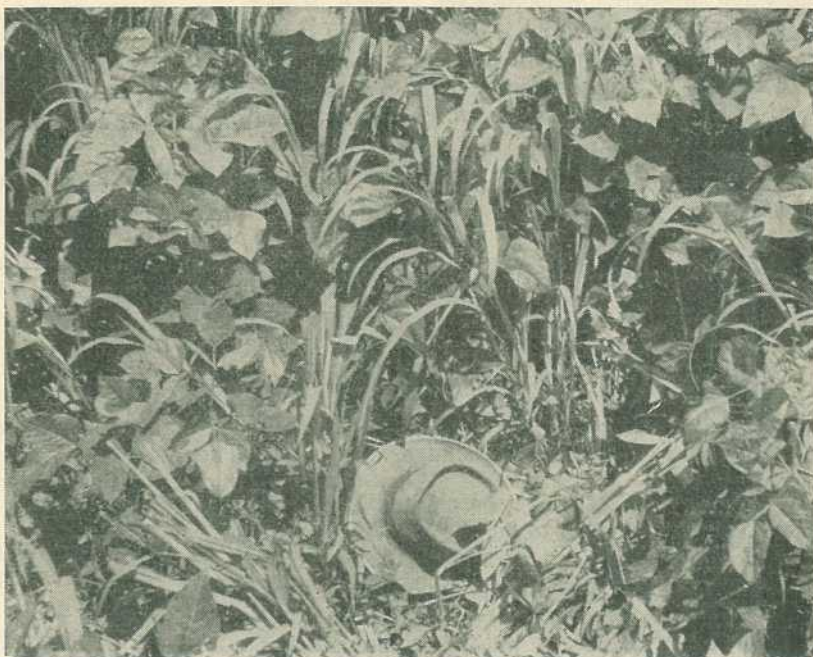
A two paddock system will provide fodder during the periods December and January, April

May and June, July August and September. Spring regrowth in sown pastures may be used in the September to November periods in conjunction with the green pick in native pastures.

Allow about 1 acre of crop for each adult beast to be fed. As soil fertility improves, higher carrying rates may be possible.

For 50 head of cattle, two 25-acre paddocks are suitable. The system is set out in Table 1.

Plate 2
A Sweet Sudan/Poona Cowpea Mixture that is Ready for Grazing.



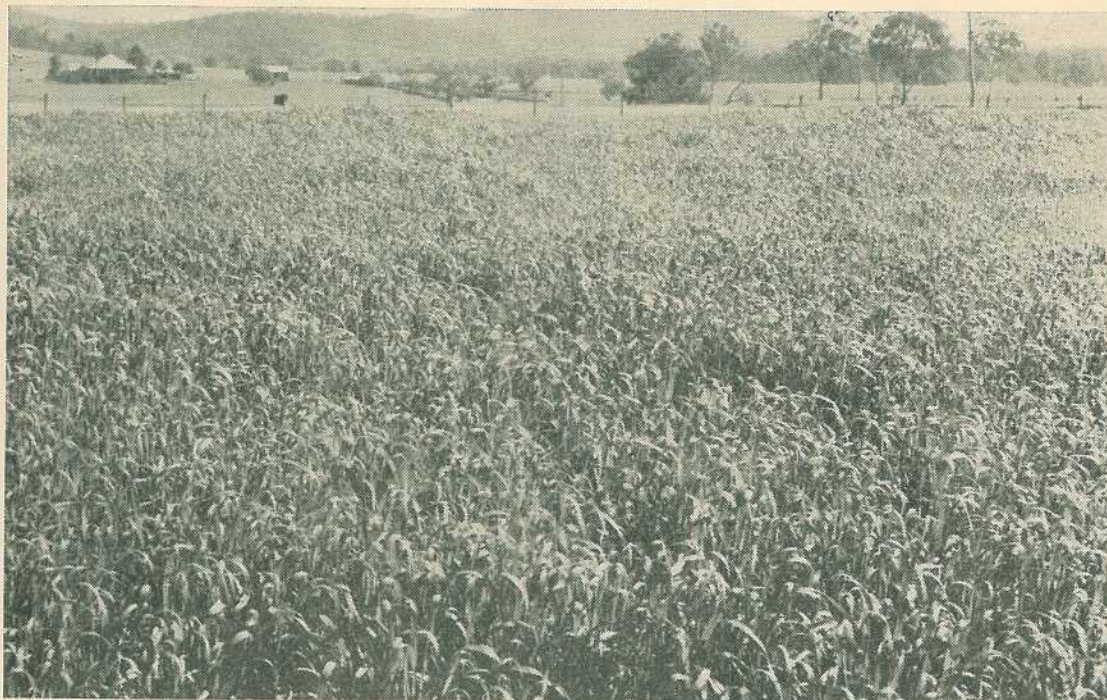


Plate 3
A Good Crop of Oats.

Property Improvement.—The system allows for progressive property development. Each year the early paddock could be planted to sown pasture and a new area brought into cultivation. In this way the carrying capacity of the property might be increased gradually while maintaining production per animal unit.

What it Costs.—Clearing costs and fencing will vary from property to property, but on

cleared land it can be shown that the standard cost of growing three crops in the two 25-acre paddocks for 50 head of cattle is £3 5s. a head, or £4 17s. a head if 2 cwt. of superphosphate is applied to each acre annually.

Many farmers and graziers will be able to produce more cheaply.



Don't Plant Cotton Too Deep

Planting depth for cotton seed is a vital factor in obtaining a good stand of seedlings.

For germination, seed must be planted in moist soil but don't be tempted to "chase" the moisture beyond 2 in. If the seed germinates below this depth on heavy clay soils, the seedling may not be able to break the surface. Sandy soils are safer from this point of view but the seedlings may

be weakened by the time they push above ground. They then have no resistance to dry spells or insect attacks and a poor stand results.

Some growers fit a shallow furrow opener in front of the planting boot to scrape away loose dry soil. This is a good idea but don't make the furrow too deep.

—W. G. STEELE, Senior Adviser in Agriculture.

Growing Glycine For Seed In The Lower Burdekin

By W. A. R. COWDRY, Senior Experimentalist.

Climatic conditions in the Burdekin Delta are very favourable for the production of glycine seed.

The combination of summer wet season conditions, necessary for prolific growth of tropical plants, with dry, temperate winter weather required for seed harvesting, occurs nowhere in Queensland except in the area known as the "Dry Tropics." This is an area of coastal lowland which extends from Ingham in the north, south to Bowen, and is bounded on the west by the Dividing Range.

The lower Burdekin part of this district is particularly favoured because of the abundant supply of underground water available at a comparatively shallow depth. Moreover, most farmers in the area are already equipped for irrigating large areas of land, and the country, while slightly undulating, is all irrigable. Soils are well drained.

Time of Planting

Planting can be carried out in either the autumn or the spring months. Seedlings of *Glycine javanica* are slow-growing, especially if planted in April or May, but this period has the advantage of better moisture conditions while the weed growth, although relatively thick, can be controlled. It usually effects a shading which may (in the odd season of lower temperatures) be beneficial.

On the other hand, plantings made in spring may need to be established under irrigation. Early seedling growth should be slightly faster than that of the autumn-sown crops but will have to compete with rather prolific weed growth before

becoming properly established. In this case, therefore, preplanting preparation of the seedbed should be of a better standard.

Spacing and Rates of Seeding

If it is desired to plant in 42 in. rows, so that cultivation may be practised in the early stages, the sowing rate should be 2 to 3 lb. to the acre. It can be carried out with a vegetable seeder using planting depths of $\frac{1}{2}$ to 1 in. The surface tilth should be as fine as possible.

Because of the prostrate habit of this plant, soil ridges should be avoided; otherwise some of the crop would be missed in the subsequent mowing. The seed may, therefore, be broadcast or sown in narrow drills, and in this event a sowing rate of 8 to 10 lb. to the acre will be needed.

Establishment

In order to maintain the growth of the seedlings and suppress the growth of grasses and weeds, judicious mowings with the blade set high should be carried out until the seedlings attain 6 in. After that time they will fend for themselves and during late summer will grow and spread quite rapidly.

Seed Treatment

Because the seed develops a hard coat, that which is older than six months should be immersed in boiling water. It should be allowed to cool for 15 min. and then to dry quickly and thoroughly. Seed so treated should be planted as soon afterwards as possible.



Plate 1
Glycine Grown For Seed At the Ayr Regional Experiment Station.

Because this crop is a comparatively new one, it is important to inoculate the planting seed. The correct inoculum is available from the Department of Agriculture and Stock's laboratory in Brisbane, and should be applied to the seed according to the directions included with each bottle.

General Growth

Plantings made in the autumn should be sufficiently advanced to produce a reasonable coverage and mature a seed crop in the winter of the next year. The first seed crop from a spring planting will be relatively light, as it has not had the same time to develop vigorous plants.

It is important to keep the crop growing evenly. The reason for this is that under Lower Burdekin conditions, while flowering might extend over a period of 4 to 5 weeks, all pods in such a crop will mature evenly over a period of a few days. This is a particularly valuable asset, which other

tropical legumes such as centro and stylo do not possess to the same degree.

Seed Formation

The flowering period is a particularly vulnerable one. This is because any check to growth during this period may interfere greatly with the even rate of maturity. This check may be caused by moisture stress or frosty conditions and in either case will cause premature ripening of those pods nearing maturity, together with shrivelling of seed.

Some regrowth and flowering, with a second crop of pods, will then take place, so that two distinct seed crops will be formed. Under these circumstances, the decision has to be made to harvest when the highest yield of mature and viable seed can be obtained. This is sometimes difficult.

In order to mature the crop over as short a period as possible, it is sometimes necessary to

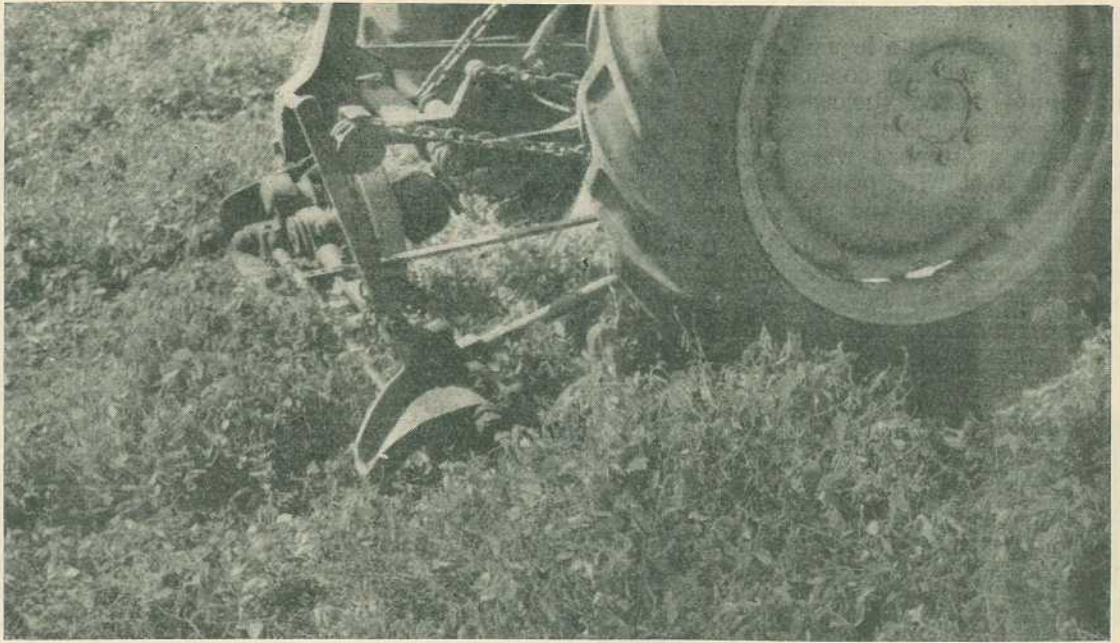


Plate 2

Mowing Glycine Which Carries a Heavy Seed Crop.

curtail the soil moisture supply. In practice it is very difficult to judge just when cessation of watering will give even ripening without serious reduction in yield.

When fully mature, the pods shatter readily, especially if dry weather has prevailed. Time for harvesting is then very limited, because a few hours' delay will result in heavy seed loss.

If large areas are involved it is not advisable to mow larger sections than 2-3 acres in any one day. The harvesting can thus be spread and seed loss by shattering will be minimized. The later seeds at the top of the plant should be fully developed, that is, the shape of each seed must be well-defined on the outside of the pods. By this time the early seeds should have turned from yellow to brown in colour.

Harvesting Methods

Conventional headers may be used for seed harvesting.

Because the plant is prostrate when grown as a crop for seed, it is necessary to harvest the whole of it. This involves passing a considerable quantity of material through the header.

Two methods of harvesting are available. One is direct harvesting, in which the crop should be allowed to wilt and dry out in the field. The seed sample so obtained is often contaminated and has lower viability owing to the need to force the setting of the seed.

The other method involves mowing, allowing the plants to wilt so that the leaves and pods become brittle and then passing the mown swathe through an "all crop" type of header for thrashing and winnowing. It is then a relatively simple matter to clean the resultant seed and produce a final sample that will be of good viability and contain little trash.

Depending on circumstances, the mown material should be ready for thrashing within 4 to 7 days. The dry material can be picked up easily by lowering the knife bar as near as possible to the ground. In this position the reel arms will pass the material on to the canvas if set close to and slightly forward of the knife bar. A high drum speed should be used, and for a 20 in. diameter peg drum the best speed of the cylinder shaft will probably be 900 to 1,170 r.p.m.

Cold Tolerance

Because glycine is a legume of tropical origin, its growth is reduced considerably as soon as temperatures descend below 40 to 45 deg. F. Leaves become yellow at first, then they drop, and growth is stopped when temperatures fall below frost level. The plants are not killed, however, unless exposed and unprotected.

Glycine shows slightly more tolerance to cold than does centro, which is the main pasture legume grown in the tropics. For this reason it maintains a certain amount of cover throughout the winter months, when grown as the legume component of a pasture.

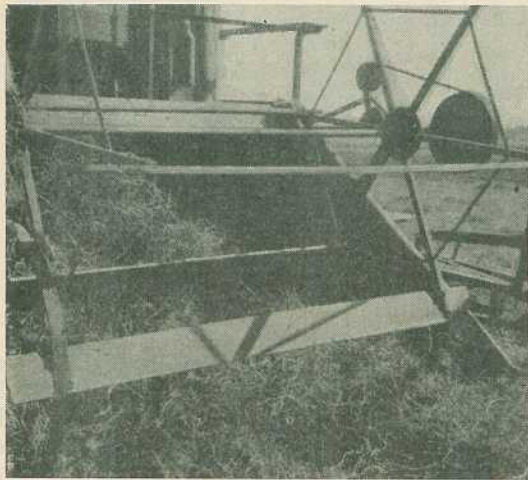


Plate 3

Dried Bulk Passing Up the Canvas of the All-Crop Header for Threshing.

Weed Seed Problems

When growing glycine or any of the tropical legumes for seed, it is important to keep the areas free from weeds. Many weed seeds of this area are of a size approximating one or other of these legumes and it is very difficult, if not actually impossible, to get rid of them by mechanical means.

Convolvulus is probably the main weed to watch in the Burdekin area.

Seeds of grasses are not so hard to remove, but the presence of grass, besides spoiling the look of the crop may, if too thick, hamper the effective harvesting of the crop for seed.

Persistence of Crop.

It is advisable to burn the residue after thrashing, because it has been found that this does not readily disintegrate and causes inconvenience from dust and unsatisfactory harvesting conditions in the following year.

Furthermore, it is imperative that a thorough irrigation be given the area as soon as possible after the crop is harvested, so that the quick regrowth will reduce the inroads of weeds and grasses in the period before the summer rains.

An area of glycine can be expected to produce up to five crops of seed on the alluvial soils in this district, and yields should average 150 lb. to the acre. The invasion of grasses, such as Guinea and Para will have to be watched, however, and chipped out in later years.



Fowl Manure

Fowl manure is a by-product of the poultry industry and, like most natural manures, is of variable composition. The composition depends on the feed the poultry have been receiving, the amount of moisture present and the degree of contamination of the droppings. The best manure is that collected from under the batteries or perches. Fowl-yard sweepings are diluted with soil and other substances which have little or no manurial value.

Air-dried fowl manure from under batteries or perches contains from 2 to 3 per cent. nitrogen,

from 4 to 6 per cent. phosphoric acid and about 1 per cent. potash. Wet poultry manure would contain about half these amounts of plant nutrients. Fowl-yard sweepings usually run about the same as wet manure.

Fresh fowl manure should not be allowed to come in contact with the roots of young plants as it is liable to cause burning. It should be supplemented with potash to make a complete fertilizer but is best used in conjunction with artificial fertilizers.

From Mat Grass to Lush Clover

By R. E. PHILIPS, Dairy Officer.

The transformation of swampy, coastal mat grass flats into lush clover pastures spells successful management on any farm. Not only does it ensure increased dairy production but it also increases the fertility and capital value of the farm concerned.

On a property in the Beachmere area of the Caboolture district this amazing transformation has been brought about in the short space of 5 years by the owner, Mr. W. Lehmann. These improvements have enabled cow numbers to be increased and extensive subdivision to be introduced to obtain the most favourable feeding value from pastures.

In 1942, Mr. Lehmann purchased a 93-acre mat grass farm near Beachmere. For the next 10 years, market gardening provided the entire income from the farm, but at times returns from this produce fluctuated widely.

It was in 1952 that Mr. Lehmann turned his attention to dairying. Assisted by his wife and his two young daughters, he set about building up a dairy farm.

By 1954 the herd had been increased from the original three cows to 15. However, this stocking rate taxed the carrying capacity of the farm to such an extent that heavy feeding with concentrates had to be undertaken to maintain the condition and production of the herd. It became evident to Mr. Lehmann that under these conditions dairying was not profitable. Some cheaper method of production had to be found.

Pasture Establishment

Mr. Lehmann developed an interest in improved pastures whilst attending several field days in the surrounding district. A firm belief

that equally good results could be achieved on his own farm convinced him that improved pastures would overcome his problem. He sought and acted on advice from officers of the Agriculture Branch of the Department.

Two major obstacles prevented immediate adoption of any pasture improvement scheme. Firstly, a large area of the farm consisted of poorly drained swampy marshes. Secondly, an almost pure stand of mat grass covered the entire farm.

