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READY FOR THE HARVEST: A NEWLY EXCAVATED SILAGE TRENCH.

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Editor: C. W. Winders, B.Sc.Agr.

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S. T. Fowler, "Kenstan" Stud Pittsworth
W. Zahnow, Rosevale, *via* Rosewood
Regional Experiment Station, Biloela
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G. I. Skyring, "Bellwood" Stud, *via* Pomona
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C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. Stewart, Mulgowie, *via* Laidley
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O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy.
B. F. Jensen, Rosevale
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes, Brisbane
R. Kennard, Collar Stud, Warwick
A. C. H. Gibbons, Mt. Glorious

Tamworth.

D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
Department of Agriculture and Stock, Regional Experiment Station, Kairi
E. C. Phillips, "Sunny View," M.S. 90, Kingaroy
F. N. Hales, Kerry road, Beaudesert
T. A. Stephen, "Withcott," Helidon
W. F. Kajewski, "Glenroy" Stud, Glencoe
A. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
F. Thomas, "Rosevale" Stud, M. S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
R. H. Coller, Tallegalla, *via* Rosewood
A. J. Potter, "Woodlands," Inglewood
D. V. and P. V. Campbell, "Lawn Hill," Lamington
S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
C. R. Smith, "Belton Park" Stud, Nara
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
R. A. Collings, "Rutholme" Stud, Waterford
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale Stud," 492 Beenleigh road, Sunnybank
Kruger and Sons, "Greyhurst," Goombungee
A. Scott, "Wanstead" Stud, Grantham
G. C. Burnett, "Rathburnie," Linville

British Large Black.

H. W. Naumann, "Parkdale" Stud, Kalbar

Tuberculosis-Free Cattle Herds.

The studs listed below have fulfilled the conditions of the Department's Tuberculosis-free Herd Scheme to 31st January, 1957.

Breed.	Owner's Name and Address.
A.I.S.	M. E. & E. Scott, "Wattlebrae" A.I.S. Stud, Kingaroy
	F. B. Sullivan, "Fermanagh," Pittsworth
	D. Sullivan, "Bantry" Stud, Rossvale, *via* Pittsworth
	W. Henschell, "Yarranvale," Yarranlea
	Con. O'Sullivan, "Navillus" Stud, Greenmount
	H. V. Littleton, "Wongalea" Stud, Hillview, Crow's Nest
	J. Phillips and Sons, "Sunny View," Benair, *via* Kingaroy
	Sullivan Bros., "Valera" Stud, Pittsworth
	Reushle Bros., "Reubydale" Stud, Ravensbourne
	H. F. Marquardt, "Chelmer" Stud, Wondai
	A. C. and C. R. Marquardt, "Cedar Valley," Wondai
	A. H. Sokoll, "Sunny Crest" Stud, Wondai
	W. and A. G. Scott, "Welena" A.I.S. Stud, Blackbutt
	G. Sperling, "Kooravale" Stud, Kooralgin, *via* Cooyar
	C. J. Schloss, "Shady Glen," Rocky Creek, Yarraman
	W. H. Thompson, "Alfa Vale," Nanango
	S. R. Moore, Sunnyside, West Wooroolin
	H.M. State Farm, Numinbah
	D. G. Neale, "Grovely," Greenmount
	Edwards Bros., "Spring Valley" A.I.S. Stud, Kingaroy
	A. W. Wieland, "Milhaven" A.I.S. Stud, Milford, *via* Boonah
	W. D. Davis, "Wamba," Stud, Chinchilla
	Queensland Agricultural High School and College, Lawes
	C. K. Roche, Freestone, Warwick
	Mrs. K. Henry, Greenmount
	D. B. Green, "Deloraine" Stud, Durong, Proston
	E. Evans, Wootha, Maleny
	T. L. and L. M. J. Cox, "Seafield Farm," Wallumbilla
	J. Crookey, "Arolla" A.I.S. Stud, Fairview, Allora
	M. F. Power, "Barfield" Kapaldo
	A. H. Webster, "Millievale," Derrymore
	W. H. Sanderson, "Sunlit Farm," Mulgildie
	R. A. and N. K. Shelton, "Vuegon" A.I.S. Stud, Hivesville, via Murgon
	R. R. Radel & Sons, "Happy Valley." Coalstoun Lakes
Ayrshire	L. Holmes, "Benbecula," Yarranlea
	J. N. Scott, "Auchen Eden," Camp Mountain
	E. Mathie and Son, "Ainslie" Ayrshire Stud, Maleny
	C. E. R. Dudgeon, "Marionville" Ayrshire Stud, Landsborough
	G. F. H. Zerner, "Pineville," Pie Creek, Box 5, P.O., Gympie
	T. F. Dunn, Alanbank, Gleneagle
Friesian	C. H. Naumann, "Yarrabine" Stud, Yarraman
	D. J. Pender, "Camelot," Lytton road, Lindum
	S. E. G. Macdonald, "Freshfields," Marburg
Guernsey	C. D. Holmes, "Springview," Yarraman
	A. B. Fletcher, Cossart Vale, Boonah
	W. H. Doss, Degilbo, *via* Biggenden
	A. C. Swendson, Coolabunia, Box 26, Kingaroy
	C. Scott, "Coralgrae," Din Din Road, Nanango
	R. J. Wissemann, "Robnea," Headington Hill, Clifton
	G. L. Johnson, "Old Cannindah," Monto
	A. Ruge & Sons, Woowoonga, *via* Biggenden
	G. Miller, Armagh Guernsey Stud, Armagh, M. S. 428 Grantham
	N. H. Sanderson, "Eden Valley," Monto
Jersey	Queensland Agricultural High School and College, Lawes
	J. S. McCarthy, "Glen Erin" Jersey Stud, Greenmount
	J. F. Lau, "Rosallen" Jersey Stud, Goombungee
	G. Harley, Hopewell, M.S. 189, Kingaroy
	Toowoomba Mental Hospital, Willowburn
	Farm Home for Boys, Westbrook
	F. L. Cox and Sons, "Rosel" Stud, Crawford, Kingaroy line
	P. J. L. Bygrave, "The Craigan Farm," Aspley
	R. J. Crawford, "Inverlaw" Jersey Stud, Inverlaw, Kingaroy
	P. H. F. Gregory, "Carlton," Rosevale. *via* Rosewood
	E. A. Matthews, "Yarradale," Yarraman
	A. L. Semgreen, "Tecoma," Coolabunia
	L. E. Meier, "Ardath" Stud, Boonah
	A. M. and L. J. Noone, "Winbirra" Stud, Mt. Esk Pocket, Esk
	W. S. Conochie and Sons, "Brookland" Stud, Sherwood road, Sherwood
	Estate of J. A. Scott, "Kiaora," Manumbar road, Nanango
	F. W. Verrall, "Coleburn," Walloon
	C. Beckingham, Trouts road, Everton Park
	W. E. O. Meir and Son, "Kingsford" Stud, Alberton, *via* Yatala
	G. H. Ralph, "Ryecombe," Ravensbourne
	Mrs. I. L. M. Borchert, "Willowbank" Jersey Stud, Kingaroy
	W. and C. E. Tudor, "Boree" Jersey Stud, M.S. 498, Gayndah
	Weldon Bros., "Gleneden" Jersey Stud, Upper Yarraman
	D. R. Hutton, "Bellgarth," Cunningham, *via* Warwick
	J. W. Carpenter, Flagstone Creek, Helidon
	H. G. Johnson, "Windsor" Jersey Stud, Beaudesert
	W. S. Kirby, Tinana, Maryborough
	S. A. Cramb, Bridge St., Wilsonton, *via* Toowoomba
	G. & V. Beattie, "Beauvern," Antigua, Maryborough
	J. A. & E. E. Smith, "Heatherlea" Jersey Stud, Chinchilla
	W. C. M. Birt, "Pine Hill" Jersey Stud, Gundiah
	T. Nock, Dallarnil
	P. Fowler & Sons, "Northlea," Coalstoun Lakes
	F. Porter, Conondale
	H. M. State Farm, Palen Creek
Poll Hereford	W. Maller, "Boreview," Pickanjinnie
	J. H. Anderson, "Inverary," Yandilla
	D. R. and M. E. Hutton, "Bellgarth," Cunningham, *via* Warwick
	E. W. G. McCamley, Eulogie Park, Dululu
	Wilson and McDouall, Calliope Station, Calliope

HELP YOURSELF

By W. J. S. SLOAN, Director of Agriculture.

Self-service has become an accepted part of our daily life. Stores selling groceries, hardware and clothing on the self-service pattern are now commonplace. The method requires more effort from the customers but it makes more efficient use of operating labour.

What has this to do with farmers and the Department of Agriculture and Stock? Let me explain.

We have limited staff, long distances to cover, and with the expansion of farming lands and areas under improved pastures, the demand for advice on crops and pastures is constantly increasing. We have to make the most efficient use of the services of our advisory officers. That requires that farmers help themselves more.

The Agriculture Branch of the Department provides a wide range of services embracing advice on cropping, pastures, soil conservation, fodder conservation, fertilizers and so on. But that service cannot continue to be based mainly on farm-to-farm visits. By reducing individual visits to farms and by dealing more with farmer groups, our advisory services can reach a greater number and give a better overall service to the farming community.

It is true that many feel that their properties have special problems of their own. They hesitate to introduce farming improvements without a visit and inspection from an advisory officer, and perhaps some supervision of the operations as well.

Doubtless there are a number of cases where a personal visit is required, but there are many more where the farmers can try things for themselves, basing their approach on what they have read or seen or on advice which they have received. Advisory officers are readily available for discussion and consultation, but that does not mean they are able to make individual visits to properties as well, except in cases where circumstances warrant them.

How can farmers help themselves more? Here are a few suggestions.

Farmers could read more. I have heard it said that farmers don't have the time to read, that if a farming article is more than a page or two in length then it is too long for them to study.

I am sure that if farming is to improve its efficiency in this State then we cannot accept such statements. These days, with rapid changes in the types and usage of agricultural chemicals, alterations in farming machinery and developments in cropping, farmers need to read semi-technical articles to keep abreast of modern agricultural knowledge. Reading is one way the progressive farmer can find out what to do, how and when to do it.

Demonstrations, field days, inspections, meetings and the like, where better practices, better equipment and better management methods can be seen and discussed, can be of great assistance to farmers in planning and

operating their own properties. From time to time in all districts, on a wide range of subjects, the Department of Agriculture and Stock conducts field days.

Many are well attended, but I believe that farmers could attend in greater numbers with profit to themselves. And in saying this, I don't want to restrict my comments to meetings planned by this Department. Other organisations also hold similar functions from all of which additional knowledge can be gained. Not the least important is the opportunity given to exchange and discuss experiences with fellow-farmers.

In an even more direct way, farmers can help themselves a great deal by conducting their own small observation plots, whether they be on new crops, new varieties, pasture species and their management, the application of fertilizers or other matters on which advice can easily be obtained from the nearest agricultural officer.

To accelerate progress in saving our soil resources the application of soil conservation methods requires a much greater measure of self-help by farmers in this State than has been the case in the past. For example, at present soil conservation officers plan, survey and supervise the construction of earthworks on farm lands to control runoff water and soil erosion. If more and more farmers could handle the surveying and supervision required in work of this nature, then more farmers would get assistance and the rate of construction would be markedly increased.

Confidence in their own ability and self-reliance are characteristics of our farmers. Those qualities have enabled them to meet and overcome successfully many difficult situations in the past. On their own initiative they have contributed much valuable knowledge to the development of farming methods and farm machinery. There is every reason to anticipate they will continue to do so.

By helping themselves they help their own industries and communities and enable Agriculture Branch officers to give a wider service to a greater number.

HELP YOURSELF—BY READING.

If you are a Queensland primary producer, leaflets on a wide variety of subjects are available to you free of charge.

Recent leaflets include—

Control of Wild Tobacco Tree on the Atherton Tableland.
Tyre Rollers on the Darling Downs.
Machine Sown Pastures on the Darling Downs.
Fleece Measurement for Queensland Stud Masters.
The Dairy Calf: Its Feeding and Management.
Seasonal Farming for Dairy Cows.

Notes on Biloela Buffel Grass

By B. GROF, Assistant Agrostologist.

The origin of this grass and its history in Queensland were discussed in this journal for April 1956. The following notes have been prepared to assist farmers in establishing and managing the grass.

Climatic and Soil Requirements.

Biloela strain, like other buffel grasses, is a summer grower making its best growth during the December-March period. Information gained at the Biloela Regional Experiment Station indicates that green panic (*Panicum maximum* var. *trichoglume*) is well suited to soil types with a good moisture retention (for example, clay loam alluvials) because this species is rather sensitive to soil moisture. It is generally noted for the quick response to light showers but it also wilts quickly when moisture is in short supply.

In contrast, the lighter textured soils and sandy loams are regarded as ideal for buffel grass. In heavy soils the extension of the underground stems of this latter species is checked to some extent. The better drought resisting characteristic and comparably high yielding capacity of this new strain make it a suitable alternative to green panic on droughty soils in districts where green panic otherwise thrives, especially in the 26-30 in. rainfall areas. However, experience with strains possessing a short-leafed growth habit like the Western Australian buffel grass grown commercially in Queensland, and also similar types,

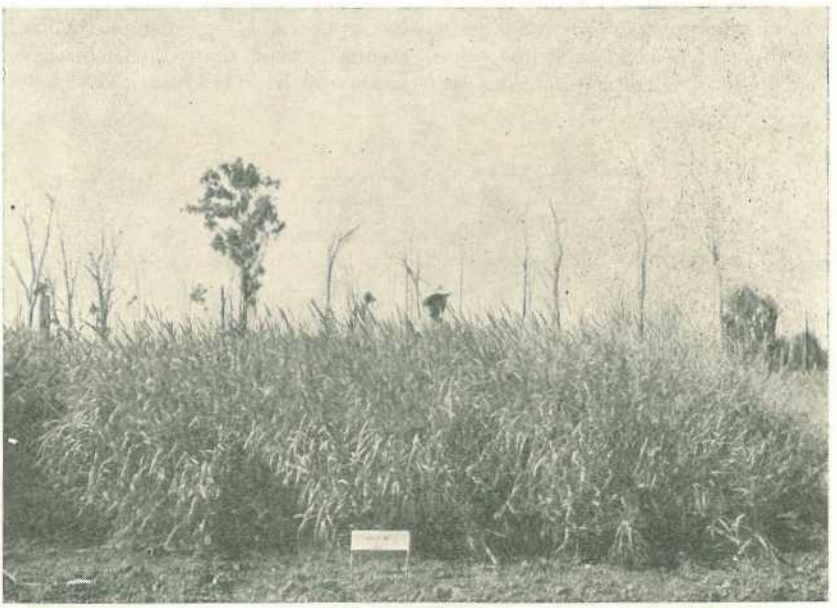

Plate 1.

Nursery Plot of Biloela Buffel Grass at the Biloela Regional Experiment Station.

has shown that they retain their meagre growth habit under even short periods of suitable growing conditions. It is questionable whether the vigorous Biloela strain, which produces a heavy bulk of leaf, would thrive under conditions which are only capable of maintaining a short-leafed type during a restricted period of effective rainfall.

Potential Distribution.

Regional trials with Biloela buffel have, of necessity, been restricted. Numerous pilot plots and small commercial areas have been established, however, during recent years and its suitability to conditions experienced in the drier sub-coastal areas has been recorded. The longevity of seasonal growth of the Biloela strain makes it well suited to conditions experienced in the Callide Valley, where it has maintained leafy growth during the cooler part of the season after the Gayndah strain ceased growth.

Yield Potential and Nutrient Value.

As a first step in the evaluation of this new buffel grass, after preliminary observations of general habit and suitability to local climatic conditions, it was established in plots of one-fifth of an acre to allow measurements of yields and observation of plant behaviour under controlled grazing. Similar areas of common Rhodes grass and green panic (which are recognised pasture grasses in the district), Gayndah buffel grass and promising newer strains of Rhodes grass, buffel grass and green panic were incorporated as standards of comparison.

The dry weight yields in tons per acre from $\frac{1}{5}$ acre plots each of Biloela and Gayndah buffel grasses and the average yield of seven other grasses are shown with respect to each cut in Table 1.

In general, yields from Biloela buffel grass compare very favourably with the standards chosen, and illustrate the high yield potential of this introduction under actual grazing conditions.

The nutrient value of Biloela strain, assessed on crude protein content, differs only slightly from that of Gayndah buffel grass, while protein contents of both buffel grass strains are appreciably greater in the leafy seeding stage than those of green panic and Rhodes grass. The protein

Plate 2.

Biloela Buffel Grass Pasture in Good Condition for Grazing.

TABLE 1.

YIELD OF GRASSES—TONS PER ACRE (Dry weight).

——	18–12–53.	21–1–54.	16–2–54.	30–8–54.	1–11–54.	23–3–55.	3–6–55.	6–2–56.
Buffel Grass Biloela Strain	2·4	0·8	0·9	0·5	0·2	1·6	0·6	1·2
Buffel Grass Gayndah Strain	1·3	0·7	0·7	0·5	0·3	1·3	0·4	0·7
Average for 7 Other Grasses	1·8	0·6	0·7	0·4	0·3	1·5	0·3	0·8

content varies from about 7 per cent. in mature grass to as high as 13 per cent. when the plants are in the early heading stage.

The evaluation of mature growth is a matter of prime importance to pasture study under summer rainfall conditions because grass tends to grow too quickly for stock to eat it down during the flush growing period. The comparatively high protein content of Biloela strain even in the seeding stage can also be utilized by making hay from stands which have passed the most favourable stage for grazing. The erect growth habit of this strain makes it a useful hay type.

The foliage of this buffel grass is liable to frost damage and it contains a high proportion of stemmy growth in the hayed-off stage. In general, green panic has, at the comparable stage, more dry leafy material acceptable to cattle.

TABLE 2.

CRUDE PROTEIN CONTENT OF GRASSES.

——	Crude Protein Per Cent. of Dry Matter.						
	18–12–53.	21–1–54.	17–2–54.	30–8–54.	1–11–54.	22–3–55.	2–6–55.
Buffel Grass Biloela Strain	10·2 seeding leafy	13·1 lush heading	12·9 lush heading	6·4 young growth and stemmy residuals	7·8 leafy in head	6·8 mature leafy	7·9 young leafy
Buffel Grass Gayndah Strain	10·4 seeding leafy	12·0 lush heading	13·6 lush heading	8·8 young growth and stemmy residuals	12·5 leafy in head	6·8 mature leafy	9·0 young leafy
Green Panic . .	8·0 seeding rank	7·6 leafy heading	8·0 succulent leafy	5·2 young leafy	10·1 succulent leafy	4·5 in seed	9·5 young leafy
Rhodes Grass . .	7·8 in seed rank	. .	7·1 leafy in full head	8·2 succulent young growth	6·0 in full head	7·1 in seed	6·7 young leafy

The results of chemical analysis at various stages of growth are given in Table 2. It is stressed that these protein figures indicate the range of values and that specific comparison at particular dates is unwise as the maturity rate and mode of growth of the grasses listed can vary considerably. However, the buffel grasses possess very satisfactory protein values considering that they also produce more bulk than the other common perennial grasses in the trial.

Planting Technique.

At the present time seed supplies of Biloela buffel are somewhat limited but seed was supplied for planting 115 acres on seed producing farms in the Callide Valley district in December 1955 and additional acreages were established in 1956.

On the basis of experience in establishing plots at Biloela the following recommendations are made:—

Though buffel grass may be sown from spring to late summer, surface dampness for at least 3-5 days is necessary to obtain a good germination. This is most likely to occur during the months of January, February and possibly early March and these months are recommended as the safest. Every effort should be made to anticipate a rain group with the sowing. Best stands result from plantings on a well prepared seedbed. The seedbed should be fine and firm. The preplanting cultural operations should be completed with a harrowing. Planting on the surface is recommended for buffel grass. Rapid germination results if a cultipacker or Cambridge roller is used after sowing. If a cultipacker is not available a plain roller will suffice.

