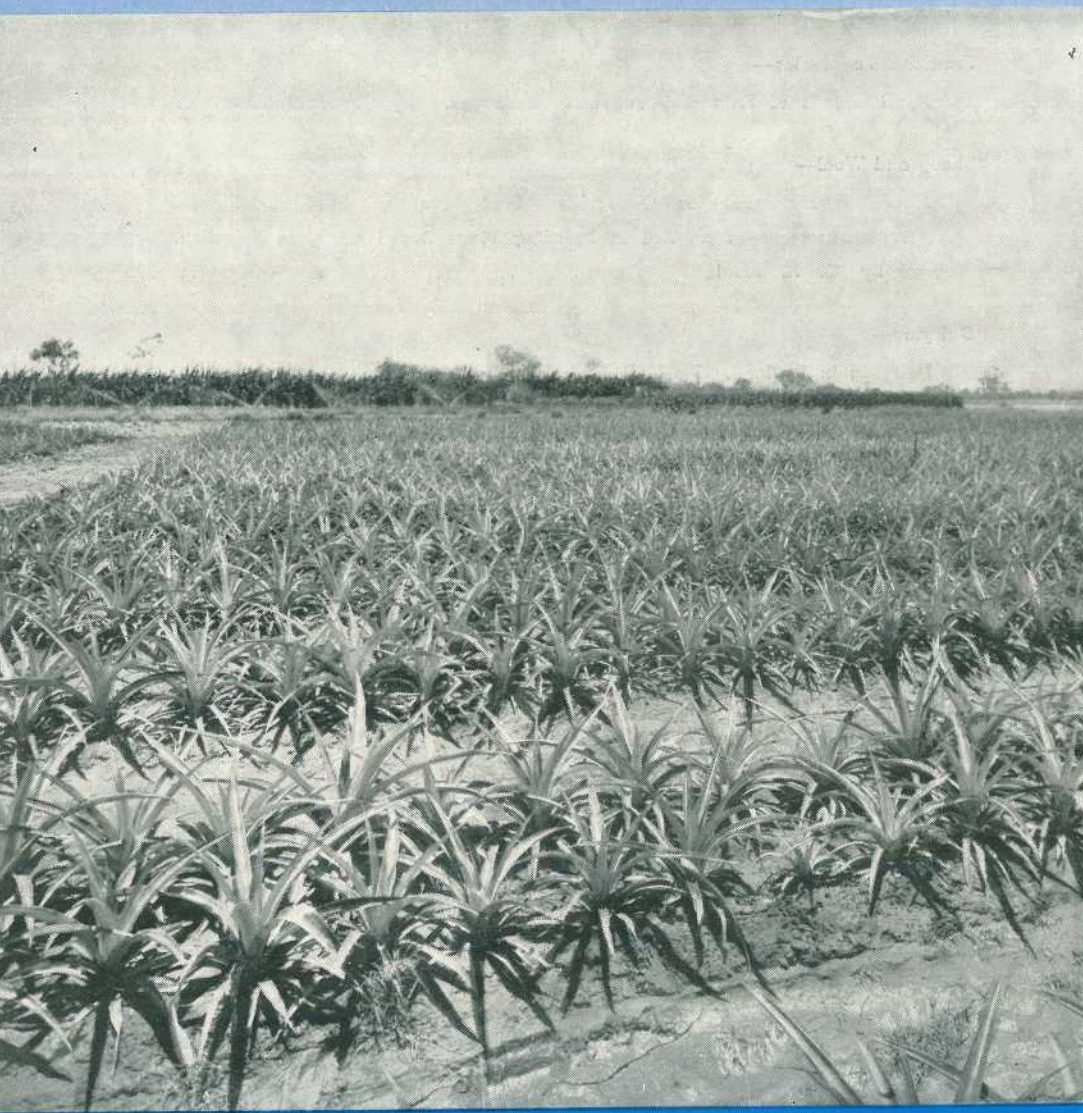
Queensland AGRICULTURAL JOURNAL



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

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The subscription rate for Queensland primary producers whose main source of income is the land, for schools and for students is one shilling a year. The charge to others is ten shillings a year.

Brucellosis-Tested Swine Herds

(As at 30th April, 1956).

Berkshire.

A. P. and N. Beatty, "Deepdene," Barambah road, Nanango
S. Cochrane, "Stanroy" Stud, Felton
G. Handley, "Handleigh" Stud, Murphy's Creek
J. L. Handley, "Meadow Vale" Stud, Lockyer
O'Brien and Hickey, "Kildurham" Stud, Jandowae East
G. C. Traves, "Wynwood" Stud, Oakey
Westbrook Farm Home for Boys, Westbrook
M. K. Collins, "Kennington" Stud, Underwood road, Eight Mile Plains
H.M. State Farm, "Palen" Stud, Palen Creek
A. R. Ludwig and Sons, "Beau View" Stud, Beaudesert
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
R. H. Crawley, "Rockthorpe" Stud, *via* Pittsworth
F. R. J. Cook, Middle Creek, Pomona
Mrs. I. M. James, "Kenmore" Stud, Cambooya
H. L. Stark, "Florida," Kalbar
J. H. N. Stoodley, "Stoodville," Ormiston
H.M. State Farm, Numinbah
N. F. Cooper, Maidenwell
R. H. Coller, Tallegalla, *via* Rosewood
E. J. Clarke, "Kaloon" Stud, Templin
M. G. and R. H. Atkins, "Diamond Valley" Stud. Mooloolah
W. F. Ruhle, "Felbrie" Stud, Kalbar
L. Puschmann, "Tayfeld" Stud, Taylor
Dr. B. J. Butcher and A. J. Parnwell, "Hartley Grange" Stud, 684 Logan Road, Greenslopes
C. E. Edwards, "Spring Valley" Stud, Kingaroy
G. McLennan, "Murcott" Stud, Willowvale
H. M. Wyatte, "Cumberland Vale," Cooyar
C. F. W. and B. A. Shellback, "Redvilla" Stud, Kingaroy
R. J. Webber, "Webberberry" Stud, 35 Caxton st., Petrie Terrace
J. C. Lees, "Bridge View" Stud, Yandina
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
A. C. Fletcher, "Myola" Stud, Jimbour
Q.A.H.S. and College, Lawes
E. F. Smythe, "Grandmere" Stud, Manyung, Murgon
The Marsden Home for Boys, Kallangur
M. F. Callaghan, Lower Mount Walker, *via* Rosewood
J. B. Lotz, M.S. 794, Kalbar
G. J. Hutton, Woodford
E. R. Kimber, Coalstoun Lakes
K. B. Jones, "Cefn" Stud, Pilton
A. J. Potter, "Woodlands," Inglewood
Regional Experiment Station, Hermitage
L. Pick, Mulgeldie
J. W. Bukowski, "Secreto" Stud, Oxley

Large White.

H. J. Franke and Sons, "Delvue" Stud, Cawdor
Garrawin Stud Farm Pty. Ltd., 657 Sandgate road, Clayfield
J. A. Heading, "Highfields," Murgon
K. B. Jones, "Cefn" Stud, Pilton
R. Postle, "Yarralla" Stud, Pittsworth
B. J. Jensen, "Bremerside" Stud, Rosevale, *via* Rosewood
E. J. Bell, "Dorne" Stud, Chinchilla
L. C. Lobegeiger, "Bremer Valley" Stud, Moorang, *via* Rosewood
H. R. Gibson, "Thistleton" Stud, Maleny
H.M. State Farm, Numinbah
K. A. Hancock, "Laurestonvale" Stud, Murgon
V. P. McGoldrick, "Fairymeadow" Stud, Cooroy
S. T. Fowler, "Kenstan" Stud, Pittsworth
G. J. Hutton, Woodford
H. L. Larsen, "Oakway," Kingaroy
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. I. Skyring, "Bellwood" Stud, *via* Pomona
O. J. Horton, "Manneum Brae" Stud, Manneum, Kingaroy
O. B. Vidler, Manneum, Kingaroy
K. F. Stumer, French's Creek, Boonah
Q.A.H.S. and College, Lawes
R. S. Powell, "Kybong" Stud, Kybong, *via* Gympie
C. Wharton, "Central Burnett" Stud, Gayndah
S. Jensen, Rosevale, *via* Rosewood
Kruger and Sons, "Greyhurst," Goombungee
V. V. Radel, Coalstoun Lakes
H. R. Stanton, Tansey, *via* Goomeri
L. C. and C. P. F. Hill, Kingaroy

Tamworth.

S. Kanowski, "Miecho" Stud, Pinelands
N. R. Potter, "Actonvale" Stud, Wellcamp
D. F. L. Skerman, "Waverley" Stud, Kaimkillenbun
A. C. Fletcher, "Myola" Stud, Jimbour
Salvation Army Home for Boys, "Canaan" Stud, Riverview
A. J. Surman, "Namrus" Stud, Noble road, Goodna
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
L. Herbst, "Hillbanside" Stud, Bahr Scrub, *via* Beenleigh
H.M. State Farm, Numinbah
Dr. B. J. Butcher and A. J. Parnwell, 684 Logan road, Greenslopes
G. H. Sattler, Landsborough
F. Thomas, "Rosevale" Stud, M.S. 373, Beaudesert
H. J. Armstrong, "Alhambra," Crownthorpe, Murgon
Q.A.H.S. and College, Lawes
R. H. Coller, Tallegalla, *via* Rosewood
A. J. Potter, "Woodlands," Inglewood
P. V. Campbell, "Lawn Hill," Lamington
L. C. and C. P. F. Hill, Kingaroy

Wessex Saddleback.

W. S. Douglas, "Greylight" Stud, Goombungee
J. Gleeson, "Iona Vale" Stud, Kuraby
C. R. Smith, "Belton Park" Stud, Nara
H. H. Sellars, "Tabooba" Stud, Beaudesert
D. T. Law, "Rossvill" Stud, Trouts road, Aspley
J. B. Dunlop, "Kurrawyn" Stud, Acacia road, Kuraby
F. K. Wright, Narangba, N. C. Line
R. A. Collings, "Rutholme" Stud, Waterford
M. Nielsen, "Cressbrook" Stud, Goomburra
G. J. Cooper, "Cedar Glen" Stud, Yarraman
"Wattledale Stud," 492 Beenleigh road, Sunnybank.
A. J. Hicks, M.S. 98, Darlington, *via* Beaudesert
Kruger and Sons, "Greyhurst," Goombungee
G. C. Burnett, "Rathburnie" Stud, 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 30th April, 1956.

Breed.	Owner's Name and Address.
Aberdeen Angus ..	The Scottish Australian Company Ltd., Texas Station, Texas
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. Hens-hell, "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, "Groveley," 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
	"St. Christopher's" and "Iona" Studs, Brookfield road, Brisbane
	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
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
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. J. Cox and Sons, "Rosel" Stud, Crawford, Kingaroy Line
	R. J. Browne, Hill 60, Yangan
	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. Meier 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, "Trecarne Stud," Lockyer
	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
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

Tyre Rollers on the Darling Downs

By R. G. WILSON, Adviser in Agriculture.