As an initial step, effective drainage was achieved by laying out a network of channels which ultimately emptied into a nearby salt water creek. Areas which were once entirely covered by water during the wet season now drain rapidly, even after heavy storms.

In an effort to eliminate the mat grass, ripping of the natural pasture with a hired chisel plough was carried out. Superphosphate was applied at the rate of 3 bags to the acre towards the end of February, 1954. Inoculated clover seed ($\frac{1}{2}$ lb. Ladino, $\frac{1}{2}$ lb. New Zealand White and 1 lb. strawberry clover to the acre) was broadcast early in March. A light set of pasture harrows was used to cover the seed. Six acres were treated in this way in 1954, and since then additional areas have been improved each year.

Pasture Management

Mr. Lehmann knew that without a balanced grazing programme the real value of improved pasture growth would be lost, so he subdivided the farm into 35 paddocks, ranging in area from 4 acres to half an acre. This was a vast improvement on the original layout when the farm consisted of only 2 large paddocks. A strict routine of rotational grazing is now practised.

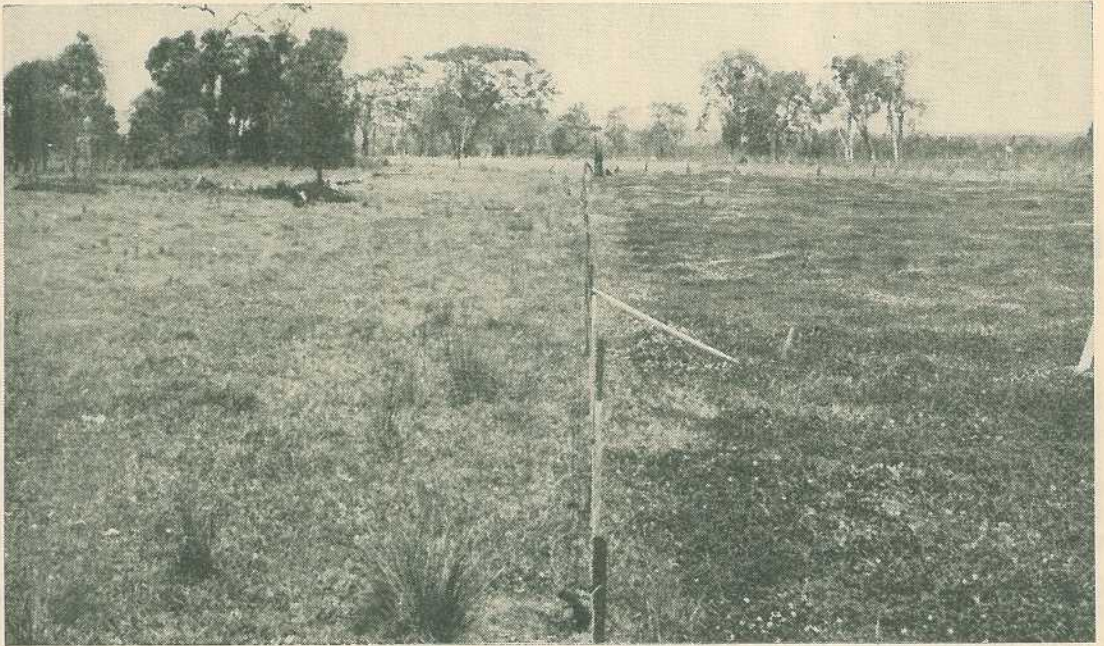


Plate 1

The Dark Area of Clover on the Right of the Fence on Mr. Lehmann's Property Shows how Fertilization of the Soil Brought a Rewarding Response.

The dairy herd is grazed on each paddock for 1 day and then this paddock is spelled for 1 month. It is interesting to note that while the pastures contain a high proportion of clover, Mr. Lehmann, by careful management and controlled grazing times, has almost eliminated the problem of bloat in his herd.

Rank pasture growth and weeds are mown when considered necessary. Particular attention is given to this aspect of pasture management during the summer months. A complete mowing is carried out during April each year to stimulate clover growth. A yearly topdressing with superphosphate is also carried out during the autumn months, at a rate of 3 bags to the acre. The improvement in soil fertility has resulted in the reappearance of paspalum, which is gradually suppressing the growth of the unprofitable mat grass.

Pasture harrows are used at regular intervals to spread the manure over the pastures.

Irrigation

Three small dams have been constructed to conserve surplus water and an area of 6 acres of pasture has been established under spray irrigation. The pasture on this area is irrigated at the rate of 1 in. an hour an acre and the lines are moved every hour during the low rainfall periods. A valuable fodder reserve is thus ensured for that period of the year when growth is normally dormant.

Since 1954, 40 acres of improved pastures have been established on this property. The dairy herd now numbers 60 and the quality of feed supplied from the improved pastures has enabled Mr. Lehmann to dispense with hand feeding.

Farm Income

The development of improved pastures on his farm has allowed him to greatly increase the carrying capacity of his farm and thus expand farm income. Not only has total production increased but the production per cow has also risen.

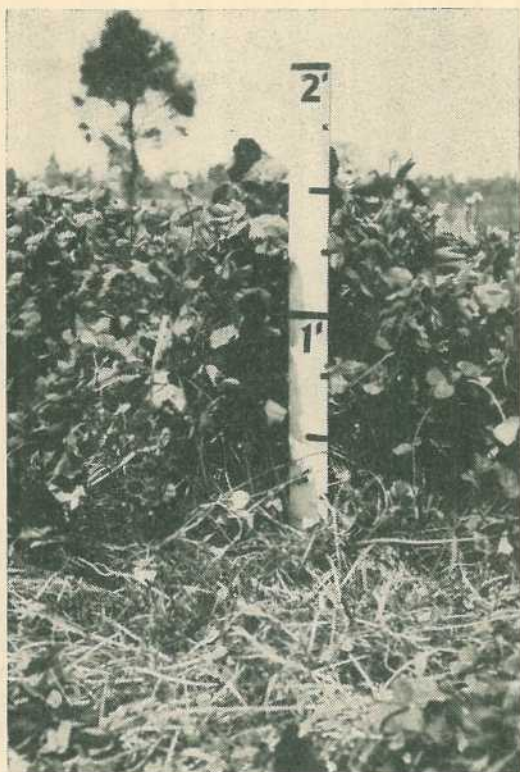


Plate 2

The Clover is now Thick and Tall and Dairy Herd Production has Increased.

Farm incomes obtained from dairying since 1953 are as follows:—

	£
1953	389
1954	446
1955	859
1956	1,298
1957	1,754
1958	1,897
1959	2,205

Botany For Farmers. Although compiled in the first place for beekeepers, "The Honey Flora of South-Eastern Queensland" has a use for farmers and others interested in botany. It contains illustrations and descriptions of the important ironbarks, gums, bloodwoods, boxes, stringybarks, wattles, tea-trees, and cultivated plants such as

"It took many hours of hard work to improve the pastures on this farm," says Mr. Lehmann, "but I'm certainly reaping the benefit now in the form of increased returns."

Pasture Machinery

In the initial stages of this pasture development programme, all necessary land preparation and management was done with hired machinery. As the returns from the farm increased, Mr. Lehmann was able to buy his own machinery. Today the property is self-sufficient in these items.

The main equipment is a tractor. In addition he has a mouldboard plough, a bush and bog harrow, a set of pasture harrows and a 6 ft. power-take-off drag mower. The irrigation equipment comprises irrigation plant with an electric motor and 2½ in. pump and mains.

A modest dairy building was erected in 1953. A high standard of cleanliness is the keynote. A thorough cleansing programme and the provision of a refrigerator ensures a top quality product at all times. A special feature of this dairy is a footbath situated at the entrance gate to the bails. Little or no mud is carried into the bails on the hooves of the cows after they have walked through this footbath.

Has it Paid?

Mr. Lehmann considers that the £120 outlaid each year on the purchase of superphosphate to topdress the pastures is money well spent. "It would cost me more a month to feed my herd with concentrates," he says.

"Money spent on fertilizer for the topdressing of my pastures has proved a sound investment; money spent on concentrates can only be regarded as a short term relief."

lucerne, pumpkins, oranges and clover.

"The Honey Flora of South-Eastern Queensland" contains 199 pages and 178 illustrations. Prices are: In Queensland 15s. a copy, with a 3s. discount to registered apiarists, University botany students and booksellers; elsewhere £1 a copy.

pasture and crop

Do you need extra Tobacco Seedlings? Many people plant insufficient tobacco seedbeds to complete their field plantings, and as a result are obliged to obtain planting material from their friends.

The selection of planting material, if you have to obtain it from others, calls for care. This material should have had the same attention that your own seedbed received. Planting seedlings affected with blue mould is foolish. With such seedlings you run the risk of crop loss due to stem infection at an early age. In addition, you introduce a source of the disease to infect your own clean plants.

Select your seedlings with care and reject any planting material from a bed which has shown blue mould or which is not being well fumigated with benzol.

Your local tobacco advisers may be able to assist you in the selection of such seedlings.

—I. K. HUGHES, *Plant Pathologist.*

Choose a Cotton Variety to suit your Soil. An overseas authority on cotton growing has stated that success or failure in producing a crop of cotton probably depends more on the variety chosen for planting than on any other single factor. This is a sweeping statement, but a few minutes thought proves its significance.

There are many conditions and operations such as moisture and food supply to the plant, cultivation and insect control which govern the ultimate yield. If, however, the variety is unsuitable, all the effort may produce only a mediocre crop. Even though the yield may be satisfactory, quality of the lint may be affected, resulting in a drop in grade. Some of the finer diametered, long staple varieties, for instance, on fertile soils produce a strong fibre, while on poorer country the lint is weak and wasty.

The Department of Agriculture and Stock is carrying out trials with cotton varieties in all the main cotton-growing districts, and field officers can advise you on the most suitable variety for your soil type.

—W. G. STEELE, *Senior Adviser in Agriculture.*

Blue Mould in Tobacco Seedbeds. If you have blue mould in your tobacco seedbeds, look for the cause. Generally you will find a source of infection close at hand or within 100 or 200 yards of the seedbeds. Usually, infection comes from a few stray, diseased tobacco plants. In some instances last year the sources of infection were 800 yards away, but in these cases it was large and obvious.

Survey work has shown that early field infections result in a much greater loss from stem mould later in the life of the crop.

It is well to remember that if you fail to find a source of infection causing blue mould in the seedbeds, it will still be there to infect your field plantings early in their life.

It is not sufficient, once blue mould has shown in seedbeds, to adopt proper benzol fumigation to correct the trouble. You must try to find the source of infection. Your local advisory officers will help you to do this.

—I. K. HUGHES, *Plant Pathologist.*

Earthy Limestones. In many parts of Queensland, and particularly in black soil country, deposits of white or greyish white material are encountered when digging post holes or other excavations.

These deposits are often quite extensive and the Agricultural Chemist is frequently required to determine what they are and if they have any value in agriculture.

Most of these deposits are earthy limestones sometimes containing magnesium, in which case they are classed as magnesian limestones or earthy dolomites.

Typical analyses of these earthy limestones range from 15 to 25 per cent. of lime with from three to 10 per cent. of magnesia in the magnesian limestones. Deposits containing 30 to 40 per cent. of lime and up to 15 per cent. of magnesia are not, however, uncommon.

Although lime (calcium) is an essential plant food, there is generally sufficient of it in other than strongly acid soils to meet the needs of the growing plant. The main value of the lime is then its property of being able to neutralise or reduce soil acidity.

Magnesium is also an essential plant food, and besides being a neutraliser of acidity the magnesia in the dolomite also takes its place as a plant food, particularly in magnesium-deficient areas.

The low-quality deposits can be used on the farm generally at about twice the rate recommended for limestones of better quality such as the crushed or ground limestone commonly supplied commercially.

The efficiency of limestone depends to a great extent on its fineness. Most of the lumps in the black soil deposits can be broken up with the back of a spade, or if a face is dug into the deposit, the material can be sieved by throwing spadefuls against a wire bed mattress supported in an inclined position with pieces of wood nailed on either side.

Only the better grade earthy limestones have a commercial value.

If the material is to be sold it must be registered under the Agricultural Standards Act and comply with the following specifications:—"Lime shall contain not less than 35 per cent. of calcium oxide (CaO) equivalent; provided that when magnesia (MgO) is present the total percentage of lime (CaO) and magnesia (MgO) shall not be less than 35 per cent."

The prescribed labels require to be set forth—

1. The names and respective percentages of active constituents and the form or forms in which they occur.
2. The neutralising value.
3. The degree of fineness.

Methods of determining these values are set out in the regulations.

The Agricultural Chemist is prepared to analyse material from deposits on farmers' properties and advise on its possible uses.

If the owner decides to sell the material he will require to seek the services of a consulting analyst or chemist to control the product and ensure that it meets the requirements of the regulations at all times.

—W. R. WINKS, *Chief Chemist.*

Weed Control in Crops. Chemical weed control is a valuable aid to the grain grower. To get the maximum benefit from these new herbicides, it is essential to understand how they work and when to apply them. 2,4-D and MCPA are plant growth regulators, not poisons, and if they are to be effective the plants you wish to control must be growing actively.

It is useless to spray weeds if they have ceased to grow through drought or dry conditions.

The best time to spray winter cereals is when the crop is 7 to 10 in. high or when the secondary roots are established and the crop can be grazed.

Avoid the seedling stage, and from shot blade to when the seed has set, or damage and reduced yield will result.

When you realise that only a few ounces to the acre of 2,4-D acid are required to control weeds, the importance of accurate spray equipment becomes obvious. *Remember, it is the amount of pure acid ingredient applied to each plant which controls your weeds.* Water is used as a dilutant to make it possible to apply the small quantities of the herbicide.

Experience has shown that failure to control weeds satisfactorily in past seasons can be attributed, in the main, to these points:

1. Incorrect identification of weeds.
2. Spraying at the wrong growth stage.
3. Application of the incorrect dosage of spray material.

The last point has been the main cause of failure, and I would emphasise that growers should equip their spray outfits with reliable and accurate spray nozzles. The "Monarch" nozzle is a reliable type.

Once the acreage covered by a tank load at a constant speed and pressure is known, it is a simple matter to apply any desired amount of herbicide to your crop.

All herbicides offered for sale in Queensland clearly state the percentage of active ingredient on the label. Most of these are liquids and each 10 per cent. equals 1 lb. of active ingredient.

—S. R. KLOSE, *Adviser in Agriculture.*

Marketing Potatoes. The quantity of potatoes sold each day on the Brisbane markets far exceeds all other vegetables, yet how many potato growers take the time and trouble to present their produce in such a way that will attract buyers?

Every grower knows that he must comply with certain grade standards provided under the Fruit and Vegetable Acts, and must brand his bags accordingly. However, it is the grower who packs uniform sized potatoes within these standards that gets top price.

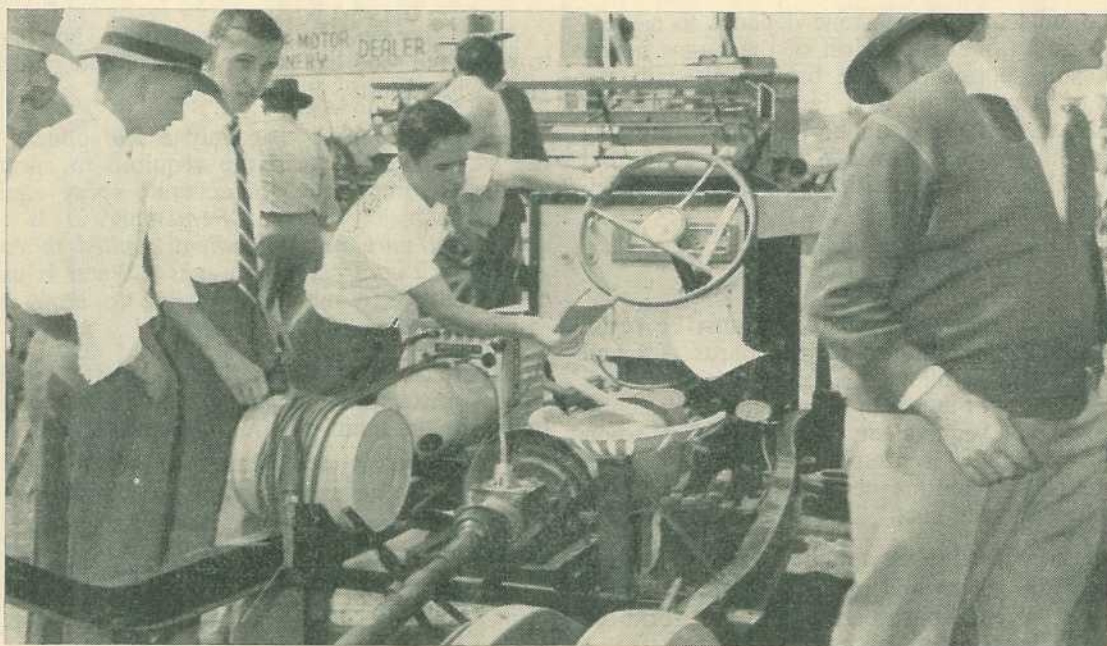
The size requirement under the Act for a No. 1 Grade potato is 3 oz. and over in weight. There is a big difference in the requirements of buyers. On one hand you have the small shopkeeper—and there are many of them in Brisbane. He likes to be able to weigh the potatoes near to his customers' requirements. The large self-service stores look for a medium-size potato because their customers, when selecting their potatoes from the bins, invariably pass over the large tubers.

Cafes, fish-and-chip shops and potato flake manufacturers do not want potatoes too small or too large, because these are hard to peel in mechanical peelers.

The hotel and residential trade, on the other hand, do not mind large potatoes.

So you see, not only do evenly graded potatoes look attractive on display, but the produce agent knows at a glance with which customer he can place the various grades.

—A. B. LOWRY, *Markets Inspector.*



Mr. B. J. Carey, of Clifton, won Second Prize in Class 1, Section 1, at the 1960 Toowoomba Farmers' Festival, with this Mobile Welder.