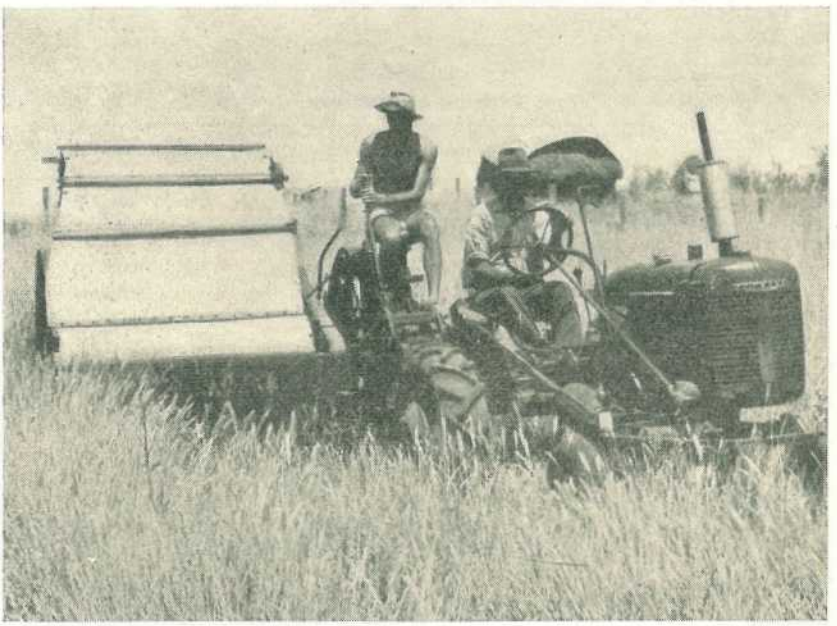

Plate 3.

Harvesting Biloela Buffel Grass Seed with Old Type Wheat Stripper.

Machine planting is possible if clean seed is used. A two-row cotton or maize planter, or the fertilizer box of a drill, serves well for this purpose if the seed is mixed with slightly damp sawdust. Special planters for grass seed are now becoming available from machinery manufacturers.

While seed of the new buffel strain is in short supply, establishing stands in rows of 3 ft. 6 in.–4 ft. apart has the distinct advantage that low seeding rates can be used. One or two inter-row cultivations will greatly assist in establishing a pure stand and will increase productivity. Good stands may be obtained from plantings in 3 ft. 6 in. rows if 2-2½ lb. of seed is used per acre. Stands established in this way can readily be converted into swards later if desired.

Management.

Biloela strain buffel grass can withstand heavy grazing. In fact, it is essential that it be kept short, as palatability declines with age. Palatability tests were carried out on green panic, buffel grass and Rhodes grass pastures in conjunction with grazing trials. They were all eaten readily when grazed at a young stage. However, relative palatability rating estimated by the amount eaten at the more mature stage was the highest for green panic, less for buffel grass and lowest for Rhodes grass.

With regard to the buffel grass strains, higher palatability ratings were awarded to the fine-leafed Gayndah strain than to the Biloela strain when both were in the mature stage. On the other hand, the Biloela strain can stand heavier stocking rates. It is likely that pastures sown to this strain would need to be grazed for at least one week in every four during the flush growing period in order to maintain them in a desirable condition (Plate 2). Light grazing will result in stemmy stalks with short bunched leaf growth clustered around the nodes at the height of the previous grazing. Close intermittent grazing will encourage fresh shooting from the base. The numerous leaf buds formed on the subterranean stems give good protection from damage through overgrazing. The use of the mower is recommended to remove rank growth.

Seed Harvesting.

In general, buffel grass is easily established from seed. Seed harvested at the mature stage has usually a high germination percentage. However, tests have shown that better germination can be expected after the seed has been stored for several months. The effect of storage on seed germination was described in detail in the October 1954 issue of the *Queensland Agricultural Journal.*

Under favourable conditions buffel grass commences heading six to eight weeks after grazing or mowing. Occasional heading takes place even sooner. Seeding is continuous over a period of several weeks and it takes about 3-4 weeks from the commencement of heading until the primary seedheads mature. The mature seedheads of Biloela buffel are straw-coloured and can be stripped from the stems by pulling towards the tip. The mature heads are formed above the bulk of the leaves; this facilitates the collection of mature seed with a stripper provided attention is given to the correct height setting of the machine. The strain is a rather prolific seeder.

It is of considerable advantage that mature buffel grass seed does not shatter too readily and harvesting may be delayed until a large proportion of the seedheads mature. Until recently, the bulk of the commercial seed was harvested by hand collection. This slow and expensive way of harvesting has one advantage—that usually good quality seed is obtained. Obviously

only mechanical harvesting methods can fulfil the continuously increasing demand for seed.

Two different harvesting methods have been used in mechanical harvesting tests, and experience gained during previous and current trials with these basic methods can outline the way for the construction of further improved harvesting devices.

Stripping with the old-time wheat stripper (Plate 3) which is, in effect, similar to straight heading, gave satisfactory results. The stripped seed samples usually contain variable amounts of chaffed leaves, stalks and immature seedheads, according to the leafiness of the crop. By varying the height of the comb, stripping may be concentrated on the uppermost mature heads. The germination of stripped seed samples is generally lower than for hand harvested seed.

Another reasonably effective harvesting device consists of a fly gauze wire screen (6 ft. by 3 ft. is a convenient size) with a U-shaped galvanised iron trough (12 in. wide and 14 in. deep) fitted at the bottom of the screen (Plate 4). This is attached to the bumperbar of a truck. Driven through the crop at 8–10 m.p.h. mostly mature seed is harvested. The lower efficiency obtained with this method is compensated by the higher germination of the sample and several harvests are possible in the progressively maturing crop.

The results of seed (caryopsis) counts support the visual observations that more mature, fully developed seed is harvested with the screen than by stripping. Four samples harvested by the respective harvesting methods showed the following seed (caryopsis) contents:—

Per cent. Buffel Grass Seed.		
Stripper.		Screen.
38.0	.. .. ..	60.0
47.5	.. .. ..	58.0
16.0	.. .. ..	50.5
21.7	.. .. ..	44.0
30.8	Averages	53.1

Seed Cleaning.

With mechanical buffel grass seed harvesting consideration should be given to appropriate seed cleaning methods to produce marketable seed and to meet commercial demands. The bristly nature of the seeds makes cleaning with standard equipment a rather difficult undertaking.

Removal of the awns by singeing with a knapsack flame thrower and subsequent sieving gave considerably cleaner samples. This treatment did not interfere with germination and offers a means of cleaning raw samples. Nevertheless it carries a risk of fire when large quantities are treated.

The purity and germination analysis of singed and sieved samples is shown in comparison with untreated buffel grass:—

Sample.	Date of Harvest.	Purity Per Cent.	Inert Matter. Per Cent.	Weed Seed. Per Cent.	Germination.	
					Date.	Per Cent.
Singed and sieved ..	21–4–55	97·0	2·6	0·4	28–6–55	15
Untreated	21–4–55	79·5	15·0	5·5	28–6–55	13

Plate 4.

Seed Harvesting Screen in Row Cultivated Biloela Buffel Grass.

For treatment of large amounts of buffel grass seed hammer-milling can be used with certain advantages. The main purpose of hammer-milling mechanically harvested buffel grass seed is to remove the bristles and break up trash and chaff, &c. The effect of hammer-milling on seed viability has been investigated in some detail at the Biloela Regional Experiment Station.

By varying the speed of the hammer-mill the composition of the samples varies considerably. At low to moderate speed the trash and any seedheads still remaining are broken down to single seeds, and the awns are partially removed. A certain amount of dust and light particles is blown out of the sample. With an increase of milling speed it is possible to separate the caryopsis (seed) from its cover; in the bare state, this is suitable for recleaning by means of a standard seed grader. The recleaned sample of this bare seed is somewhat similar in appearance to clover seed, but in the hammering and cleaning process there is not only an enormous decrease in bulk from the fuzzy sample, but a loss in weight of approximately 80 per cent. Sowing of this seed therefore may be carried out by means of a combine or drill, the seed being sown through the lucerne drills at rates of ¼ to ½ lb. per acre—a suitable carrier such as sawdust or fertilizer being used if desired to increase the bulk.

The effect of hammer-milling seed at four different speeds from 450 to 750 r.p.m. was investigated and the effect on subsequent seed viability was studied. At the date of the first germination test, which took place approximately one month after harvesting and treatment, it was found that the germination of the treated seed for the most part was higher than that of the untreated seed. In

addition, the germination percentage rose with an increase in the speed of the hammer-mill up to 750 r.p.m. With speeds greater than this the seed was badly cracked.

Further germination tests four months after harvesting and treatment indicated a sudden increase in germination up to a very high level in all treatments except with the lowest speed, which showed a gradual increase from harvesting till planting time, similar to that of the untreated seed.

The final germination test six months later in February, at the usual planting time, showed a sudden decline in viability of seed treated at higher speeds, indicating that damage to the seed (caryopsis) had occurred during the storage period.

Both stripper and screen harvested seed showed the same trend indicated above. It seems that hammer-milling helped to break the primary dormancy of buffel grass seed by improving permeability of the seed coat and outer cover, thereby facilitating moisture absorption and rapid germination.

In view of the findings that germination of hammer-milled seed rapidly deteriorates during storage it is probable that hammer-milled bare seed once planted is more vulnerable to small showers which may not be sufficient for successful later growth. On the other hand, untreated seed will remain dormant until conditions are favourable for germination and further growth.

A logical suggestion seems to be that in order to get safe germination the seed should be stored as harvested, and just prior to planting be hammer-milled at a low speed, which leaves the seed in the glumes.

The planting time should be carefully selected. Satisfactory stands were obtained under favourable conditions with a planting rate as low as 4 oz. of hammer-milled recleaned seed per acre. Very good stands resulted when 10-14 oz. of seed were planted in rows 42 in. apart, using the lucerne box of the combine. It is an appreciable saving compared with the seeding rates of 2–2½ lb. per acre recommended for untreated seed.

Conclusions.

Buffel grass (*Cenchrus ciliaris*) (Biloela strain) has shown its suitability to climatic conditions experienced in the Callide Valley. In trials it has compared favourably with green panic (*Panicum maximum* var. *trichoglume*) under conditions which were eminently suited to that species, Rhodes grass (*Chloris gayana*) and Gayndah buffel grass, all of which are recognised pasture plants in the 26–30 in. rainfall area. It is hardier than green panic and Rhodes grass and endures dry weather and heavy grazing. The longevity of seasonal growth and superior recuperation after overgrazing also favour the Biloela strain of buffel grass. Its suitability as a grazing type has been proven while the erect growth form makes it also a convenient hay type.

The probable range of distribution is in the 28–30 in. or slightly lower rainfall areas. It is suggested that it be established as an alternative to green panic on the lighter textured soils where the limiting factor for the optimum performance of green panic is water supply.

It has to be remembered though that the Biloela strain is not a wonder pasture plant which will automatically solve our pasture problems. As with many introduced species and strains, the knowledge regarding the range of conditions under which it will thrive is still very meagre. It is also abundantly clear that the degree of success achieved depends, to a large extent, upon the management pastures of this species receive.

Elephant Grass

By A. HEGARTY, Agrostologist.

Elephant grass, or Napier grass as it is called in most countries, is a native of Africa. It is now commonly grown in various subtropical and tropical regions of the world, including South America, the southern States of America, West Indies, East Indies and Hawaii.

Elephant grass was introduced to Australia in 1914 and is now used to a limited extent for forage purposes in New South Wales and Queensland.

Plantings are usually confined to small areas for cutting, chaffing and feeding as chop-chop to poultry, cattle and horses. Limited areas have been recently used for grazing but correct management has been found important.

Description.

The common form of elephant grass is a perennial cane-like grass usually reaching a height of 7–8 ft., but occasionally growing much taller. It forms large tufts or stools which tiller very freely.

A large amount of palatable leaf is produced, and when the plant is grazed or cut at the correct stage, heavy yields of succulent feed result. If

Plate 1.

A Fine-stemmed Strain of Elephant Grass on Coomera River Flats, South-eastern Queensland. The grass is planted in rows 8 ft. apart, with paspalum between the rows.

Plate 2.

A Single Stool of Fine-stemmed Elephant Grass, Showing Habit of Growth and Production of Seedheads.

allowed to mature, however, the stems become coarse, dry and hard and are not readily eaten by stock.

A number of finer stemmed strains of elephant grass have been introduced to Queensland by the Commonwealth Plant Introduction Service, but generally these are not as productive as the common type at present being cultivated. Some of these finer stemmed strains may be useful for grazing despite their somewhat lower productivity.

The capacity of these leafy finer stemmed strains to produce ample feed has been demonstrated at Mackay, Bundaberg and Kairi Regional Experiment Station. Two of these strains produce somewhat thicker and more succulent stems and their foliage is more abundant than that of former introductions.

Climatic Requirements.

Though the tropical coast is the most suitable area for elephant grass it grows quite well in many sub-coastal areas and can be grown quite successfully in a large portion of eastern Queensland. Its growing period coincides with the summer rainy season and little development is made during the winter months or during dry periods in the summer.

The grass is very drought resistant, and quickly produces feed after the breaking of a dry spell. The foliage is injured by frosts, but the underground parts are not damaged seriously. Useful perennial growth has been obtained as far west as Miles, where cold dry winters are often experienced.

Soils.

Elephant grass will grow on a wide range of soils, but being a heavy producer it rapidly exhausts the plant foods available in poor soils, so attention must be paid to maintaining soil fertility.

Individual farm plantings are usually small, and even on soils of reasonable fertility excellent results can be obtained if the crop is fertilized with farmyard or poultry manure.

Deep loam or scrub soils will grow elephant grass to perfection. With the establishment of a vigorous rooting system in these deep soils the foundation is laid for useful drought resistance in later seasons.

Provided soil moisture is present, relatively infertile gully and roadside cuttings and embankments will support elephant grass to assist in erosion and bank control. The extensive fibrous rooting habit of this grass offers much promise as a soil-binding agent in areas subject to either wind or water erosion.

Planting.

Elephant grass readily sets seed under both northern and southern temperate conditions. The seed is light and fluffy and easily harvested. Propagation may be carried out by means of this seed, though the grass is usually established from cuttings or setts.

Plate 3.

Common or Coarse-stemmed Strain of Elephant Grass. This picture gives some indication of the height and fodder yield that can be expected from this grass under good growing conditions.

Plate 4.

A Single Stool of Fine-stemmed Elephant Grass Twelve Months Old.

Planting should take place during the summer on well prepared land. The stem-pieces used should be cut from hard stems about six months old, and each piece should possess four or five nodes. If the leaf sheaths are stripped from the nodes to expose the buds or eyes, establishment is hastened.

When planting material is abundant the stems can be cut into 3 ft. lengths and laid end to end in furrows.

When stem cuttings are used the furrows should be run out 3–4 in. deep, and the cuttings laid horizontally in the furrows and covered with soil. When crown divisions are broken up for planting, the pieces should be planted in hills about 2 ft. apart in the row. Row spacings of 4–8 ft. are frequently used.

After it has been planted the grass should be inter-row cultivated until it has become well established.

Management.

The areas of elephant grass grown on any one property are usually small, and to make best use of the bulk of grass produced, it is a normal practice to cut and chaff the material for stall feeding. With adequate moisture and fertility, regular cuttings can be made at monthly intervals throughout the main growing months.

Winter productivity is usually low and the plants should at least have some dormant period prior to the following summer cutting period.

If kept short at a level of approximately 12–24 in., elephant grass will

produce dense leafy growth from the stool. Mowing techniques can be employed to reduce the coarse stubble; however, extreme care is necessary to ensure that plant food reserves are not disturbed by frequent close mowing.

The leafy growth is very palatable to stock and in recent years in Hawaii extensive areas of elephant grass have been established for grazing. Here the grass is said to have proved its worth as a pasture grass when grazed intermittently.

Under Hawaiian conditions, one mature head of beef cattle per acre per annum can be fattened on the grass. In Hawaii also, some areas are fertilized with nitrogenous manures and irrigated, and then mechanically harvested with direct-cut forage harvesters to provide green roughage for dairy cattle. Heavy tonnages of green material are obtained with such modern practices.

Old stands of elephant grass are best treated as a crop, and handled in a similar manner to cane.

In the Mackay district old stands are ratooned by cutting away from the stools with a mouldboard plough and then, on the next round, throwing back the soil towards the rows. In young stands only one to two years old, the inter-rows are merely scuffled.

In both instances sulphate of ammonia is applied as a side-dressing at the rate of ½ cwt. per acre, and if not washed in by rain irrigation may be applied. Resultant growth from such renovation and fertilizing practices is quite spectacular.

Conservation.

Elephant grass is in some countries cut for silage, but the common form cultivated in Queensland appears to be too fibrous for this purpose. Where maize and sorghum can be grown, these crops are preferable for ensilage, whilst any surplus elephant grass could be left growing as a standover crop for cutting and feeding as chop-chop. Used in this way it can provide useful reserve fodder, but it is generally inferior to the more succulent cowcanes in this respect.

Feeding Value.

The feeding value of young leafy elephant grass compares very favourably with that of such annual grazing crops as Sudan grass. The high protein content available from young shoots shows that the grass has real possibilities for nutritious grazing, if properly managed.

As in all grass species, the nutritive value drops considerably as the grass approaches maturity. However, if cut before its heading stage, elephant grass has the capacity to provide large yields of high quality roughage for stock feeding.

The following table shows the chemical analysis of elephant grass at two different stages of growth, compared with that of a mature sample of Sudan grass.

Description of Sample.	Analysis of Water-free Material.				
	Crude Protein.	Crude Fat.	Crude Fibre.	Lime.	Phosphoric Acid.
	%	%	%	%	%
Elephant Grass—Young shoots ..	21·0	1·5	23·2	0·764	0·429
Elephant Grass—Shoots from 7 ft. stalks	7·0	0·7	44·1	0·197	0·081
Sudan Grass—Mature	6·2	0·8	37·1	0·4	0·7

Seed Production.

Under coastal conditions seed setting of elephant grass is quite common. Whilst this seed may be harvested for local requirements, no commercial harvesting for sale has so far been carried out in Queensland.

APPROVED STRAWBERRY PLANTING MATERIAL, 1957 SEASON.

The Department of Agriculture and Stock invites strawberry growers to nominate crops planted in 1957 as sources of Approved Planting Material for 1958. Nominated crops will be inspected regularly by Departmental officers and the names of growers whose crops are approved as sources of runners will be published in the *Queensland Agricultural Journal* and *Queensland Fruit and Vegetable News* early in 1958.

Nominations.

Any grower desirous of nominating a crop for inspection should submit the following information to the Department of Agriculture and Stock, William street, Brisbane, *not later than 1st May, 1957*:—(1) Name in full; (2) Address (details); (3) The area of the plot from which runners will be sold; (4) The source of the runners used for planting.

Conditions.

Growers who nominate crops for inspection must:—

(1.) Plant not less than 4,000 runners from a source approved by the Department in an area which is at least 5 chains from other strawberry plantings.

(2.) Keep the crop well cultivated and reasonably free from weeds until the runners are dug.

(3.) Apply such fertilizers, insecticides and fungicides as may be necessary to maintain vigorous growth in the crop, or as the inspecting officers may require.

(4.) Rogue out all virus-infected and off-type plants at intervals of not more than 2 weeks, or as directed.

(5.) Destroy not later than 30th November, 1957, all strawberry plants on the property other than those in the area nominated for approval.

(6.) Keep record of and supply such information on crop management as may be required by an inspecting officer.

(7.) Sell runners only from an approved area.

(8.) Furnish a list of all sales in excess of 500 runners not later than 30th April, 1958, to the Department of Agriculture and Stock.