Used motor tyres can still be profitably employed on the farm, even though they may be of no further use for motor vehicles. Discarded flexible tyres (minus their inner tubes) pressed together on supporting frames make one of the most common and popular types of roller in use on the cereal growing farms of the Darling Downs.

BENEFITS OF ROLLING.

These light, flexible tyre-rollers usually render valuable aid in the form of seedbed consolidation prior to or following the sowing of cereals, lucerne, grass or clover seeds. Their action in gently firming sown seeds into close contact with moist soil usually results in more even germination, growth and maturity of the crop. This may mean higher yields, easier harvesting and therefore lower production costs.

The benefits of rolling are usually most obvious when sowing has been carried out under dry conditions and

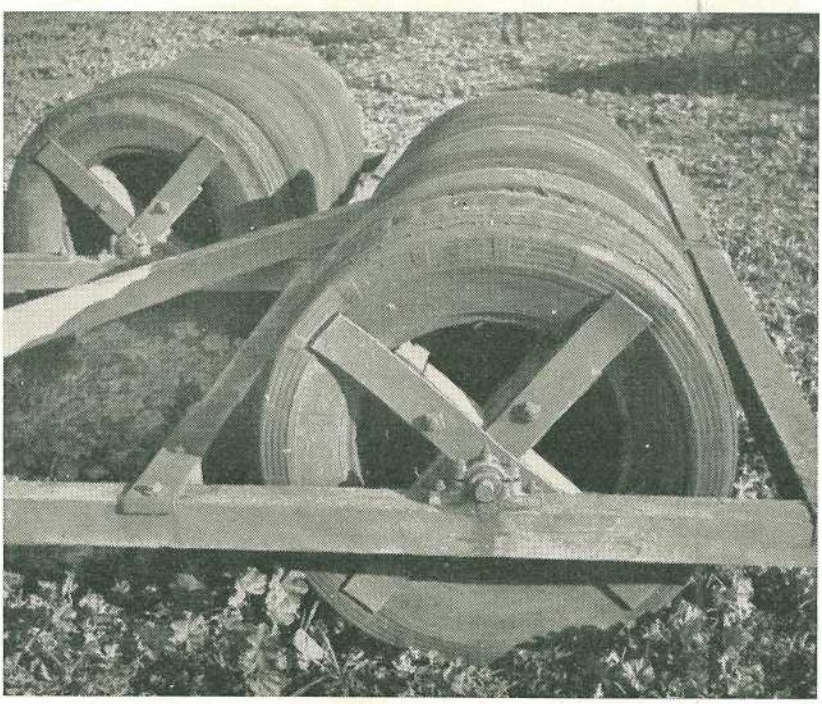

Plate 1.

A Two-Section Tyre-Roller made by Mr. A. Kruger, Greenmount. This roller consists of two sections, each of 12 (6.00 x 16) tyres, housed in a 10 ft. x 6 ft. 8 in. frame of 3 in. x 3 in. hardwood. It is adaptable for use behind or offset from a 16-run combine. Essential details of construction may be readily seen.

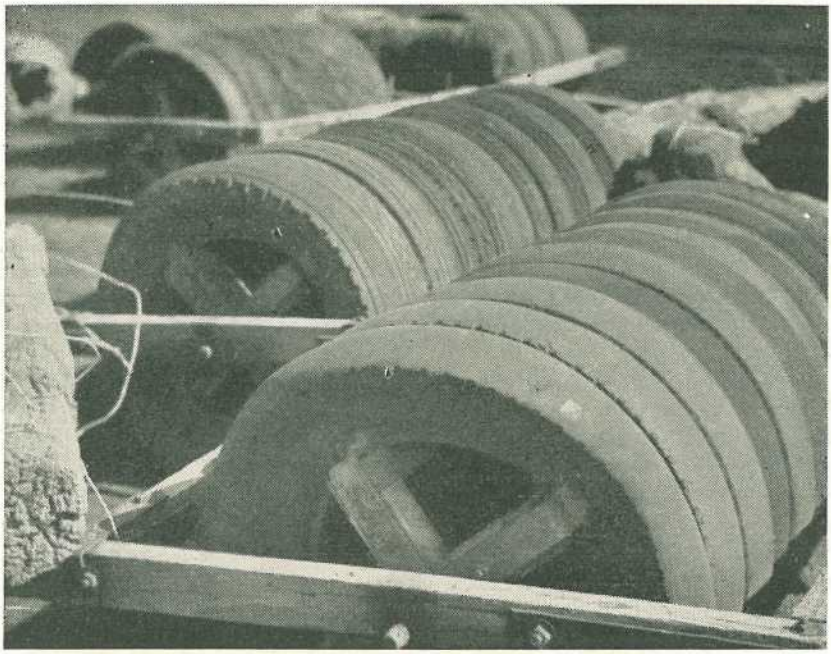

Plate 2.

Close-up of Portion of a Multiple Unit Tyre-Roller. This roller shows some slightly different features of construction from that in Plate 1.

useful follow-up rains have not occurred shortly afterwards. On the Darling Downs, rolling under such conditions has often resulted in satisfactory strikes when unrolled plantings have given a patchy and much reduced stand.

The damage caused by the small brown seed-harvesting ants is often greatly reduced by timely rollings. These ants have caused serious seed losses on the dark-grey to black clay soils of the mid-western Downs.

For these reasons, if no others, the use of rollers has frequently allowed a reduction in seeding rates of from 15 to 50 per cent. This reduction means a considerable saving in planting costs, especially where expensive pasture seeds may be involved.

Finally, it has often been claimed that the rolling of young growing cereal crops has greatly encouraged tillering. This experience parallels that in many older countries of the world.

SPECIAL FEATURES OF THE TYRE ROLLER.

The home-made flexible tyre roller undoubtedly owes much of its popularity to its cheap and simple construction. In addition, of course, it offers a useful outlet for old discarded motor tyres, which would otherwise be valueless. Again, it has been shown repeatedly that rollers of this type are very effective, and may actually in some circumstances be superior to the heavy, manufactured steel rollers.

One important requirement is that the tyres should be "bald" or smooth, and flexible in the walls. Firm tyres carrying a good tread usually collect moist earth far more readily than old

smooth tyres. This is especially the case when following a combine or an iron-wheeled tractor.

Some farmers actually provide their tyre rollers with a built-in "scraper", by stretching a length of K-wire loosely across the tops of the tyres and nailing to the frame fore and aft. This wire screen is claimed to be effective in scraping away caked soil which has been picked up by the tyres.

In practice, the tyre roller was originally, and often still is, made approximately the same width as the combine or seed-drill it is intended to follow. Such rollers may be towed directly behind the drill or may be offset to one side or the other. It is often found preferable to offset the roller so as to cover the previous ground sown, and thus minimise soil pick-up.

Where wide, rapid rolling is required, gangs of tyre-rollers may be used directly behind the tractor (Plates 3 and 4). On the plains country, some of these have been built to a total width of 30 ft. A general trend among farmers is now towards the use of such ganged rollers in order to firm the seedbed and bring up the soil moisture in readiness for sowing.

Rolling may then be carried out again after planting, to assist uniform germination. This second rolling may take place at any time from a few hours to some days after planting, depending upon soil conditions at the time.

SOME DETAILS OF CONSTRUCTION.

Smooth-treaded, discarded tyres (minus their tubes) are mounted side by side on a braced hardwood frame made from 4 in. × 2 in. timber, as shown in the accompanying plates.

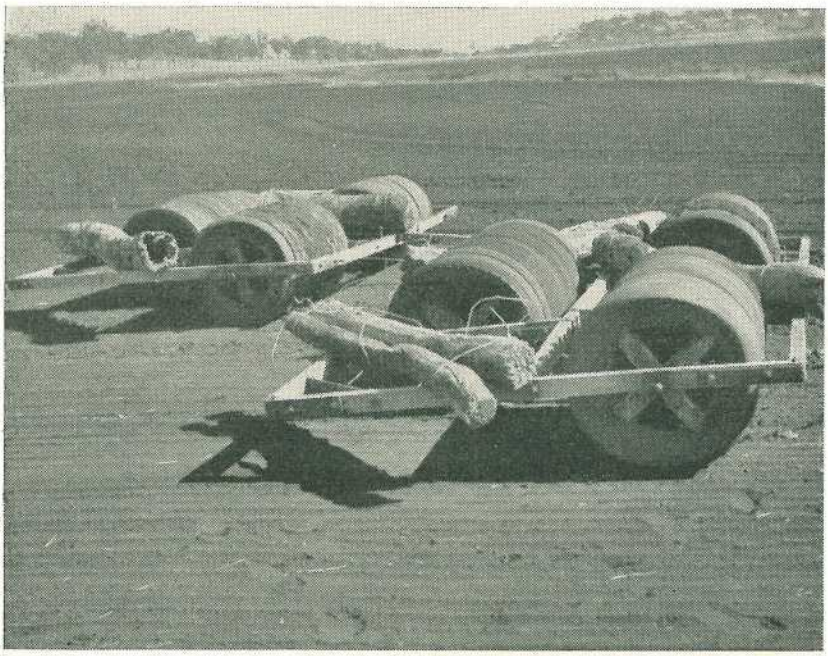

Plate 3.

A Multiple Unit Tyre-Roller Comprising Two Gangs of Three Sections Each. This roller has been weighted with logs to provide heavier pressure on the surface soil. The effects of the roller can readily be seen on the foreground soil.

Tyres of the same diameter, and usually 10, 12, 14 or 20 in number, are clamped together by means of a rim-plate, or with two 3 in. × ⅝ in. soft-iron cross-clamps at each end. Two types of clamp straps are clearly illustrated in Plates 1 and 2.

Two short shaft-steel stub-axles, about one inch in diameter and eight inches long, are then inserted through drilled and augered holes in the iron clamps and hardwood bracing. A 3 in. × 2 in. wooden stop is then bolted to the inside of one of the braces, to prevent the stub-axle from sliding inward. The inner end of the stub-axle may be threaded, and a nut applied. In this case the nut is countersunk into the stop block, thus helping to overcome axle play.

Prior to fitting the tyred section to the outer frame, a piping spacing-bush, 1½ in. in diameter by 1½ in. long, is fitted over each stub-shaft. The stubs are then inserted either into a bushed pillow-block bearing or simply into an augered, bushed hole in the outer hardwood frame.

The outer frame is made according to the width of coverage required, and may house two or three unit roller sections. Sections should be fitted so as to overlap by one-half to one full tyre width, to ensure complete coverage.