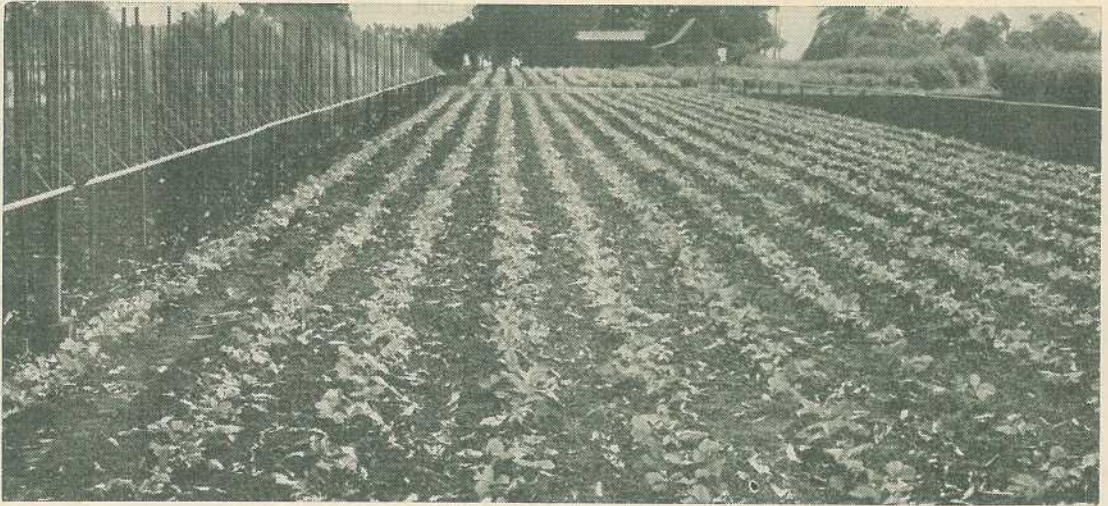


Plate 1

Single Row Planting of Strawberries. Single row planting is practised in areas where ample water is available for irrigation and the crop is grown without a mulch cover.

Strawberry Growing in Queensland

By C. N. MORGAN, Senior Adviser in Horticulture.

The cultivated strawberry is a hybrid between two American species, *Fragaria virginiana*, fam. *Rosaceae*, and *F. chiloensis*. The plant is a squat, herbaceous perennial with dark green, serrated leaves and bears fleshy fruits with small seeds embedded in the surface. The fruits mature to a brilliant red colour. During the summer months, runners develop on the parent plant and root at the nodes. These runners are used as planting material.

The crop is grown in Queensland from the New South Wales border to the far north, but the main producing districts lie within an area extending from 80 miles north to 30 miles south of Brisbane. The mild winter in this area ensures a long picking period which frequently extends from June to the end of December. In central and northern Queensland, the cropping season is much shorter.

During the early part of the season, the fruit sells freely on the fresh fruit market in Queensland but many growers also consign to the southern States. By using fast rail and air transport, the

fruit reaches the Sydney and Melbourne markets in first-class condition. Later in the season most of the fruit is consigned to processors for canning and jam making.

Varieties

A locally selected variety, Phenomenal, has proved satisfactory for Queensland conditions. It is vigorous and produces medium-sized, highly coloured, firm-textured berries which carry well and are suitable for the fresh fruit market and the processing trade. The variety bears self-fertile flowers and crops well without inter-planting with a second variety.

Virus diseases such as yellow edge and crinkle are a constant threat to the industry and production therefore depends largely on the use of runners from vigorous, disease-free, true-to-type plants.

Location and Soils

The strawberry crop must be grown in areas with ready access to markets and a relatively

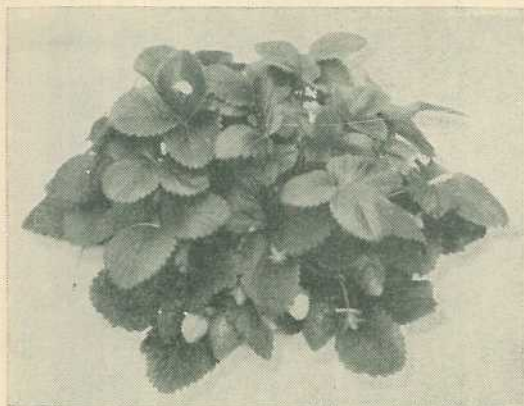


Plate 2

The Phenomenal Strawberry. Phenomenal is the principal variety grown in Queensland. It is well adapted to the climate of southern Queensland and is in production from June to November each year.

mild climate. A reliable supply of water for irrigation is essential, particularly for crops grown on light-textured soils which dry out quickly during the winter and spring months.

Under favourable conditions, strawberries grow well on almost any type of soil though well-drained, sandy loams with a good water-holding capacity are generally preferred for the crop. However, irrigated plantings on the red-brown clay loams give satisfactory yields and, where the drainage can be improved, even the heavier clays may be planted. On badly drained soils, weed growth is difficult to control, root rots are apt to thin out the stand, and the plants usually lack vigour.

In the main producing areas at Redlands and Maroochy, land which is too cold for the more frost-susceptible crops during winter can often be planted profitably to strawberries. New land has some advantages, not the least of these being the small amount of weed growth during the first year of cultivation.

Land Preparation

Because the crop is planted in autumn, land preparation should begin in spring in order to get the soil into a good tilth. Though the strawberry is not a deep-rooted plant, ploughing to a depth of 8 in. is desirable. After the initial ploughing in spring, a cover crop of cowpea or maize can be sown and ploughed-under in summer. A further ploughing and the

subsequent cultivation should then bring the soil into good condition for planting the strawberry crop. Thorough cultivation before planting does much to level the ground and control weeds.

On the clays and clay loams, monsoonal rains in February and March may interfere with land preparation before planting. The cover crop should therefore be ploughed in by mid-December so that the soil will be in good tilth by the end of January. On the loams and sandy loams, land preparation during wet weather presents less difficulty and the cover crop can remain until January.

Strawberries frequently do well after a late spring vegetable crop which has been fertilized well and cultivated regularly during the growing period. Land preparation is then comparatively easy.

On shallow or heavy-textured soils, it is usual to plant on raised beds.

Strawberries are fairly tolerant of acid soils. However, should the pH reading fall below 5.5, leaf symptoms of calcium or magnesium deficiency



Plate 5

Strawberry Plants in Bearing. Crop grown without mulch.

may appear in the crop. On such soils, dolomite should be broadcast over the ground at the rate of 1 ton to the acre during pre-planting tillage operations.

Fertilizing

Fertilizing practices depend largely on the cropping history of the land. Farmyard manure can be used to advantage, provided it is incorporated in the soil a few weeks before planting. Poultry manure is particularly useful and, unlike other sources of manure, does not introduce weeds to the cropping area. However, even when the land receives a liberal dressing (10 tons to the acre of farmyard manure), a 5-13-5 or similar fertilizer mixture should be applied before planting.

When farmyard manure is not available, a heavy preplanting fertilizer dressing is necessary and amounts of from 15 cwt. to 1 ton to the acre are not excessive. A 5-13-5 mixture containing a fair proportion of blood and bone is suitable for most soils. It should be spread in a band about 12 in. wide in single row plantings (20 in. wide in double row plantings) and thoroughly cultivated into the soil about 10 days before the runners are set out in the field.

Side dressings of fertilizer are usually needed during the growing period. The first side dressing is applied when flowering begins and this is followed, usually at four-week intervals, by further side dressings of up to 1½ lb. to the chain row for single row plantings or 2 lb. to the chain row for double row plantings. A water soluble 5-13-5 mixture is normally used. Side dressings rich in potash frequently improve the quality of the berries particularly in soils in which this element is deficient; a 4-13-5-12 or similar mixture is suitable for this purpose. Straight nitrogen fertilizers such as sulphate of ammonia should be used with caution, as they may produce excessive leaf growth, retard berry development and cause lack of firmness in the fruit.

In single row plantings, the side dressing fertilizer is placed in rings around each plant or, alternatively, in 4 in. bands on each side of the row. In double row plantings, the fertilizer should be distributed evenly over the soil between the two rows of plants. Side dressings are applied in such a way that little or no fertilizer comes

in contact with the fruit or leaves. In order to avoid any risk of burning, however, the crop should be irrigated after each side dressing.

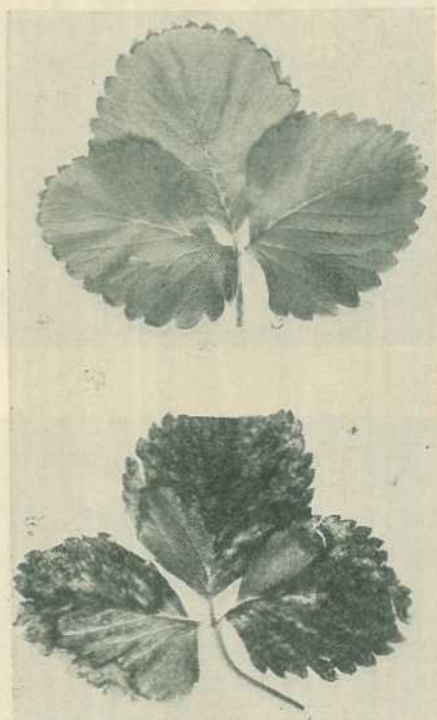


Plate 3

Fertilizer Burn in Strawberry Plants. The typical symptom is necrosis of the leaf margin and, in severe cases, death to the leaf. To avoid injury, the crop should be irrigated shortly after the application of a side dressing.

Establishing the Crop

Strawberries are grown in Queensland as an annual crop and the plants are seldom left in the ground for a second year. This practice is largely brought about by the difficulty of controlling weeds during the wet summer months, but quite apart from this, the fruit from a ratoon crop does not compare either in size or in quality with that from a plant crop. Annual planting is, therefore, sound practice.

Planting Material.—Planting material is usually obtained from a selected area reserved from the previous crop for runner production. Provided they are well looked after, 1,500 plants yield enough runners to plant one acre. Plants in the

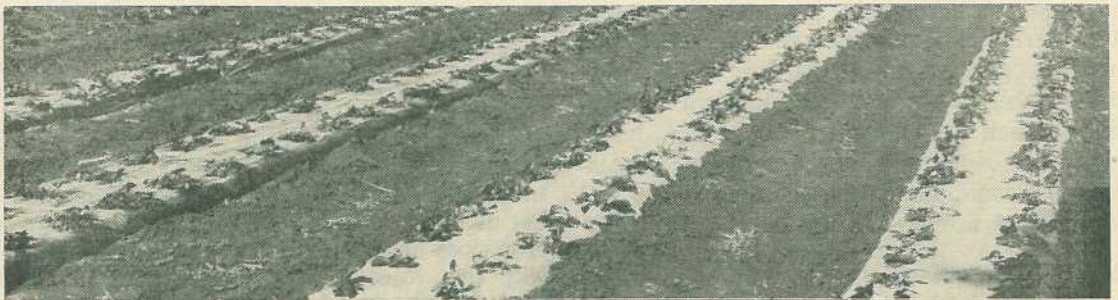
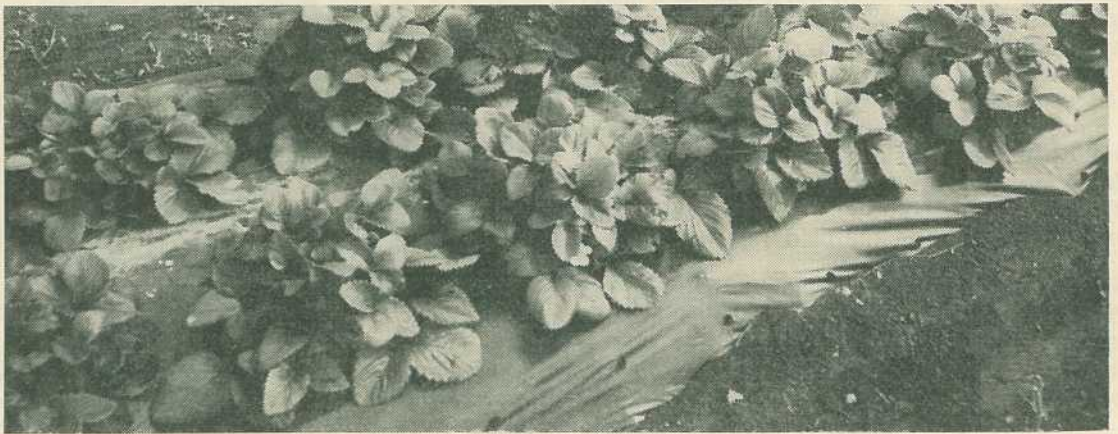


Plate 4

Forms of Mulching Materials. Top—Tanbark; satisfactory when applied at light rates shortly after planting. Excessively heavy applications may depress yields. Centre—Plastic sheeting; one of the best of the mulching materials but rather expensive. The crop must be watered regularly until the runners are well established. Bottom—Paper sheeting; has been used experimentally and shows promise. Considerable care is needed if wind damage and tearing is to be avoided when applied.

runner bed should be vigorous, true to type and free from disease; runners from inferior plants produce a most unsatisfactory crop. Severe roguing must therefore be carried out in the runner bed, diseased and backward plants being destroyed as soon as they are detected in the field. Off-type plants should be clearly marked and then chipped out when picking is finished.

To encourage the production of sturdy, well-rooted planting material, the runner bed must be cultivated regularly and, if necessary, watered. A light side dressing of fertilizer when the runners first appear in December is required. Weeds grow rapidly at this time of the year and they should be controlled before the runners spread out between the rows. Runners growing in competition with weeds lack vigour; furthermore, they may carry weed seeds to the new area and these offset some of the benefits derived from pre-planting tillage.

Before removing the runners, the beds should be well watered to facilitate digging. It is best to start digging the runners at a given point and work through the area on a "face." The runners are lifted carefully and separated from each other with a small trowel or a strong-bladed knife, the roots being trimmed to about 3 in. and all broken and dead leaves removed. They are then placed either in a bucket containing a little water, or between wet bags, and protected from both wind and sun. No more runners should be dug than can be planted on the same day.

Only healthy runners with a good root system and a well-developed crown should be planted. The first and second plants on each runner are often preferred as planting material but it is a difficult and tedious job to sort them out. In any case, the crop grown from such plants seldom bears earlier than a crop grown from sturdy runners roughly graded for size before planting.

Planting.—Planting begins in the first week of March and continues for 3 weeks. Earlier plantings are difficult to establish, tend to be vegetative in habit and are slow to come into bearing. Later planted crops, on the other hand, develop slowly and are seldom productive.

Care in transplanting is essential, for the runner must be set with the crown just above ground level. If set too low, the crown silts up and the plant dies or makes unsatisfactory growth; if set too high, the roots may dry out. It is

difficult to transplant runners at the right depth unless the land is in good tilth and has been allowed to settle. A wire is stretched along the row and the plants are set alongside it; the straight rows obtained in this way are easy to cultivate by tractor and hand implements.

Planting holes are made by hand or trowel and each plant is set at the correct depth with the roots well spread out. The soil is then firmed around the roots, care being taken to prevent dirt getting into the crown. As soon as possible after transplanting, the crop should be irrigated. Planting is best done in the afternoon.

Strawberry runners may be planted in single or double rows. A double-row planting takes approximately 40 per cent. more runners than a single row planting in the same area. Where ample land and water are available, single row plantings are generally preferred owing to the greater ease of watering and picking. However, double row plantings make better use of the available water when supplies are limited and, in mulched crops, reduce the cost of mulching material for any given number of plants.

Planting distances vary according to the implements in use but common spacings for single row plantings are 2½ ft. between rows and 15 in. between plants in the row. For double-row plantings, the best spacings are 3½ ft. between the centres of adjacent pairs of rows, with 15 in. between the two rows in each pair and 15 in. between plants in the row.

The numbers of plants required for an acre are shown in Table I.

TABLE I
STRAWBERRY PLANTS PER ACRE

<i>Single-Row Planting—</i>			
Distance between rows	Distance Between Plants In.	Approx. No. of Plants	
2 ft. 6 in.	{ 12 15	17,500	14,000
<i>Double-Row Planting—</i>			
Between Centres of Double Rows	Distance Between Rows In.	Distance Between Plants In.	Approx. No. of Plants
3 ft. 6 in.	15	{ 12 15	25,000 20,000

Management in the Field

Except in mulched crops, cultivation between the plants and in the rows is necessary to control weed growth. As the strawberry is not a deeply-rooted plant, only shallow implements can be used. A dutch or flat hoe is suitable for close work between the plants and small hand cultivators fitted with hoe attachments are generally used in the rows. Cultivators should be fitted with duck-foot tynes to ensure shallow working. When chipping by hoe, care must be taken not to pull soil away from the plants, and conversely not to lift soil into the crowns.

Irrigation.—Irrigation is essential for commercial strawberry production because the plants quickly react to dry weather, particularly during the cropping period. Lack of soil moisture is soon followed by a reduction in both fruit size and quality. Water is usually applied through overhead spray equipment such as that of the Skinner system.

The soil should be moist at the time of planting and runners set out in any one day require watering the same night to firm the soil. During the first two weeks after planting, the soil must not be allowed to dry out. In some seasons, this may involve daily irrigation and on very hot days it may even be necessary to irrigate twice. Lack of attention at this stage often results in an uneven stand of plants.

Once the crop is established, occasional heavy waterings which saturate the root zone should keep the plants growing satisfactorily until harvesting begins. From then on, about 30-50 points are applied regularly at intervals of three or four days. The amount required varies with the soil type, but sufficient water should be used to keep the plants in full production. On unmulched ground, splashing of the fruit is unavoidable, but the berries in the picking trays can be washed and allowed to drain in the packing shed.

Mulching.—Mulches are useful for controlling weed growth, conserving soil moisture and keeping the fruit free from dirt. On the other hand, some mulches may increase the risk of damage to the fruit from certain ground-frequenting insect pests. Various materials such as tanbark, wood shavings and plastic or paper sheeting are used as mulches.

Tanbark and wood shavings are spread around the plants to a depth of 2 in. on either side of the row and, in the case of double rows, between adjacent rows in the bed. The mulch

soon settles down to a firm ground cover which gives some measure of weed control in the young crop. Heavier mulches, about 3-4 in. thick, though they effectively control weeds, tend to suppress plant growth and lower berry production. Provided the land has been well prepared for strawberries before planting, the tanbark and wood shavings may be applied 2 to 3 weeks after the runners are set out in the field.

Plastic and paper mulches are still in the experimental stage but could prove very useful if some problems of management can be solved. The sheeting is normally supplied in rolls, the plastic being 36 in. wide and the paper 30 in. wide. It is placed in position before planting and held by a soil overlap on each side of the slightly raised bed. An allowance of 1 ft. in every 15 ft. length must be made for shrinkage after new sheeting is laid out. Slits about 6 in. long are made in the sheet at each plant position to permit insertion of the runners about a week after the sheets are laid out. Frequent watering is necessary in strawberry crops mulched with plastic sheeting to minimise the risk of heat damage to the young plants. Plastic sheeting is supplied in thicknesses of .0015 in. and .002 in. for use in the crop.