(9.) Accept the standards set out below:—

(*a*) At the first inspection (winter), the crop must contain not more than 1 per cent. of virus-infected plants.

(*b*) At the time of subsequent inspections, the crop must contain not more than 0.2 per cent. of virus-infected plants and not more than 5 per cent. of plants with off-type characters.

(*c*) The crop must, in the opinion of the inspecting officer, be sufficiently well grown to ensure that planting material obtained from it will be of good quality.

(*d*) The crop must be free from all noxious weeds which are propagated by underground vegetative parts—for example, nut grass (*Cyperus rotundus*) and pink shamrock (*Oxalis martiana*).

The Department of Agriculture and Stock reserves the right to limit nominations to properties which can be effectively serviced by its staff.

The Control of Common Pests of Citrus in Inland Irrigated Orchards of Southern Queensland

By T. MANEFIELD, Entomologist.

Effective control of citrus pests depends primarily on four factors—a sound appreciation of the economic value of control measures; ready recognition of the different pests; the correct timing of the appropriate spray; and thoroughness of spray application.

The major pest in inland irrigated orchards of southern Queensland is red scale*, which, if left unchecked, can cause fruit blemish and severe tree damage. Other hard scales of importance are circular black and white louse, whilst mussel scale is encountered occasionally: these and the soft scales can be controlled by using the spraying programme as against red scale. Fruit blemish is also caused by Maori mite, and sooty mould resulting mainly from the presence of white wax, pink wax, and soft scales.

Fruit fly attacks can reduce crop yields severely and spectacularly during late autumn and spring. Other pests which may cause occasional trouble are larger-horned citrus bug, green vegetable bug, aphids, thrips, and citrus bud mite.

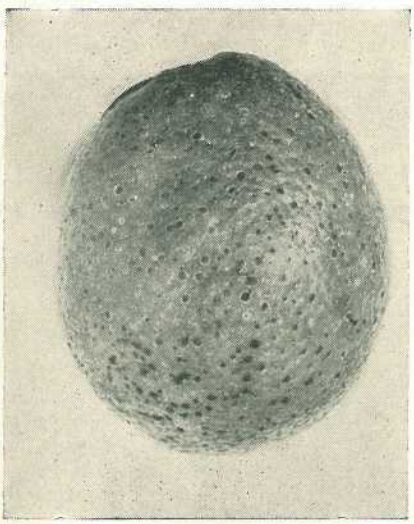

Plate 1.
Red Scale on An Orange.

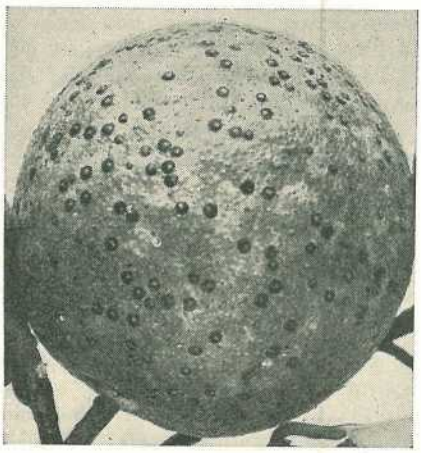

Plate 2.
Fruit Infested With Circular Black Scale.

*A list of scientific names of the pests referred to appears at the end of this article.

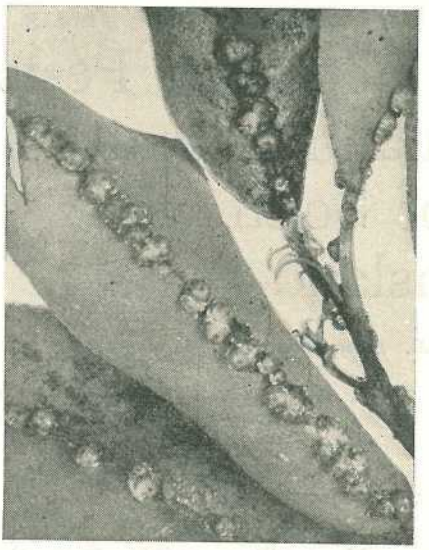

Plate 3.
Pink Wax Scale Infestation on Leaves.

In the Burnett district particularly, the aim is to produce fruit of special grade for the metropolitan, interstate and export markets, and the recommended spraying programme has been designed accordingly. Although this programme applies in principle to all inland areas, grower experience in districts other than the Burnett may allow modifications to suit local conditions and marketing. These will consist mainly in reducing the number of incidental controls.

Maori mite and its damage and sooty mould are the only causes of fruit blemish for which descriptions and comments may be required to supplement the illustrations.

The mite is yellowish, tapering to the posterior end, and hardly visible to the naked eye. Its feeding does not produce an immediate blemish, and may be unnoticed unless a careful watch is kept during the warmer months. The dusty appearance of fruit, sometimes called "gold-dust," is an early warning of mite attack and indicates that immediate spraying is necessary. Eventually, if mite feeding is allowed to continue, a dark-brown discoloration of the rind of the oranges and mandarins is produced, whilst on lemons it causes a silver-grey appearance, sometimes with surface cracking.

Sooty mould is composed of the massed threads of a number of fungi which are not parasitic on the plant but grow in the sugary secretion or honey-dew produced by some of the scale insects. When these are eliminated the mould dies, and is removed eventually by rain and wind.

SPRAYING PROGRAMME.

Midwinter.

A *lime sulphur* spray is essential in all districts for the control of white louse scale, citrus bud mite and Maori mite. A complete tree cover at a strength of 1:15 should be applied, preferably in July after the crop has been harvested. Particular attention should be paid to the wetting of the trunk and main limbs. If at this time fruit is still hanging (as for example with Late Valencias), the lime sulphur strength should be reduced to within the range of 1:20 to 1:25.

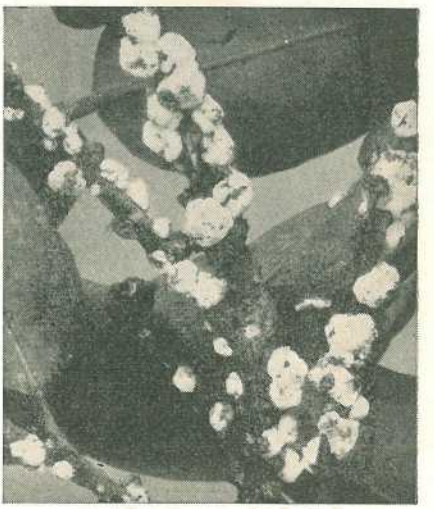

Plate 4.
White Wax Scale on a Citrus Branch.

Early November.

If Maori mite populations are evident, apply a *wettable sulphur* spray according to label directions. To avoid complications with oil spraying in December and January, the early detection of Maori mite is most desirable. (See Warning 1.)

Summer.

Scalicides (other than for Glen Retreat mandarin*).

Double Spray.—When red scale predominates, two white oil sprays at a strength of 1:60 should be used, starting during the first week of December with a fortnight between applications. If the scale population is mixed and the wax scales warrant control, an oil-soap-soda spray in the following proportions can be substituted for the first of these applications:—

Washing Soda (or Soda Ash 4½ lb.) ..	12 lb.
Soap	8 lb.
White Oil ..	1 gallon 5 pints
Water	100 gallons

Follow-up Single Spray.—For early varieties, a further *white oil* spray at a strength of 1:40 should be applied in late January or early February. For late varieties, this spray should be used during March-April.

Miticides.

A further *wettable sulphur* spray should be applied only when Maori mite is active. (See Warning 1.)

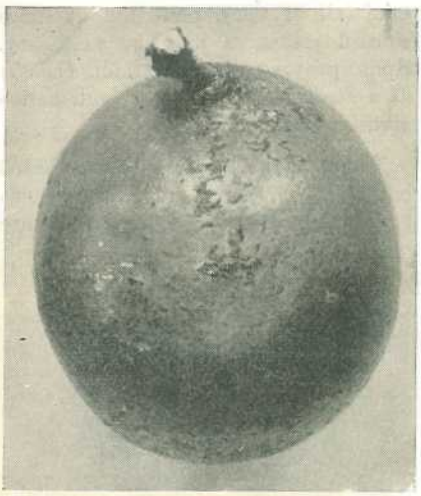

Plate 5.

Meyer Lemon Infested With Mussel Scale.

INCIDENTAL CONTROLS.

Fruit Fly.

An 0.2 per cent. DDT spray applied at fortnightly intervals during periods of fruit fly activity will give control of this pest in citrus. The spray should be aimed at the inner side of the tree canopy, using 1 gallon per tree on large trees. With the continued use of DDT, abnormal activities of mite and scale populations have been experienced by most growers. Strict attention therefore must be given to the routine spraying for the control of these pests.

Shield Bugs.

Usually applications of DDT to control fruit fly are sufficient to prevent appreciable damage by the larger-horned citrus bug. If, however, a heavy population build-up occurs, DDT at 0.2 per cent. should be applied

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* Glen Retreat mandarin, on which red scale is to some extent more readily controlled, may be damaged by heavy oil application. For the control of red scale on this variety, therefore, a single white oil—parathion (E605) combination spray (white oil 1:80: parathion 0.015 per cent. active) should be applied in early December and again in late January.

If white wax scale control is also required the general schedule should be used, but to minimise damage the white oil strengths must be reduced to 1:80.

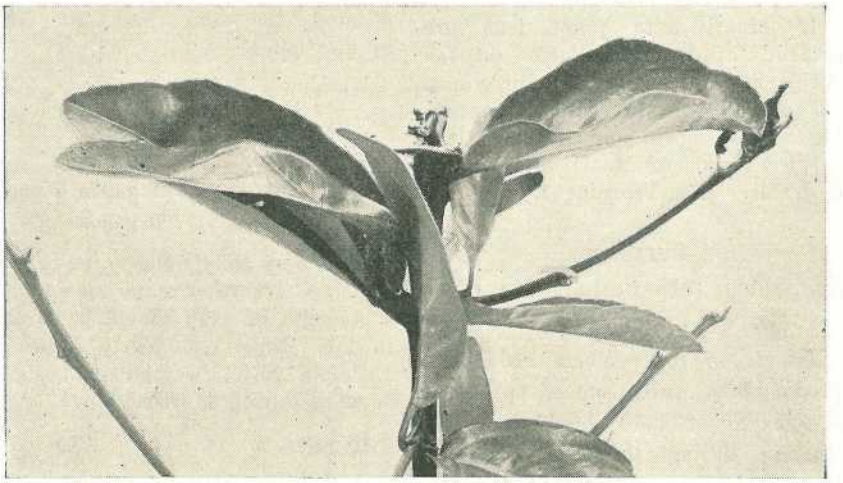


Plate 6.
Severe Citrus Bud Mite Damage.

when the bugs are in the nymphal stages. The green vegetable bug is also controlled by spraying with DDT.

Aphids and Thrips.

Aphid populations may increase rapidly and cause severe damage to flushes of new growth, particularly on young trees during spring. Predaceous ladybirds and their larvae often take toll of these pests but at times control measures may be necessary. Spot spraying with parathion (E605) at a strength of 0.01 per cent. active gives control.

Thrips control is rarely warranted but heavy populations in the blossoms may result in blemish to the mature

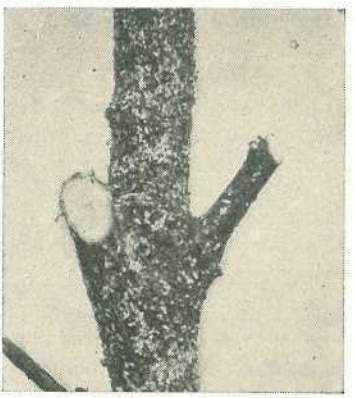


Plate 7.
White Louse on a Small Branch of a Citrus Tree.

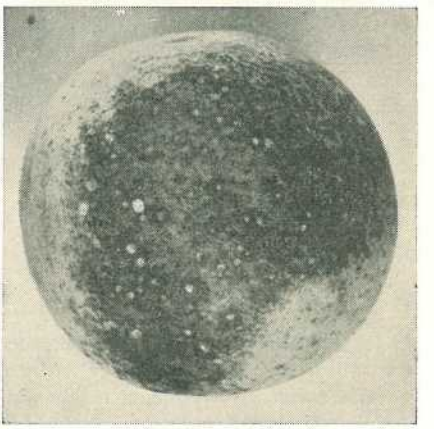


Plate 8.
An Orange Discoloured by Maori Mite.
Red scale is also present.

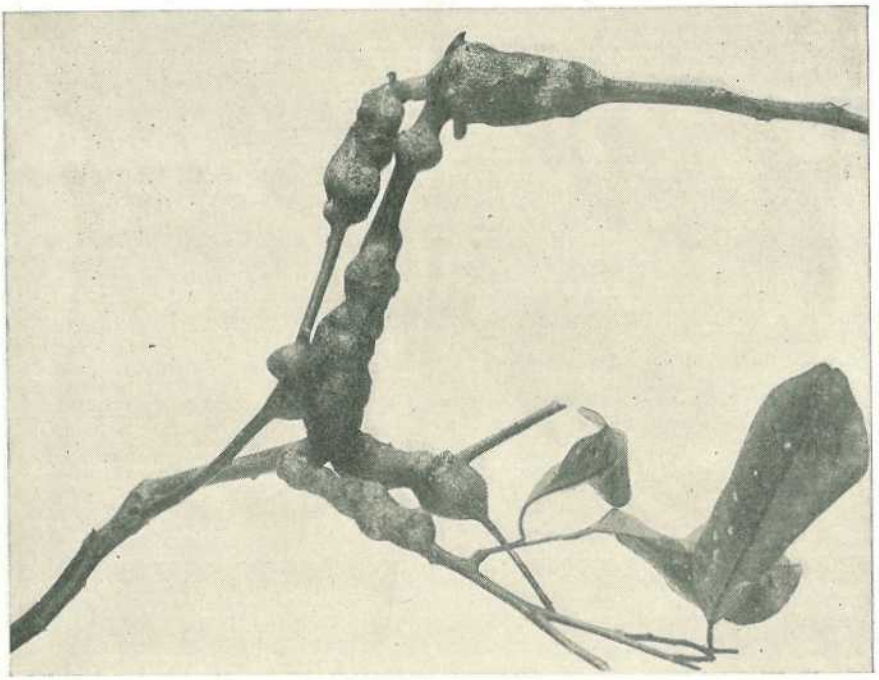


Plate 9.
Galls on a Citrus Twig.

fruit. Parathion spray (0.01 per cent. active) at ¾ petal fall satisfactorily kills these pests.

WARNINGS.

(1) To avoid fruit drop and other damage, applications of oil sprays and sulphur sprays must be separated by at least three weeks.

(2) Trees should be watered before spraying to minimise damage which can be caused to drought-affected trees by oil, soda and lime sulphur.

(3) When daily temperatures are persistently over 90 deg., sprays should be applied early in the morning, and operations should cease when the temperature rises above this reading.

Health Risk.

With any use of parathion (E605), full precautions must be taken. Spray operators should wear freshly laundered protective clothing daily and at all times avoid drift. Particular care must be taken when handling the concentrates.

CLEANING THE FRUIT.

Should it be necessary to remove sooty mould from fruit, this may be done efficiently in the packing shed by the use of one of the modern detergents. The fruit should be dipped in a 1 in 2,000 solution, brushed, and then allowed to dry well before being packed.

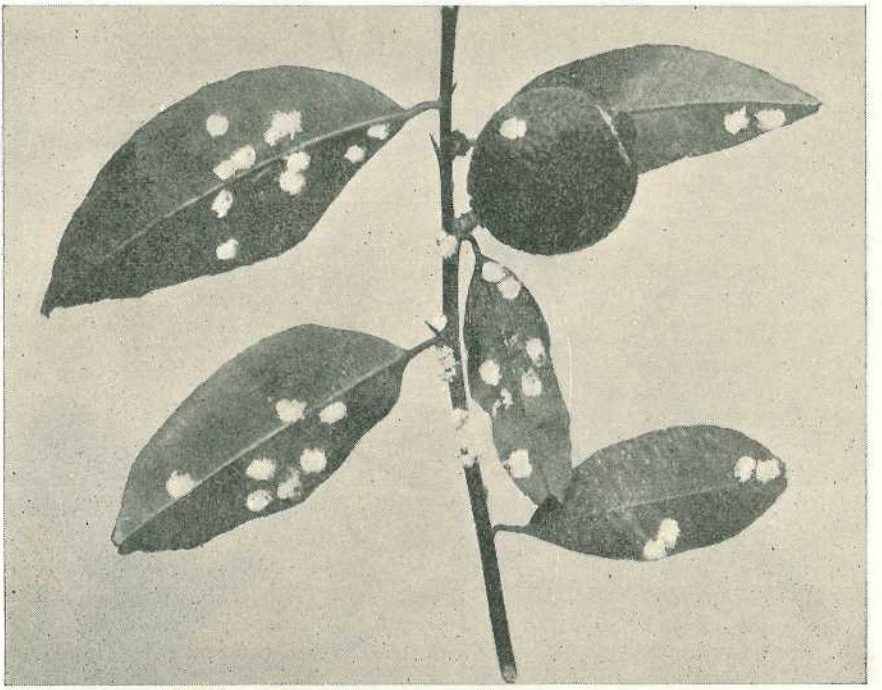


Plate 10.
Pulvinaria Scale.

Plate 11.
Fall of Grapefruit Caused by Fruitfly Attack.

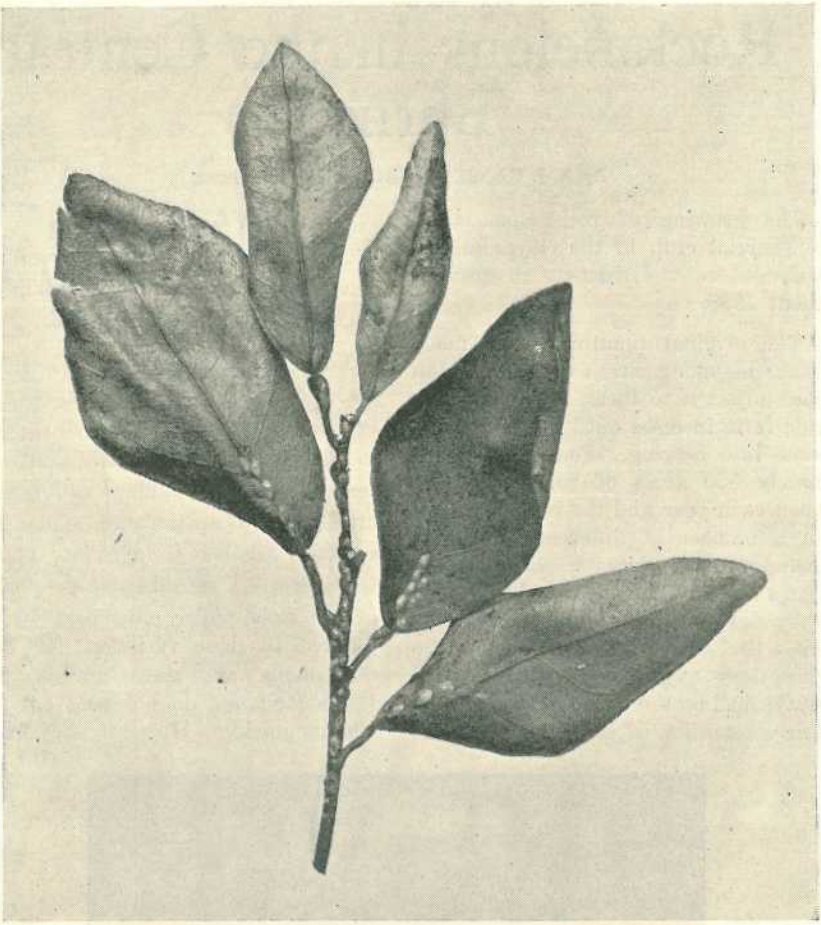


Plate 12.
Soft Brown Scale.