Wide single-unit rollers with over 14 tyres tend to drag and slide when turning corners; this will impose a strain on the bearings and outer frame. Such wide rollers (using up to 20 tyres) have only been found satisfactory when the tyres are given considerable play. This is done by making the inside frame a little smaller than the inside diameter of the tyres, and not clamping the tyres tightly together. It is generally considered, however,

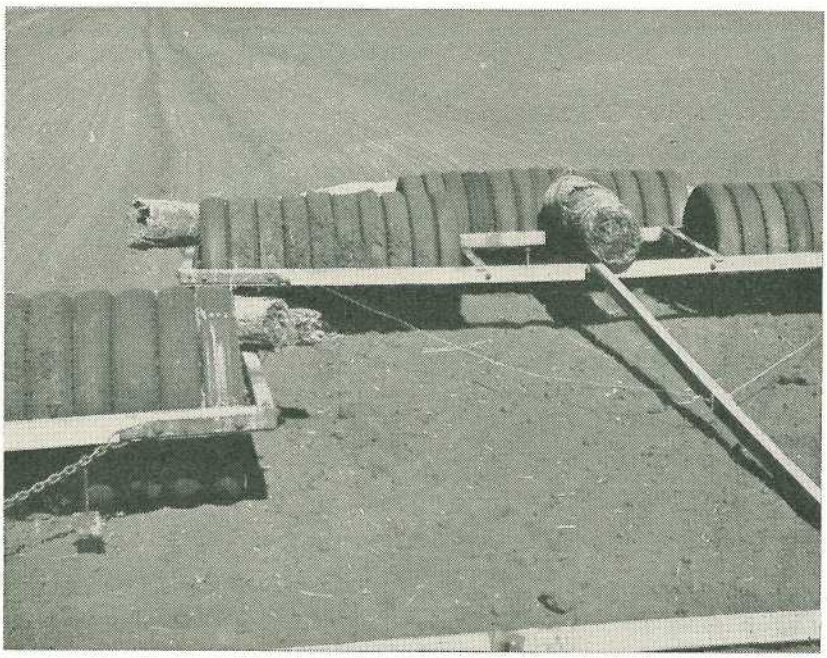

Plate 4.

A Front View of Portion of the Roller Illustrated in Plate 3. This view shows further details of the overall construction and hitching arrangements.

that the best means of combining width with manoeuvrability is by the use of shorter, overlapping sections of 10 to 12 tyres each.

The construction of poles and hitches is quite simple and requires no detailed comment.

MATERIALS REQUIRED FOR A TWO-SECTION ROLLER.

The small two-section tyre-roller illustrated in Plate 1 was made by Mr. A. Kruger of Greenmount, being designed to follow a 16-run combine. This roller had overall frame dimensions of approximately 10 ft. by 6 ft. 8 in.

The approximate material used is as follows:—24 (6.00 × 16) smooth tyres (12 tyres per section); 52 ft. × 3 in. × 3 in. hardwood outer frame; 58 ft. × 3 in. × 2 in. hardwood tyre frame and support braces; 11½ ft. × 3 in. × 2 in. hardwood diagonal outer frame brace; 7 ft. × 3 in. × 2 in. hardwood pole (stayed by 2 trace chains); 15 ft. × 2½ in. × ⅜ in. soft-iron straps for outer and inner frame corners and joins; 16 ft. × 3 in. × ⅜ in. soft-iron tyre clamp straps; 4 × 1½ in. (1½ in. diameter piping) stub-axle spacing bushes; 32 (4 in.) wood screws; 10 (5in. × ½ in.) cuphead bolts; 8 (3in. × ½ in.) cuphead bolts; 2 (9 in. × ⅜ in.) cuphead bolts; 24 (4½ in. × ⅜ in.) cuphead bolts; 8 (4 in. × ⅜ in.) cuphead bolts; 4 pillow-block bearings to house 1 in. diameter steel axle; 4 × 8 in. (1 in. diameter) shaft-steel stub-axles—inner ends threaded, with nuts attached; 1 pole-bar, outer frame swivel and hitch.

Tobacco Leaf Marketing in the United States of America

By H. S. HUNTER, Director of Marketing.

PRODUCTION.

Total production of tobacco leaf in the United States of America in recent years has ranged between 2,057 and 2,332 million lb., with about 850,000 growers in the industry. In 1953, some 2,057 million lb. was harvested from 1,634,000 acres. Average yields are high by Australian standards and the 1953 figure of 1,259 lb. per acre was about normal.

The bulk of production is consumed within the U.S.A. and total exports during 1952-53 accounted for only 448 million lb., whilst at the same time imports totalled 106 million lb.

The average price per lb. received by farmers for their 1953 crop was 52·2 cents, equivalent to about 56d.

Tobacco is grown in many States. However, the major producing states are North Carolina, Kentucky, Virginia, South Carolina, Georgia, Tennessee and Maryland, which together accounted for more than 92 per cent. of the total in 1953. Flue-cured tobacco accounts for more than half the total, with light air-cured leaf making up the greater part of the balance. The relevant figures for 1953 were—flue-cured 1,272 million lb.; light air-cured 607 million lb.; other types such as dark air-cured, fire-cured and cigar types make up the balance.

This report is concerned mainly with the marketing of flue-cured types, these being similar to the type of leaf grown in Australia.

The flue-cured tobacco producing States (Virginia, North Carolina, South Carolina and Georgia) are divided into four belts which each produce a somewhat different type of leaf. These types are known as Types 11, 12, 13 and 14, and the areas to which they apply are set out below.

Type 11—Old Belt and Middle Belt flue-cured; produced in the Piedmont sections of Virginia and North Carolina. This type is further subdivided into 11*a* (Old Belt) and 11*b* (Middle Belt).

Type 12—Eastern North Carolina flue-cured; produced in the coastal sections of North Carolina, north of the South River.

Type 13—South Carolina and Border North Carolina flue-cured; produced in the coastal sections of South Carolina and the south-eastern counties of North Carolina south of the South River.

Type 14—Georgia and Florida flue-cured; produced in southern Georgia and northern Florida.

This division into types is significant from the marketing point of view, with regard to both presentation and price. However, this is commented upon later in the report.

The relative importance of the different types can be gauged from the sales figures for the 1953 crop set out below.

Type.	Lb. Sold.	Average Price Per Lb.
		Cents.
11 (a)	235,979,951	41·74
11 (b)	122,732,884	47·18
12	432,383,188	57·74
13	304,068,064	57·41
14	173,450,375	51·53
Types 11 to 14 ..	1,268,614,462	52·81

PRICE SUPPORT PROGRAMME.

Prices for tobacco leaf, in common with a number of other commodities, are supported by the United States Government through the Commodity Credit Corporation. The level of support at the time of my visit was 90 per cent. of parity. The support price guarantee is applicable only to growers who are members of a co-operative, but any grower may join a co-operative on the payment of a nominal fee of 5 dollars, which entitles him to life membership. The support price ensures a minimum average price for each grade of leaf. However, it does not apply to low-grade leaf.

Where leaf of an approved grade, grown by a co-operative member, is unsold through the normal trade channels, it is taken into the possession of the co-operative and the Commodity Credit Corporation then makes loans against it at the support level on a grade basis.

There is a three-point contract between the grower, the co-operative and the Government. The co-operative in turn has contracts with warehousemen who re-dry the leaf, pack it in hogsheads and store it until it is sold. One of the conditions imposed on growers who take advantage of this scheme is that the grower must undertake to restrict production upon demand.

All unsold leaf taken up by the co-operative is held until such time as all other leaf of that season has been sold. The grower, however, receives payment at the support price based on the official Government grades. At the conclusion of sales through normal trading channels the leaf held by the co-operative is sold at a price sufficient to cover all costs such as re-drying, storage, fumigation, interest, &c., plus a small profit.

Prices are fixed for each grade and these are then increased each month that the leaf remains unsold to cover the costs. Since leaf improves through maturation for up to two years provided it has been redried and properly stored, the co-operative can always command the additional price loading on this leaf.

The co-operative is financed initially by means of an advance from the Government over and above the support price (90 per cent. of parity) on leaf handled, and this advance is repaid out of the proceeds of sales. Any profits which remain after expenses have been met and the Government advance repaid are returned to growers. However, no distribution is made to growers until all leaf of a particular season in the hands of the co-operative has been sold.

The national marketing quota under the price support scheme during 1953 resulted in acreage allotments totalling 1,044,500 acres for flue-cured tobacco. In a referendum conducted in July 1952, quotas were approved by growers for the seasons 1953 (1,044,500 acres), 1954 (1,053,000 acres) and 1955 (1,011,000 acres). The acreage restrictions apply to all growers whether or not they are members of a co-operative.

The overall Commodity Credit Corporation loan level for 1953 and 1954 was 47·9 cents per lb. For tobacco marketed in "tied" form (types 11 to 13), rates for the 1954 crop ranged from 13 to 73 cents for the various grades on the schedule. Rates by grades for "untied" leaf (type 14) were set at 5 cents per lb. below those for "tied" leaf.

The co-operative organisation to which growers in the flue-cured tobacco States belong is known as the "Flue-cured Tobacco Co-operative Stabilisation Corporation." Under the price support program a total of 151·4 million lb. of leaf, or 11·9 per cent. of the crop, was taken in by this organisation during 1953. Information concerning this co-operative is given later in the report.

GRADING.

There are three general aspects of grading of flue-cured leaf in the United States—(*a*) the growers' preliminary grading; (*b*) the Government grades; and (*c*) the manufacturers' grades.

(a) Growers' Grading.

When submitting his leaf the grower follows a simple system of grading under which he divides his leaf into separate lots as the crop seems to the grower to demand. Attention is paid to plant position, quality, colour and special factors so that as far as possible each lot contains only one type of leaf.

(b) Government Grades.

A system of Government grading is operated under the Tobacco Inspection Act of 1935 through the Tobacco Division of the United States Department of Agriculture, which maintains a staff of 32 supervisors and 432 inspectors for this purpose. This service is free and mandatory on those markets which favour the service by a two-thirds majority vote of growers selling on such markets. All leaf is inspected and graded by this staff after being placed on the display floor and before being offered for sale. The official grade is entered on a ticket on top of each offering and is thus available for inspection by both growers and buyers. Full records of prices by grades are kept, and as the grades do not vary they form a valuable basis for comparison for growers, buyers, and other agencies from sale to sale and from season to season.

A complete daily market news service is also provided by the U.S.D.A. under the Tobacco Inspection Act of 1935, and this keeps the farmer informed on details of the previous day's sales. Information provided includes quantities, average prices, Government grades and the Government's advance price. The Government grades also play an important role in the support price programme previously outlined.

Graders' Schools are held periodically by the U.S.D.A. to ensure that the Government grading is kept uniform and any wastage among inspectors is made good by the recruitment and training of young men with experience in tobacco growing.

The system of grading by the U.S.D.A. consists of the classification of the leaf according to four main quality determinants, namely group, quality, colour and special factor. Within each of these broad classes there are a number of elements and any particular grade is made up of a combination of four elements, one from each of the four main classes. The key to the classification system is given below, whilst the standard grades are listed in Appendix 1.