Sawdust is not a satisfactory mulching material for strawberries; it sticks to the ripe fruit and is difficult to remove when the crop is harvested. If used, it should be checked before use for the presence of boron as sawdust from timber treated with boron for the control of borers may carry injurious quantities of this element. There is a somewhat similar risk involved in the use of wood shavings from timber treated with PCP (pentachlorophenol) for the control of mould.

Harvesting

Strawberries should be picked for the fresh fruit market with the stems on and when about three-quarters coloured. The stems are removed, however, from fruit consigned to factory for this fruit is normally allowed to develop full colour. To handle the crop successfully, daily picking during the main part of the season is often necessary and rarely is it possible to allow the interval between pickings to extend beyond two days.

A well-grown crop should yield at least 1 lb. of berries to each plant which is equivalent to approximately 6 tons to the acre in double row plantings.

stock and station

This Rooster Has Scaly-leg. Plate 1 shows the legs of a 3-year-old rooster from a backyard flock. Note the extreme thickening of the scales on the shanks and feet. Most of the normal, flat, shiny scales have become replaced by thick, spongy crusts. This is a condition in fowls called scaly-leg.

It is caused by a mite called the scaly-leg mite, *Cnemidocoptes mutans*, which is little bigger than a speck to the naked eye.

This mite burrows under the scales of the unfeathered parts of the fowl's leg. In exceptional cases, the mite also attacks the skin of the

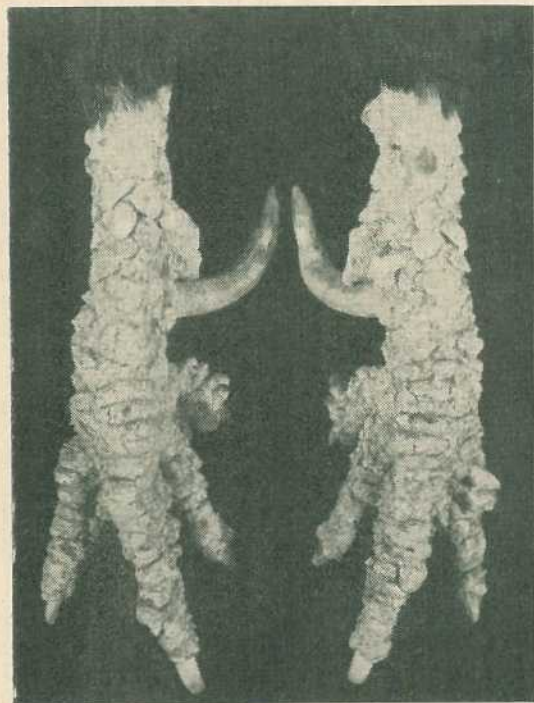


Plate 1

Scaly-Leg in a 3-year-old Rooster.

comb and wattles, causing the formation of crusts. Severe cases of scaly-leg are unsightly and the affected bird is disinclined to walk.

The mites pass their entire life cycle in the skin. Spread from infested to uninfested fowls appears to be slow and probably occurs from the perches (the lesions spread from the bottom of the bird's legs upwards).

Scaly-leg typically affects old fowls, severe cases not being seen before 3 years of age. The disorder is fairly common in backyard flocks, due, no doubt, to the tendency of householders to keep older fowls. In contrast, scaly-leg is seldom seen in commercial flocks. Poultry farmers usually dispose of their flocks for table purposes before the fowls are 2 years old.

Although turkeys can act as hosts for the mite, scaly-leg in them is rare, since they are usually kept under range conditions.

In budgerigars, a disorder called scaly-face is caused by a similar mite, *Cnemidocoptes pilae*.

The most satisfactory way of controlling scaly-leg in fowls is to dispose of the birds at an earlier age. In addition, any fowls showing leg lesions should be culled or isolated.

Treatment of fowls will usually produce a response but may not result in a complete cure in all cases. Dipping the shanks in a tin of light diesel fuel has given good results. Sump oil or raw linseed oil may be used when thinned with kerosene (two parts of oil to one of kerosene). Insecticides such as BHC applied by a brush have also been recommended. At the same time, the perches in the fowl-house should be brushed over with sump oil, creosote or an insecticide. These measures should be repeated at weekly intervals until 3 or 4 treatments have been carried out.

—P. D. RANBY, Veterinary Officer.

Whole Grain for Sheep. No advantage is gained by grinding or crushing grain before it is fed to sheep. This has been made clear by both feeding trials and observations in the paddock.

Of all farm animals, sheep are best able to do their own grinding. In drought feeding trials, wheat, oats, maize, barley and grain sorghum have all been fed whole. Each of these grains has been fed as a sole diet, except for the addition of finely ground limestone, for periods up to eight months. In this time there has been no evidence that undigested grain was passing through the animals.

Even when urea was fed with the grain in trials, crushing offered no advantage.

But crushed grain has a place when old sheep with poor teeth are being fed. Crushed grain is also better for young lambs up to 5 or 6 weeks old. If grain has to be prepared before being fed to sheep, it should be ground coarsely or crushed. It should not be ground into a fine meal, as this is not so palatable as the coarser material.

Ewes that have been on water high in fluorides for a long time are likely to have their teeth affected. These ewes may do better on crushed grain than whole grain. In drought feeding this class of stock, it may be better to give them cracked maize in troughs rather than broadcast whole maize.

On the Darling Downs, where self-feeding is common in sheep raising, the ration is usually made up of equal parts of grain and roughage. The main reason for using the roughage is to prevent grain poisoning or acidosis.

In practice, the grain is added to the roughage and both are then put through a hammermill. The mixing of the grain and roughage before hammermilling is intended mainly to ensure an even spread of the grain through the roughage. Although the grain does go through the hammermill, the wide screening allows much of it to pass through unground, but well mixed through the roughage.

—R. B. YOUNG,

Senior Adviser in Sheep and Wool.

Bracken often Kills Young Stock. Many stock-owners who live in the elevated, high rainfall districts of Queensland do not realise just how many deaths are caused by bracken fern poisoning, especially in young cattle. Bracken fern poisoning is most serious in such areas as Maleny, Mt. Mee, Eungella and Atherton Tableland districts.

Many of the deaths attributed to snakebite are, in fact, caused by bracken fern. This is easy to understand, because affected stock are not noticeably sick for more than a day or so. The result is that stock are often found dead. Furthermore, there are no obvious external signs.

The young, fresh fronds of bracken fern are the most dangerous. Experiments have shown that stock can eat bracken fern for a long time without any obvious ill-effects. Then fatal symptoms can build up in a period as short as 24 to 48 hours.

Bracken fern poisoning has rightly been described as a chronic disease with an acute ending.

Bracken fern is one of the few plant poisons that consistently give a high temperature. Other symptoms that may be seen include minute haemorrhages in the mucous membranes of the gums, anaemia and occasionally staggering associated with it, and blood flecks in the droppings.

On post-mortem examination, diagnosis is simple to those who have had experience with bracken fern poisoning. The animal virtually bleeds to death internally. Haemorrhages can be seen under the skin and in the tissues and organs of the body, while the last portion of the large bowel is usually filled with blood.

If you think you are losing stock from bracken fern poisoning, call in a veterinary surgeon or a stock inspector, who can confirm the diagnosis and prescribe treatment. Young stock, which are the ones commonly affected, should be shifted to another paddock immediately and supplied with a bonemeal lick.

Even though the paddocks of your farm carry only a light infestation of bracken fern, losses from bracken fern poisoning are still likely. In fact, such farms are often the ones most severely affected.

—S. G. KNOTT, *Divisional Veterinary Officer.*

Heavy Weaners Increase Profits. Pigs which are 20 lb. or more above the average weight at weaning have a big start on their way to becoming baconers. What's more important, this extra weight is put on at the stage in their growth when less than 2 lb. of feed is needed for 1 lb. of live weight gain.

The Department of Agriculture and Stock is investigating factors which influence litter weights at weaning. When the trials started about two years ago litters averaged a little above 30 lb. at eight weeks. Creep feeding with improved rations brought the average up towards 40 lb.

Improvements in housing, hover boards and false ceilings, and better creep feeders and waterers, brought the average of some Berkshire weaners up as high as 54 lb. at Hermitage, near Warwick. Large Whites at Kairi, in north Queensland, have done even better with this improved equipment. The last two litters weaned there averaged 56 lb. and 58.6 lb. at 56 days.

The heavy weaners have continued to grow quickly after weaning. A Berkshire pig from a litter of nine at Hermitage weighed 55 lb. at weaning, and just before slaughter at 19 weeks old weighed 172 lb. alive. The carcass weighed 126 lb. and was graded prime.

A few farmers are already rearing litters to equal those, and many more can do so if they give their young pigs a warm, dry, draught-free shed, and creep feed them correctly. Money spent on growing big healthy weaners will prove a sound investment.

—T. ABELL, Senior Adviser, Pig Branch.

Keep Fowl Pox in Check. Routine vaccination of all chickens is a sure way to avoid production losses through fowl pox. Vaccination confers such a high degree of immunity on chickens that, these days, there is no need for fowl pox to be a problem at all.

Outbreaks of fowl pox occur in many Queensland poultry flocks every year. Although this disease kills only a few birds, its real harm lies in the sharp drop in egg production in affected flocks. Fowl pox usually strikes pullets just commencing to lay, and many of the birds will go off the lay. In others, commencement of laying may be delayed.

Fowl pox is a highly infectious disease and is found in all parts of the State where poultry are kept. The disease is transferred from bird to bird by mosquitoes, and when the mosquito season begins in spring or early summer outbreaks of fowl pox usually increase.

Wart-like sores on the unfeathered portions of the bird, especially the comb, face, and eyelids, are the main symptoms of the disease. Sometimes the disease attacks the membranes of the throat and may cause suffocation.

Permanent immunity can be conferred on a poultry flock by vaccinating with fowl pox vaccine. Because it can cause a severe general reaction 18 to 21 days after vaccination, it is best to wait until the birds are between 8 and 12 weeks old before using fowl pox vaccine. The general reaction may lower the birds' resistance to chronic respiratory disease, coccidiosis, worms and so on. Birds showing symptoms of any disease should not be vaccinated with either fowl pox or pigeon pox vaccine.

Because of the risk of a severe general reaction from fowl pox vaccine, pigeon pox vaccine is becoming popular in Queensland. There are no ill-effects from this vaccine, and even day-old chickens may be vaccinated with perfect safety.

Pigeon pox vaccine confers immunity for about 4 months, but in commercial flocks it is usually found that only one vaccination is necessary. Pigeon pox vaccine is best used on chickens hatched from July onwards.

If you need advice on the method of vaccinating fowls, consult the Poultry Branch officer in your district. A demonstration of the method may be arranged.

—C. MANNING, Senior Poultry Adviser.

Feeding Started Chickens. Don't neglect your chickens' rations in the rearing period between weaning at eight weeks and maturity. After putting a good deal of time and money into getting them through the difficult brooding stage, it would be folly to reduce the quality of their ration from then on.

Although the growth rate decreases during this period, the amount of food the birds eat increases. A mash and grain or all-grain system of feeding may be adopted. But in each case the

protein content of the ration should be 16 per cent. Greater quantities of more fibrous foods like lucerne meal may be used.

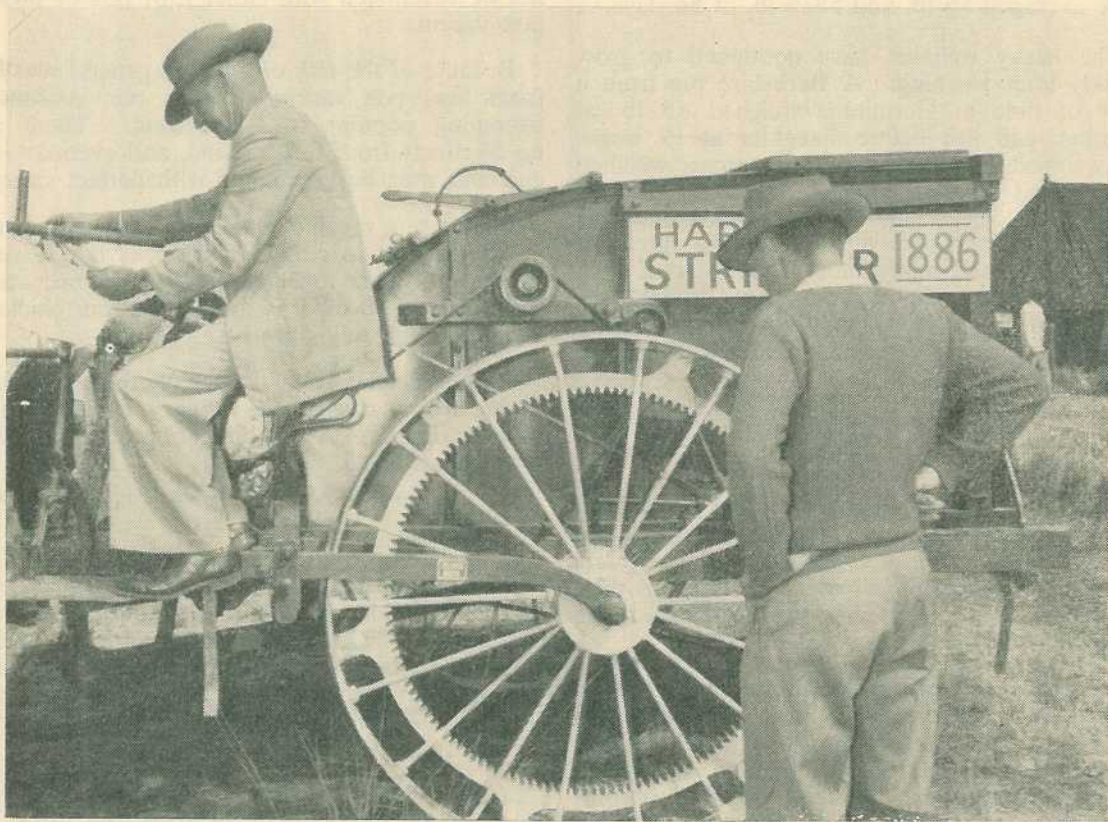
After weaning, growing stock do not require the previous high levels of riboflavin. For this reason, the amounts of costly riboflavin-rich foods like livermeal, buttermilk powder or whey powder may be reduced or even left out of the ration. If an adequate supply of succulent green feed is available (5 lb. a day to each 100 birds), vitamin A supplements also can be left out of the ration.

It is important to remember that a shortage of vitamin A during the rearing period can undo all the benefits from the care and attention given during the brooding and weaning stages. Continued use of a vitamin A supplement would be a good insurance.

As pullets approach maturity, their calcium needs increase in anticipation of the coming egg-laying season. Most of the calcium reserves are deposited as extra bone in the skeleton, and is drawn on when egg-laying starts. In the period between weaning and maturity, pullets should have shell grit or non-dolomitic limestone grit before them all the time.

Pullets housed intensively cannot make proper use of calcium and phosphorus unless cod liver oil, fish oil emulsion or some other preparation containing vitamin D3 is added to the ration. This should be borne in mind during the late rearing period.

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



Mr. J. Yeats, Kumbia, via Kingaroy, Tests the Controls of an 1886 Model Stripper which Won First Prize in Class 2, No. 1, at the Toowoomba Farmers' Festival of 1960.



Goats at Blackall.

Milch Goats in Queensland—II

By G. I. ALEXANDER, Senior Cattle Husbandry Officer.

Many diseases affect goats, causing unthriftiness, loss of milk production and sometimes death. Careful feeding and management will prevent or lessen the severity of many of these conditions. If the disease is one which is serious or which has not been experienced before, it is desirable to get the advice of a veterinary surgeon promptly, as delay or the use of home treatments may prove fatal.

The diseases discussed in this section do not all occur in this country but are of interest to most goat breeders.

Mastitis

There are two main forms of mastitis—acute and chronic—caused by the same organism (*Streptococcus agalactiae*) as that causing the common form of mastitis in cattle.

Symptoms.—The acute form of mastitis often occurs soon after kidding but may occur up to the middle of the lactation. There is usually a hot, tense, painful swelling of one or both sides of the udder. A small amount of watery or

bloodstained milk may be squeezed from the affected udder.

The chronic type is similar to that affecting cattle and is difficult to treat. The udder is no longer firm and smooth to the touch, but, on massaging, lumps of fibrous tissue may be felt in the substance of the udder. This fibrous tissue replaces the infected secretory tissue and so decreases the milking capacity of the animal. The milk in chronic mastitis may contain clots or may be watery. Chronic mastitis may occur as a sequel to acute mastitis or it may be chronic from the beginning. The production of the affected half of the udder is decreased, and unless the condition is cleared up, will continue to decrease.

Treatment.—The treatment for the acute type is to apply frequent hot fomentations to the udder. Constant stripping of the udder is also necessary, as this aids elimination of the organism.

Penicillin infusion is the only effective treatment. Three infusions of 25,000 units every 24 hours are necessary. The udder should be

stripped before infusing the penicillin. The penicillin tubes as used for mastitis in cattle are suitable, one being used for each infusion.

Chronic mastitis is treated similarly with infusions of penicillin. It is less responsive to treatment than acute mastitis and affected does may remain as a source of infection to the rest of the herd. Therefore, it is often desirable to cull any does with bad cases of chronic infection.

Prevention.—Careful washing of the udder with an antiseptic such as a hypochlorite solution before and after milking, and drying of the teats, are measures to be practised. A strip cup is useful in detecting any cases; the first milk may be directed into the strip cup before milking. Goats affected with mastitis should be milked last and the affected milk mixed with a disinfectant such as Lysol or hypochlorite and destroyed, or it may be boiled.

All utensils, especially those coming in contact with the affected milk, should be scalded.

Milk Fever

This usually occurs after kidding, but in some cases it may occur just before or up to several months after kidding.

Symptoms.—The first symptoms noticed are a loss of appetite and lassitude; the breathing becomes slower and shallow. The doe staggers about, and eventually lies down and cannot get up. The hindquarters become paralysed. She bleats occasionally, becomes unconscious and may die if not treated. If practicable, a veterinary surgeon should be called in to give the doe injections of calcium borogluconate, which are made by a skilled operator into the jugular vein or the mammary vein and under the skin. If unable to enlist the aid of a veterinary surgeon, the owner may inject the whole dose under the skin, but this has a slower action. In these circumstances, a dose of 40-60 c.c. of a 20 per cent. solution may be administered.