Scientific Names of Pests.

Circular black scale	*Chrysomphalus ficus* Ashm.
Citrus bud mite	*Aceria sheldoni* (Ewing)
Fruit fly	*Strumeta tryoni* (Frogg.)
Green vegetable bug	*Nezara viridula* F.
Larger-horned citrus bug	*Biprorulus bibax* Bred.
Maori mite	*Phyllocoptruta oleivora* (Ashm.)
Mussel scale	*Lepidosaphes beckii* (Newm.)
Pink wax scale	*Ceroplastes rubens* Mask.
Red scale	*Aonidiella aurantii* (Mask.)
Soft scales—	
Soft brown scale	*Coccus hesperidum* L.
Pulvinaria scale	*Pulvinaria cellulosa* Green.
White louse	*Unaspis citri* (Const.)
White wax scale	*Ceroplastes destructor* Newst.

Rockmelons in the Central Burnett

By A. J. CROCKER, Adviser in Horticulture.

The growing of rockmelons as a commercial crop in the Gayndah and Mundubbera districts commenced about 1938.

The original plantings were made either in young citrus orchards or on land adjacent to them, mainly to provide farm incomes until the fruit trees came into bearing. To-day, approximately 500 acres of rockmelons are sown each year and the crop is grown on a number of different soil types including red basaltic loams, clay loams and alluvial sandy loams. Very few rockmelons are grown without the aid of irrigation, the exceptions usually being those crops established on the clay loams which are fairly retentive of soil moisture.

VARIETIES.

The Australian consumer prefers a rockmelon with a well-netted skin and a good deep, salmon-pink flesh.

For several years, Hales Best has been deservedly popular but, recently, two new varieties have proved superior to Hales Best in both yield and resistance to downy mildew and equally attractive in appearance. The new varieties are Rio Gold (Plate 1) and Conqueror. A considerable proportion of the area under crop in 1956 was planted to these varieties. In both, the plants are more upright than Hales Best and do not send out runners as quickly. However, they finally

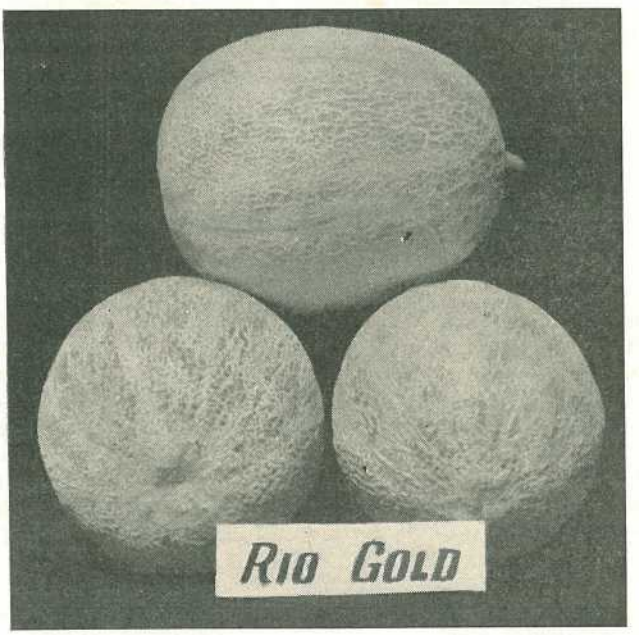


Plate 1.

Rio Gold, A Disease-Resistant Rockmelon of Excellent Quality.

cover the ground and produce a good crop of high quality fruit. Rio Gold has, however, a firmer fruit than Conqueror and therefore is less subject to wastage in the field and during transport to market.

PLANTING.

Land that is to be cropped with rockmelons should be ploughed and harrowed at least a month before sowing and finally cultivated to a seedbed tilth.

The seed is usually sown between late July and August. Row spacings vary according to the type of implements used by the grower from 4½ to 6 ft. The seed is dropped at 2–4 in. intervals along the drill by hand or machine planter and the young plants are later thinned out to 18 in. apart. From 1½ to 2 lb. of seed per acre is needed for this method of planting, but the relatively heavy sowing rate normally ensures a good strike.

The seed should only be covered by half an inch of soil; deep planting can be the cause of uneven germination.

FERTILIZING.

Farmyard manure may be used to advantage in the rockmelon crop; it should be distributed along the drills and worked into the ground a few weeks before planting. In addition, a complete 5:13:5 fertilizer mixture is applied at rates of up to 8 cwt. per acre prior to sowing the seed.

The fertilizer is placed beneath the seed. This can easily be done by opening the furrow with a mouldboard or ridging plough, distributing the fertilizer along the sides and bottom of the furrow at the rate of 6–8 lb. per chain and, finally, running a scuffler along the furrow. The rows are then clearly marked and the seed can be placed directly above the fertilizer.

A side dressing of fertilizer is applied in a band alongside the row when the vines commence to run. Sulphate of ammonia or a 10:8:7 complete mixture may be used at the rate of 2 cwt. per acre (about 2 lb. per chain row) just before the crop is irrigated.

CULTIVATION.

The land must be well cultivated when the plants are young. Soon after the seedlings break through the ground, the soil in the row should be chipped and the surplus plants removed by hand pulling.

Tine implements are preferred for inter-row cultivation. Once the vines commence to run, care must be taken to prevent injury to the plants from power implements. All cultivation should be shallow and just deep enough to destroy weeds; root injury caused by deep cultivation may give the crop a serious setback.

IRRIGATION.

If the maximum yield is to be obtained from the rockmelon crop, the vines must be well grown (Plate 2). An ample supply of water for irrigation is, therefore, essential, especially in the early stages of growth. In sandy loams, it is usual to apply about half an inch of water at each application. This is sufficient to keep the first 8 in. of soil damp. However, the amount of water required and the rate of application vary a great deal according to soil type.

Once the fruit commences to set, the water requirements of the vines increase until, as the crop approaches maturity, watering may be necessary every few days. A system of irrigation that applies water as quickly as it can enter the soil is best suited to the rockmelon crop; if the foliage is damp for long periods, downy mildew can become troublesome, even in resistant varieties such as Rio Gold.

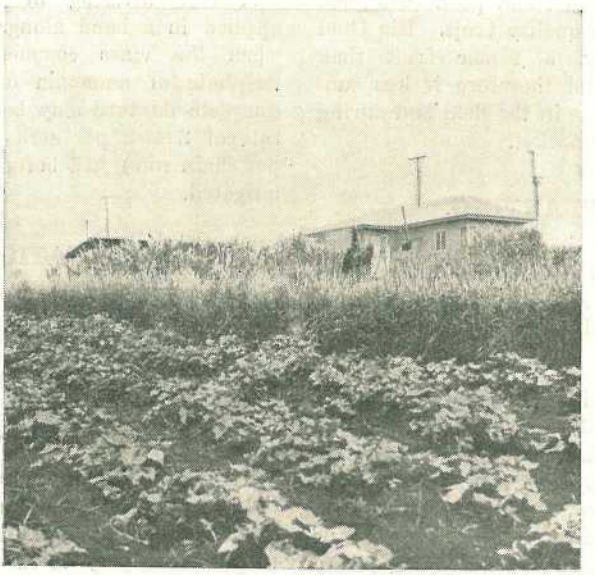


Plate 2.

Rockmelon Crop. In some districts windbreaks are used to protect the young plants.

HARVESTING.

When grown under good conditions, harvesting will begin about 12 weeks after planting.

The correct stage of fruit maturity for picking depends on the variety, climate and distance from market. Rockmelons must be left on the vine long enough to develop full flavour and yet be free from yellow external colour when picked for distant markets.

With practice, the correct stage of maturity can be determined by such indications as: (*a*) the surface of the netting becomes round; and (*b*) the skin colour between the netting changes from green to yellow. However, it is wise to cut a few melons at the commencement of each pick in order to re-check one's competence in assessing the right stage for harvesting.

The fruit is cut from the vine with secateurs or a sharp knife. Pulling the fruit is a bad practice as it not only damages the vine, but quite often leaves a cavity at the end of the melon where fruit rotting organisms develop. A sling or cradle built to carry a bushel case is a useful accessory during harvesting.

The fruit can be graded and packed in one operation on a bench which is large enough to hold six cases side by side. The field case is placed in the centre of the bench, the fruit taken from it being placed in one or other of the cases on either side according to its size. This method of grading and packing is quick and reduces bruising of the fruit.

Rockmelons packed without filling material travel quite satisfactorily provided the fruit is firmly bedded in the case.

Purebred Bulls Used in Dairy Herds

By S. E. PEGG, Chief Adviser, Herd Recording.

The use in dairy herds of purebred bulls with production backing as a means of increasing production has always been advocated by Field Officers of the Department of Agriculture and Stock.

For many years the yardstick of production backing of a bull has been the ability of his dam to qualify for entry into the Advanced Register of the appropriate Herd Book. To qualify for such an entry a cow must produce a certain standard of butterfat in a single lactation. The butterfat standard varies according to age.

In the rules governing Group Herd Recording there is one which requires members of Herd Recording Groups to obtain a bull from an Advanced Register cow within three years of commencing recording.

A survey of a number of Herd Recording Groups was made recently to ascertain how many farmers were using purebred bulls and how many of these bulls were from Advanced Register cows.

TABLE 1.

HERDS CLASSIFIED ACCORDING TO NUMBER OF YEARS RECORDED.

—	No. of Herds.
Herds recorded for 6 years or more	107
Herds recorded for 5 years ..	36
Herds recorded for 4 years ..	59
Herds recorded for 3 years ..	121
Herds recorded for 2 years ..	191
Herds recorded for less than 2 years	352
Total	866

Information was obtained regarding 866 farms. These farms have been divided according to the number of years the herd has been recorded. Details are given in Table 1.

It was found that registered purebred bulls were used in 79.2 per cent. of these herds. This was disappointing, as a greater percentage was expected.

It is realised that in some of the higher producing grade herds the cows are termed grade only because their ancestors were not registered in a Herd Book. Genetically, they compare favourably with many registered purebred herds. Owners of some of these herds have reared bulls from their high-producing cows for use in the herd with satisfactory results, and their action in so doing has much to commend it. Even allowing for such cases the use of grade bulls in only one-fifth of the herds is to be deplored.

The percentage of herds which have been recorded for various periods and in which registered purebred bulls are used is shown in Table 2.

It will be noted that the percentage of herds in which a purebred bull is used increased from 71.3 in herds recorded for less than two years to 89.7 in herds recorded for six years or more. It therefore appears that the owners of herds recorded continuously have realised the advantages of using a purebred bull to mate with their cows.

TABLE 2.

USE OF REGISTERED PUREBRED BULLS.

—	Herds Surveyed.	Herds in which a Purebred Bull is used.	Percentage in which a Purebred bull is used.
Herds recorded for 6 years or more	107	96	89·7
Herds recorded for 5 years	36	35	97·2
Herds recorded for 4 years	59	47	79·7
Herds recorded for 3 years	121	104	86·0
Herds recorded for 2 years	191	153	80·1
Herds recorded for less than 2 years ..	352	251	71·3
All Herds	866	686	79·2

BULLS FROM ADVANCED REGISTER COWS.

Perhaps the most disquieting feature of the survey is the low percentage of bulls from Advanced Register cows which are used. The survey revealed that only 52.8 per cent. of the purebred bulls were from such cows.

Details according to the periods for which herds have been recorded are shown in Table 3.

It will be noted that in herds which have been recorded for less than two years the percentage was 43.4, but in herds recorded for six years or more it was 71.9. This indicates that the owners of herds which are recorded continuously are more conscious of the advantages of purchasing bulls with production backing.

It must be realised that the selection of such bulls is limited by the number available. It is in this regard that stud breeders can play their part by recording their herds so that larger numbers of production-backed bulls are available to the commercial dairymen.

A survey of the value of continuous recording showed that the average production of the herds increased as the number of years of recording increased. It would appear that this is due to the greater use of production backed bulls in these herds as well as to improved farm practices.

When selecting a herd sire it is advisable to select him according to the production records of his dam, his sisters and his half-sisters. Of course, the ideal is to buy a proven bull, but where can one be obtained?

TABLE 3.

PERCENTAGE OF PUREBRED BULLS WHOSE DAMS ARE IN THE ADVANCED REGISTER.

—	No. in which Purebred bulls are used.	No. of Bulls from A.R. Dams.	Percentage of Bulls from A.R. Dams.
Herds recorded 6 years or more	96	69	71·9
Herds recorded 5 years	35	19	54·3
Herds recorded 4 years	47	29	61·7
Herds recorded 3 years	104	48	46·1
Herds recorded 2 years	153	88	57·5
Herds recorded less than 2 years	251	109	43·4
All Herds	686	362	52·8

If a proven bull is unavailable the son of a proven bull might be purchased. This advice is sound, but bull proving is in its infancy in this State and insufficient information is available about proven bulls. Therefore it is necessary to select bulls on the available production records of close female relatives.

BUT REMEMBER THAT WHEN EXAMINING PRODUCTION RECORDS IT IS NECESSARY TO CONSIDER THE CONDITIONS UNDER WHICH THEY WERE PRODUCED. If these conditions approximate those which prevail on your own farm and the production records are satisfactory, then it is likely that a bull selected from a suitable dam will be a big factor in breeding replacements with a high production potential for your herd.

QUEENSLAND BUSH BOOK CLUB.

Country men and women who are out of reach of any library and who would like a regular supply of books are invited to join the Bush Book Club. The books are supplied by friends and well-wishers in the city as a tribute from them to people in the country.

The Club charges a membership fee of 3s. 6d. a year and books are carried free to the nearest railway station. The books are sent out in parcels containing 10 books and some magazines and periodicals. Each parcel is planned to contain about three months' reading, but fast readers may always ask for more frequent exchanges if they wish.

To join, just write to the Bush Book Club, Victory Chambers, 249 Adelaide st., Brisbane, or, if you live north of St. Lawrence, to the northern Branch at Kellock's Building, Flinders st., Townsville. Give your name and address and the nearest railway station and enclose 3s. 6d. for the membership fee.

HANDBOOK OF CROP PESTS AND DISEASES.

The Department's comprehensive handbook entitled "Insect Pests and Diseases of Plants" is still available to Queensland primary producers at a concession price of ten shillings a copy. The full price is £1 per copy.

The handbook carries descriptions and illustrations of economic insects and plant disease organisms and information on control practices.

Order from Under Secretary, Department of Agriculture and Stock, Brisbane.

Cheese Packaging is Improving

By T. A. MORRIS, Dairy Technologist.

A general "prettying-up" of packaged cheese is taking place in Queensland.

It has been brought about by the growing practice of pre-packaging foodstuffs to meet the requirements of self-service stores and by the demands of housewives.

Cheese is, of course, attractive to consumers because of its nutritional value, but it sells better if attractively presented.

However, pre-packaging of cheese serves a much bigger purpose than merely attaining eye-appeal. It is possible to dispense with the rind, a source of waste which must have cost many thousands of pounds in past years.

The inedible rind on a 10 lb. loaf cheese can amount to as much as 1½ lb., or 15 per cent. of the total weight. Added to this loss is the shrinkage which occurs in cheese which is dressed in the conventional manner. The avoidance of these sources of waste is a matter of some importance to both producer and consumer.

A common argument against the buying of cheese has been that it stores badly. Drying out or moulding of the cheese has often meant that it has not kept as long as the consumer would have liked. The packaging of cheddar cheese in moisture-proof containers which exclude air and prevent mould growth for several weeks could do much to overcome this source of consumer resistance.

The fact that many cheese packaging materials can be printed in colour not only provides a means of further increasing the attractiveness of the package but also opens up an extensive field for advertising the considerable merits of cheese as a food.

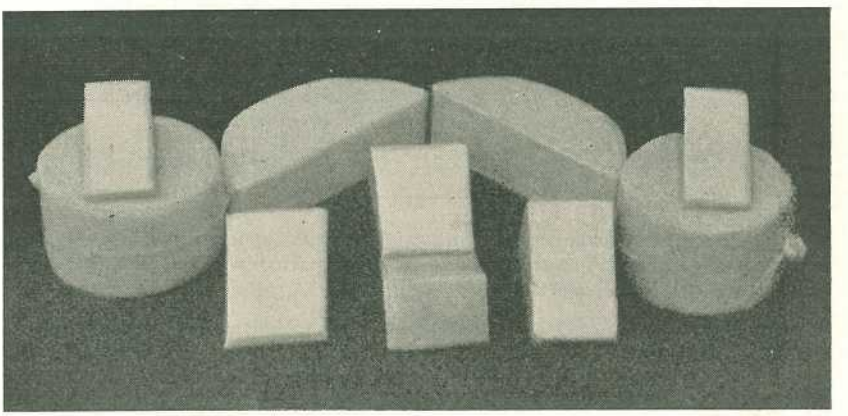


Plate 1.

Packaged Cheese. Wrapped wedges and half-moons of cheese and vacuum-packaged small loaves suitable for retailing.

Production of Rindless Cheese.

As previously mentioned, the production of rindless cheese and prepackaging go together. The cheese factory has therefore to adapt itself to the elimination of the use of conventional bandage and caps and the substitution of a calico type of cloth which serves as a multi-use bandage.

There are at least three methods of producing rindless cheese using the ordinary cylindrical, telescoping cheese hoops.

Probably the simplest method, but also the least satisfactory as far as finish is concerned, is to use a single square of calico press-cloth. The cloth is placed squarely over the hoop and then pushed in at the centre, the edges being turned back until the curd is placed in, when they are pulled tightly across the curd and tucked down the sides. A wooden follower block is used to eliminate the rim which would otherwise occur on the cheese and which makes the removal of the bandage difficult.

After a preliminary pressing the hoops are taken up and the cheese reversed in the hoop so that the rougher end—previously in contact with the folds of the press-cloth—is turned to the smoother section of the cloth. The ends of the cloth are again tucked in, the follower block replaced, and the hoops returned to the press.

After removal from the hoops the next morning the press-cloth is stripped off. Some trimming of one end of the cheese is usually necessary and the sides of the cheese may show indentations caused by wrinkling of the cloth.

Another method for producing rindless cheese is to use a rectangular press-cloth with circular calico caps. The press-cloth in this case is draped around the hoop in a similar manner to that in which an outer bandage is applied. A calico cap is placed in the bottom of the hoop and after filling the hoop with curd another cap is placed on the top.

After the usual initial pressing the hoops are taken up and the press-cloth is straightened and turned in. A follower block may or may not be used. If it is used, a rimless cheese is produced; this has some advantages over the rimmed cheese. However, the use of a block reduces the size of cheese obtainable from a particular hoop and some prefer to dispense with it. The rim formed may be trimmed off with a knife, although it does smooth away to some extent when the cheese is packaged and left standing.

The third method is similar to the second except that the press-cloth is in two pieces which slightly overlap. Such an arrangement for the most part eliminates wrinkles in the surface of the cheese.

It should be noted that in all instances of the repeated use of press-cloths considerable care in cleaning them between uses is necessary. After removal from the cheese they should be washed well in a warm detergent solution of moderate causticity, rinsed and then boiled for a few minutes. Strong caustic cleaning solutions, hypochlorite solution and boiling in a detergent solution should be avoided, as these will cause a rapid deterioration of the cloth.

Before being applied to the hoops the press-cloths should be soaked in a strong salt solution for 30 minutes. They are lightly rung out immediately before being applied to the hoops. It is a good practice to have two sets of press-cloths so that one set can be undergoing cleansing while the other is in use.

Rectangular Blocks of Cheese.