KEY TO STANDARD GRADE MARKS FOR FLUE-CURED TOBACCO.

Group.	Quality.	Colour.	Special Factor.
A—Wrappers	1—Choice	L—Lemon	V—Greenish
B—Leaf	2—Fine	F—Orange	GL—Light Green
H—Smoking Leaf	3—Good	R—Red	GF—Medium Green
C—Cutters	4—Fair	S—Mahogany	GR—Dark Green
X—Lugs	5—Low	D—Walnut	KR—Dappled
P—Primings	6—Poor	K—Variegated	W—Unsafe Order*
N—Nondescript		M—Mixed	
		G—Green	U—Unsound†

* Unsafe Order—Sound but containing excess moisture which is likely to damage unless unusua precaution is taken.

† Unsound—Damaged under 20 per cent.

(c) Manufacturers' Grades.

Each manufacturer has his own grading system which, presumably, is based on the requirements of his own business. However, manufacturers have been known to purchase on the Government standard grades without inspection.

METHOD OF SALE.

The method of sale in the U.S.A. is that of auction. The procedure is for the leaf to be displayed in open shallow baskets on a warehouse auction floor which is usually owned by a warehouse company. Flue-cured types 11 to 13 are marketed in "tied" form, whilst type 14 is marketed "untied." The maximum allowable weight per basket for flue-cured leaf is 300 lb. However, the average weight per basket in 1953 was only 158 lb., rather similar to the average weight of a Queensland bale. In Kentucky, burley and other air and fire-cured tobacco has a maximum limit of 700 lb. per basket.

Following delivery to the auction floor the leaf is inspected and labelled with the appropriate standard grade by a Government grader. The auction is conducted over each bale with the auctioneer and buyers moving rapidly up and down the rows of baskets. Only a very short time is spent over each bale and during this time the buyer has to assess the value of the leaf as well as bid for it. There is no inspection of leaf by buyers before the sale commences. The buyers are followed by assistants who check each offering to ensure that the visible hands provide a reliable indication of the offering.

Both grower and buyer have the option of rejecting a sale within a reasonable time after it has been knocked down at auction, the grower if he is not satisfied with the price and the buyer if he considers the overall quality of the offering is not up to the standard of the hands visible at the time of sale.

Some idea of the speed of auction can be gauged from the fact that the maximum selling rate is 400 baskets per hour per set of buyers, or one basket every 9 seconds. Selling is carried out on a 5½-hour day basis, which means at the maximum selling rate some 2,200 lots, approximately 155 tons, per day per set of buyers. The maximum rate is not always adopted, however, and during the 1954 sales some adjustments were made, the selling rates being reduced by up to 50 per cent. for the first few weeks of the selling season.

As a further instance of the speed at which leaf passes through the auction floors it might be mentioned that in Danville, Virginia, where there are 20 warehouses, leaf was sold at the rate of 1,600,000 lb. a day, the total quantity sold at this centre alone in 1953 being some 80 million lb.

Appendix 2 shows average prices realised for the various types of flue-cured leaf during the 10 years ended 1954.

The sale of the flue-cured crop in the United States normally occupies the period from July to December each year, However, all centres are not selling throughout this period. The following tabulation gives the approximate selling periods for the various types of flue-cured leaf which operated during the 1954-55 season and will serve as a guide. The periods vary from year to year by a few weeks.

Type.	Opening Date.	Closing Date.
11 (*a*)	13th September	23rd November to 13th January
11 (*b*)	23-24th August	12th November to 10th December
12	16th August	27th October to 8th December
13	2nd August	23rd September to 29th October
14	15th July	11th August to 3rd September

Leaf which has been sold is removed by the buyer or his agents to a redrying plant where it is redried and stored for maturation for periods of up to two years or more.

If the price at auction is below the support price for the respective grade and the leaf is from a grower who is a member of a co-operative and that grower rejects the sale, the leaf automatically passes to those administering the Government price support scheme. However, this leaf is also immediately sent to a redrying plant before storage.

REDRYING.

The first destination of all leaf after offer at auction is a redrying plant. This applies whether the leaf is unsold or is bought by a manufacturer or dealer for local use or export. The leaf at this stage—that is, after curing but before redrying—is referred to as "green" leaf, and before being placed into storage for maturation it is redried and packed in hogsheads. Following this the leaf is stored in warehouses for periods of up to two years or more before use in manufacture.

The redrying process is completely mechanised and an idea of size can be gauged from the fact that one fully enclosed plant inspected covered a length of 165 feet. The redrying process is divided into three stages—(1) the drying of the leaf right out under temperatures of up to 200°F.; (2) cooling; and (3) the restoration of moisture in the leaf to the desired content.

The American practice is a moisture content of 10 to 11½ per cent., whilst orders for the United Kingdom are conditioned to a moisture content of not more than 10 per cent. owing to considerations relating to import duty. The reason for the higher American moisture content was stated to be that the leaf matures better at the higher figure.

In the process of redrying, the leaf, in hands strung on sticks, is carried on a conveyor from one end of the machine to the other. The drying is carried out as the sticks pass heated coils and the leaf is then cooled by rotating fans 10 to 12 feet in diameter. Finally, steam is injected to restore moisture to the desired percentage.

The principal manufacturers of redrying machines are Proctor-Swartz & Co. of Philadelphia.

PACKING AND HANDLING.

After removal from the redryer, the tobacco leaf is pressed into hogsheads, which are mostly assembled on the premises. These measure 47 in. in diameter by 47½ in. high and hold from 900 to 1,000 lb. of leaf. The hogsheads are not airtight, but it was stated that under American conditions the leaf would keep indefinitely in this form provided it was suitably stored.

Filled hogsheads are given great mobility in factories, etc., by the use of circular rings mounted on four small wheels on which the hogshead is placed. Motive power is provided by fork-lift trucks, the "fork" being replaced by a semi-circular band which grips the hogshead. The hogsheads may be turned on their sides for stacking one upon another, the second layer resting in the beds formed by the layer below. This method of handling is standard throughout the country.

STORAGE.

An inspection was made of stores owned by warehousemen co-operating in the price support scheme. These stores were merely large sheds which could be sealed for fumigation purposes. It was stated that weevil and other insect pests were kept in check very largely by spraying with ordinary pyrethrum sprays. However, where infestation warrants it, fumigation is carried out with cyanide. It should be mentioned, however, that climatic conditions in America are very different from those in Queensland, and the severity of the winters undoubtedly has much effect on the insect pest problems in tobacco.

THE FLUE-CURED TOBACCO CO-OPERATIVE STABILIZATION CORPORATION.

Frequent mention has been made in earlier sections of this report of the part played by growers' co-operatives in the marketing of tobacco leaf in America, particularly in relation to the operations of the Commodity Credit Corporation and the support price plan which it operates.

The co-operative which handles virtually all of the flue-cured leaf (types 11 to 14) coming under the price support plan is known as the Flue-cured Tobacco Co-operative Stabilisation Corporation. This co-operative is owned and controlled by tobacco grower members (numbering 487,581 at the time of my visit) and covers the flue-cured tobacco producing States of Virginia, North and South Carolina, Georgia and Florida, with its headquarters in Raleigh, North Carolina.

The purpose of the co-operative is to assist in the stabilisation of the price of tobacco leaf at a minimum of 90 per cent. of parity by making available to the growers of flue-cured tobacco the support price provided by the Commodity Credit Corporation, performing the functions of arranging the redrying and storage of leaf accepted under the price support plan, and subsequently selling this leaf and distributing the proceeds to growers after repayment of the growers' support price loans, the co-operative's own operating loans and interest, costs, etc.

The co-operative was incorporated on 1st June, 1946, and commenced operations on 12th August, 1946, and up to the end of the 1954 season had handled a total of 1,175 million lb. of leaf under the price support plan. The quantity handled under the plan in 1954 alone was 130 million lb., or nearly 10 per cent. of the 1954 flue-cured crop.

Only growers of flue-cured tobacco may become members and membership is achieved by the purchase of one share of common stock at a price of 5 dollars. The moneys so obtained have been used for the erection and equipment of offices, with the balance being invested in Government securities. The directors of the co-operative are elected by the grower stockholders at an annual general meeting.

All and only members are entitled to place tobacco in the Stabilisation Corporation under the price support plan provided that they are not exceeding their acreage allotments. In the event of a grower's

leaf not exceeding the support price at auction and the grower rejecting the sale, the leaf is taken in by the Co-operative and the grower is paid the support price (90 per cent. of parity in the case of flue-cured leaf) on a grade basis.

The finance for this purpose is made available to the Co-operative by the United States Government through the Commodity Credit Corporation. The money is, however, in the form of a loan and is repayable if and when the leaf is sold by the co-operative and then only to the extent to which the price realised covers the loan.

Once a grower's leaf is accepted by the Co-operative under the price support plan, it loses its identity except to the extent that a full record is kept of the weights and Government grades of each grower. All leaf received by the Co-operative is immediately redried and packed in hogsheads for storage. The Co-operative does not itself carry out the redrying, packing and storing, but enters into contracts with warehousemen who perform this function on its behalf. These contracts make full provision for entry of premises and inspection of leaf by employees of the Co-operative.

When selling the "stabilisation" leaf taken in under the price support plan the Co-operative is careful not to interfere with normal auction sales and the leaf from a current year's crop is not offered until the conclusion of that season's normal auction sales. Old crop stocks of matured leaf are, however, sold whenever a buyer is available.

The Co-operative sells the leaf at a price sufficient to cover all costs, such as redrying, storage, fumigation, interest, etc., plus a small profit if this can be obtained. Appropriate prices are fixed for each grade and these are increased each month that the leaf remains unsold to take care of the additional costs. This arrangement works quite satisfactorily, as the leaf improves with age for up to two years and in any case the buyer would have to meet such costs in his own business if he had purchased direct from the auction floor.

The operations of the Co-operative are financed by means of loans from the Commodity Credit Corporation in addition to the support price which is paid to the grower. These loans are needed to cover operating expenses, storage, redrying, fumigation, packaging, etc., until such time as the leaf is sold. The tobacco leaf itself provides collateral security for the loans and interest was charged to the Co-operative at 4 per cent. on all moneys lent by the Commodity Credit Corporation for the 1953 crop.

When all the "stabilisation" leaf held by the Co-operative under the price support plan from any one season's crop has been sold and the Commodity Credit Corporation loans and interest repaid and operating expenses deducted, any remaining balance is distributed to growers with leaf in that season's stabilisation pool. The distribution is made on a *pro rata* grade basis.

The Co-operative was at first opposed by manufacturers, but now every co-operation is forthcoming from both manufacturers and warehousemen. It is the policy of the Co-operative not to supplant any other

interest in the tobacco industry, and its function consists mainly of administering the financial and marketing sides of the price support plan under contract with the Commodity Credit Corporation. The Government interests are protected through supervision by Government inspectors and auditors.