If no calcium borogluconate is available, pumping up the udder over a period of about two hours may be tried. The udder is pumped up, using an ordinary milk fever outfit incorporating a bicycle tyre pump and a sterilized teat syphon, until quite tense. The teats are then tied off with a bandage, which should be removed

every half hour to allow the teat to be massaged, and re-inflated. It may not be necessary to tie off the teats, as many will remain inflated without tying off.

Prevention.—It is impossible to prevent milk fever, as it is not due to a deficiency of calcium but to the inability of the doe to use the calcium salts available in her body.

Goat Pox

Goat pox is a disease similar to cowpox and is transmitted from goat to goat by the milker's hands. It is transmissible to humans. When a goat has recovered from an attack of the disease it is immune to further attacks for quite a long time, usually for life. The introduction of an infected animal into the herd is the most common source of infection. Kids may develop sores on the face if allowed to suckle affected goats.

Symptoms.—Goat pox first appears on the teat as brownish-red, circular areas about the size of a threepenny coin. These develop into watery blisters which become full of pus. Scabs form later. The affected areas cause pain at milking and rawness of teats due to constant rubbing off of scabs.

Treatment.—Milk affected goats last and wash hands and udder cloths in hypochlorite or a similar disinfectant solution before handling other goats.

Before scabs develop paint the sores with triple dye solution, a preparation obtainable from chemists. A mixture containing 10 per cent. sulphathiazole and 10 per cent. salicylic acid in paraffin, rubbed well in, is also very useful in treating the pox lesions. After the scab develops, rub Whitfield's ointment, which is an iodine ointment, well into the entire teat before each milking.

Prevention.—If the goats are badly infected it may be advisable to vaccinate the kids. For this, a qualified veterinary surgeon should be engaged.

Contagious Ophthalmia (Pink Eye)

This is a similar disease to pink eye in sheep. It usually occurs under hot, dry, dusty conditions when flies are numerous or when grass is seeding heavily. These lead to irritation of the eye and produce ideal conditions for the multiplication

of the organism. The trouble is mostly seen in young animals in spring, summer and autumn. It is highly infectious and spreads rapidly.

Symptoms.—Irritation and inflammation of the membranes lining the eyelids and eyeball are the chief signs; they are accompanied by cloudiness of the eyeball and a copious discharge of tears. The discharge from the eye becomes thick and the lids may become full of pus and stick together. The affected animals shut their eyes and avoid light as much as possible. One eye is frequently affected first, but the other eye often becomes affected within a few days. Both eyes are usually affected to the same degree.

Commonly, recovery begins in three to four days and is complete in seven to 10 days. More severe cases may last six weeks, and in rare cases the eye may become permanently blind.

Treatment.—Affected animals should be placed in clean, darkened quarters and given water and laxative nutritious food.

A few drops of 10 per cent. argyrol placed in each eye after first washing the eyes with warm saline solution are beneficial.

Penicillin ointment such as is used in the treatment of mastitis, while not curing the ophthalmia, will reduce the severity of the disease. It may be applied twice a day at each milking time.

Chloromycin eyedrops are possibly the most effective to use if obtainable.

Retained Afterbirth and Metritis

Retention of the afterbirth is common in does which have had a difficult kidding, requiring assistance. It is advisable therefore to examine the afterbirth to see that no part of it has been left.

If there is any retained, a veterinarian should be consulted immediately because 4 days after kidding the opening into the womb decreases in size and the retained afterbirth cannot escape and subsequently putrefies.

Symptoms: If the afterbirth has not been noted as being retained, the first sign is a brownish, slimy discharge from the vagina or breeding passage which soils the tail. If not treated, the doe goes off her milk and loses her appetite.

Treatment: A veterinary surgeon should be called in immediately. He will usually treat the infection by giving an intra-muscular injection of stilbestrol, which has the effect of maintaining the opening into the womb. This enables him to treat the infection in the womb by irrigation with suitable disinfectant solutions. Stilbestrol tablets may be given by mouth and have a similar effect.

If a veterinarian is not available, the doe may be given sulphamezathine tablets (0.5 gm.). The dosage recommended is 10 tablets at first followed by 5 tablets at 12-hourly intervals for five days.

Cystitis (Inflammation of the Bladder)

Cystitis is sometimes seen in does after kidding.

Symptoms: The characteristic symptom is straining and adopting the stance for urinating. Often no urine will be passed and the little urine that is passed is cloudy and may contain pus or blood. The tail and breech area are soiled and may even scald. The animals are dull and lethargic, and die unless treated.

Treatment: As for retained afterbirth and metritis, veterinary attention is desirable; the earlier it is rendered the better the chance of recovery.

If veterinary advice cannot be obtained, the most effective treatment is sulphathiazole tablets (0.5 gm.) giving 8-10 tablets initially and 4-5 tablets at 12 hourly intervals for 5 days. Ample drinking water should be provided.

Urinary Calculi (Stones in the Bladder)

This condition is rare in goats, the only outbreak recorded in Queensland being one near Clermont. It is reported to occur mostly in male goats on pasture, but it may affect hand-fed male animals. The calculi are composed mainly of calcium and magnesium salts.

The cause of the production of the calculi is not known, but water containing excessive amounts of minerals and a decreased water intake are suspect. There seems to be some association also between the incidence of urinary calculi and an abundance of lush herbage which has a high content of lime and magnesium salts.

Symptoms.—The animals are restless and strain to urinate. Urine dribbles out while the

animals are not straining. They stand with arched backs, stamp with their hind legs, kick at the abdomen and wriggle the tail. They often lie down and bleat constantly. The goats are tender around the rear of the abdomen.

After two or three days, they usually die following rupture of the bladder.

Treatment.—Treatment is not very satisfactory. Surgery by a veterinary surgeon, if attempted in the early stages, is often successful.

Sore Teats

Occurring most commonly in the colder months, chapped and cracked teats are usually associated with failure to dry the udder after milking. Wounds to teats may be due to thorns, to barbed wire or to being trodden on.

Treatment.—Treatment should be similar to that for goat pox, and should be before milking.

Wounds may be treated by binding with adhesive tape. If they involve the milk duct, veterinary attention is necessary. The side should never be left un milked even if it slows healing of the wound.

Impaction (Constipation)

This condition occurs mostly in older animals fed on hard dry feed or fibrous roughage.

Symptoms.—The first sign is absence of cudging. A lack of appetite and a fall in milk yield are also noticeable.

Treatment.—Five to six fluid ounces of liquid paraffin or raw linseed oil should be given as a drench immediately and the stomach should be kneaded for 10 minutes every two hours. The animal should be offered young green succulent feed. Severe cases may require the rumen or paunch to be opened and some of the impacted material removed.

Bloat

The cause of bloat is not fully understood but the trouble usually occurs when the goats are on very succulent pasture, especially legumes. It may sometimes occur associated with impaction.

Symptoms.—The symptoms of bloat are similar to those of impaction but they are more acute. The abdomen, particularly the left side,

is greatly distended. The animal may have great difficulty in breathing.

Treatment.—Drench with five to six fluid ounces of raw linseed oil with a teaspoonful of turpentine. If the bloat is severe, a trocar and cannula should be inserted into the paunch on the left side of the animal at a spot equidistant from the last rib, kneecap (or stifle) and the edge of the loins.

Laminitis

Laminitis occurs after heavy over-eating on grain or whey, and is occasionally due to excessive walking or after high fevers.

Symptoms.—Acute lameness in one or all four feet is the chief sign. The feet are hot and painful. The animals lie down or kneel down if only the forelegs are affected. There is a fall in milk yield and depressed appetite.

Treatment.—Drench with 2-3 fluid ounces raw linseed oil daily, give the animal plenty of roughage and reduce the intake of grain.

Hot fomentations should be applied to the affected feet three to four times a day, 20 minutes at a time.

Scabby Mouth (Contagious Pustular Dermatitis)

Scabby mouth is a disease affecting sheep more commonly than goats. However, goats can be affected in the same way as sheep. The disease is infectious and is transmissible to human beings. It is caused by a virus which affects the skin. The disease, while not responsible for many deaths, causes much loss of condition and retards growth.

Symptoms.—The earliest symptoms are a slight swelling of the lips, which are soon covered by a sticky material which seeps through the skin. This develops into a hard scab which extends with the continued exudation of fluid until it may be up to half an inch thick. The scabs are usually dark-grey in colour. They are mostly around the lips but may occur on the nostrils, around the eyes and just above the hoof, as well as on the udder of the does. Sometimes sores may be seen on the gums and inside the mouth; these bleed if the scabs are knocked off before the skin underneath the scab has healed.

The time taken for the scabs to form and fall off is from 12 to 20 days.

The scabs may prevent kids from suckling and they will lose a lot of condition due to lack of feed. Affected kids suckling does will often infect the udder of the doe and cause the formation of scabs on the teats and skin of the udder.

Treatment.—Isolation of the affected animals is the best method of countering the spread of the disease. The ordinary case is best left alone without treatment until it recovers. More severe cases may be treated by applying an oily or fatty dressing to soften the scabs. Antiseptics are of little or no value.

Prevention.—When the outbreak first occurs, it is necessary to vaccinate all the stock immediately. Following this it is necessary to vaccinate the young stock every year at about six weeks of age. The vaccination is carried out by scratching the inside of the thigh of the animal with a needle which has been wetted with the live virus. Care is necessary while handling the vaccine.

Tuberculosis

This has not been recorded in goats in Australia.

Brucellosis (Malta Fever)

This disease, which resembles brucellosis (contagious abortion) of cattle and sheep, has not been recorded in Australia.

Parasitic Diseases

Goats, like sheep, can suffer severely from the effects of internal parasites. Mortality can at times be serious but there are also the less obvious effects of parasitism such as failure to grow and loss of condition and production. These latter effects are often not spectacular and so may be overlooked by the stock owner.

Worms are not capable of breeding within their host and must spend a portion of their life cycle outside the goat. The female worm lays the eggs which pass out with the droppings on to the pasture. In the case of tapeworms, their eggs are eaten by a small mite and if this mite is swallowed by a goat the young tapeworm is set free and grows to maturity. The mite acts

as an intermediate host for goat tapeworms just as the goat acts as an intermediate host for some of the dog tapeworms. Roundworm eggs on hatching give rise to tiny larval worms which undergoes a period of development on the pasture. In 4-5 days the larval worms, now known as infective larvae, are ready to infest a goat; they migrate up blades of grass and are then available to the grazing animal.

The external parasites of goats do not assume the same importance as the internal parasites as, with the exception of tick paralysis, they rarely cause mortality. However, they can cause considerable worry and irritation and so result in a lowered milk yield. As they affect the coat of the animal, they are more readily seen and so may be much more easily controlled than the internal parasites.

Internal Parasites

Large Stomach Worm or Barber's Pole Worm (*Haemonchus contortus*).—This is a slender worm, half an inch to one-and-a-half inches long; on close examination it is seen to have a twisted red and white striping of its body. It is one of the most important internal parasites of goats.

Anaemia is the chief sign of *Haemonchus* infestation and is indicated by pale skin and mucous membranes of the eye and mouth. The animals sometimes lose condition rapidly and

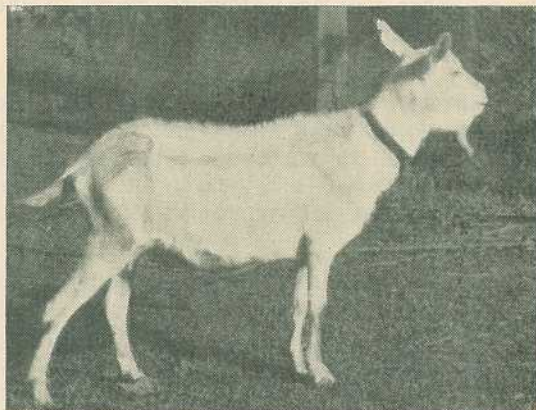


Plate 16

Goat Suffering From "Bottle Jaw," a Soft Swelling Below the Jaw which often Develops with Barber's Pole Worm Infestation.

often develop a "bottle jaw," which is a soft swelling below the jaw. There is often no scouring associated with this disease. The goats have no stamina and the milk production of the does falls off rapidly.

The female worms produce enormous numbers of eggs, so a pasture may become heavily contaminated in a relatively short period of time. The disease is frequently of sudden onset due to the rapid building up of the larvae in the pasture, and goats in prime condition may die. It affects goats of all ages but its effects are seen more noticeably in very young and in aged goats.

Periods of heavy rainfall and warm weather create ideal conditions for the survival of the infective larvae on the pastures, so infestations occur during the summer rainy season. Any factors lowering the condition of the goat, such as malnutrition, imperfect teeth and the strain of pregnancy and lactation, render it very susceptible to heavy stomach worm infestation.

Small Stomach Worm (Ostertagia spp.).—The small stomach worm, which is a small brown worm, is found in the fourth stomach near the opening into the small intestine.

The symptoms of heavy small stomach worm infestation are not very clear-cut. They include slight anaemia, diarrhoea and loss of condition.

The small stomach worm is more resistant to cold than the large stomach worm and is found in colder areas. It is not of such great importance as either the large stomach worm or the black scour worm.

Black Scour Worms or Hair Worms (Trichostrongylus spp.).—These small hair-like worms are found in the small intestine. They are very difficult to see but if a portion of the intestine is stretched and held up to the light the worms can be seen as reddish-brown streaks on the lining.

Scouring and loss of condition in young goats during the cooler months of the year should arouse suspicion of small intestinal worm infestation. Anaemia is rare in this disease, in contrast with large stomach worm infestation. The onset of the disease is usually gradual and many animals may be affected before the owner begins to suspect the disease is present. The goats most commonly affected are those up to two years of age.

Eggs of this worm, when containing a young larva, are very resistant to coldness and dryness. A fall of rain after a period of dry, cold weather may produce mass hatching of the eggs and lead to heavy contamination of the pasture with hair-worm larvae.

Malnutrition is a common predisposing cause of black scour worm infestation and a high plane of nutrition is a sound control measure to adopt.

Tapeworms (Moniezia spp.).—Tapeworms are found in the middle and towards the end of the small intestine. They are white segmented worms which may grow many feet in length. Except when heavily infesting kids, they do not seem to cause any great trouble. The tapeworms usually pass out of the animal after about three months without any treatment.

Whipworms (Trichuris ovis).—This parasite has a long thin neck about one inch long and a short thick body. It is found in the caecum or "blind gut" and has not been found to cause any trouble in goats.

Nodule Worm (Oesophagostomum columbianum).—The nodule worm is a creamy-white worm, half an inch to three-quarters of an inch long. The adult worms are found in the large intestine but part of their life cycle is spent in the wall of the large and small intestines, where they form nodules. High summer rainfall provides ideal conditions for the parasite and the disease produced by the worms is most severe in wet districts. The larvae develop slowly in the wall of the bowel and may not cause any symptoms until late autumn or winter.

Heavy infestations with nodule worm cause the goats to become debilitated and develop a humped back and characteristic stiff action of the hind legs. The tail is frequently held up at an angle from the body. Soft faeces containing much slimy mucus and sometimes streaks of blood are passed.

Lack of feed during the winter months will aggravate the condition, so it is essential to supplement the winter grazing.

The adult worms affect chiefly young goats, but older goats which have had long continued infestations may develop such an extensive nodule formation in the intestine as to interfere with the proper function of the bowel. This may

cause the goat to become unthrifty and not capable of improving in condition.

Bladder Worm (*Cysticercus tenuicollis*).—This is the intermediate or cystic stage of a dog tapeworm. It is found in the abdominal cavity, hanging from the mesentery (the membrane to which the bowel is attached) and may be up to two inches in diameter. The goat becomes infested by eating grass contaminated by dogs' faeces.

Hydatids (*Echinococcus granulosus*).—This is also the intermediate stage of a dog tapeworm but has greater significance as it can also occur in man. The hydatid cyst varies in size from a quarter of an inch up to three inches or more in diameter; it is usually found in the liver and lungs, but can occur in any of the organs. The goat is infested by eating grass contaminated by dogs' faeces. Since people can become infested by handling the dogs, some measure of control of this disease must be adopted. The most practical method of control is not to allow dogs to eat any of the raw offal from goats (or sheep, pigs, cattle) which have been slaughtered for meat. This prevents infestation of the dog and this in turn prevents further infestation of the goats and any people handling the dogs.

Treatment.—The internal parasites of most consequence are the large stomach worm, black scour worm and nodule worm.

The usual drench employed is phenothiazine, which is marketed in the form of a powder which will form a suspension when mixed with water. Ready prepared suspensions are also obtainable.

The most convenient method of drenching goats is by means of a 1-2 oz. drenching syringe designed to handle the thick phenothiazine suspension.

The powder is usually packed in 1 lb. and 7 lb. containers. The best method of mixing the drench is to put the required amount of powder in a container, add water gradually and stir until it becomes a creamy suspension, then run the mixture through a fine sieve to remove any lumps. A measuring jug marked in fluid ounces and pints is of great assistance in making up phenothiazine.

The dosage of phenothiazine powder recommended for large stomach worm and nodule worm in goats of various ages is:—

Adults	$\frac{3}{4}$ ounce.
8-12 months	$\frac{1}{2}$ ounce.
4-8 months	$\frac{1}{4}$ ounce.

If 8 oz. of phenothiazine are mixed with half a pint (10 fl. oz.) of water, approximately 16 fluid ounces of suspension will result. Each fluid ounce of this suspension will then contain half an ounce weight of phenothiazine. The dose rate of this suspension will be:—

Adults	1 $\frac{1}{2}$ fl. oz. $\frac{1}{2}$ oz. of the powder <i>or</i>
8-12 months	$\frac{3}{4}$ oz. of the powder <i>or</i> 1 fl. oz. of suspension.
4-8 months	$\frac{1}{4}$ oz. of the powder <i>or</i> $\frac{3}{4}$ fl. oz. of suspension.

Small intestinal worms are much more resistant to phenothiazine than the stomach worms and a heavier dose should be used. The dose rate for these worms is as follows:—

Adults	1 oz. of the powder <i>or</i> 2 fl. oz. of suspension.
8-12 months	$\frac{3}{4}$ oz. of the powder <i>or</i> 1 $\frac{1}{2}$ fl. oz. of suspension.
4-8 months	$\frac{1}{2}$ oz. of the powder <i>or</i> 1 fl. oz. of suspension.