Because of the difficulty in wrapping the wedges or half-moons which have to be cut from the cylindrical loaf cheese (Plate 1), there has been a strong trend towards the production

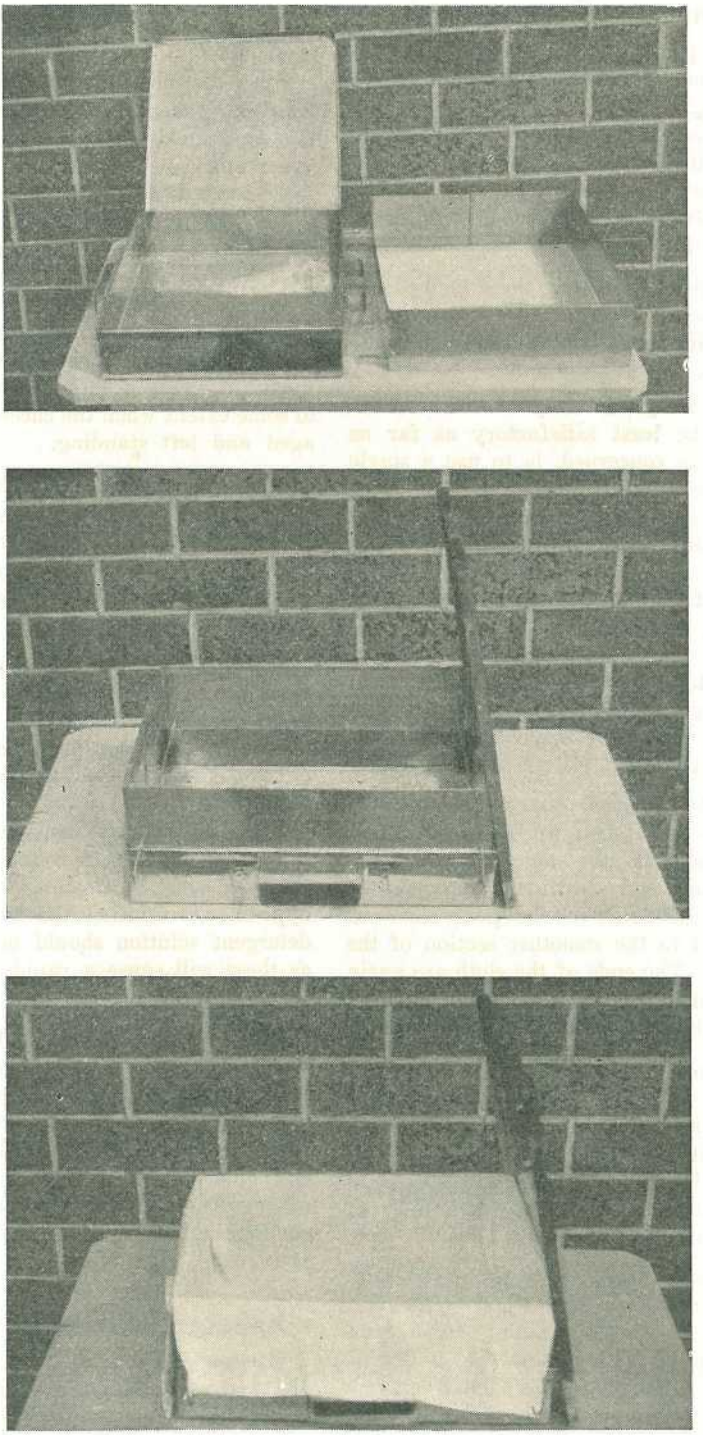


Plate 2.

A Rectangular Cheese Mould. Top, the unassembled pieces of the mould. Centre, the mould assembled and ready for dressing. Bottom, the dressed mould ready to receive curd.

of rectangular blocks of cheese associated with the spread of the use of flexible wrapping materials.

To produce cheese of this shape it is necessary to use rectangular cheese moulds. These are sometimes referred to as "Wilson" type hoops. They consist of three pieces in heavy gauge stainless steel, one piece comprising sides and bottom, another being a split sleeve and the third a lid. In addition, there are two long metal pins used to keep the sleeve in position while the hoop is being filled (Plate 2). Common capacities are 20 lb. and 40 lb.

The press-cloths used are either in two rectangular pieces or in one piece like a plus sign (+) with one long pair of arms. The hoops are filled with the press-cloth in position and with the sleeve extended on the pins. The cover is placed on after the curd has been evenly spread and the pins are removed when the hoops are lightly held in the press, before the actual pressure is applied.

After an initial pressing, the hoops are taken up and the cloth adjusted over the cheese. Pressing is then carried out until next morning, when the blocks of cheese are turned out and stripped of the press-cloths prior to packaging. The complete block may be packaged or it may be cut into a number of smaller rectangular blocks.

Methods of Packaging.

There is an ever-increasing number of cheese packaging materials becoming available and a number of ways of applying these materials.

Many of these materials, however, can be considered together under the heading of cheese wrappers, because they are used simply as a means of wrapping cheese. Such methods employ cellophane or similar material, and rubber hydrochloride, laminated aluminium foil, and polyethylene and polyvinyl chloride plastic films with various trade names. Some wrappers are prepared by coating such plastic films with a mixture of isobutylene, petroleum wax and polyethylene.

In addition to these wrappers, there are polyethylene and heat-shrinkable polyvinylidene chloride films which are applied as a vacuumised bag with mechanical or heat sealing.

Attempts are made in the manufacturing of these packaging materials to produce them resistant to the passage of moisture vapour, grease or oil, and oxygen, but at the same time permitting some passage of carbon dioxide evolved by the cheese. The loss of moisture from cheese results in an unpalatable dryness, while if moistness is maintained in the presence of oxygen and mould spores, mould growth soon causes spoilage.

The complete elimination of the passage of gases causes blowing of the package by carbon dioxide evolved in the normal process of maturing.

Cheese Wrappers.

Cheddar cheese may be matured in wrappers of various types and sold in the original wrapper, or it may be re-wrapped, probably after further cutting, prior to selling. The cheaper grade of cellophane, for example, is one wrapper intended for retail use where only a short "life" of the purchase is required.

Curing cheese in flexible wrappers has one main disadvantage which with some processes makes the work of wrapping somewhat tedious. This is the susceptibility to the development of mould growth. In order to overcome this it is frequently necessary to subject the cheese to pressure and heat during packaging. This causes close bonding of the wrapper around the cheese, and the elimination of air space prevents the germination of mould spores.

With some wrapping processes, such as that employed with the use of laminated aluminium foil, an airtight seal on the package itself is relied upon to prevent the development of mould growth.

When using such materials as rubber hydrochloride, the rindless blocks of cheese are wrapped in the material and placed in specially constructed pressure-pack boxes, which are held at about 80 deg. F. for one day or at about 70-75 deg. F. for two days. The boxes of cheese are then stacked in the normal curing room until matured sufficiently for sale.

With a wax-coated plastic film, the warm packaging is carried out by running hot water over the hoops containing the wrapped blocks of cheese in the press.

With the heat-sealing type of laminated aluminium foil, pressure packing is not carried out. After removal from the press-cloths the blocks of cheese are wrapped and completely sealed with a hot iron.

Vacuumised Plastic Packaging.

The development of plastic films which are capable of shrinking to about half the original size when heated has simplified the problem of packaging odd shapes of cheese. By using a bag made of the material and just large enough to contain the piece of cheese it is possible to heat-shrink the bag to almost the same shape as the cheese.

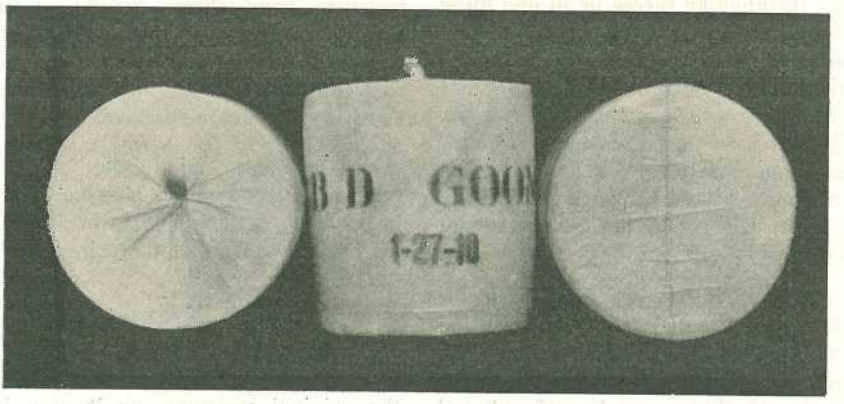


Plate 3.

Vacuum-packaged Cheese. Three 10 lb. loaf cheddar cheese shown immediately after packaging.

Rindless cheese or freshly cut pieces are placed in plastic bags, which are then attached to a vacuumising machine to withdraw the air from the package. This is then sealed by a metal clip or by a heat-sealing device. On being dipped into water at a temperature of 200-205 deg. F., the plastic shrinks closely to the contours of the cheese. In this manner any shape of cheese can be given an attractive close-fitting package (Plate 3).

The Occurrence and Control of Worm Parasites of Sheep in Queensland

Prepared by Dr. G. R. MOULE, Director of Sheep Husbandry, in collaboration with officers of the C.S.I.R.O. McMaster Laboratory and the Department of Agriculture and Stock and Woolgrowers in Queensland.

(*Continued from page 90 of the February issue.*)

OTHER METHODS OF CONTROL.

An attack against worm parasites should be concentrated along three main lines:—

(1) Killing the worms in the sheep by drenching.

(2) Killing the eggs and larvae on the ground by allowing sunlight, dryness, and cold to destroy them while the area is spelled from sheep.

(3) Maintaining the general health and resistance of sheep by means of adequate nutrition.

Why Outbreaks Occur.

In the better rainfall areas practically all sheep harbour worms, yet severe outbreaks of parasitism are relatively uncommon. This depends on the number of worms present and the damage they cause. Every worm in a sheep is picked up as a larva on the pasture; every larva comes from an egg laid by a worm in a sheep. For their development and survival on the ground, eggs and larvae must have warmth, moisture, and shelter. Several wet days accompanied by cloudy and humid conditions are necessary. Under very favourable conditions eggs and larvae may live on the ground for many months, but under average conditions a very high proportion of them die off within three or four weeks.

Spelling and Rotational Grazing.

If sheep are drenched and returned to the same paddock they will pick up larval worms as soon as they begin to graze, and in a few weeks may be just as heavily infested as before drenching. A system of rotational grazing provides spelled paddocks at all times.

Spelling a paddock for three to four weeks results in the death of most of the worm larvae and this very greatly reduces the risk of heavy infestation when sheep are again placed in it. Spelling also permits pasture growth and provides better nutritional conditions. Adequate nutrition builds up and maintains the sheep's resistance to worms.

Rotational grazing and spelling can be combined conveniently. If there are two paddocks of about equal size, carrying approximately the same number of sheep, run all the sheep in one paddock for three to four weeks, then transfer them all to the other paddock, which has been spelled meanwhile. Repeat this rotation and spelling.

An even more intensive system can be used under suitable conditions. A four-paddock unit can be used and each paddock stocked in turn for seven days with all the sheep which formerly ran over the whole area of the four paddocks. Each paddock is thus stocked for seven days and spelled for 21 days. In general, a period of about seven days is necessary for the eggs passed in droppings to develop sufficiently to infect sheep. By moving sheep every seven days the sheep are ahead of the worms and this together with the 21-day spell should still further reduce the chances of reinfestation.

Rate of Stocking.

Reduction of stocking aids the control of worms by reducing soiling of pastures and making more feed available. Many graziers have found that reducing sheep numbers has not resulted in a lower wool cheque but in an actual increase in wool and monetary returns. If you cannot decrease the stocking rate for the whole property, reduce the number of breeders and young sheep, or else give them more room.

Protecting Young Sheep.

Weaners are most susceptible to worms, and they are often crowded at a relatively high rate of stocking because they are small sheep. Their demands for certain food materials are greater than those for grown sheep —weaners are expected to grow as well as to produce wool, whereas the grown sheep has only to maintain itself and produce wool. Always provide your weaners with adequate feed. The weaner population of a paddock should be kept low. This can be achieved by "cross-weaning" or weaning into a wether mob. If a property is "sheep-to-the-acre" country, aim to have half a weaner and half a grown sheep per acre rather than one weaner per acre. Grown sheep resist worms and do not contaminate the pastures so heavily. Moreover, they probably destroy many of the larvae they pick up with their feed, whereas the same larvae eaten by a weaner, which is not resistant, will develop into adult worms.

Adequate Nutrition.

Adequate nutritious feed is of very great value in the control of worms. A well-fed sheep develops and maintains resistance to worms. Grazing crops, improved pastures, spelled pastures, rotational grazing, and conserved feed are all means of maintaining adequate nutrition, and they all diminish the need for drenching.

CONTROL OF THE NODULE WORM.

Special consideration is given to the nodule worm because of its importance as a cause of economic loss to the sheep and wool industry and because of special difficulties in devising methods of control.

After having been picked up from the grass by the grazing sheep, the larval stage of the nodule worm burrows into the wall of both the small and the large bowel. Generally, a nodule like a small abscess develops, and once formed it remains in the bowel throughout the life of the sheep. The number of nodules is increased every year, with the result that more and more of the bowel is affected. In a number of sheep the amount of damage due to nodules is sufficient to interfere with the functions of the bowel. Many sheep properties where nodule worm occurs carry uneconomical animals because of this damage.

It is clear that complete control of this parasite will be a matter of several years, for it will not be reduced to negligible importance until all sheep having nodule damage to the bowel are disposed of and replacements have been raised under a control plan.

Control is a matter of killing the adult worms in the large bowel by drenching with phenothiazine at certain times, based on knowledge of the life history of the parasite, and of the effects of weather and seasonal conditions on its yearly cycle.

The eggs and larvae of the nodule worm on the ground will develop only when there is ample warmth and moisture. Dryness and cold are fatal. The sheep pick up the infective larvae following periods of wet weather during the warmer months of the year, chiefly September to May. The larvae enter the bowel wall and may remain there for a few days, weeks, or even months before returning into the bowel to complete development to adult worms and begin laying eggs to carry on the life cycle. Larvae in nodules in the bowel wall cannot be killed by drenching. Drenching must therefore be repeated in order to kill the adult worms developing from successive

batches of larvae leaving the bowel wall.

The onset of cold weather in May and June largely prevents further development of eggs and larvae on the ground, with the result that very little fresh infestation is picked up by the sheep after the end of May. By the end of August most of the larvae will have completed their sojourn in the bowel wall and will have returned to the large intestine.

With the onset of warmer weather in September the eggs laid by the female worms will be able to develop on the ground and thereby begin the new seasonal cycle of the parasite. Drenching late in August therefore has two objectives—firstly, to obtain a maximum destruction of adult worms at a period when there is likely to be a minimum number of larval stages in the bowel wall; and secondly, to kill the worms before they have a chance to contaminate the spring pastures.

The August treatment of ewes that are to lamb in late spring is essential if the lambs are to be protected. Similarly in North Queensland the treatment of breeding ewes and their lambs is essential in districts where nodule worm occurs.

Although the nodule worm is picked up during the warmer months, it produces its most serious ill-effects during the winter due to the damage caused by the young worms in the bowel wall and the injury caused by the adult worms.

Malnutrition in the winter is aggravated by infestation with nodule worms. A very important aspect of control of this parasite is the provision of adequate feed during the winter. A green grazing crop is particularly useful.

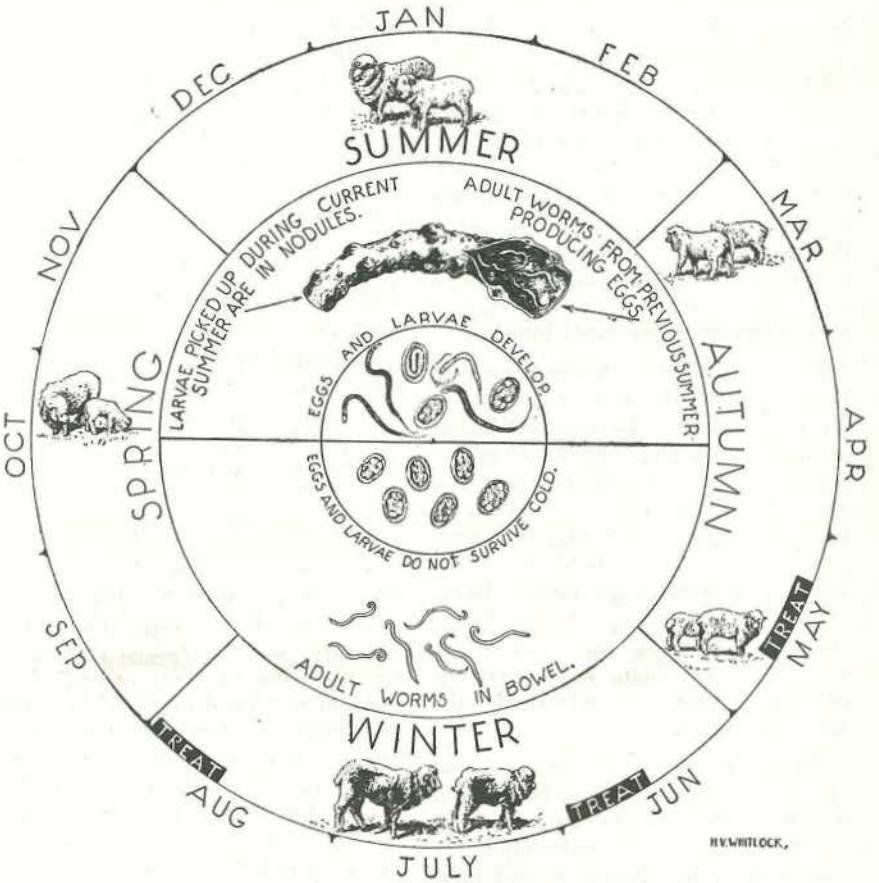
A plan of control should be based on the use of an efficient drench applied at the appropriate times, having due regard to the seasonal cycle of the parasite (Plate 5). Phenothiazine is the only drench possessing a high degree of efficiency against the nodule worm. The times for drenching are mentioned above. The late autumn treatment will remove adult worms already present in the large bowel and will thereby provide the sheep with a better start for the winter. The midwinter drench is necessary in districts where nodule worms are causing severe ill-effects. The special importance of the late August drench has been discussed already.

Regular treatments along these lines will, after two or three years, go far towards reducing the nodule worm to harmless levels. The control programme can be hastened and made more effective by adopting certain changes in management.

The more important procedures are: (1) provision of green grazing crops to supplement winter feed (grazing oats is especially good); (2) the adoption of a system of spelling and rotational grazing. Following the three key drenchings the treated sheep can be moved into paddocks that have been spelled from sheep for a month. Horses and cattle, which do not harbour the sheep nodule worm, can remain in such paddocks while being spelled from sheep.

CONSIDERATIONS OF HUSBANDRY.

(1) Stocking influences the occurrence of worm infestation in many ways. Overstocking results in heavy contamination of pastures with worm eggs and eventually leads to malnutrition from eating-out of the best feed. Overcrowding also leads to heavy contamination of pastures with eggs though feed may remain adequate (for example, leaving large numbers of sheep on an improved pasture for a long period). Overstocking may be local or general in a paddock or on a property. Local effects are seen where sheep persistently regraze the same areas and neglect the rest of the paddock. The overgrazed areas soon become heavily contaminated with worm eggs and are "danger



CONTROL OF NODULE WORM

Plate 5.

areas" for infestation of sheep grazing over them.

Overstocking or overcrowding, whether local or general, is an indication for drenching—and even more important, for reduction of stocking and spelling of areas. The dangers of local overgrazing are often overlooked.

(2) Inadequate feed reduces the resistance of sheep to worms. In addition, when feed is scarce sheep have to spend more time in grazing and have to graze closer to the ground. The chances of sheep picking up large numbers of worm larvae are thereby increased. During any period when malnutrition is evident, drenching, particularly of young sheep and breeders, should be carried out.

(3) Young sheep and very old sheep are specially susceptible to worms. Breeding ewes also suffer severely. Young sheep require regular drenching to protect them against worm infestation. Breeders should be treated before lambing in order to keep them as free from worms as possible while they have lambs at foot.

ACKNOWLEDGMENTS.