APPENDIX 1.

SUMMARY OF STANDARD GRADES AND SUBGRADES.

6 Grades of Wrappers—

A1L	A1F	A1R
A2L	A2F	A2R

25 Grades of Normal Leaf—

B1L	B1F	B1R		
B2L	B2F	B2R		
B3L	B3F	B3R	B3S	
B4L	B4F	B4R	B4S	B4D
B5L	B5F	B5R	B5S	B5D
B6L	B6F	B6R	B6S	B6D

16 Smoking Leaf Grades—

H1L	H1F	
H2L	H2F	
H3L	H3F	H3R
H4L	H4F	H4R
H5L	H5F	H5R
H6L	H6F	H6R

10 Grades of Normal Cutters—

C1L	C1F
C2L	C2F
C3L	C3F
C4L	C4F
C5L	C5F

10 Grades of Normal Lugs—

X1L	X1F
X2L	X2F
X3L	X3F
X4L	X4F
X5L	X5F

6 Grade of Normal Primings—

P3L	P3F
P4L	P4F
P5L	P5F

10 Grades of Variegated Tobacco—

B4K	C4K	X4K	B4KR	
B5K	C5K	X5K	B5KR	C5KR
B6K				

8 Mixed Grades—

B4M	C4M	X3M
B5M	C5M	X4M
B6M	..	X5M

12 Grades of Greenish Tobacco—

B3LV	B3FV	..	X3LV	X3FV
B4LV	B4FV	C4LV	X4LV	X4FV
B5LV	B5FV	C5LV		

14 Grades of Green Tobacco—

B4GL	B4GF	B4GR	X3G	
B5GL	B5GF	B5GR	X4G	P4G
B6GL	B6GF	B6GR	X5G	P5G

12 Grades of Nondescript—

N1L	N2L	Decayed (N3)
N1D	N2D	Botched (N4)
N1GL	N2GL	Nested (N5)
N1GR	N2GR	Off-type (N6)

APPENDIX 2.

FLUE-CURED TOBACCO LEAF—AVERAGE PRICES REALISED BY TYPES, 1945 TO 1954.

Season.	Type 11 (a).	Type 11 (b).	Type 12.	Type 13.	Type 14.	Types 11-14.
			CENTS PER LB.			
1945	44·44	44·02	44·19	43·95	39·55	43·67
1946	43·63	47·20	52·68	50·28	43·20	48·46
1947	38·26	42·65	43·48	42·44	38·06	41·46
1948	49·63	50·99	50·03	51·11	47·48	50·01
1949	46·04	48·46	49·27	49·45	40·48	47·44
1950	53·77	56·53	56·89	55·98	48·31	55·05
1951	50·85	54·27	55·60	52·39	46·46	52·67
1952	48·72	49·88	50·98	52·42	49·40	50·47
1953	41·74	47·18	57·74	57·41	51·53	52·81
1954	52·31	52·86	55·28	51·78	46·79	52·64

Specifications of Fruit and Vegetable Packages.

By C. G. WILLIAMS, Supervisor (Preparation and Transport), Horticulture Branch.

FRUIT PACKAGES FOR QUEENSLAND SALES.

Under the Queensland Fruit and Vegetable Grading and Packing Regulations of 1953, fruits packed for sale in Queensland shall be contained in a wooden, cardboard or fibreboard package conforming in measurement and capacity to one of the standards set out in the second and third columns of Table 1.

Wooden packages shall be manufactured from seasoned hardwood or softwood smoothly sawn and dressed and constructed according to the specifications set out in the fourth column of Table 1.

Cardboard or fibreboard packages shall be sufficiently durable to withstand conditions likely to be experienced during handling and transport of such packages to any destination.

Although it is not obligatory for a grower to use a particular package for a certain type of fruit, each package must be well filled with the variety of fruit of uniform grade packed in accordance with methods approved by the Department. The grower is therefore advised to use the packages recommended in the fifth column of Table 1.

TABLE 1.

SIZES AND SPECIFICATIONS OF FRUIT AND VEGETABLE PACKAGES.

Case.	Inside Measurements. (Inches.)	Capacity. (Cubic Inches.)	Timber Specifications.	Kind of Produce for which Package is Used.
Tropical Fruit Case	24¾ long, 12 wide, 12 deep	3,564	Ends—Two pieces each 12 in. long by 6 in. wide, by ¾ in. thick Sides—Pieces each 26¼ in. long by $\frac{5}{16}$ in. thick, aggregating 11 in. in width. No piece to be under 3 in. in width Tops and bottoms—Two pieces each 6 in. wide or three pieces each 4 in. wide, 26¼ in. long by $\frac{5}{16}$ in. thick Cleats—Four pieces placed on each end of the case parallel to the sides, each 12 in. long by 2 in. wide, by $\frac{5}{16}$ in. thick	Pineapples, papaws, granadillas, rockmelons, vegetable marrows, carrots, beans for the interstate trade

TABLE 1.—*continued.*

SIZES AND SPECIFICATIONS OF FRUIT AND VEGETABLE PACKAGES—*continued.*

Case.	Inside Measurements. (Inches.)	Capacity. (Cubic Inches.)	Timber Specifications.	Kind of Produce for which Package is Used.
Standard Banana Case	21 long, 12 wide, 12 deep	3,024	Ends—Two pieces each 12 in. long by 6 in. wide by $\frac{3}{4}$ in. thick Sides—Pieces each 22½ in. long by $\frac{5}{16}$ in. thick, aggregating 11 in. in width. No piece to be under 3 in. in width Tops and bottoms—Two pieces each 6 in. wide or three pieces each 4 in. wide, 22½ in. long by $\frac{5}{16}$ in. thick Cleats—Four pieces placed on each end of the case parallel to the sides, each 12 in. long by 2 in. wide by $\frac{5}{16}$ in. thick	Bananas and marrows
Special Pine-apple Case	24¾ long, 12 wide, 10 deep	2,970	Ends—One piece 6 in. wide and one piece 4 in. wide, 12 in. long and $\frac{3}{4}$ in. thick Sides—One piece 6 in. wide and one piece 4 in. wide, 26¼ in. long, and $\frac{5}{16}$ in. thick Tops and bottoms—Two pieces each 6 in. wide or 3 pieces each 4 in. wide, 26¼ in. long by $\frac{5}{16}$ in. thick Cleats—Four pieces placed on each end of the case parallel to the sides, each 10 in. long by 2 in. wide, by $\frac{5}{16}$ in. thick	Pineapples for long - distance transport
One Bushel Dump Case	18 long, 8⅜ wide, 14¼ deep	2,223	Ends—One or two pieces 14¼ in. long by $\frac{5}{8}$ in. thick, aggregating 8⅜ in. in width Sides—Pieces 19¼ in. long by ¼ in. thick, aggregating 13½ in. in width. No piece to be under 3 in. in width Tops and bottoms—Pieces 19¼ in. long by ¼ in. thick, aggregating 8½ in. in width. No piece to be under 3 in. in width	Apples, pears, citrus, papaws, mangoes, rosellas, rockmelons, cucumbers, beans, lettuce, carrots

TABLE 1.—*continued.*

SIZES AND SPECIFICATIONS OF FRUIT AND VEGETABLE PACKAGES—*continued.*

Case.	Inside Measurements. (Inches.)	Capacity. (Cubic Inches.)	Timber Specifications.	Kind of Produce for which Package is Used.
Canadian Standard Bushel Case	18 long, 11½ wide, 10½ deep	2,173½	Ends—One or two pieces 10½ in. long by ⅝ in. thick, aggregating 11½ in. in width Sides—Pieces 19¼ in. long by ¼ in. thick, aggregating 10½ in. in width. No piece to be under 3 in. in width Tops and bottoms—Pieces 19¼ in. long by 3/16 in. thick, aggregating 11 in. in width. No piece to be under 3 in. in width Cleats—Four pieces, one each end, top and bottom, each 11½ in. long by ¾ in. wide by ⅜ in. thick	Apples and citrus fruits
Long Bushel Case	26 long, 6 wide, 14¼ deep	2,223	Ends—One piece 14¼ in. long by 6 in. wide by ⅝ in. thick Sides—Pieces 27⅞ in. long by ¼ in. thick, aggregating 13½ in. in width. No piece to be under 3 in. in width Tops and bottoms—Two pieces each 27⅞ in. long by 3 in. wide by ¼ in. thick This case has a central division of the same dimensions as the end pieces	Pears and mangoes
Half Bushel Dump Case	18 long, 8⅜ wide, 7⅛ deep	1,111½	Ends—One piece 7⅛ in. long by 8⅜ in. wide by ⅝ in. thick Sides—Pieces 19¼ in. long by ¼ in. thick, aggregating 7¼ in. in width. No piece to be under 3 in. in width Tops and bottoms—Pieces 19¼ in. long by ¼ in. thick, aggregating 8 in. in width. No piece to be under 3 in. in width	Stone fruits, apples, passion fruit, grapes, tomatoes, citrus fruits, custard apples, strawberries (punnets), persimmons, pear-shaped avocadoes. This case is frequently best packed when made up on the narrow 7⅛ in. width

TABLE 1.—*continued.*

SIZES AND SPECIFICATIONS OF FRUIT AND VEGETABLE PACKAGES—*continued.*

Case.	Inside Measurements. (Inches.)	Capacity. (Cubic Inches.)	Timber Specifications.	Kind of Produce for which Package is Used.
Flat Half Bushel Case	18 long, 11½ wide, 5¼ deep	1,086¾	Ends—One piece 11½ in. long by 5¼ in. wide by ⅝ in. thick Sides—One piece 19¼ in. long by 5¼ in. wide by ¼ in. thick Tops and bottoms—Pieces 19¼ in. long by ¼ in. thick, aggregating 12 in. in width. No piece to be under 3 in. in width Cleats—Two pieces placed on the lid each 12 in. long by 2 in. wide by ⅜ in. thick	Grapes, apricots, peaches, passion fruit, tomatoes, custard apples
Flat Half Bushel Grape Case	18 long, 10½ wide, 6 deep	1,134	Ends—One piece 10½ in. long by 6 in. deep by ⅝ in. thick Sides—One piece 19¼ in. long by 6 in. wide by ¼ in. thick Tops and bottoms—Pieces 19¼ in. long by ¼ in. thick, aggregating 11 in. wide. No piece to be under 3 in. in width Cleats—Two pieces placed on the lid, each 11 in. long by 2 in. wide by ⅜ in. thick	Grapes packed on the narrow width, round-shaped avocadoes, custard apples, papaws in a single layer or two layers of small fruit
Long Half Bushel	26 long, 6 wide, 7⅛ deep	1,111½	Ends—One piece 7⅛ in. long by 6 in. wide by by ⅝ in. thick Sides—Pieces 27⅞ in. long by ¼ in. thick, aggregating 6½ in. in width. No piece to be under 3 in. in width Tops and bottoms—27⅞ in. long by 6 in. wide by ¼ in. thick. This case has a central division of the same dimensions as the end pieces	Tomatoes and passion fruit
Tray	18 long, 14¼ or 11½ wide. Any depth not exceeding 4 deep	..	Thickness of timber similar to flat half-bushel case. Tops and bottoms and side pieces not to be under 3 in. in width	Most fruits