The large stomach worm is a summer parasite and the risk of infestation is greatest after rain followed by dull, humid weather. It is a good plan to treat the goats about three weeks after such a period. If these conditions persist, repeat the drench at three-weekly intervals until dry or cool weather returns.

The nodule worm infests goats in spring, summer and autumn but may not show any effects until winter. Treat the does about a month before kidding to reduce the risk of the kids getting infested. Treat the kids in autumn to prevent the disease in winter. Treat all goats in the winter to prevent any carry-over of adult worms to the following spring.

The small intestinal worm is a parasite of the cooler months. Treat the kids at weaning time and from then on at intervals of four to five weeks from autumn until spring feed comes away.

Stocking plays a big part in the occurrence of worm diseases. Overstocking may lead to heavy contamination of the pasture long before it may cause the best feed to be eaten out. Overgrazed areas become heavily contaminated with worm eggs and become a potent source of infestation. While there may be adequate feed in the pasture,

a heavily stocked pasture will defeat any drenching plan. If the pasture is adequate, it should be subdivided and the goats moved over the paddocks so formed at weekly intervals so as to reduce the risk of infestation. This also prevents selective eating out of the better plants in the pasture and ensures its even utilisation. Adequate subdivision may seem expensive initially but will give very good results. Combined with strategic drenching, it is the only effective control for worm diseases of goats.

External Parasites

Lice (*Damalinia caprae*, *Damalinia limbata*, *Linognathus stenopsis*).—The first two are biting lice and the third is a sucking louse. They are usually found close against the skin and, if the animal is standing in the sun, will appear as small white or yellow specks. They cause a roughening of the goat's coat due to frequent rubbing in an attempt to relieve the irritation. The lice are easily spread by contact between goats, also by bedding, bags and brushes.

The goat should be dusted thoroughly with a DDT powder such as is used for dogs. BHC powders are also effective. The dusting should be repeated fortnightly with DDT or weekly with BHC until the infestation is cleared up.

Scrub Tick.—Paralysis occurs when the goat has carried a scrub tick for four days. The goat becomes sluggish, and disinclined to move. It may become paralysed and breathing may become difficult. Death is a sequel in over 50 per cent. of cases.

If anti-tick serum is not available, there is no really effective treatment. Careful nursing, giving the animal adequate water and feed and keeping it warm in a shed, is the only useful measure which can be adopted.

Ringworm.—This is seen in animals in low condition and is due to a fungus infection of the skin. The hair is destroyed at its root in a small circular area up to the size of a two shilling piece. The bare areas are usually to be found around the head and neck of the animal. Ringworm is highly infectious and readily transmissible from animal to animal and to humans.

The lesions should be painted with tincture of iodine. One or two applications should clear up each lesion, and if each new one is treated early, the infection should be quickly brought under control. Tetmosol and Zephiran are also effective in the control of ringworm.



Mrs. C. Thorogood Holds Two Kids from the 50-strong Herd of the "Marcliff" Saanen Stud at Mt. Gravatt. In addition to pasture the stock are fed protein and essential minerals twice daily. The herd's average production is 6 pints a day from each goat over a minimum lactation period of 300 days. Journalists inspected this stud on the 1960 Tour arranged by the R.N.A. and the Shell Company of Australia.

bucket and bail

Thermostats on Electric Dairy Water Heaters.

Low tariff electricity charges for water heating can be obtained provided the heater has an element which does not exceed 60 watts per gal. This upper limit, however, results in a lengthy heating period for 14 gal. capacity dairy heaters. By fitting a thermostat, the water can be preheated and held at a temperature high enough to ensure that it can be brought to boiling during milking. The thermostat is disconnected when the dairy is being prepared for milking by switching on a special "booster switch," and thus the very necessary boiling water is then available by the time milking is completed.

The cost to boil 14 gal. of water is almost the same whether a thermostat control and booster switch is used or whether the heating element is simply switched on with an ordinary wall switch. In fact the thermostat control uses a little more power, to replace the heat lost by radiation, but it saves you going to the dairy about 11 p.m. to switch the power on for the next morning's boiling water.

—J. D. ELRINGTON, *Senior Dairy Adviser.*

Udder Stimulation in Milking. Correct stimulation of the cow before milking has the greatest bearing on quick and complete milk let-down. The real value of this brief operation is still not fully appreciated by many dairy-farmers.

A cow's ability to milk out rapidly and completely is conditioned by the let-down process, and this is initiated by correct training and handling. In contented cows held in satisfactory sheds, a chemical hormone is injected into the bloodstream from the pituitary gland at milking time.

When the hormone in the blood reaches the udder, it promotes the release of milk from the milk secreting tissues.

It has long been recognised that unless this milk let-down mechanism functions fully, maximum production cannot be obtained from the cow. For this reason, set milking routines, prevention of excess noise, freedom from fear, and proper training for young stock are all recommended to aid milk let-down.

Reports of recent investigations in New Zealand indicate that actual physical stimulation of the udder has the greatest effect of all in getting good milk let-down.

In the New Zealand studies, one of each pair of identical twins was milked by just putting the teat cups on without stimulation. The other in each pair was given vigorous stimulation for 30 to 40 sec. before putting the cups on. In a lactation, one of the cows that was stimulated gave 36 per cent. more butterfat than her unstimulated twin. The average difference in favour of the stimulated animals was 18 per cent. more butterfat.

Trials have been commenced in the Ipswich district, using special equipment, to investigate the factors affecting individual levels of production and the rate of milking. This long-term investigation will include an examination of the influence of the milking machine as well as stimulation on milk yields. If possible, cow family variations will also be examined.

—E. B. RICE, *Director of Dairying.*

Brucellosis-Tested Swine Herds

(As at 1st November, 1960)

Berkshire

Bernoth, B., Wyreema
Clarke, E. J., "Kaloon", Mt. Alford, via Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., "Astonvilla", Middle Creek, Pomona
Crawley, R. A., Rockthorpe, Linthorpe
Edwards, C. E., "Spring Valley" Stud, Kingaroy
Farm Home For Boys, Westbrook
Fletcher, A. C., "Myola" Stud, Jimbour
French, A., "Wilson Park", Pittsworth
H. M. State Farm, Numinbah
H. M. State Farm, "Palen" Stud, Palen Creek
Handley, J. L., "Meadow Vale", Lockyer
Handley, G. R., "Locklyn" Stud, Lockyer
James, I. M. (Mrs.), "Kenmore" Stud, Cambooya
Kath, E. E., "Topcamp", via Toowoomba
Kimber, E. R., Block 11, Mundubbera
Law, D. T., "Rossvill" Stud, Aspley

Lees, J. C., "Bridge View" Stud, Yandina
Ludwig & Sons, A. R., "Beau View" Stud, Beaudesert
O'Brien & Hickey, J., "Kildurham" Stud, Jandowae East
Orange, L. P., "Eula", Flagstone Creek
Pfrunder, P. L., Pozieres
Potter, A. J., Ascot, via Greenmount
Q.A.H.S. & College, Lawes
Regional Experimental Station, Hermitage
Rosenberger, N., "Nevrose", Wyreema
Rosenblatt, G., Rosevilla, Biloela
Schellback, B. A., "Redvilla" Stud, Kingaroy
Smyth, E. F., "Grandmere" Stud, Manyung, Murgon
Stark, H. L., "Florida" Stud, Kaibar
Traves, G., "Wynwood" Stud, Oakley
Weier, V. F., "La Crescent", Clifton
Wolski, A., "Carramana", Warra
Young (Jnr.), W., Kybong, via Gympie

Large White

Assenbruck, C., Mundubbera
Barron Bros., "Chiltern Hill", Cooyar
Bell & Son, E. J., "Dorne", Chinchilla
Behm, A. M., "Aleon", Wondai
Butcher, Dr. B. J. & Parnwell, A. J. Plunkett Rd., via Tamborine
Clark, L. D., Greens Creek, Gympie
Coller, R. H., "Relloc", Tallegalla, via Rosewood
Cook, F. R. J., "Astonvilla", Middle Creek, Pomona
Dower, R. J. & E. A., "Dowlea", Tingoorra
Duncan, C. P., "Colley", Flagstone Creek
Fowler, S., "Kenstan", Pittsworth
Franke, H. J. and Son, "Delvue" Stud, Cawdor
Garwin Stud Farm Pty. Ltd., Samford
Gibbons, A. E. H., Mt. Glorious
Gibson, H., "Thistleton" Stud, Maleny
H. M. State Farm, Numinbah
Hall, M., "Milena" Stud, D'Aguliar
Heading, J. A., "Highfields", Murgon
Hicksion, K. L., "Warra", Calliope
Hoey, T. W. & S. J., Mirriodong Farm, Upper Forest Springs, MS74 Clifton
Horton, C. J., "Mannuem Brae" Stud, Mannuem, Kingaroy
Hutton, G., "Grajae" Stud, Toowoomba
Jensen, S., Rosevale, via Rosewood
Jones, K. B., "Cefn" Stud, Clifton
Kahler, J. & S., "Karajoy", East Nanango
Kanowski, A., "Exton", Pechey
Kennard, R. B., "Collar" Stud, Warwick
Larsen, H. L., "Oakway" Stud, Kingaroy
Law, D. T., "Rossvill" Stud, Aspley

Lees, J. C., "Bridge View", Yandina
Lobegeiger, L. C., "Bremer Valley" Stud, Moorang, via Rosewood
Mack, A. J., Mundubbera
"Marcliff" Stud, Wecker Rd., Mt. Gravatt
Neilsen, L. R., "Sunny Hill", Ascot, via Greenmount
Neilsen, A. R., Ascot, via Greenmount
Palmer, V. P. & Son, "Remlap", Greenmount
Pampling, G., Watch Box Rd., Goomeri
Port Curtis Co-operative Dairy Association Ltd., Stud Piggery, Biloela
Postle, R., "Yaralla" Stud, Pittsworth
Potter, N. R., "Actonvale", Wellcamp
Powell, R. S., "Kybong", Gympie
Q.A.H.S. & College, Lawes
Radel, V. V., Coalstoun Lakes
Radel, R. M., "Turua", Coalstoun Lakes
Regional Experiment Station, Biloela
Regional Experiment Station, Kairi
Robinson, O. R. & O. J., "Linvale", Argoon, Biloela
Rosenblatt, G., Rosevilla, Biloela
Skyring, G. I., "Bellwood" Stud, via Goomeri
Stanton, H. R., "Lanherne" Stud, Tansey, via Pomona
Stehn, L. W., "Hodgson Vale", via Toowoomba
Stewart, L., "Ban-Nookoo", Mulgowie, via Laidley
Stumer, K. F., French's Creek, Boonah
Thomas & Sons, "Rosevale", Laravale
Wharton, C. A., "Central Burnett" Stud, Gayndah
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah
Zahnaw, W., Rosevale, via Rosewood

Tamworth

Armstrong, H. J., "Alhambra", Crownthorpe, Murgon
Booth, J. D., Swan Creek, Warwick
Campbell, P. V., "Lawnhill" Stud, Lamington
Fletcher, A. C., "Myola" Stud, Jimbour
Herbst, L., "Hillbanside", Bahr Scrub, Beenleigh
Kanowski, S. E., "Miecho", Pinelands
Potter, N. R., "Actonvale" Stud, Wellcamp

Regional Experimental Station, Kairi
Salvation Army Training Home For Boys, "Canaan" Stud, Riverview
Skerman, D. F. L., "Waverley", Kaimkillenbun
Stephen, T., "Withcott" Stud, Helidon
Wieland, L. C. & E., Lower Cressbrook, Toogoolawah

Wessex Saddleback

Ashwell, J., "Green Hill", Felton South
Cooper, G. J., Neumgaa
Douglas, W., "Greylight" Stud, Goombungee
Dunlop, J. B., "Kunawyn", Acacia Rd., Kuraby
Kingsford, D., "San Antone", Toowoomba
Kruger & Sons, "Greyhurst" Stud, Goombungee

Lau, D. E., "Homevale", Goombungee
Law, D. T., "Rossvill" Stud, Aspley
Mack, A. J., Mundubbera
Scott, A., Wanstead Stud, Grantham
Smith, C. R., "Belton Park", Nara

Landrace

Ashwell, J., "Greenhill", Felton South
Behm, A. M., "Aleon", Wondai
Crawford, G. L., "Glenvillan", Manneum
Crothers, B. M., "Booligar", Clifton
Dower, R. J. & E. A., "Dowlea", Tingoorra
Duncan, C. P., "Colley", Flagstone Creek
Fowler, K. P., "Northlea", Coalstoun Lakes
Franke, H. J. & Son, "Delvue", Cawdor
Garrawin Stud Farm Pty. Ltd., Samford
Grayson, D. G., Killarney
Itzstein, R. A., "Hyde Park", Gooroolba, Gayndah Line
Jensen, A. P., & Grace, V. S., Theodore
Jones, K. B., "Cefn", Clifton
Kajewski, W. & Son, Glenroy, Glencoe

Kath, E. E., "Topcamp", via Toowoomba
Kingsford, D., "San Antone", Toowoomba
Law, D. J., Rossville Stud, Aspley
Lusk, P. B. and I., Westbrook
"Marcliff" Stud, Wecker Rd., Mt. Gravatt
Neilsen, A. R., Ascot, via Greenmount
Neilsen, L. R., "Sunny Hill", Ascot, via Greenmount
Orange, L. P., "Eula", Flagstone Creek
Palmer, V. P. & Son, "Remlap", Greenmount
Radel, R. M., "Turua", Coalstoun Lakes
Semgreen, A. L. & D. J., "Tecoma", Kingaroy
Stehn, L. W., "Hodgson Vale", via Toowoomba
Stummer, K. F., French's Creek, Boonah

Large Black

Pointon, E., Goomburra



Plate 1: Wallan Creek at Bollon.

A Thumbnail Sketch Of Queensland's Rural Industries

By C. W. WINDERS, Officer-in-Charge, Information Services.

To the newcomer to Queensland, there are two outstanding features of its primary production. One is the diversity of crop and livestock production. The other is the vast area of fertile land that remains to be developed.

There is hardly a commercial crop, agricultural or horticultural, that cannot be grown somewhere in the State. The range of crops reflects the widely different climatic conditions of various parts of the State. This is to be expected in a region that stretches over 1,500 miles from north to south and extends up to 900 miles from the seaboard.

There are also striking contrasts due mainly to differences in elevation. Thus apples are grown on a large scale within a hundred miles of sugar-cane fields.

A similar diversity is seen in the livestock industries. Fat lamb production with British breeds goes hand in hand in some areas with the raising of fine-woolled Merino sheep. Again, a substantial dairying industry using largely

European breeds is conducted on subtropical lines about 400 miles within the tropics.

So much for the diversity of the rural scene. The other surprising feature—the relative extent of intensive farming and extensive land use—calls for some comment.

Practically the whole of the land suitable for primary production is being used either for crop or livestock production or for forestry purposes. But a great deal of the occupied land is under-developed.

In these millions and millions of acres of under-developed land lies a vast potential for expansion of primary production.

In terms of land, present knowledge of the capacity of the soils suggests that there are probably 50 million acres of land that could be cultivated. Some millions of acres are suited to intensive cropping under existing systems of agriculture.

In addition, some success with crop production, associated with livestock production, could be predicted for much of the country now devoted purely to extensive grazing with sheep or beef cattle.

Another feature of the primary industries that is worth mention is the extent to which modern practices are adopted. For example, there are nearly 50,000 milking machine stands, some 18,000 shearing machine stands, 50,000 tractors and 12,000 grain drills on the 43,000 rural holdings. Giant land-clearing and earth-moving equipment is speeding land development in many areas. Aerial spraying and dusting of crops is a regular practice in some industries.

THE LIVESTOCK INDUSTRIES

Pride of place among the livestock industries is occupied by wool-growing, which has made possible the economic utilisation of an immense belt of semi-arid country in western Queensland. The average number of sheep approaches 20 million.

The bulk of the eastern and northern country is occupied by beef cattle properties. Hundreds

of thousands of square miles of eucalypt forest have been rendered productive by thinning out trees and encouraging native pastures for beef cattle. Some six million beef cattle are run.

Dairying is a much more intensive industry than either wool production or beef cattle raising. It is conducted mainly within about 100 miles of the eastern seaboard on some 20,000 commercial dairy farms. The dairy cattle population is about 1½ million.

Pig raising is associated very largely with dairying, particularly on farms on which skim-milk is retained.

There are approximately 750 commercial poultry flocks in Queensland, with eggs as the main output. The broiler industry is now developing fairly fast.

Sheep

Wool production is carried out for the most part on native pastures in a belt of mid-western to far-western country up to 300 miles wide extending from the southern border 700 miles towards the Gulf of Carpentaria. Much of it is

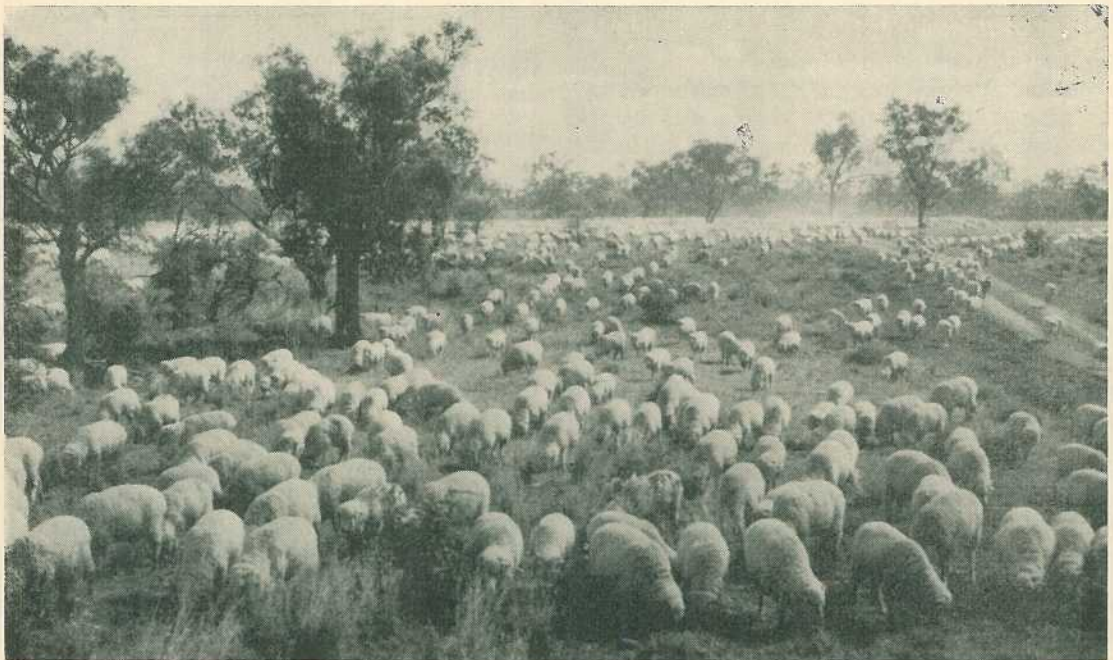


Plate 2

Travelling Sheep in the Isisford District.

semi-arid country and subject to periodical droughts, but grows excellent Merino wool.