In preparing this article, information published by Mr. H. McL. Gordon in the *Queensland Agricultural Journal* for July, 1948, in an article entitled "Control of Worm Parasites of Sheep," has been drawn upon freely.

Overfat Pigs Can be Avoided

By T. ABELL, Senior Adviser, Pig Branch.

The pig industry in Queensland today is past the stage when pig keeping was simply a convenient method of disposing of otherwise useless farm residues, though many pigs are still reared with that object in view.

The higher prices now being received for pigs, together with the considerable increase in the values of various farm residues, demand that pig raising be placed on an equal business footing with other types of farming. Under present-day conditions, should it be necessary to purchase feedstuffs for pigs, it becomes a matter of stern economical necessity to obtain the maximum possible returns in the form of pork or bacon.

Any factor which reduces the ultimate net return should be eliminated.

Higher prices of human foodstuffs tend to increase the demand by consumers for quality, and this is a most important consideration in the local and export pork and bacon markets today. Though supplies of pork, bacon and ham are below those of a few years ago, consumers are, because of the higher prices, disposed to seek out the good quality products, thus making it more difficult to place overfat pork and bacon.

Therefore, to assist in maintaining a high return for their pigs, farmers should make every endeavour to produce stock which will meet consumers' requirements.

In Australia today the overfat pig is unwanted by both the processor and the consumer, and though it is not generally realised is responsible for lowered returns to the producer.

The producer loses by receiving a lower price when pigs are sold at auction or paid on a weight and grade basis, by waste of feed used to grow the extra fat, by waste of time and energy spent in feeding the pigs too long, and by carrying fewer pigs than might otherwise be practicable.

The processor pays meat price for fat, and has difficulty in marketing overfat products, which often require additional handling before sales can be made. Handling and storage charges are thus increased.

The percentage of overfat pigs being marketed at present is the cause of much concern to all sides of the industry, and particularly as it is more profitable to rear fast growing pigs of the correct type, it is urgent that all pig raisers give serious thought to eliminating the overfat pig. It is not an expensive matter or a difficult problem if approached correctly, but the remedy lies chiefly in the hands of farmers themselves.

The pig raiser should go through his piggery and conduct a searching inquiry along the lines set out below. By so doing he can improve his standard of efficiency, increase his returns and at the same time do much to eliminate complaints from processors and consumers.

Are the Breeding Stock Suitable?

Whether the breeding stock is bred on the farm or purchased as weaners or stores, the answer to this question is of major importance. Poor type breeders are a major cause of overfat pigs, both porkers and baconers, in Queensland.

The first decision to make is whether to produce porkers or baconers; breeding stock should then be selected accordingly. This applies whether a farmer breeds weaners or stores or carries his pigs through to market.

It is useless trying to produce quality baconers from porker type pigs and *vice versa*, and this should be borne in mind when selecting breeders. Therefore, pigs of long, lean, late-maturing types should be used for producing baconers, and breeders of an early maturing type to produce porkers.

It is most important to remember that *type is more important than breed*, as off-types of any breed will not give the results that correct type pigs will.

Over-use of crossbreeding is to be avoided, as it results in uneven litters that do not develop uniformly. This makes it difficult to avoid finishing with some overfat pigs.

Is the Feeding Correct?

Next in importance to suitability of type is correct feeding. Each year thousands of pigs are marketed in an overfat condition simply because they were not fed correctly. Even pigs of correct type can be made overfat by bad feeding.

At birth the pig has a relatively large head, long legs and small body with little loin or fat. The head makes most of its growth early in life and attains its maximum size while other parts of the body are still growing

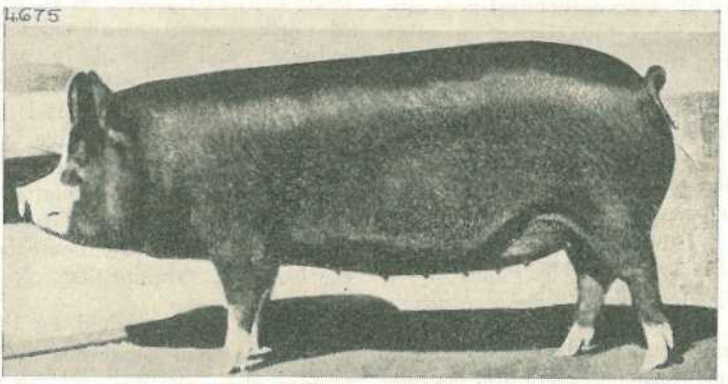


Plate 1.
A Baconer Pig of the Correct Type.

Whatever breed or cross is used, it is desirable to see the parents of stock under consideration as breeders, for if the desired characters are present in them as well as in their offspring it heightens the prospect of those characters appearing in the next generation. If possible, it is useful also to sight near relatives at a stage when their weight is about that at which it is intended to market the pigs that are bred.

actively. The limbs also make most of their growth early in life, but the body itself, and particularly the region of the loin, grows slowly and is much later in maturing.

Apart from these differences in rate of growth of parts of the body, it has to be remembered that bone develops faster than muscle (lean) and fat is slower in developing than either.

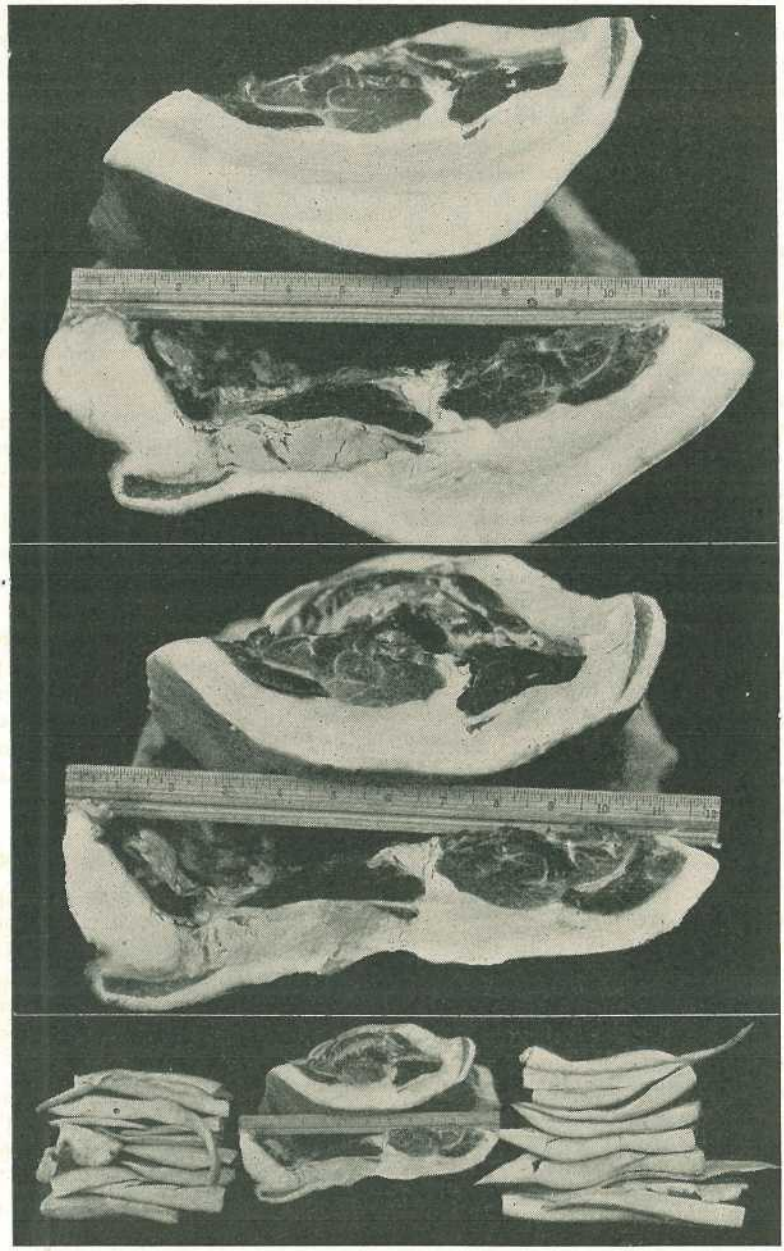


Plate 2.

Loss Due to Overfatness. Top, trade cut dividing the side into ham and flitch, showing excessive backfat extending down the side. Centre, the same side defatted to trade requirements. Bottom, the excess fat (14 lb.) cut from the overfat side.

Young animals are furnished with more bone and muscle and less fat than are older animals. It is not surprising, therefore, that feeding pigs well when young causes an increase in length of body and that restricting the food intake towards the end of the growing period reduces the amount of fat in the body and so assists materially in producing good bacon pigs.

On the other hand, if young pigs are underfed early in life and overfed later, they finish up as short and overfat and moreover consume more food before reaching bacon weight.

Feeding of the in-pig sow during the later stages of pregnancy influences the birth weight of the litter. Piglets developing in the womb make most rapid growth during the few weeks prior to birth, so it is important that the food intake of the sow be stepped up at that time.

Quality of carcase fat is as important as quantity and this factor is also influenced by feeding.

Consumers object to bacon and ham on which the fat is oily and melts at ordinary temperatures. These low melting point fats also tend to become rancid much sooner than fat with a high melting point. Bacon and ham of this type are difficult to sell, so carcases showing oily fat may be graded down.

The two main pig foods used in Queensland which produce oily fat if incorrectly used are peanuts and maize. Therefore, to avoid marketing carcases with soft oily fat, pig raisers should not feed peanuts to their pigs for at least six weeks prior to slaughter. Maize should be fed only in moderate amounts during this "finishing" period.

Is the Piggery Management Sound?

Results to be expected from the use of good stock and sound feeding practices can be upset by faulty management. Pigs should be managed so that they are given every opportunity to grow to the limit of their inherited capacity and any management practice which prevents such growth should if at all possible be eliminated.

Care should be taken to ensure that each pig has room to feed, and that no sudden changes are made in the ration. Grading of pigs into lots of approximately the same size is very important. It allows each pig to get an equal opportunity at feeding time, especially if ample trough space is provided.

Mating should be arranged to fit in with seasonal feed supplies unless provision is made for storage or purchase of some feed.

Early castration (at 3–4 weeks) and creep feeding help to produce big weaners.

Paddocks should be spelled in rotation and the management of the piggery generally should aim at regular growth in stock and guard against periods of feed scarcity that bring slower growth and subsequent tendency to overfatness.

When Are the Pigs Marketed?

The marketing of pigs at a predetermined weight or age is another common cause of overfat pigs. Only when stock and conditions are standardised can this be safely attempted. Many factors can create poor results with such a policy.

For instance, pigs of an early-maturing type which are "finished" at 120 lb. are often carried on to 160 lb. to secure a higher gross price. Such pigs almost invariably dress out overfat.

Checks in growth during the growing period will upset the average weight at a set age, and tend to produce overfat pigs, especially in the higher weight ranges.

Where mixed types are used as breeders more trouble can be expected

than with a uniform line of breeders, owing to the greater variation in growth between pigs in any one litter.

As pointed out earlier, pigs go through two main stages of development, and it is during the latter stage, when the pig has the required amount of finish, that it should be marketed, *irrespective of weight and age.*

Is the Piggery Accommodation Satisfactory?

As with faulty management, poor accommodation can undo the good established by sound feeding of pigs of correct type.

Whether an intensive or a grazing type piggery is concerned, there are certain essentials which must be provided to ensure health and growth in the stock. Protection from heat, cold, and wet should be available to the pigs and a reasonable standard of hygiene maintained. If these things are not provided, maximum growth cannot be expected, and more feed and time are required to rear the pigs. Conditions are also created which allow factors mentioned earlier to operate, thus making it difficult to avoid producing overfat pigs.

Are Seasonal Feed Supplies Used Correctly?

The seasonal nature of the supply of many foodstuffs gives rise to many overfat pigs. During seasonal feed shortages it is too often noticed that pig raisers increase the ration to older pigs at the expense of younger ones in an endeavour to get the former to the factory as soon as possible. This is an ill-advised and wasteful process.

Stepping up the food intake of the older pigs can have only one result—overfatness. This is especially so if they have been on short rations previously and suffered a check in growth.

On the other hand, the small pigs which have been given a reduced ration will have their growth checked and when they are put back on full feed will tend to develop fat instead of bone and muscle.

If the food supply is decreasing, there are three courses to follow to gain the maximum results from the pigs on hand:—

(1) Purchase food so that all pigs have an adequate ration. If this is done, a greater proportion of the more concentrated foods is best fed to the younger pigs and a greater proportion of the bulky foods to the older ones. The ration, of course, must still be balanced, but the bigger pigs can handle bulky food better.

(2) If a satisfactory market can be found, sell some young or store pigs.

(3) Sell any pigs of factory weight and grade as soon as possible, even though they may be lighter than usual.

If (2) or (3) cannot be arranged, it is cheaper in the end to purchase food and finish all pigs rather than try to keep underfed stock.

The practice of taking pigs on to heavier weights than normal during periods of over-supply of feed is responsible for the production of many overfat pigs. In addition, returns are lower than they are if the pigs are marketed as soon as they are finished and the surplus food given to other pigs coming on in their place.

If it is necessary to purchase pigs during these periods in order to use the feed to best advantage, the economics of the matter require special consideration, but in general it can be stated to be a sound practice. A piggery should be stocked according to the average food supply available, and adjustments of feed or stock made in ample time to take care of fluctuations.

Are the Pigs Healthy and Vigorous ?

Healthy, vigorous pigs will naturally make much better use of available food supplies than weaklings or sick pigs. Pigs that have recovered from sickness often fail to grow satisfactorily, and there is a similar result to that arising from underfeeding when small—namely, a tendency to run to fat quickly.

Pigs that are infested with worms make only slow progress at a time when they should be growing rapidly and so the end result is the same as with pigs recovering from sickness.

Thus disease in the piggery leads to slower growth, greater food requirements per pound of liveweight gain, greater production costs, and a tendency to produce overfat pigs.

Services Available to Pig Raisers.

The Department of Agriculture and Stock has Advisers in Pig Raising located in the principal pig raising areas of the State. These officers make inspections of piggeries with a view to determining the factors which cause trouble and advising on their elimination. In addition, they make inspections of pigs at slaughter and report back to pig raisers on the quality and grading of their pigs.

From time to time the Department co-operates with various organisations in conducting carcase competitions. By taking part in these competitions pig raisers can obtain a detailed and expert appraisal of their product as well as a comparison with that of other pig raisers. This gives valuable information on the quality of one's pigs and indicates what changes are required in management and marketing practices.

In North Queensland during the year 1944-45 only 48.6 per cent. of all pigs handled by the Northern Pig Marketing Board were classed as first grade; in 1950-51, with over 1,000 more pigs handled, the percentage of first grade pigs was 85.7. This great improvement was due mainly to an arrangement whereby whenever pigs are received in an overfat condition, the pig raiser concerned is advised accordingly and encouraged to rectify the fault in the next consignment. A visit is generally made to the farm by the Adviser in Pig Raising in the area and the factors responsible for the overfat pigs determined. The Pig Board and Bacon Factory staff encourage the farmer to watch his pigs killed and see for himself how they look when dressed. Farmers are further encouraged to enter carcase competitions or have an appraisal done on one particular pig in a consignment. The pig raiser then obtains valuable information which enables him to improve the quality of his stock, decrease losses from disease and parasites, and save feed.

Pig raisers who are interested have the power to save themselves much time and money that are now lost each year through the production of overfat pigs. Elimination of overfat pigs causes no hardship but on the contrary effects considerable all-round improvement in returns.

Dairying in the Mackay District

By A. H. HOSSACK, Dairy Adviser.

The Mackay district, for the purposes of this article, extends from St. Lawrence in the south to the Burdekin River in the north, a distance of some 280 miles. The western limits are the Sarina, Connors, Eungella and Clarke Ranges. The district varies in width from eight miles at the extremes to 50 miles at Mackay.

Sugar-cane growing is the principal form of primary production in the district. Beef cattle production, dairying, vegetable growing and fruit growing are the other main primary industries.

DEVELOPMENT OF DAIRYING.

Dairying did not assume importance until 1930. In that year the Port Curtis Co-operative Dairy Association Ltd. opened a branch butter factory at Mackay. When the factory

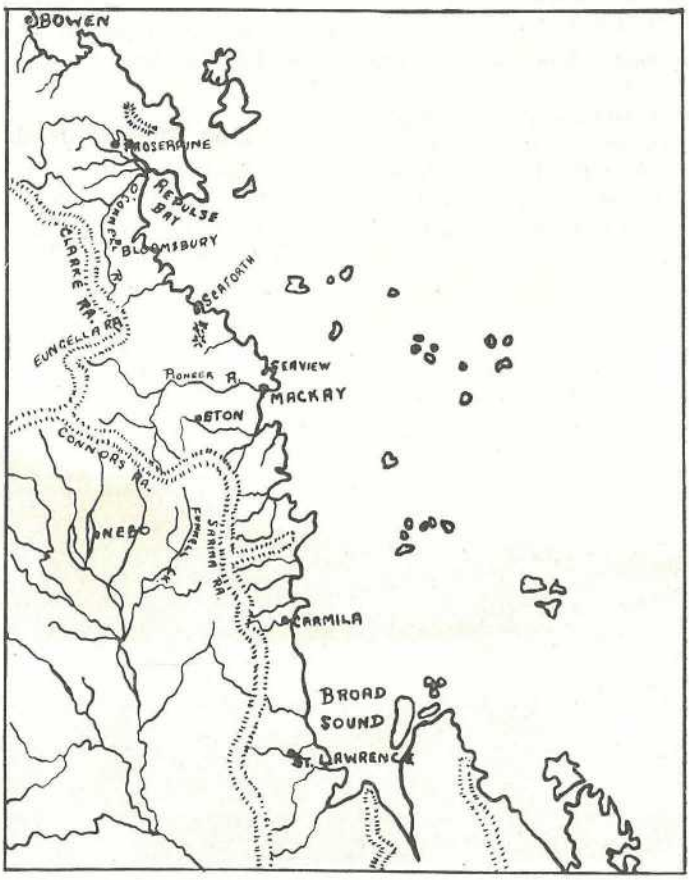


Plate 1.

Sketch Map of the Area from St. Lawrence to Bowen.

commenced operations it had 14 suppliers and during the first week of operations it manufactured 18 cwt. of butter.

Once the factory was established, dairying in the district expanded until today there are 200 suppliers forwarding milk and cream. Butter production has increased and in one year 396 tons of butter were manufactured.

During the early years of World War II., when the value of pasteurised milk as a food was emphasised, the public of Mackay demanded supplies of this milk. In 1943, with the added demand for pasteurised milk for American troops stationed at Mackay, the Port Curtis Association commenced the distribution of pasteurised milk in that town.

During that year only 51,933 gallons of milk were treated. The expansion in the milk trade was rapid, and in 1954, 585,883 gallons of milk were received at the factory. Today, the Mackay factory supplies milk to the towns of Proserpine, Bowen and Collinsville.

As a result of the increase in the milk trade, butter manufacture has declined. In 1954, only 232 tons were manufactured. The emphasis on milk is still having its effect, as the demand for bottled pasteurised milk is increasing every year. Unfortunately, local supply has not been able to keep pace with this demand. As a result, milk has been brought into the district from outside centres, such as Rockhampton, during the low production months of the winter.

MAIN DAIRYING AREAS.

Although the district covers an extensive area, dairying is carried on mainly in four areas:—East Funnell Creek, Blue Mountain, Eungella, and that part of the coastal strip within about 40 miles of the city of Mackay. Conditions in these four areas vary widely.

East Funnell Creek.