TABLE 1.—*continued.*

SIZES AND SPECIFICATIONS OF FRUIT AND VEGETABLE PACKAGES.—*continued.*

Case.	Inside Measurements. (Inches.)	Capacity. (Cubic Inches.)	Timber Specifications.	Kind of Produce for which Package is Used.
One Quarter Bushel Case	13¾ long, 10⅛ wide, 4 deep	556⅞	Ends—One piece 10⅛ in. long by 4 in. wide by ½ in. thick Sides—One piece 14¾ in. long by 4 in. wide by ¼ in. thick Tops and bottoms—Pieces 14¾ in. long by ¼ in. thick, aggregating 10 in. in width. No piece to be under 3 in. in width	Apricots, cherries, cape gooseberries, cumquats
Strawberry Punnet	8 long, 4 wide, 1¼ deep	40	This package is made of cardboard or chipwood	Strawberries, cape gooseberries, mulberries
Fig Box ..	8¼ long, 6 wide, 1½ deep	74¼	This package is made of cardboard or chipwood	Figs
Strawberry Box	11¼ long, 8⅜ wide, 3 deep	282⅝	Ends—One piece 8⅜ in. long by 3 in. wide by ⅜ in. thick Sides—One piece 12 in. long by 3 in. wide by ⅛ in. thick Tops and bottoms—Two pieces 12 in. long by 4 in. wide by ⅛ in. thick	Strawberries in bulk for jam making

VEGETABLE CONTAINERS.

Beans, beetroot, cabbage, carrots, cauliflowers, garlic, onions, parsnips and peas are marketed in open hessian bags, whilst crates are used for squashes, marrows and celery. Potatoes, swede turnips and pumpkins are marketed in jute bags described in the trade as Chapman sacks.

Cabbages and cauliflowers were formerly marketed in chaff bags but it is now standard practice to use the recognised open-mesh 7½ oz. hessian cabbage bag with dimensions of 40 in. deep x 30 in. wide for such vegetables. This type of bag is easier to handle and stack. When well packed it should contain from 12 to 15 cabbages or cauliflowers according to size, and should hold approximately 110 lb. of produce.

In Queensland the 7½ oz. hessian open-mesh small bean bag with dimensions of 29 in. deep x 18 in. wide is most commonly used for beans and peas. Beetroot, carrots, garlic and parsnips are bagged in a larger open hessian bag measuring 40 in. deep x 24 in. wide. This container is also used in many instances for beans and peas, particularly when such produce has to be transported by road over long distances. A bag of intermediate size is frequently used for the bagging of peas, such bag being 36 in. deep x 22 in. wide.

The use of second-hand sugar bags as containers for beans and peas is not recommended, as these containers do not provide sufficient ventilation and it is not uncommon for beans and peas packed in them to arrive on the market in a sweated and unsaleable condition. The uncleanliness of these second-hand bags is also a factor militating against their use. All beans and peas must be thoroughly cooled (and if wet, dried) prior to bagging.

Firmly packed bags always command better prices. The small bags mentioned above should contain from 35 to 40 lb. of beans and peas and the larger bags between 60 and 70 lb. of produce if well and carefully packed.

A special open-mesh coloured onion bag is now in general use in Queensland. This bag contains approximately 56 lb. of onions. The colouring adds to the attractiveness of the pack.

The general practice for interstate marketing of marrows, beans and carrots is to case such produce in the tropical fruit case, measurements of which are 24¾ in. long x 12 in. wide x 12 in. deep.

As all lettuce marketed is grown in proximity to a local market, the containers in general use are dump bushel cases, packed on the flat. These containers hold approximately 12 head of first-grade lettuce and are usually marketed without lids.

OVERSEAS EXPORT OF FRUIT.

Under the Commonwealth Export (Fresh Fruit) Regulations certain conditions must be complied with in respect to fresh fruit intended for export.

1. Fruit shall be packed in accordance with a method approved by the Secretary in clean new boxes or trays—

(*a*) which are suitable in respect of size, nature and durability;

(*b*) which are sufficiently strong to withstand such handling as is ordinarily incidental to transport to destinations beyond the Commonwealth;

(*c*) which are free from any insect, fungus, bacterium, virus, parasite, unsightly staining, gum vein, or other contamination likely to render the boxes or trays unfit for the packing of fresh fruit; and

(*d*) which are manufactured from seasoned softwood or hardwood—

(i.) which contains—(1) in the case of boxes used for pears not more than 20 per centum of moisture; and (2) in the case of boxes used for fruit other than pears, not more than 25 per centum of moisture;

(ii.) which is smoothly sawn or dressed in a manner approved by the Secretary and

(iii.) the outside edges of which are, where necessary, trimmed in a manner approved by the Secretary.

Fruit Packages.

2. (i.) Each kind of fruit shall be packed only in boxes or trays of the dimensions specified in the following table in respect of that kind of fruit:—

SIZES OF EXPORT PACKAGES FOR FRUIT.

Description of Box or Tray.	Inside Measurement in Inches (Clear of Divisions).			Kind of Fruit for which Box or Tray shall be Used.
	Length.	Depth.	Width.	
Australian apple box ..	18	14¼	8⅞	Apples
Australian half box ..	18	7⅛	8⅞	Apples and stone fruits
Citrus	24	11½	11½	Citrus fruits
Grape	24 5/16	6½	12½	Grapes
Long half box	26	7⅛	6	Stone fruits
Long pear box	26	14¼	6	Pears
Pineapple	24¾	10	12	Pineapples
Standard apple box ..	18	10½	11½	Apples
Standard half box ..	18	5¼	11½	Apples and stone fruits
Standard pear box ..	18	8½	11½	Pears
Tray	18	Any depth not exceeding 4 in.	14¼	All fruits
Tray	18	Any depth not exceeding 4 in.	11½	All fruits
Tropical	24¾	12	12	Pineapples

A box described as "Australian apple box" shall be constructed in accordance with the following specifications:—

(*a*) Each end shall measure 8⅞ in. wide by 14¼ in. deep by ⅝ in. thick and shall be made of one piece, or of two pieces effectively joined.

(*b*) Each side shall consist of two, three or four pieces each piece being 19¼ in. long by ¼ to ⅜ in. thick and not less than 3¼ in. wide, the combined width of all pieces being not less than 13¼ in.

(*c*) The top shall consist of—

(i.) One piece being 19¼ to 19 5/16 in. long by 3/16 in. to ¼ in. thick by not less than 8¼ in. wide; or

(ii.) Two pieces, each piece being 19¼ to 19 5/16 in. long by 3/16 to ¼ in. thick by not less than 4 in. wide, the combined width of both pieces being not less than 8¼ in.

(*d*) The bottom shall consist of—

(i.) One piece being 19¼ in. long by ¼ to 5/16 in. thick by not less than 8¼ in. wide; or

(ii.) Two pieces, each piece being 19¼ in. long by ¼ to 5/16 in. thick by not less than 4 in. wide, the combined width of both pieces being not less than 8¼ in.

(*e*) The sides, top and bottom of a box shall not project over the ends.

A box described as "Citrus" which is manufactured from softwood shall be constructed in accordance with the following specifications:—

(*a*) Each end shall measure 11½ in. by 11½ in. by 11/16 in.

(*b*) Each centre board shall measure 11½ in. by 11½ or 12 in. by 11/16 in.

(*c*) Each side and bottom shall be composed of two or three boards each of which shall measure 26$\frac{1}{16}$ in. by not less than $\frac{1}{4}$ in. by 5$\frac{1}{4}$ in. when two boards are used and 26$\frac{1}{16}$ in. by not less than $\frac{1}{4}$ in. by 3$\frac{3}{8}$ in. when three boards are used.

(*d*) The top shall consist of two, three or four boards, each 26$\frac{5}{16}$ in. long and $\frac{3}{16}$ in. thick, which shall be securely fastened at each end to a cleat before the top is nailed to the box. Each cleat shall measure 11$\frac{1}{2}$ in. by 1 in. by $\frac{3}{8}$ in.

(*e*) An aperture $\frac{1}{2}$ in. wide shall be allowed between boards comprising the sides, bottom and top.

(*f*) The inside top edges of the sides, end and centre board shall be chamfered.

(*g*) The box shall be wired at each end against the inside edge of the cleat with the twitch on the side of the box and shall be centre strapped.

A box described as "Grape" shall be constructed in accordance with the following specifications:—

(*a*) The centre and end boards shall be not less than $\frac{9}{16}$ in. in thickness.

(*b*) The sides and the top, and bottom boards shall be not less than $\frac{1}{4}$ in. in thickness.

A box described as "Long pear box" shall be constructed in accordance with the following specifications:—

(*a*) Each end and each centre partition shall measure 6 in. wide by $\frac{3}{8}$ in. thick by 14$\frac{1}{4}$ in. deep. A tolerance of $\frac{1}{32}$ in. in the thickness of dressed boards may be permitted. Ends and centre partitions shall be of one or two pieces. Two-piece ends and centre partitions shall be uniform in thickness and evenly joined, using two corrugated fasteners on one side and one on the opposite side.

(*b*) Each side shall consist of two, three, four or five boards each 27$\frac{7}{8}$ in. long by $\frac{1}{4}$ in. thick by not less than 2$\frac{1}{4}$ in. wide with a maximum spacing of $\frac{3}{8}$ in. between any two boards. Dressed hardwood may be $\frac{3}{16}$ in. thick. Boards at the top of the box shall be flush with the ends and the centre partition.

(*c*) The bottom shall consist of one or two boards each 27$\frac{7}{8}$ in. long by $\frac{1}{4}$ in. thick by not less than 2 in. wide with a maximum spacing of $\frac{3}{8}$ in. between boards. Dressed hardwood may be $\frac{3}{16}$ in. thick. Edges of bottom boards shall be flush with the edges of the ends and of the centre partition.

(*d*) The lid shall be a single board 27$\frac{7}{8}$ in. long by $\frac{1}{4}$ in. thick by not less than 5$\frac{3}{4}$ in. wide.

(*e*) The centre partition shall be centrally placed and parallel with the ends.

(*f*) Each board shall be fastened with at least two nails at each end and centre partition.

The specifications for the pineapple and tropical boxes are given in Table 1. Wherever the measurements of a box or tray, other than the measurements of the thickness of any timber, vary by not more than $\frac{1}{8}$ in. from the measurements specified, the provisions of the specifications shall be deemed to have been complied with.

A box described as "Standard apple box" shall be constructed in accordance with the following specifications:—

(*a*) Each end shall measure 11$\frac{1}{2}$ in. by 10$\frac{1}{2}$ in. by not less than $\frac{5}{8}$ in. nor more than $\frac{3}{4}$ in.