The carrying capacity of the sheep country is fairly low, and the safe minimum areas estimated for good quality lands with adequate artesian water range from 20,000 to 35,000 acres in the north, through 15,000 to 25,000 acres in central Queensland, to 10,000 acres in the south. These areas provide for carrying capacities of 3,000 to 8,000 sheep.

Over 70 per cent. of flocks have more than 5,000 sheep and only about 8 per cent. have under 2,000 sheep. Among the smaller flocks are a number run in conjunction with grain cropping in the south-eastern agricultural areas, particularly the Darling Downs.

Though the main sheep areas are far from the seaboard cities, they are served by a number of towns with electricity, water supply, public swimming baths and other amenities. The sheep holdings themselves have in most cases to provide their own lighting and power, as electricity reticulation in the western areas does not extend far from the towns. Most properties have a telephone service and those that are not so served often have pedal radio transceivers.

State primary schools are established in many centres. Those children who are unable to attend these schools are educated by correspondence by the State Primary Correspondence School. There are State secondary schools in a number of western towns, and hostels for students are available in some centres.

The wool industry is in general in a sound financial position. Its future depends to some extent on the demand for wool as compared with substitutes. The Australian wool industry is spending a large sum annually in research and promotion to combat the competition of substitute fibres.

So far as the potential for expansion of wool growing in Queensland is concerned, it may be said that this lies in two directions.

First, the policy of Queensland Governments has been closer settlement of Crown lands. This has been effected most generally in the sheep areas. As leases of large properties expire, portions are excised for subdivision into living

areas for new settlers. This process is continuing and is leading to more intensive use of sheep country.

Second, the clearing and development of timbered country within or adjacent to the main sheep belt offers considerable scope for expansion. This development has been hampered in the past by the high cost of destroying the fairly thick forests, but the use of modern land-clearing equipment and aerial spraying with herbicides is accelerating the land improvement programme.

Beef Industry

The eastern and northern beef cattle regions have an annual rainfall higher than that of the sheep country and are less subject to droughts. They do nevertheless experience extended dry periods and in addition the quality of the grazing is variable throughout the year.

To the west of the sheep belt is an area of beef cattle country which has a low rainfall but which benefits from heavy rains at the headwaters of the streams that flow through it in thousands of channels. The properties here are very large and in some cases act as seasonal fattening properties for store cattle from associated properties to the north.

The bulk of the eastern and northern cattle country is tropical open forest, interrupted by some open grassland and by denser forest formations. The main pasturage is of native grasses encouraged on most properties by partial destruction of trees.

The industry is based largely on the Shorthorn and Hereford breeds, with Aberdeen-Angus, Poll Shorthorn and Poll Hereford also important. Within recent years there has been a significant use of Brahman blood either in the purebred Santa Gertrudis or in crosses. The infusion of Brahman blood in breeds in the tropics has been shown to increase growth rate and is claimed to improve resistance to ticks.

Cattle raising is carried on mainly on an extensive scale, particularly in the breeding areas of the north, from which store cattle are sent in large numbers to more favoured regions for fattening. Small-scale cattle fattening is usually associated with mixed farms.

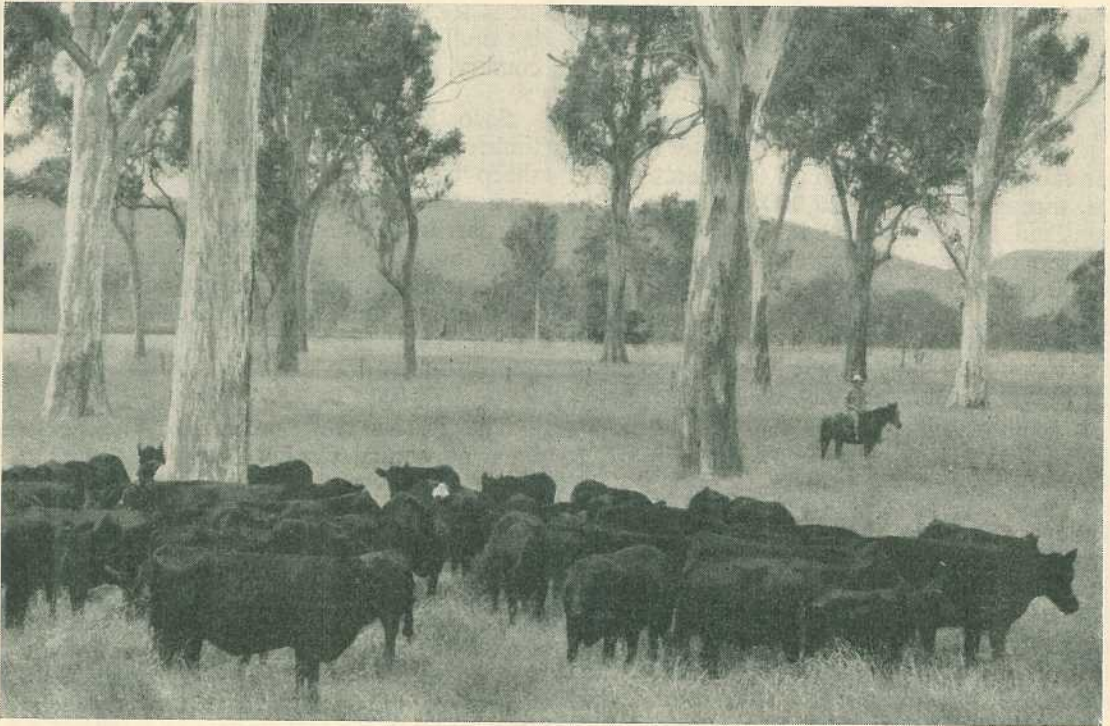


Plate 3
Beef Cattle at Beaudesert.

Much of the beef cattle country is rather sparsely settled, and the same remarks apply to amenities and educational facilities as are made for the sheep districts.

In recent years the industry has advanced, as prices in general have returned sufficient to enable property improvements such as subdivision and the provision of adequate watering facilities to be undertaken. Watering points are of particular importance in obtaining full utilisation of pasture. These usually take the form of bores, wells or earthen tanks. The cattle country in general is not underlain by artesian water and underground supplies must be lifted by windmills or pumps.

A good deal of the better class beef fattening country is held in freehold and little subdivision of these holdings is proceeding. There is limited subdivision of Crown land for closer settlement in the beef cattle regions. A good deal of development for beef cattle raising is envisaged for some millions of acres of brigalow forest country.

The prospects for the beef industry are quite good, as a satisfactory agreement for the disposal of surplus beef is operating and the local market is profitable and increasing. There is a trend towards improved fattening techniques by pasture improvement and fodder crop production and this will create opportunities for newcomers to enter the industry.

Dairying

Dairying is conducted commercially on almost 20,000 farms, many of them devoted solely to dairying.

Three main regions may be recognized—(1) the coastal region, consisting of an interrupted strip of dairying districts in the coastal plain and adjoining highlands between the southern border and the Daintree River, north of Cairns; (2) the sub-coastal region, comprising sections of the central and upper portions of the eastern river basins, mainly south of the Tropic of Capricorn; and (3) the Darling Downs (in the south-east) and a narrow westward extension.

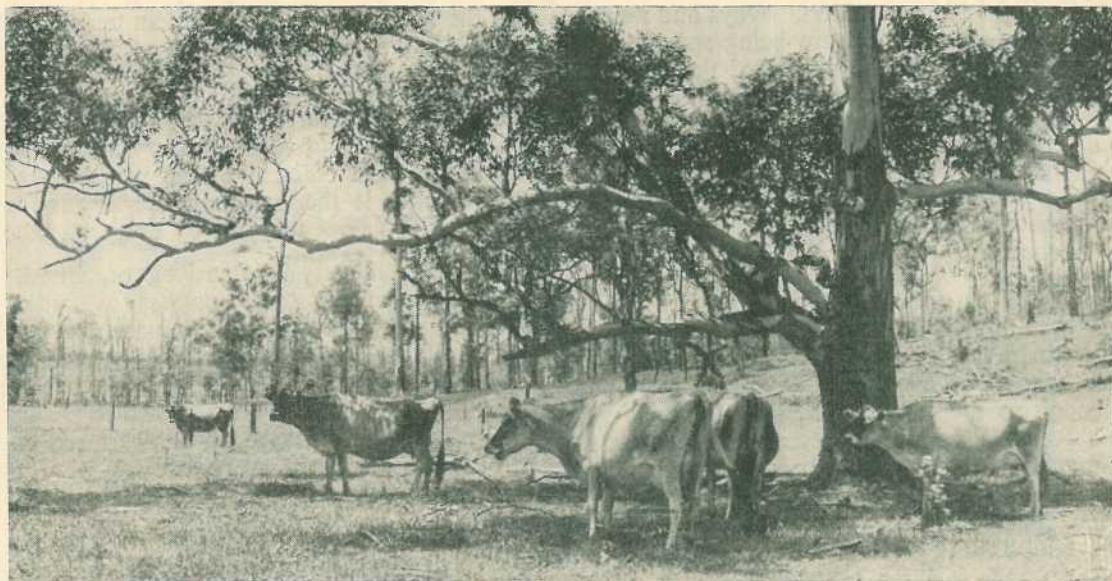


Plate 4
Dairy Cattle near Cooroy.

The type of dairying practised is substantially different in each region.

In the coastal and adjacent areas, most farms carrying livestock are devoted almost wholly to dairying and little cash cropping or growing of fodder crops is carried on. Dependence is placed almost entirely on permanent sown and/or native pastures.

In the sub-coastal region, the proportion of good cultivable land is much higher than on the coast. Here, dairying is on many farms combined with cash cropping. Permanent pasture, including a good deal of sown pasture, is less reliable than on the coast.

The Darling Downs generally are poorly supplied with good permanent pasture, either native or sown, but this disability is balanced by the fertility of the soils and the practicability of providing supplementary grazing on fodder crops in most years. About one-third of the State's dairy farms are situated on the Darling Downs, and because of the widespread use of grazing crops, production per cow is substantially higher than elsewhere in Queensland.

An increasing, though still very small, proportion of the dairy farm output is coming from irrigated pastures and fodder crops.

The main breeds of dairy cattle are Australian Illawarra Shorthorn, Jersey, Guernsey and Friesian, with the first two predominating.

The cattle tick is troublesome in the coastal and sub-coastal areas, necessitating regular dipping or spraying.

Queensland's dairy production is largely for buttermaking. Butter factories are distributed throughout the dairying districts. Cheese production is concentrated largely on the Darling Downs. Some dairy factories process milk for other purposes. The quantity of milk pasteurised is rising rapidly and numerous pasteurisation plants are operating throughout the State.

Because of the fairly close settlement of the dairying districts, few farms are very far distant from a progressive town. Primary schools are conveniently situated for most children, and secondary schools are also readily accessible in most areas. Electricity reticulation is extending through the dairying districts.

The dairying industry depends to a considerable extent on exports of butter. Within recent years, prices have not been particularly satisfactory and despite a Commonwealth subsidy on butter consumed in Australia and on a percentage of export butter, the industry generally has not

been in a flourishing condition. Ways and means of remedying this position are being sought, and there is confidence in the ability of the industry to recover the ground it has lost.

AGRICULTURE

The agriculture of Queensland is often thought of in terms of the sugar industry, but while sugar-cane is the State's most valuable field product, other crops are of considerable and increasing importance.

Though most of the State has an average annual rainfall of over 15 in., agriculture is not carried on to a great extent beyond the 25 in. line. Rainfall variability, even in the coastal districts, is high, and this, coupled with high evaporation during the summer months, in which most of the rain falls, limits the effectiveness of the total rainfall experienced.

Most of the land cultivated (some 3 million acres) is situated south of the tropic. The Darling Downs constitutes by far the largest developed agricultural area in the State, the annual cropping being about one-third of the total.

Narrow tongues of farming land extend westwards from the Darling Downs, but the remainder of the land used for agriculture in the south-east lies nearer to the coast, east of the Great Dividing Range. Here a wide variety of crops are produced in the basins of the eastern rivers.

The eastern coastal districts, in interrupted stretches along a coastline of 1,200 miles, produce the State's sugar-cane and the bulk of the commercial tropical and sub-tropical fruits. In the Cairns hinterland are the maize-growing district of the Atherton Tableland and the Mareeba tobacco area.

A large proportion of the State's arable land is held in freehold. The remainder is held under lease from the Crown.

Sugar-cane

The sugar industry in its early days was conducted largely on the plantation system, but this has almost disappeared and small growers numbering about 7,000 now produce practically all the sugar-cane. This is crushed at 31 mills, 14 of them co-operatives.

In the main, the crops are grown under natural rainfall, but some irrigation is practised in the drier cane districts.

By constant research and by farm mechanisation, the Queensland sugar industry has remained one of the most efficient in the world. At the same time, it is the only cane sugar producing country which does not employ coloured labour.

The sugar industry is intensively organised. A land assignment system operates in order to effect some measure of crop control and stabilisation. Under this system, each farm is assigned a maximum acreage that it may harvest each year. Sugar-cane farms are assigned to particular mills. Cane is purchased on analysis and check chemists are placed in every mill by the Central Sugar Cane Prices Board.

The main function of this Board is to act in a judicial capacity in making all cane prices awards and to control all sugar-cane land assignments. The Sugar Board attends to the marketing of the sugar and advises on the final price to be paid after all sugar has been disposed of.

The acreage at present assigned for cane growing for milling is more than adequate to fill domestic requirements and quotas allotted to Australia under the International Sugar Agreement, in which is incorporated the Commonwealth Sugar Agreement. Thus expansion is not warranted at the present time.

The sugar industry is particularly progressive in cane production, milling and marketing.

On the production side, the Bureau of Sugar Experiment Stations is constantly working on varietal improvement, cultural methods and pest and disease control. The Queensland Cane Growers' Organisation is active in promoting mechanical harvesting and loading of cane, which it believes to be the main avenue now open for reducing the cost of production.

Research on milling problems is proceeding all the time. The mills represent a very large capital investment. Besides having their own transport systems and in the main generating their own electricity, they possess efficient workshops and provide housing for their staff.

To improve the marketing of the raw sugar, bulk handling facilities are being established at the main export centres.

The intensive nature of the sugar industry and its magnitude have resulted in the establishment and growth of numerous prosperous towns and cities along the eastern seaboard. Cane farmers consequently enjoy all the facilities that are available under these conditions.

Grain Crops

Wheat is grown on some 700,000 acres and ranks next to sugar-cane in monetary value. The climatic hazards to growing wheat in a summer rainfall area have been countered in various ways. Cropping systems are practised which permit the retention of summer rain for the ensuring wheat crop. The breeding of drought-resistant varieties has also substantially assisted. Finally, mechanisation of farm operations enables large acreages to be prepared quickly and to be sown on isolated planting rains, and at harvest time in the early summer reduces the risk of spoilage of ripe grain due to seasonal storms.

There are nearly 6,000 wheat growers, and a large proportion of the crop comes from plantings of between 200 and 2,000 acres. The crop is grown mainly on the Darling Downs but is extending into new country each season. The total area planted fluctuates according to market prospects. Marketing is effected through the Australian Wheat Board and its agent, the State

Wheat Board. The milling quality of Queensland's wheat is high and much is disposed of at a premium price.

Barley has come into prominence in recent years as an alternative to wheat. Good disposals have been made on overseas markets. Further expansion will depend on market prospects.

Apart from the Atherton Tableland, where annual plantings of some 25,000 acres are concentrated in a very small region, maize growing is mainly a mixed-farming activity of the south-eastern agricultural areas. It has given way to grain sorghum in much of the country marginal for maize. Grain sorghum, which did not attain prominence until the 1940's, has overtaken maize as the most important summer grain.

Tobacco

Tobacco production figures very largely in the forward planning of agriculture in Queensland. Optimism for the future of the industry is based largely on the provision of more irrigation facilities and on the large domestic demand for tobacco.

About three-quarters of the acreage devoted to tobacco is situated in the north, mainly west of Cairns. Another important northern area is the Burdekin River. In the southern part of the



Plate 5

Headers Harvesting Wheat With Bulk Equipment on the Darling Downs.

State, most of the tobacco crop is grown under irrigation on the Dumaresq River system in the near south-west.

Tobacco in Queensland is a small-farm crop, the average grower cultivating about 5-10 acres and curing his own leaf. All tobacco leaf produced is sold through the Tobacco Leaf Marketing Board.

Fibre and Oil Crops

The only fibre crop that has achieved prominence is cotton. The industry declined during World War 2 but is regaining its pre-war position as production conditions improve.

Better cultural methods are promising higher returns now, and irrigation is also becoming more generally available. The harvesting position has been improved by the importation of mechanical pickers.

The industry has a sound price structure in the form of a guaranteed minimum price for satisfactory grades of seed cotton and this is encouraging farmers to plant the crop.

Linseed has become an important oilseed crop in recent years and is grown quite extensively on grain farms, especially on the Darling Downs. There are satisfactory local outlets for the seed.

The peanut has been a source of considerable wealth to the South Burnett district, where annual plantings have been as high as 40,000 acres. There is some production in other areas also. This crop is disposed of as kernels for the confectionery trade or for oil extraction. There is now considerable competition between peanut oil and imported olive oil, but the industry, which is well organised, is taking vigorous steps to maintain its position.