The East Funnell Creek area is situated roughly 40 miles south of Mackay. It is served by a good all-weather road. Milk and cream are

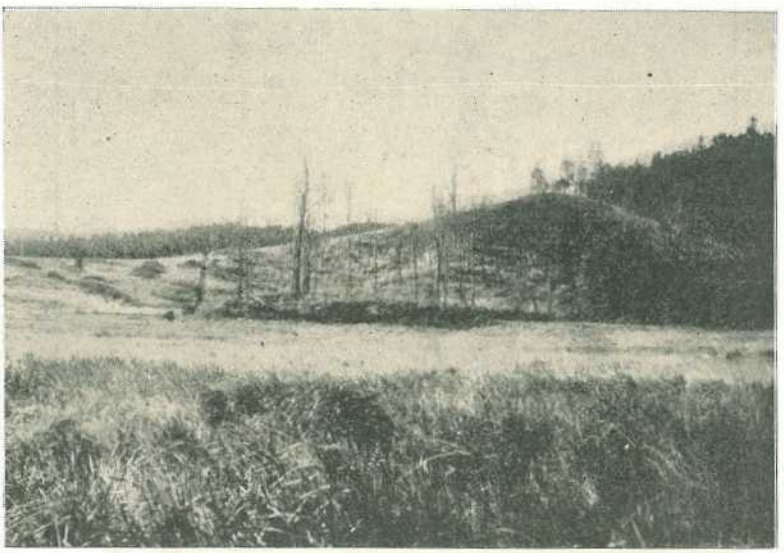


Plate 2.

Sown Pastures at East Funnell Creek.

delivered by road to the railway at Sarina and railed to the factory at Mackay. The farmers in this district are mainly cream producers, although a few supply milk. This area is well situated for conversion from cream to milk supply as the demand for milk increases.

The size of the farms varies from about 700 acres to 1,200 acres and the carrying capacity is approximately one beast to six acres. The area comprises hilly scrub country together with rich alluvial creek flats. The establishment of improved pastures has markedly increased the productive capacity of this area. Rhodes grass and paspalum have been sown in large areas and common guinea grass has been successful on farms where it has been planted.

In common with the other coastal country in this district, the East Funnell Creek area has in the past lacked a legume suitable for mixing with pasture grasses. The recent introduction of centro (*Centrosema pubescens*) to pasture mixtures in this area has produced excellent results. It is anticipated that this legume will assist in overcoming this major problem of tropical dairying.

Good winter feed has been provided by some farmers with the planting of oats. Other feed crops grown include cowcane and improved elephant grass. This grass is a summer grower, the bulk of its feed being produced during the period December to April.

Blue Mountain.

The Blue Mountain area lies further west than East Funnell Creek. The farms range in size from 1,200 to 3,000 acres, and the carrying capacity is one beast to 12 acres.

The farmers in this area depend mainly on summer production. Cows are calved about September and then milked through until May. During this period the native grasses provide the greatest amount of feed. This method of dairying is most practicable when there is sufficient land available, as farmers are able to use the large quantities of summer grazing.

In recent years farmers in this area have shown increasing interest in new grass species for their pasture. When these pastures are established, the pattern of dairying will no doubt change to one of production spread over the whole year and thus give a better utilisation of land.

Eungella Range.

The Eungella Range area is the main dairying centre for Mackay. It is situated some 50 miles west of Mackay. The area is well above sea level, varying in height from 2,000 to 3,000 ft., and conditions are more temperate than along the coast. The farm areas range from 180 to 300 acres. The soils are principally red and yellow types derived from granite, with a small area, the Hazelwood Plateau, of red volcanic soil. This country carries one beast to three acres.

The best pastures are mainly kikuyu or paspalum, while in some sections white clover is established satisfactorily in combination with these species. This is the only area in the Mackay district where clover is permanently established. The country is very uneven and under these conditions there is very little cropping.

The area is devoted almost entirely to milk production. While the road network is satisfactory, the road service is prone to breakdown during the wet season because of the numerous creek crossings which become impassable for periods during the rainy months of the year.

Coastal Belt.

The coastal country is devoted mainly to the production of sugar cane, although some dairy farms have

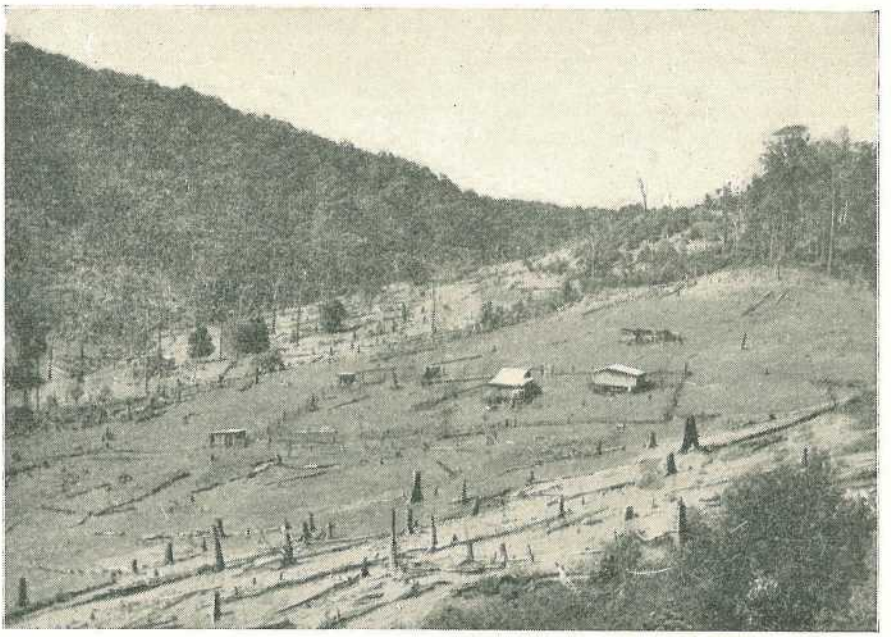


Plate 3.

A Dairy Farm in the Eungella District.

Plate 4.

White Clover in a Pasture on the Eungella Range.

been established. These farms are mainly milk-producing properties and are generally worked in conjunction with sugar-cane farms. The soils vary considerably, ranging from rich alluvials to light sandy loams. Under these conditions the carrying capacity varies.

In the Bowen area there are a few farms producing milk for sale as warm milk. The majority of these properties have some irrigated pasture, but also grow other grasses without irrigation. The total production of these farms, however, is insufficient to supply the milk requirements of the town.

RAINFALL AND WATER SUPPLY.

Rainfall in the district fluctuates widely. Average monthly rainfall for a 30-year period is given in Table 1. Summer rains are generally reliable. The wet season usually commences in January and extends to March. It

TABLE 1.

AVERAGE RAINFALL, CENTRAL COAST 1911–1941.

Month.	Points.
January	834
February	764
March	485
April	240
May	132
June	202
July	107
August	76
September	70
October	128
November	204
December	452
Total.	3,694

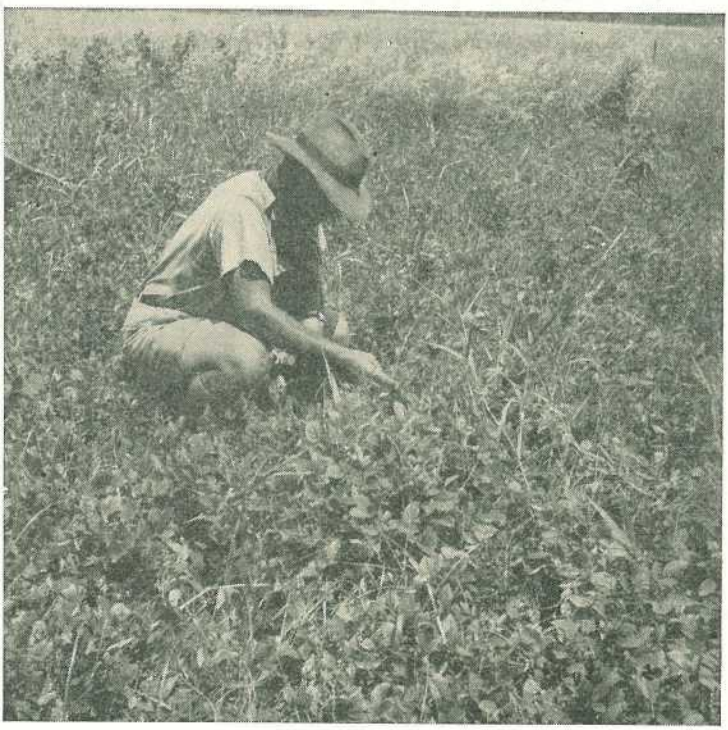


Plate 5.

The Legume Centro in a Spray Irrigated Pasture at Homebush.

may start, however, as early as December or be delayed until February, and on occasions the wet season extends into April.

Winter rains are sufficient to provide for fodder crops and grasses, but spring rains, which come mainly from storms, are very unreliable, and at times the dry spell extends from winter through November and December.

Ample water supplies for farm and dairy use are generally obtained from permanent streams or from wells. Wells vary in depth throughout the district, but average approximately 50 ft.

DAIRY CATTLE.

The main dairy cattle breed in the district is the Jersey, but large numbers of Australian Illawarra Shorthorn are also run. During recent years the Guernsey has increased in popularity and Guernsey bulls are often mated to other breeds. Ayrshires and Freisians are also represented in the district, although in smaller numbers.

At the present time in this district there are two herd recording groups operating, one in the Eungella district and the second serving the East Funnell Creek and Blue Mountain areas. Herd recording has revealed the value of the sires in recording herds, and as a consequence the improvement in those herds which have been under test since the formation of the first group has been quite noticeable.

DAIRY BUILDINGS.

As dairying has only been established in this district in comparatively recent years, the dairy buildings are of modern design. Farmers have realised that a good building and the equipment essential for hygienic production are a necessity if their produce is to withstand the hot summer conditions and long haulage to the factory.

Generally the dairy buildings have been constructed to ensure coolness. Sheds now being built reveal the modern trend from timber towards steel type of sheds.

The elevated bails type of milking shed has also been constructed and examples of both the raised crush type bail and the raised race bail can be found throughout the district.

FUTURE DEVELOPMENT.

With an improvement in the quality of pasture available it can be anticipated that dairy production in this area will increase. The establishment of permanent pastures of Rhodes, paspalum, kikuyu, para and guinea grasses according to local conditions has materially increased production, and the success of the legume centro is most encouraging.

There is an increasing demand for milk supplies in this district and future developments in dairying will be in this direction. There can be no doubt that certain areas of this district are suitable for dairying, and while the district will remain predominantly a sugar-producing one, there is ample scope for dairy farming to increase in importance within the next few years.

Agriculture in the Central Burnett

By K. B. ANDERSSEN, Adviser in Agriculture.

Geographically, the Central Burnett is not a precisely defined district. However, the area normally known by this name is contained within the square formed by the 25 deg. and 26 deg. lines of south latitude and the 151 deg. and 152 deg. lines of east longitude. The areas of agricultural importance lie within the shires of Eidsvold, Mundubbera and Gayndah.

The total area of the square defined above is between 4,500 and 5,000 square miles, and well over 95 per cent. of this area is grazing land. The total area under cultivation during the middle 1950's is probably about 1 per cent. of the gross area.

The area is bounded on the north by the Upper Burnett district and on the south by the South Burnett. The western watershed is the Auburn Range, and that on the east, the Coast Range. Numerous spurs and offshoots of these ranges are interspersed through the district. The topography is further varied by the appearance of dome-like structures such as Mount Debateable and Mount Gayndah, the fertile plateaux of Binjour and Gurgeena, the hilly section of Dallarnil, and the extinct crater which forms Coalstoun Lakes.

The remaining land areas consist of a small percentage of river and creek flats extending to undulating grazing country which varies from sandstone and shale ridges to low hills of granitic or basaltic origin.

DEVELOPMENT.

The history of development of the Central Burnett is one of the many pastoral sagas associated with land settlement in Australia.

Prior to the creation of the new State of Queensland in 1859, exploration parties had branched out from the Darling Downs and Brisbane Valley settlements in quest of suitable land to increase existing holdings. One of the foremonst of the early explorers was Henry Stuart Russell, who had emigrated to Australia in 1840 and had settled at Cecil Plains on the Darling Downs in 1841.

Russell was a member of a party headed by Andrew Petrie which made a survey of the Wide Bay district, embracing principally the Mary River Valley, in 1842. This excursion extended north to the present site of Tiaro, and the results whetted Russell's curiosity as to what lay to the north and west of Tiaro.

Following his return to Cecil Plains, Russell again ventured forth, this time with William Orton and Jimmy, a black boy from the Severn River district. After passing Tiaro, he discovered and named the Stuart River and then proceeded west until reaching the southern Boyne River in what is now known as the South Burnett district. The party followed this stream down until it entered a broad river, which was subsequently named the Burnett.

The party then retraced their steps and followed the southern Boyne in a west-south-westerly direction to its source, seeking suitable land for sheep. They chose the site of the present Burrandowan Station for this purpose, and after many difficulties returned to Cecil Plains.

Russell reported his discoveries officially and through the press, thereby arousing public interest in the new

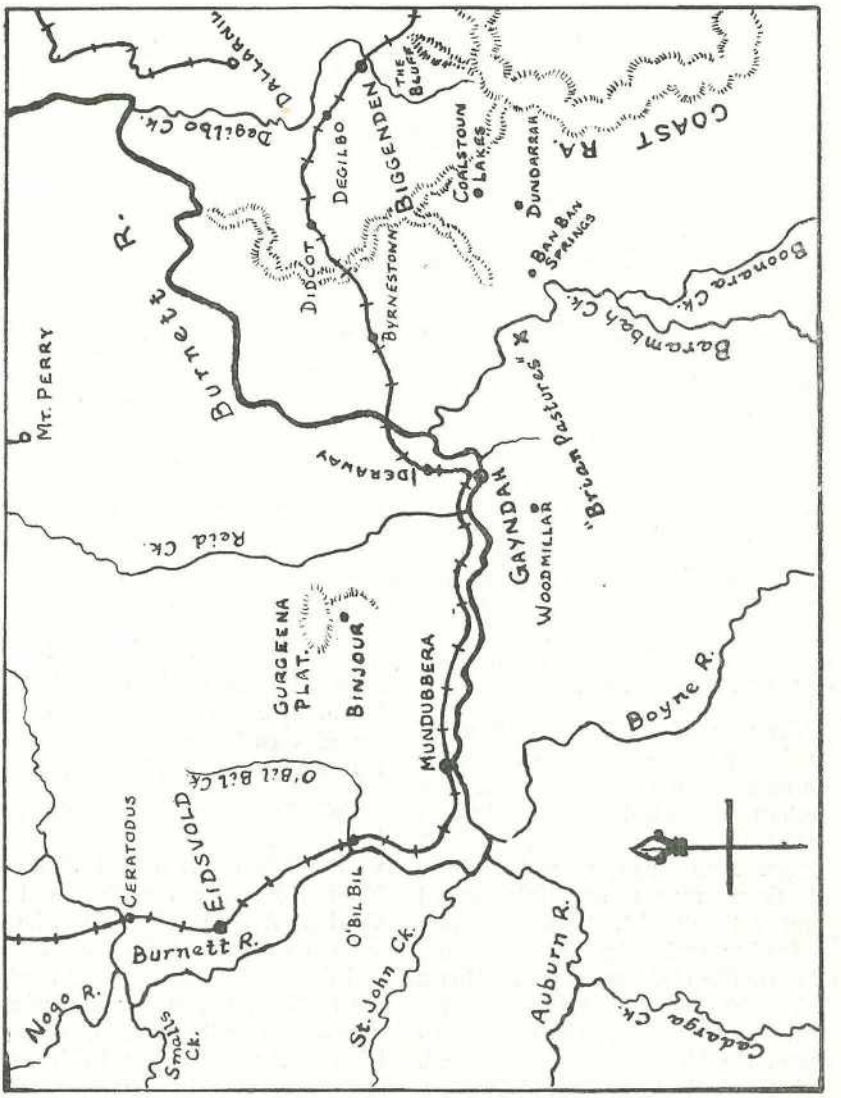


Plate 1.

Sketch Map of the Central Burnett Districts, Showing Principal Towns and Localities.

area. Numerous exploratory and land settlement parties moved into the new district, and among these the name of Thomas Archer is prominent. Archer made his first survey trip into the new region to ascertain its potentialities and then returned to his homestead at Cooyar. He returned to the Burnett with a party of 16 men, 8,000 sheep and the necessary droving plant, and selected a grazing property near the present site of Eidsvold.

His trail was blazed past Ban Ban Springs across the Burnett near Gayndah, over Bouveries Range near Mundubbera, and finally across the Burnett again near its junction with O'Bil Bil Creek.

Other historical stations in the Central Burnett were Coonambula, Dykehead, Yerilla, Auburn, Hawkwood, Coondarra, Delubra, Mundubbera, Toondahra, Cooranga, Aranbanga, Blairmore, Ban Ban, Yenda, Mingo, Mundowran, Lochaber, Wetheron and Ideraway.

In 1849 Gayndah was declared a township and in 1864 its first bank was opened. The towns of Eidsvold, Mundubbera and Biggenden quickly followed as the large holdings were subdivided for closer settlement and as gold and precious stones were discovered.

Initially, the servicing of these towns was accomplished by bullock wagon to and from the port of Maryborough, with as many as 1,000 teams operating on this route. These were later replaced by the coaches and horse teams, which in turn were superseded by the railway, which came from Maryborough through Mungar Junction in 1889. The line reached Biggenden in 1891, Degilbo in 1893, Gayndah in 1907, Mundubbera in 1913, and finally Monto in 1928.

Land settlement in the Central Burnett was originally confined to the development of large holdings for sheep and cattle raising. In the late 1860's and early 1870's, the sheep flocks were sharply reduced by disease, with the result that further development was concentrated entirely on beef cattle raising.

Later on, the dairying industry with its attendant mixed farming brought closer settlement to the district. The importance of this industry today is reflected in the three large butter factories located in the key towns of

Plate 2.

The Mundubbera Weir Across the Burnett River. This weir, near Mundubbera township, impounds about 4,000 acre-feet of water.

Mundubbera, Gayndah and Biggenden, and the cheese factory operating in the Coalstoun Lakes area.

Citrus groves also began to flourish along the banks of the Burnett and its subsidiary rivers and creeks.

WATER FACILITIES.

In moving towards the sea, the Burnett River sweeps southward, westward, southward again, then eastward, and finally in a north-easterly direction to the coast at Bundaberg. Its main tributaries are the Nogo River, Smalls Creek, St. John Creek, O'Bil Bil Creek, Auburn River, Boyne River, Reid Creek, and Barambah Creek. These rivers and creeks are the principal watercourses of the district, and each in turn has its smaller tributary streams.

In the Upper Burnett region, concrete weirs have been used effectively in damming the main creeks. In 1952, the Irrigation and Water Supply Commission completed a large dam on the Burnett itself at Mundubbera, with a capacity of 4,000 acre-feet (Plate 2). Apart from enclosing surface water, this dam has improved underground supplies and raised the water height in surounding wells and bores. The benefit of this impounded water has been experienced many miles below the Mundubbera site.

In periods of drought, the underground water supplies of the district are apt to develop a high salinity, thereby rendering some of the wells and bores unfit for irrigation or even for stock purposes. Emphasis has therefore been placed on the construction of earth dams on most properties where dairying or beef cattle raising is practised.

Water is a particular problem in the red soil plateau regions, where bores have been drilled to 400 ft., often with results of doubtful value. In most cases these bores build up rapidly in saline content during drought periods.

CLIMATE.

The Central Burnett is situated approximately 140 miles south of the Tropic of Capricorn, whilst its eastern boundary lies 50 miles from the coastline of Hervey Bay. The altitude above sea level varies quite extensively from 250 to 1,500 ft. in the settled areas, while the mountain ranges reach heights of 3,500 ft.

The barrier created by the Coast Range on the eastern boundary has exercised considerable control on local climatic conditions. East of the range an average rainfall of 42 in. per annum is recorded. Crossing the range into the Central Burnett, the average rainfall falls rapidly to 30 in., and then decreases more steadily as one proceeds towards the west of the district. Climatological data have been recorded at Gayndah since 1871, and Table 1 shows the average monthly rainfall totals for that centre.