(*b*) Each side shall be 10½ in. wide by not less than 19¼ in. nor more than 19½ in. long. If made of softwood, it shall be of one piece or two pieces $\frac{5}{16}$ in. thick. If made of hardwood, it shall be of one piece ¼ in. thick or of two pieces $\frac{5}{16}$ in. thick.

(*c*) The bottom shall be not less than 19¼ in. nor more than 19½ in. long. If made of softwood it shall be of two pieces each 5½ in. wide by $\frac{3}{16}$ in. thick. If made of hardwood, it shall be of one, two or three pieces aggregating 11 in. wide by $\frac{3}{16}$ in. thick. If a unitized bottom is used, it shall be of two, three or four pieces aggregating 11 in. wide by not less than ⅛ in. nor more than $\frac{3}{16}$ in. thick.

(*d*) The top shall be not less than ⅛ in. nor more than ¼ in. longer than the bottom. If made of softwood, it shall be of two pieces each 5½ in. wide by $\frac{3}{16}$ in. thick. If made of hardwood, it shall be of one, two or three pieces aggregating 11 in. wide by $\frac{3}{16}$ in. thick. If a unitized top is used, it shall be of two, three or four pieces aggregating 11 in. wide by not less than ⅛ in. nor more than than $\frac{3}{16}$ in. thick.

(*e*) A cleat shall be used at each end of the top and bottom and shall be not less than 11 in. nor more than 11½ in. long by not less than $\frac{5}{8}$ in. wide by not less than $\frac{5}{16}$ in. thick.

A box described as "Standard pear box" shall be constructed in accordance with the following specifications:—

(*a*) Each end shall be 11½ in. wide by 8½ in. deep by not less than $\frac{5}{8}$ in. nor more than ¾ in. thick.

(*b*) Each side shall measure 8½ in. wide by not less than 19¼ in. nor more than 19½ in. long. If made of softwood, it shall be of one piece only, $\frac{5}{16}$ in. thick. If made of hardwood it shall be of one piece ¼ in. thick or of two pieces $\frac{5}{16}$ in. thick.

(*c*) The bottom shall be not less than 19¼ in. nor more than 19½ in. long. If made of softwood, it shall be of two pieces each 5½ in. wide by not less than $\frac{3}{16}$ in. nor more than ¼ in. thick. If made of hardwood the bottom shall be of one, two or three pieces aggregating 11 in. wide by $\frac{3}{16}$ in. thick. If a unitized bottom is used it shall be of two, three or four pieces aggregating 11 in. wide by not less than ⅛ in. nor more than $\frac{3}{16}$ in. thick.

(*d*) The top shall be not less than ¼ in. nor more than ½ in. longer than the bottom. If made of softwood it shall be of two pieces each 5½ in. wide by $\frac{3}{16}$ in. thick. If made of hardwood, it shall be of one, two or three pieces aggregating 11 in. wide by $\frac{3}{16}$ in. thick. If a unitized top is used, it shall be of two, three or four pieces aggregating 11 in. wide by not less than ⅛ in. nor more than $\frac{3}{16}$ in. thick.

(*e*) A cleat shall be used at each end of the top and bottom and shall be not less than 11 in. nor more than 11½ in. long by not less than $\frac{5}{8}$ in. wide by not less than $\frac{5}{16}$ in. thick.

OVERSEAS EXPORT OF VEGETABLES.

Under the Commonwealth Exports (Fresh Vegetables) Regulations vegetables shall be packed in clean new boxes, crates or bags which are sufficiently strong to withstand such handling as is ordinarily incidental to transport to destinations beyond the Commonwealth.

Crates in which vegetables are packed shall be of the dimensions specified in the following table in respect of the kind of vegetable:—

Description of Crate.	Inside Dimensions of Crate in Inches.	Shape of End of Crate.	Kind of Vegetables to be Packed in Crates.
Crate A ..	22½ x 15½ x 15½	Octagonal ..	Beetroot, carrots, onions, parsnips, potatoes, swede turnips, and other root vegetables
Crate B ..	25¼ x 11½ x 11½	Rectangular..	All vegetables
Crate C ..	25 x 11½ x 17½	Rectangular..	Cabbages, cauliflowers, and other leaf vegetables

Vegetables other than onions and potatoes must be packed in crates. Onions and potatoes may be packed in bags with the permission of the Secretary.

CASE CONSTRUCTION.

A well constructed case is essential, for fruit defects during transport and storage can be caused by faulty case structure. The common faults are:— (*a*) cases made of unseasoned timber which shrinks considerably; (*b*) cases made of very flimsy timber which allows the sides to bulge during

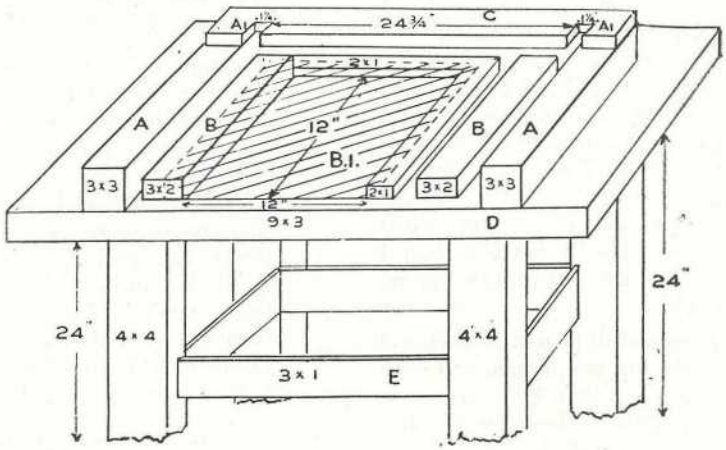

Plate 1.

Bench for Making Tropical Case, Showing Method of Attaching Case End, Template and Nail Clincher.

Specifications.—Length 42½ in.; height to underside of top 24 in.; width 24 in.

Timber.—Legs 4 x 4; outside stops (A) 3 x 3 x 13½; inside stops (B) 3 x 2 x 12; back stop 3 x 1 x 34; top (D), 3 pieces 8 x 3 to desired length; stays (E) 3 x 1.

Description.—The stops A and B are placed approximately 1½ in. apart with the back stop C placed across the back ends of A and B. A cut 1 in. deep and 1½ in. wide is made in the back stop to correspond with the slot between A and B. The back end of this cut should be 12 in. from the front of the bench. The inside stop B is placed ½ in. from the front edge.

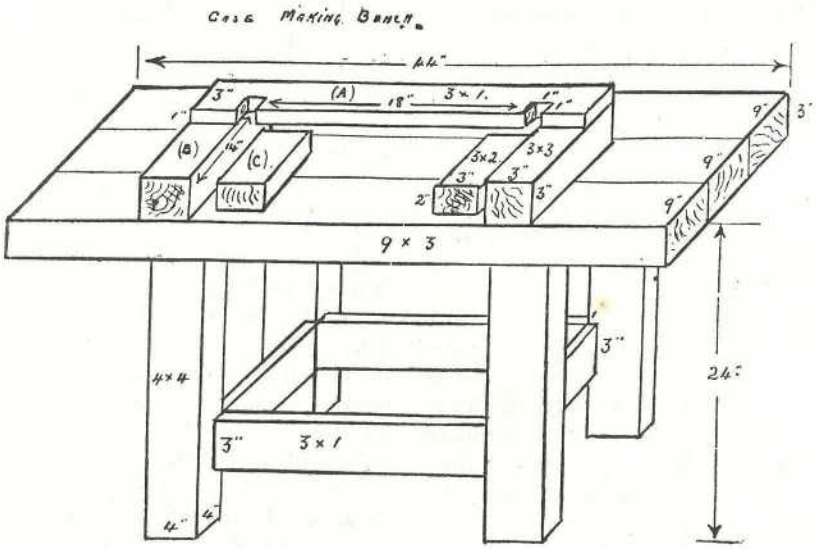

Plate 2.

Bench for Making Australian Dump, Canadian Standard, Bushel and Half-bushel Cases and Other Fruit Cases 18 in. Long, Inside Dimensions.

Specifications.—Length 44 in.; height from floor 24 in.; width 27 in.

Timber.—Legs 4 x 4; inside stops (C) 3 x 2; outside stops (B) 3 x 3; back stop (A) 3 x 1; top 9 x 3; stays 3 x 1.

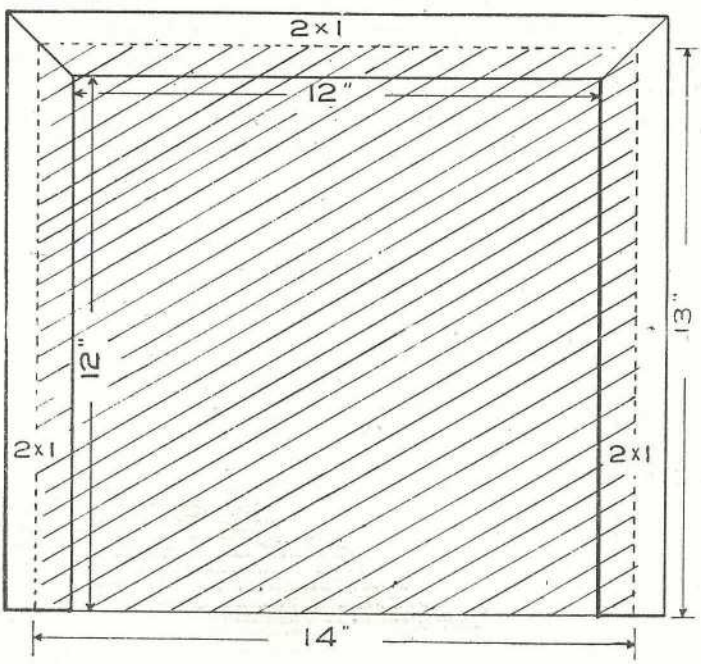

Plate 3.

Nail Clincher and Template. This can be made separately or fitted to the case-making bench. The dotted line enclosing the shaded portion shows the shape of the piece of sheet iron. The materials required are 2 pieces 2 x 1 timber, 14 in. long; 1 piece 2 x 1 timber, 16 in. long; 1 piece $\frac{1}{8}$ in. sheet iron 14 x 13.

packing, causing damage to the fruit when the case is stacked on its side; (*c*) cases constructed with too much space between the boards; and (*d*) cases made to incorrect size and specifications. Incorrect internal measurements will result in the packer improvising a pack to fit the case. Larger sized fruit has to be used for an oversized case and smaller fruit for an undersized case.

Case-making machines have come into general use in recent years. These automatic machines not only completely make the case but may be adjusted to construct cases of various sizes. Most cases, however, are still made by hand and for this purpose a case-making bench, template and nail clincher and casemaker's nail comb are useful items of equipment.