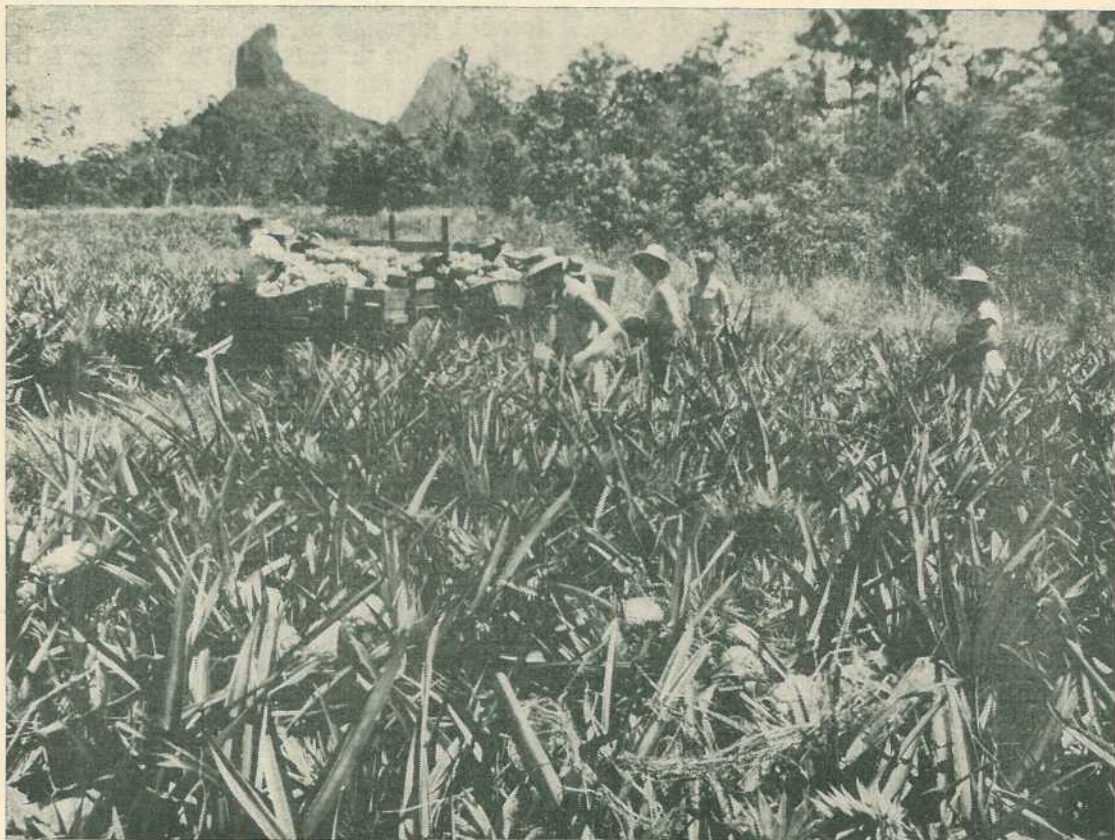


Plate 6

Harvesting Pineapples on Mr. Jack Gowen's Farm, Glasshouse.

Fruits and Vegetables

The most important of the fruit crops is the pineapple, which is grown mainly within 100 miles of Brisbane. Apart from a few large plantations, the crop is grown on small farms, often as a sideline to other enterprises. There are large areas on the north-eastern coast suitable for pineapple production, but distance from markets has retarded the development of the industry there. There is some production on the central coast.

The economy of the pineapple industry has been based largely on canned fruit and canned or bottled juice. Owing to heavy production in recent years, a large proportion of the canned pineapples has had to be disposed of on overseas markets. Increasing competition from other suppliers, together with tariff changes unfavourable to Australia, has made overseas markets less remunerative, and returns to growers have fallen. Sales promotion is expected to keep export sales at a reasonable level.

Banana growing is conducted on over 4,000 acres and is in general a remunerative enterprise. The industry is expected to advance as transport and holding methods are improved by scientific research.

Citrus fruits are grown commercially on over 4,000 acres. The main production centres are lower North Coast and Gayndah, on the Burnett River. In the latter district, production is confined to irrigated land. This industry is in a satisfactory position, but no great expansion is warranted at present.

Papaws, mangoes and custard apples are tropical or subtropical fruits of lesser importance. Papaws, apart from fresh fruit sales, are disposed of to canneries largely for inclusion in tropical fruit salad packs. The main production is confined to a few districts, mainly close to Brisbane.

Apples, grown on some 7,000 acres on a plateau in the south-east, are the chief deciduous fruit crop. While most of the deciduous fruits are marketed locally, there is some export of apples to the United Kingdom and the Far East.

Queensland plants about half the Australian acreage of pumpkins and roughly one-third of the tomato, bean and onion crops. Large tonnages of pumpkins, tomatoes and beans are sent to other States. Potatoes are grown only for consumption within the State. Little canning or dehydration of vegetables is carried out in Queensland, production being almost wholly for the fresh vegetable markets.

The small-crop industry is important around the larger centres of population, and many migrants with limited capital have taken up vegetable growing.

THE OUTLOOK

The many primary industries of Queensland could be expanded or intensified to a considerable degree. There is a vast area of underdeveloped land, and methods for developing much of it are now known. There is, in fact, a good deal of expansion of crop-growing and intensification of stock-raising going on continuously.

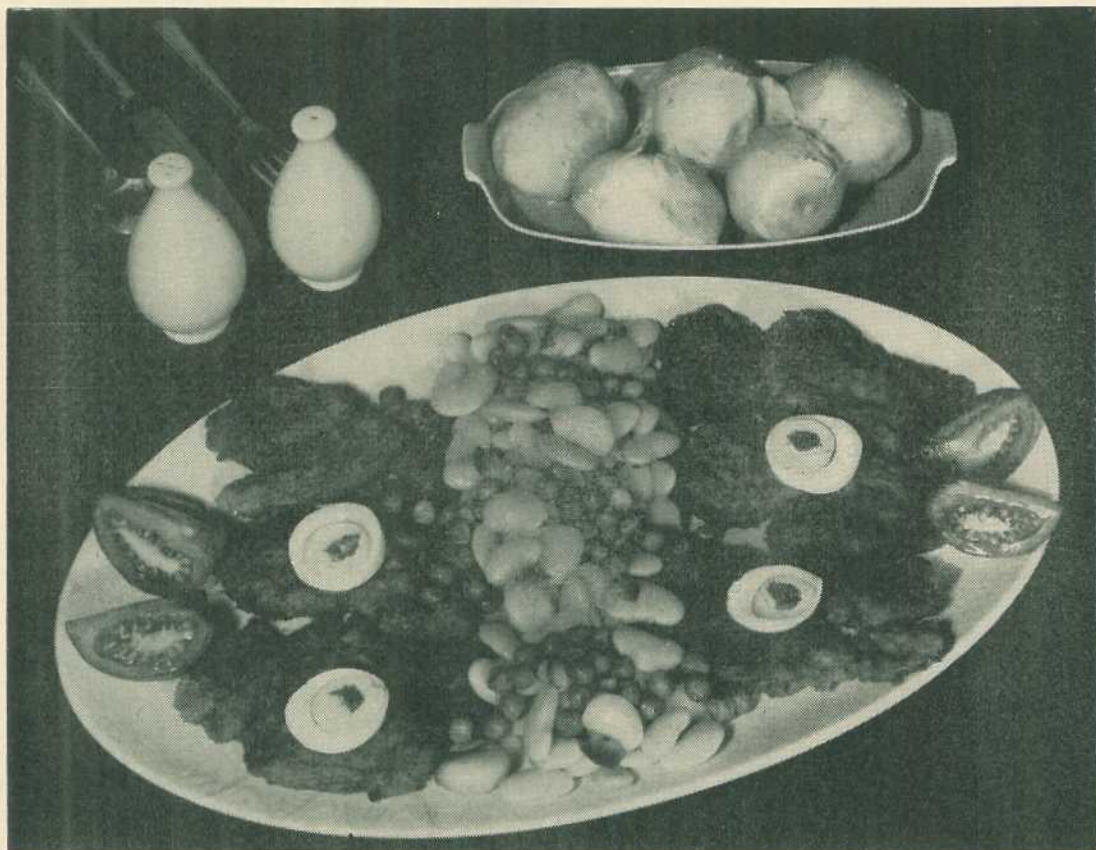
There is a very large capital investment in the primary industries, but new investment is not sufficient to allow the best use to be made of improved properties, let alone promote the development of new enterprises. Primary production as much as secondary industry offers a big field for investment.

The rate of development will depend also on market prospects for primary products. The Australian market is increasing rapidly as the population increases and will demand more and more of the commodities which Queensland is particularly suited to supply. The export market is in these times a variable one, but Queensland has firm outlets for many of its products and is continually opening up new markets for particular commodities.

There is every reason to predict an era of expansion in a State which more than any other has the potential for expansion.

For Country Cooks

Notes from the **JUDITH MAY TEST KITCHEN**
directed by **RUBY BORROWDALE** for
The Butter Marketing Board



Veal, Continental Style

Veal is always a happy choice for the housewife when planning the main meal of the day. It is a lean meat giving a very small percentage of waste in cooking and has the advantage of combining tender quality with a delicate flavour. Veal joints are always popular and are particularly suitable for roasting. Cutlets and fillets are frypan favourites the world over.

WIENER SCHNITZEL (photographed on this page)

Six veal fillets or veal steaks cut from top of leg, $1\frac{1}{2}$ teaspoons salt, $\frac{1}{2}$ cup plain flour, 1 teaspoon dry mustard, 1 slightly-beaten egg, 1 tablespoon water, 1 cup fine dry breadcrumbs or cereal flake crumbs.

Flatten veal with meat pounder; rub with salt and then mustard, and coat evenly with flour, dip in egg mixed with water and then coat evenly with crumbs. Fry in hot deep fat or oil (370 to 380 deg. F.) until richly browned and cooked through. Or line a shallow baking pan with aluminium foil and brush the foil with melted butter or ghee, place crumbed veal fillets on the foil and sprinkle generously with melted butter or ghee and bake in moderate oven (350 deg. F.) about 45 minutes. No other cooking fat is necessary for this method and it is an easier way of preparing a larger quantity.

When veal is cooked, sprinkle with paprika. Serve with new potatoes boiled in their jackets, buttered green peas and lima beans. Garnish with sliced hard-cooked egg, tomato wedges and parsley.

SAVOURY VEAL ROLLS

Four trimmed veal cutlets, 2 tablespoons butter or ghee, $\frac{1}{2}$ lb. finely-minced beef steak, $\frac{1}{2}$ cup soft white breadcrumbs, $\frac{1}{2}$ teaspoon mixed dried herbs, $\frac{1}{2}$ cup milk, 1 cup chopped onion, 1 small can tomato soup, 1 cup of water, $\frac{1}{2}$ bay leaf, dash of allspice.

Melt butter or ghee in frypan and fry the veal cutlets until lightly browned on both sides but not completely cooked. Remove cutlets from the pan and allow to cool. Mix the minced meat, crumbs, herbs and milk together, divide into four equal portions. Cover each veal cutlet with one-quarter of the prepared meat mixture, pressing it neatly into shape. Dust lightly with flour, pepper and salt and brown on all sides in the pan, then sprinkle with the chopped onion; combine soup, water, bay leaf and allspice and pour into pan. Cover with lid and simmer about 40 min.

Serve with freshly cooked rice and a crisp cabbage salad. Makes four servings.

VEAL PAPRIKA

Two rashers of bacon, $1\frac{1}{2}$ lb. veal steak, plain flour, $\frac{1}{2}$ cup chopped onion, 1 teaspoon paprika, $\frac{1}{2}$ teaspoon salt, 1 cup sour cream, $\frac{1}{2}$ cup tomato sauce, 1 tablespoon butter or ghee.

Melt butter in pan, add bacon and fry till crisp; remove from pan. Cut veal into serving-size portions and dust well with seasoned flour.

Brown pieces evenly in the hot bacon fat in the pan. Add the chopped onion and sprinkle with paprika and salt. Stir in the sour cream, tomato sauce and crisp bacon. Cover pan and simmer about 30 min. Serves four to six.

Serve with plain dumplings or freshly cooked spaghetti.

CURRIED VEAL

For every four servings allow about a 3 lb. Knuckle of veal, 1 pint water, 3 tablespoons butter or ghee, $\frac{1}{2}$ cup chopped onion, $\frac{1}{2}$ cup chopped apple, 1 chopped red capsicum, 1 clove garlic, 2 teaspoons curry powder, 1 teaspoon salt and about 4 tablespoons cornflour.

Place veal in water and simmer until veal is tender. Remove veal from stock and add water, if necessary, to make $2\frac{1}{2}$ cups stock. Cut veal into neat pieces. Melt the butter or ghee in a large enamel-lined saucepan, add the onion, garlic, apple and capsicum. Cook over low heat, stirring occasionally until vegetables are tender but not browned. Mix the curry powder, salt and cornflour with a little of the stock to a smooth paste. Add remaining stock to vegetables, and when heated stir in the cornflour mixture, cook, stirring until a thick, smooth sauce is formed. Add the veal and heat thoroughly.

Serve with steamed rice.

Note: Some cooks like to add a tablespoon of sweet, spicy chutney to the curry before removing it from the stove.

GRILLED VEAL CHOPS

Select rib or loin chops cut 1 in. thick; wipe with damp cloth and brush each side with melted butter or ghee—this is necessary because veal is a lean meat. Grill under medium heat about 20 min. or until well done, turning chops when browned.

Sprinkle with salt and pepper, and serve on a hot plate with lemon butter.

Lemon Butter: Cream 2 oz. butter in a small bowl, then gradually blend in $\frac{1}{2}$ teaspoon grated lemon rind and 2 teaspoons lemon juice. Store in a covered dish until required. At serving time place a small cube of the lemon butter on each grilled chop and allow it to melt over the chop to form a sauce.

BRAISED VEAL

Select 1½ to 2 lb. veal cut from top of leg or use veal chops cut about 1 in. thick; wipe and dredge with seasoned flour. Melt ¼ cup butter or ghee in heavy pan and fry the steak or chops on both sides until richly browned, turning frequently. Add 1 cup hot water, stock or tomato juice, or 1 cup sour cream; cover pan and simmer about 1 hour, turn meat once or twice. Serve on a hot dish with gravy from pan. If necessary thicken gravy with cornflour, adding more liquid if necessary to make sufficient gravy. Serve with freshly boiled rice and a green vegetable.

VEAL CHOPS WITH MADEIRA AND MUSHROOMS

Six veal chops with kidneys, 4 white onions, ½ lb. fresh mushrooms, 2 outside stalks celery, 5 tablespoons butter, plain flour, pinch thyme, pinch marjoram, 1 tablespoon chopped parsley, 1 cup veal stock, 1 cup sour cream, 1 tablespoon canned tomato paste, salt, paprika, ½ cup Madeira (wine) and 2 tablespoons brandy.

Peel and slice onions and mushrooms thinly; remove strings from back of celery and cut into small pieces. Melt 4 tablespoons of the butter in a small enamel-lined saucepan and add these vegetables. Cook and stir over low heat until tender. Remove from stove and stir in a rounded tablespoon plain flour till smooth. Gradually add the stock, stirring to blend; return to stove and cook, stirring to make a smooth, thick sauce. Remove from heat again and gradually add the sour cream, herbs, seasonings, and tomato paste. Bring to boil again and then add the ½ cup Madeira. Cover saucepan and simmer while preparing the chops.

Dust the veal chops evenly on both sides with plain flour and fry in the tablespoon hot butter until nicely browned on both sides. When the chops are browned, pour 2 tablespoons brandy over them, set it alight and let it burn for a few seconds. Then extinguish the flames by pouring the onion-mushroom-wine sauce over them. Cover the pan and cook over very low heat about 30 min.—fast cooking will spoil the flavour of this dish. Serve with freshly boiled rice, spaghetti or mashed potatoes. Add a garnish of green peas and lemon wedges.



On the Right is Edmund Bohl, of Hermann, Missouri, U.S.A., 21-year-old 4H Club Member, Who Is Visiting Queensland under the Sponsorship of Caltex Oil. He is talking to (l. to r.) Ted Lewis and Gwen Brider (Queensland Junior Farmers) and Mr. Ken Graham, Assistant Manager for Queensland of the Caltex Oil Co.

AUSTRALIAN WOOL FASHIONS



Grey Wool Sheath with Deep Plunging V Neckline of Snow White Mouton. The fitted coat is cut with classical neckline to reveal the white fur. Matching hat with high fur crown.



A Sophisticated Tunic of Fine Black Wool Dramatised With a Deep Low Back Outlined With Snow Drift Fox Fur. The slim dress is an ankle length hand pleated sheath with fine rhinestone shoulder straps.

A parade of Australian fashions in Australian fabrics made of Australian wool was staged in the Washington Hotel, London. It was the first time that an Australian fashion designer had taken his own haute couture collection overseas.

The 40 garments paraded were designed by Hall Ludlow for the Department of Trade. They were to form part of a range of 70 Australian wool fashions to be featured in the Australian Government Trade and Fashion Promotion at the Lausanne Fair (Switzerland).

The collection showed how adaptable Australian wool is to every season, and to every time of day. Mr. Ludlow visited the leading Australian woollen mills and chose their most

beautiful, adaptable and varied pure wool. He chose textures and colours to complement a complete collection, and decided on designs as he handled, weighed and draped each new fabric.

This collection is not solely winter fashion, but particularly shows how adaptable the Australian wools are to every season.

Knitwear—finely and dramatically styled—features wool fur trimming. Hand-sewn loops of wool are trimmed and brushed to great effect. Australian fur broadtail and white mouton and also snow drift fox have been used to accentuate style.

Matching hats, in wool were devised to finish each ensemble.

The evening and cocktail gowns were styled of fabulous colour and contrast. A white cocktail dress was embroidered with heavy clusters of scarlet wool and Australian gum flowers. It was worn with a chignon cap of the flowering gum and the ensemble was completed with a

dramatic draped coat of vivid scarlet, lined with white.

A slender evening sheath was embroidered with clusters of soft gold Australian wattle. It was shown with a cleverly draped, sophisticated gold evening coat.



Bee Enthusiasts



Two Enthusiasts, Mr. N. V. Rice and his Daughter, Mary, of Wynnum West, Show No Fear of Bees when Discussing Beekeeping with Members of the R.N.A.-Shell 1960 Journalists' Tour. Mr. Rice now has 350 honey-producing hives which he consistently moves around the South Coast and Brisbane's surrounding hills to give more than 7 tons of honey a year. His principal interest, however, is breeding more than 2,000 Pure Italian Queens a year to supply commercial apiarists throughout Australia and New Guinea.