TABLE 1.

AVERAGE RAINFALL FIGURES FOR GAYNDAH, 1871–1951.

Month.	Inches.
January	4·64
February	4·32
March	3·07
April	1·50
May	1·55
June	1·77
July	1·46
August	1·06
September	1·53
October	2·49
November	2·93
December	4·14
Total for Year	30·46

The district lies in the subtropical region of Australia and is subject to extreme variations in its rainfall incidence. For example, during a 10-year period from 1941 to 1950 the annual rainfall ranged from less than 20 in. in one year (1946) to nearly 46 in. in another (1942).

Average rainfall follows the usual Queensland pattern, with October to March giving over twice as much as April to September. Thunderstorms occur sporadically from September to December and often into January. These are followed by the onset of the monsoonal rains, usually in February and sometimes extending into April.

An adequate winter rainfall for cropping occurs in an average of four out of every ten years, although successful winter production has been obtained in marginal years by an efficient summer fallow.

In common with other subcoastal districts of southern central Queensland, the Central Burnett shows marked fluctuations in temperature, both daily and seasonal.

The maximum daily temperature in summer may range up to 100 deg. F., with an average maximum of 80 deg. F. The highest temperatures usually occur between October and February. A maximum length of daylight of 16 hours is reached during December. The average relative humidity during the summer approximates 65 per cent. whilst at peak periods it ranges between 80 and 90 per cent.

The comparative mildness of the winter months is reflected in the normal temperature range of 30–70 deg. F., although exceptional temperatures as low as 15 deg. have been registered. The minimum length of daylight experienced is 10 hours, during the later part of June.

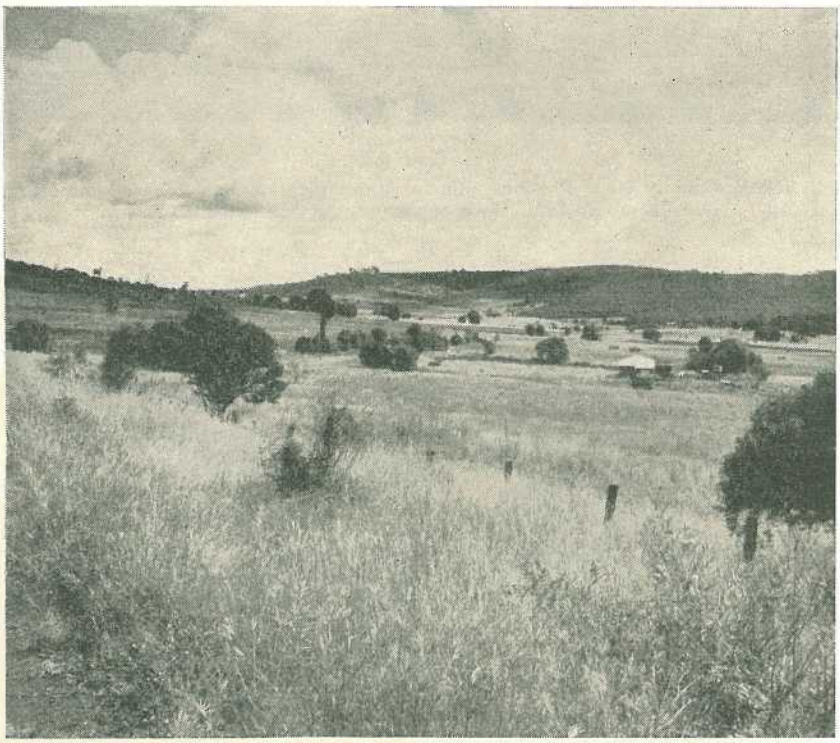


Plate 3.

North Binjour Plateau, Looking Towards Gurgeena Plateau. In the foreground is dairying country. In the background can be seen part of the flat top of Gurgeena Plateau.

Plate 4.

Rolling Country Near Degilbo. Rhodes grass planting has followed clearing of the scrub pockets. Open eucalypt forest dominates the ridges.

Plate 5.

Typical Bottle-tree Scrub Country of the Coalstoun Lakes District. This small scrub pocket has provided a very attractive farming district, producing good crops of maize and peanuts and excellent Rhodes grass.

SOILS AND VEGETATION.

Considerable variation in geological formations exists throughout the district. The different types of parent rock have given rise to characteristic soil types, though factors such as climate, elevation and the effects of vegetation have also played an important part in soil formation. Locally, the soils are usually referred to in terms of the original vegetation —for example, "forest" and "scrub" soils. Another important type agriculturally is the alluvial or "river-bank" soils, which occur usually in fairly narrow strips along the various watercourses.

On the scrub soils, there originally grew a wide variety of trees. Some of the more characteristic are the bottle tree (*Brachychiton rupestre*), brigalow (*Acacia harpophylla*), belah (*Casuarina lepidophloia*), wilga (*Geijera parviflora*) and hoop pine (*Araucaria cunninghamii*). These soils range in colour from grey to black and red, and are of excellent structure and fertility. Unfortunately, they constitute only a small proportion of the available arable land in the district. They occur at altitudes to 1,500 ft., and their local classification is governed by the prevailing vegetation—for example, "brigalow scrub" and "softwood scrub."

These scrub soils are slightly acid to neutral in the 6–9 in. of surface depth, with any acidity disappearing at lower levels. The accumulation of organic matter in the surface soil renders it friable, open and permeable to water. These soils can store a lot of water and are not prone to dry out rapidly in the surface during hot dry weather.

The forest soils constitute the greater part of the grazing and farming lands of the Central Burnett. They were originally covered with hardwood trees, principally eucalypts and wattles. The former include various gums, stringybarks, boxes, ironbarks and bloodwoods. Each species is commonly found associated with one or more soil types and can often be used as a guide to soil depth, structure and fertility.

For example, blue gums and Moreton Bay ash are usually associated with the river and creek alluvial soils of medium to good fertility. Ironbarks, stringybarks, wattles and box trees are found on the red and brown soils of the ridges, ranges and lesser slopes. Spotted gum generally indicates a shallow ridge soil of very low fertility. With the exception of the alluvial soils, the forest soils vary from poor to moderate fertility, possessing a medium to very acid surface soil, with decreasing acidity in the lower layers.

The forest soils generally are low in organic matter, and during limited periods of cultivation are likely to show deficiencies in the major plant foods. They have a poorer initial structure than the scrub soils and this structure rapidly deteriorates with overworking. Under drought condition they dry out rapidly.

SOIL CONSERVATION.

The cultivation of these areas has robbed the soils of their protective covering and reduced their capacity to hold and absorb water. The inevitable runoff of excess water on the cultivated slopes has resulted in erosion in its varying forms.

However, farmers are gradually taking advantage of Departmental assistance in soil conservation practices, with the result that over 1,200 acres of exposed farm land have been protected by soil conservation measures.

FORESTRY.

Relatively small areas of forestry reserve have been retained throughout the Central Burnett by the Sub-department of Forestry. These areas are

principally hardwood forests of messmate, blue gum, spotted gum and ironbark. In addition, a few small scrub areas carry depleted stands of hoop pine. Timber milling operations are carried out by 12 sawmills, which are dispersed throughout the district.

PASTURES.

Native Pastures.

Despite the recent advances in the use of sown pastures in this district, native pastures remain the mainstay of the beef industry, for which the area is noted.

The most important native grasses associated with the forest and alluvial soils are forest blue (*Bothriochloa intermedia*), Queensland blue (*Dichanthium sericeum*), pitted blue (*Bothriochloa decipiens*), black spear (*Heteropogon contortus*), three-awned spear (*Aristida*), kangaroo (*Themeda australis*), windmill (species of *Chloris*) and love grasses (species of *Eragrostis*). Among the more common native legumes are glycine pea (*Glycine tabacina*), rhynchosia (*Rhynchosia minima*) and sesbania pea (*Sesbania benthamiana*).

The composition of the native pastures has varied considerably from season to season as well as showing trends over longer periods. For example, continuous stocking has greatly reduced the initial population of kangaroo grass. The normal practice of year-long grazing and annual burning has also over the years resulted in the dominance of black spear grass over much of the forest country. Similarly, the absence of annual winter and spring burning, especially when combined with good seasons, may lead to Queensland blue and forest blue regaining ground from the spear grasses. However, such a programme is not economically practicable owing to the exceedingly low nutritive value of the matured native grasses during winter and early spring.

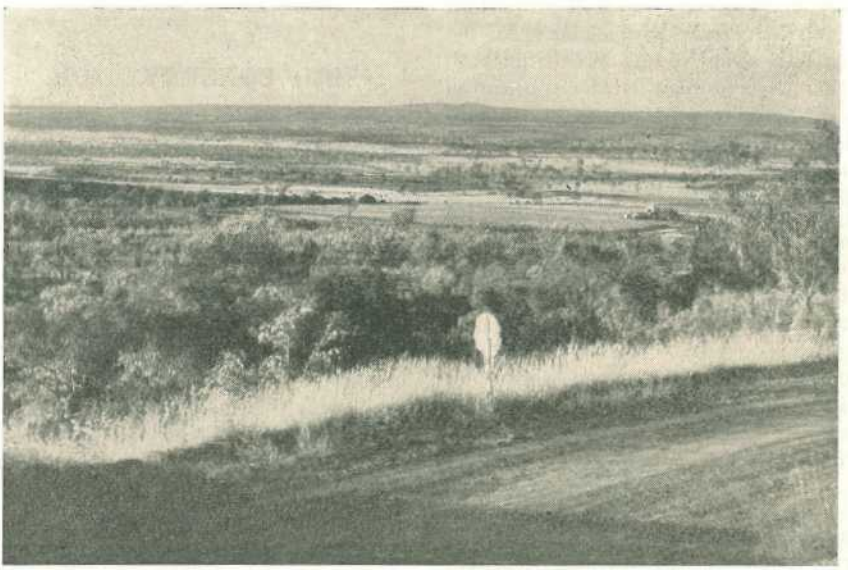


Plate 6.

View of Reid Creek District, Looking North-east Towards Mount Perry.
The Reid Creek flats in the middle distance comprise good agricultural land. The bulk of the distant country is typical Central Burnett grazing land.

The native pastures are quite nutritious during the early and middle stages of their growing period. As the grasses begin to ripen and decrease rapidly in feeding value the native legumes are usually most palatable and may provide a useful supplement. During these stages cattle thrive and make excellent weight gains.

Each winter and early spring, however, these pastures deteriorate badly in both palatability and quality. This means that every year cattle which have access only to native pasture suffer serious losses in weight before they begin to pick up again with the summer flush.

Sown Pastures.

The main function of sown pastures is to extend the period of nutritious grazing. They may in some cases supply a higher plane of nutrition than the native pastures during their main growing season, but this is of little importance compared with the better feed provided during the winter-spring period.

Of the earlier introductions, Rhodes grass has made the most important contribution to this district as to many other Queensland districts of similar rainfall distribution. This grass is well adapted for use on the scrub soils, frequently being planted immediately after the initial scrub burn.

It has many advantages for this class of country. In the first place it seeds freely, and as the seeds are very small a sowing rate of a few pounds per acre gives an excellent coverage. In the second place, it spreads by means of surface runners which root at the nodes, and thus gives a better soil cover than the tufted native grasses. Thirdly, while not resistant to heavy frosting, it shows considerable frost tolerance; if there is a good body of the grass in winter the tops may be frosted but still provide protection for a green shoot at the base. The value of a Rhodes grass pasture is considerably improved if a legume such as lucerne or phasey bean is included with the grass.

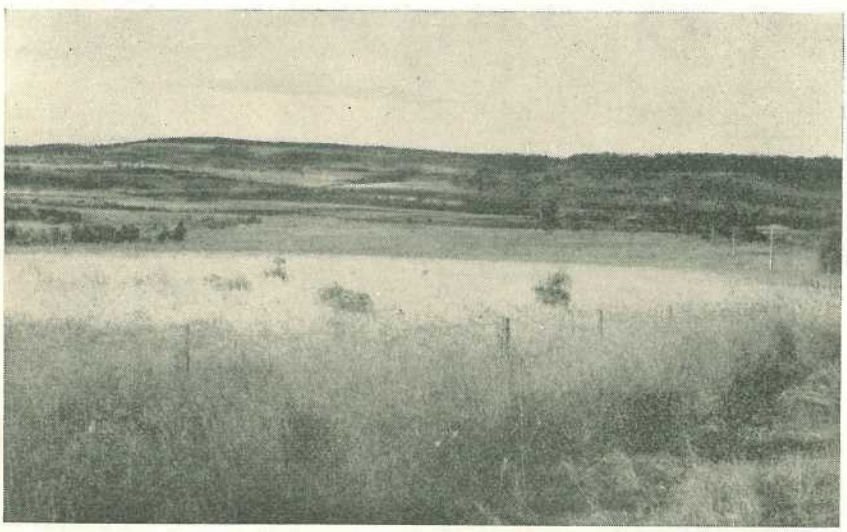


Plate 7.

View of the Binjour Plateau, Looking East. This is one of the fertile scrub areas of the Central Burnett. In the foreground is a Rhodes grass paddock, while background slopes carry maize cultivation and dairy farms.

Paspalum is another earlier introduction, but it has not contributed to this district's production to nearly the same degree as Rhodes grass. Paspalum has a relatively high water requirement, and in a 25–30 in. rainfall district will only thrive on the wetter alluvial soils or under supplementary irrigation. It is a summer grower like Rhodes grass and the native grasses, but it shows some tolerance to frost and will make good growth into the winter if ample moisture is available.

While Rhodes grass has proved the ideal grass for the scrub soils, two newer introductions—buffel grass and green panic—have shown better prospects for improving some of the lighter forest soils. The capacity of these two grasses to make rapid regrowth in early spring and during warm spells in the winter has lengthened the seasonal grazing period by 6–8 weeks. They are, however, rather less tolerant of frosting than Rhodes and paspalum. The history of the development of both these grasses in Queensland is closely tied up with the Central Burnett district.

The strain of buffel grass known as Gayndah buffel originated as a short row in a grass project plot at the Gayndah State School in the late 1930's. Seed was collected by Mr. N. J. Sandford, of Little Woodmillar Scrub, and increased on his property. Other farmers followed suit, with the result that this district rapidly became the chief Queensland producer of buffel grass seed. Buffel grass has given good results on a wide variety of soils

Plate 8.

Green Panic Grass Invading Scrub on a Gayndah Farm. This grass, being shade-tolerant, can spread through brush and under timber.

in this district, but one of its main virtues is its adaptability to the lighter classes of soil.

It is a summer-growing tufted grass which provides a good bulk of leafy grazing material of high palatability and good nutritive value. The seed is protected by a bristly covering and for this reason presents some special problems of harvesting and sowing. However, various simple devices attached to tractors or trucks are being used to mechanise the harvesting process. Sowing, whether by hand or by mechanical means, has been greatly facilitated by mixing the seed with an equal amount of sawdust; however, seeders are now being marketed which can handle the seed direct.

Green panic, which is a fine-stemmed strain of guinea grass, had its first commercial development on Mr. A. A. Petrie's property, "Madoora," near Gayndah, also in the late 1930's. From this source it has spread widely within the district and provided seed bulks for sowing elsewhere in Queensland. It also is a tufted summer-growing grass which is very leafy in the early stages but becomes stemmy when allowed to run to head. This grass has a free-seeding habit and rapidly spreads by means of its seed. Among its most useful attributes are its adaptability to forest soils of medium fertility and its shade tolerance. The latter characteristic enables it to be sown under standing timber, and also

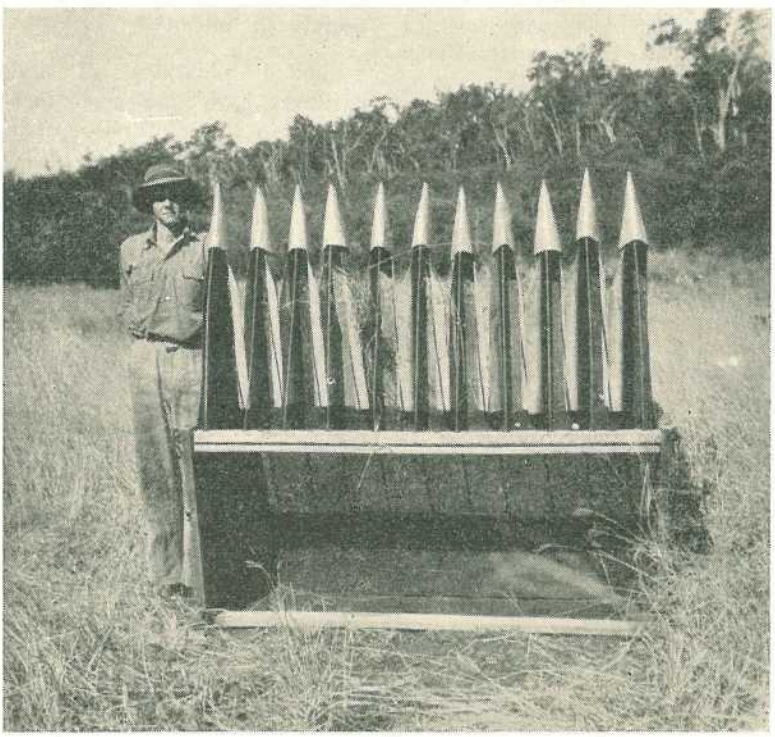


Plate 9.

A Farm-made Stripper for Harvesting Grass Seed. This stripper, devised mainly for harvesting green panic seed, is here shown up-ended. In use, it is pushed horizontally in front of a truck or tractor travelling at 7-8 miles per hour.

among such weeds as lantana and turkey-bush, which can afterwards be controlled by firing the grass stand.

The growing of green panic presents no difficulties, but as with buffel grass, methods of machine-harvesting have had to be worked out on the spot. Methods now in use include (1) adaptation of standard harvesters, (2) application of the principle of the old stripper, and (3) the use of the reaper-and-binder with subsequent threshing of the sheaves.

While legumes have not been widely used in sown pastures, more recent experience has shown the importance of even a small legume content in pastures of Rhodes, green panic and buffel. Lucerne is a most valuable pasture component and should be used wherever possible. Light sowings of about 1 lb. per acre have enabled lucerne to establish with all of these grasses, though the mixture may be easier to maintain in the case of green panic than the other two grasses.

Phasey bean is a well-known legume which is widely scattered throughout Queensland as a weed. It is also a useful pasture component which can contribute directly towards improving the nutritive value of a pasture as well as indirectly by raising the fertility of the soil. Although it behaves as an annual or biennial, it seeds very freely and regenerates by this means. Because of harvesting difficulties, there has been no regular supply of commercial seed. However, much good can be done by hand-harvesting small stands, lightly seeding established pastures and encouraging its annual re-seeding.

While other legumes cannot as yet be recommended for pasture sowing in this district, experiments are being conducted with species of *Stylosanthes* and other types which have done well elsewhere on sandy soils and soils of relatively low fertility. There are indications that some of these legumes are more adaptable than was once believed, and they may yet play a major part in improving the pastures of this district.

Irrigated Pastures.

The Central Burnett has numerous rivers and streams in which sufficient water is available to permit the irrigation of a substantial area of pasture. The soil types occurring near the streams range from deep sandy loams to medium clay soils. All the soil types with the exception of the coarser sandy loams are suitable for irrigated pasture production.

Limited plantings of irrigated pastures have indicated that the returns in terms of milk production would be comparable with those from irrigated pastures in southern Queensland. The border method has been generally used for pasture irrigation, though on the lighter (coarser) soil types spray application would give more economical use of water.

The mixtures used in the present plantings are based on white clover, ryegrass and phalaris. Simpler mixtures such as white clover + paspalum for heavy soils and lucerne + phalaris on the deeper soils may be found useful for special conditions.

[TO BE CONTINUED.]