Due often to badly cut timber, many growers find difficulty in making up two-piece ends for fruit cases into correct widths. This can be easily overcome by attaching a template, in the form of a three-sided wooden frame, to the shed bench (Plates 1 and 3). A piece of flat sheet iron is placed to cover the space enclosed by the sides of the template. This acts as a nail clincher, turning the ends of the nails when the cleats used for joining the two pieces making the end are hammered on (Plate 3).

A nail comb (Plate 4) for picking nails up with all the heads in one direction will be found useful. The comb is made of a heavy piece of galvanised iron turned to clip on to the end of the nail box with a number of knitting needles soldered to the iron. The knitting needles are placed so that nails will slide between them easily, without dropping through, and remain suspended by their heads in the comb. A comb with up to 16 needles is a handy size for working, and will hold enough nails to make 10-15 cases. The needles are best placed with the ends shaped in a circular manner, the centre needles projecting about 6 inches and the side needles 5 inches. The comb is loaded by scraping or pushing it through the nails in the box. The cost of the comb is the price of four sets of knitting needles and the necessary solder.

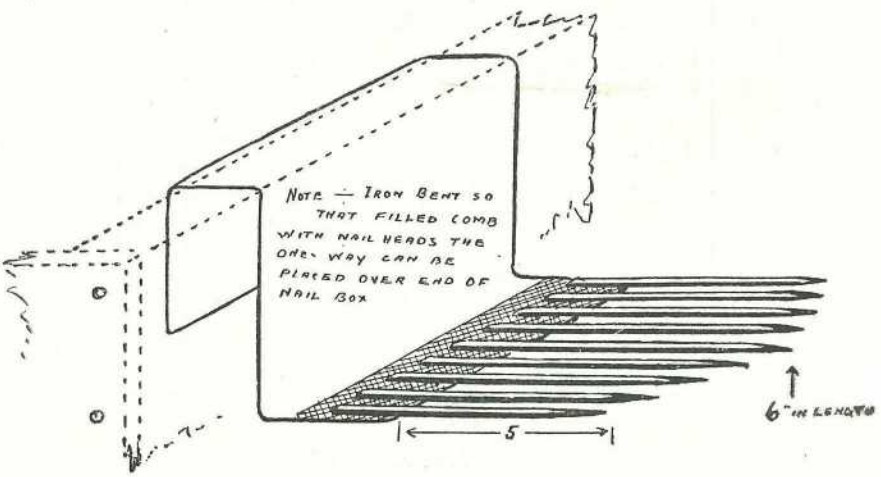

Plate 4.

Casemaker's Comb. Made of galvanised iron and knitting needles.

Fleece Measurement for Queensland Stud Masters

Part 5. Fleece Measurement as an Aid in Breeding Plans Based on Mass Selection

By G. R. MOULE, Director of Sheep Husbandry.

Most studs base their breeding plans on mass selection. This means that generally they grade their rams and ewes according to their appearance, and mate them accordingly. There is nothing to stop a ewe or ram bred in one of the lower flocks rising to a higher flock.

In a large stud the numbers of the various ewe flocks would probably be something like this:—

Top stud: 300-500 ewes.

Seconds: 800-1,200 ewes.

Ram breeding flock: 2,500-5,000 ewes.

SELECTING THE RAM REPLACEMENTS.

Allowing a 60 per cent. lamb-marking percentage, the following numbers of ram lambs would be produced:—

From ewes in the top stud: 90-150.

From ewes in the second stud: 240-360.

From ewes in ram breeding flock: 750-1,500.

It is more than likely that these rams would be run together from weaning to classing as 2-tooths. At that time the "reserve" rams would be taken off and the remainder graded for sale.

As the replacements to fulfil deficiencies in the ranks of the sires joined with the top studs will be selected next year from the reserves, particular interest attaches itself to them.

Eight to 15 rams may be required for mating with the ewes in the top flock, 20 to 30 for the ewes in the second flock and between 63 and 125 for those in the ram breeding flock. It would be unusual to replace all of these rams in one year—perhaps you would cast about a quarter of your total ram flock each year. This means your annual replacements would be in the vicinity of 40 rams.

Their final selection from amongst the reserves is the most important choice you make. The easiest way of ensuring most satisfactory results is as follows.

At the 2-tooth classing take off three times the number of reserve rams you require (that is, 120 instead of 40). Shear them and weigh and sample their fleeces. Make your final choice of 40 top rams on the results obtained from the measurement of their 2-tooth fleeces, plus the appearance of the rams themselves as 4-tooths (that is, before you mate them). The remaining 80 4-tooth rams will probably meet a ready market.

You will have to consider two other points:—

(1) What proportion of the sires joined with the top stud ewes should be replaced each year.

(2) What should happen to the rams cast from the top and second stud flocks each year.

You will recall from Part 2 of this series of articles that the rate of progress made in sheep breeding depends upon the length of each sheep generation.

Generation length is calculated from the average age at which sheep become parents, and for Merino sheep in Queensland it is somewhere in the vicinity of 5 years.

One of the most effective ways of reducing generation length is to keep the ram flock young. This can be done by replacing more than the customary one-fifth or one-quarter of the rams joined with the top stud ewes each year. The Australian system of holding rams until they are 4-tooths before mating them with ewes in the top stud tends to lengthen the time between generations. Holding top rams until they are old extends it even further.

Our knowledge about the way the characters of economic importance are transmitted by rams to their offspring makes it clear that, provided your selection is accurate, the sons will be better than their fathers! Obviously, therefore, it is better to pass over the fathers and use their sons as soon as possible. This will mean a rapid "turn-over" of rams in the top stud—you might like to replace at least half of them each year; some may like to go even further!

If you do this the second point immediately crops up—what are you going to do with the rams cast from the top stud? Provided they are still fertile they could be conveniently passed down the line to the seconds; the rams they displace from the seconds can go down to the ram breeding flock. Doing so will ensure that the progress wrought by selection is transmitted "down the line" as quickly as possible. However, any rams that sire a black lamb or one showing other serious cull points might well be discarded.

If your initial selection has been accurate, most of the reserve rams should come from the top stud, the remainder from the seconds. However, be certain that you give your young rams identical treatment; don't allow the effects of a little supplementary feeding or the use of a better paddock warp your judgment in favour of young rams bred in the top stud.

SELECTING THE EWE REPLACEMENTS.

The selection of ewes to replace those in the various flocks is not at all difficult.

You can class your maidens in the usual way, shear them and weigh the fleeces. Select more than the number of ewes you need—probably twice or three times the number—and be guided largely by breed standard. Take samples from the mid-side of the fleeces when they are weighed and forward the samples to the Wool Laboratory for scouring. No other measurements will be made on the ewe samples unless you ask for them.

The result sheet will be forwarded to you showing the average cut per head of clean scoured wool and greasy wool and percentage of yield. The sheep will be arranged in descending order of clean wool weight, so you can make your final choice upon a knowledge of the ewe herself and the way she produces.

Usually you wish to mate the ewes soon after they are classed and shorn. It does not take long to scour the wool and get the results back. However, if

more detailed measurements are required, more time will be needed by the laboratory.

The rate as which ewes are replaced in the top nucleus is important. It is best to keep the age of the ewes in this group as low as possible. This means a 20-25 per cent. replacement rate each year, including the actual culling of any ewe that produces a hairy lamb or one growing black wool, as well as those that don't lamb!

Here Is Your Time Table.

Here is an outline of a summarised time table you can follow. Draw up a similar one for your own stud before you start using fleece measurement—you will find it a most useful guide in your work.

Breeding Plan for Top Stud Nucleus—"Bulgonunna" Stud, Dartmouth, Q'l'd.:

Briefly, it is intended to set up a top stud nucleus of approximately 400 ewes. This nucleus is intended to breed ewes as replacements for itself and rams as replacements for the nucleus, plus rams for use in the second studs and ram breeding flock.

Ewes for Nucleus.

Approximately 800 ewes have already been selected and ear tagged. They comprise:—

Year Dropped.	Number.
1954	420
1953	146
1952	116
1951	84
1950	34

These sheep will be shorn in February and fleeces and bellies weighed. A mid-side sample will be taken and forwarded to the laboratory for yield determination.

It is intended to join the ewes in April, 1956 with 4-tooth rams. The final selection of ewes can be made on clean fleece weights from the 1955 shearing, as they will be available. They will be arranged within their age groups. You can make your final selection, giving preference to the younger ewes, as they will have the longer breeding life.

Selection of Rams for Nucleus.

Between 6 and 10 rams will be used for the April, 1956 joining. However, they will be 4-tooths and information on them will be available from their performance as 2-tooths in 1955. The best will be selected from that year's reserves. After mating the ewes will run together. Lambs will be mothered at joining. Hairy lambs will be noted, as also will their sire and dam.

Replacement Ewes for Nucleus.

Replacements will be made to the nucleus in 1957 from the young ewes born in 1955. Fleece measurement will be used as an aid to selection. These will be added as 2-tooths in time for the April, 1957 joining. Replacements will continue to be made prior to joining each year.

Supposing 120 ewe lambs are born as a result of the April, 1956, joining; then:—

(1) At marking, the hairy coated lambs will be culled and the number of their parents noted.

(2) These ewe lambs will be run together till after they are sampled at the second shearing.

(3) Prior to their second shearing they will be classed and faulty sheep culled. Points to consider are:—

- (*a*) Open back.
- (*b*) Wool blindness.
- (*c*) Bad hocks.
- (*d*) Black or brown wool.
- (*e*) Kemp and harshness.
- (*f*) Undershot jaw.

(*g*) Devil's grip.

(*h*) Small size.

(*i*) Defective udders.

(*j*) Wool off type (that is, too strong or too fine).

(*k*) Too much development.

(4) The remainder will be ear-tagged.

(5) At their second shearing they will be sampled for yield and greasy fleece weight recorded. The best 40-50 will be selected on clean fleece weight and enter the nucleus for the April, 1958, joining. Obviously this will not be sufficient to maintain numbers in the nucleus. Therefore ewes will have to be selected also from the second stud. Probably another 40-50 will be required and they will be chosen on appearance plus fleece weight.

The 400 nucleus ewes will be joined again in April, 1957. The same procedure will be adopted with their lambs. The best will be selected on their second shearing measurements. These will enter the nucleus for the April, 1959, joining.

Culling Ewes from Top Stud Nucleus.

Four hundred ewes will comprise the top stud nucleus. By using a 20-25 per cent. culling rate, 80-100 replacements will be required annually. This will theoretically give each ewe 4-5 joinings in the nucleus. It is probably wiser to keep the culling rates high in the ewe flock, if it does not increase the generation length.

Culls will be taken from the nucleus ewes, noting the following points:—

(*a*) Cull any ewe that has a hairy lamb or one with black wool.

(*b*) Cull any sheep that goes harsh or rough in the wool.

(*c*) Cull any sheep that is dry two matings in succession. This will be easily handled as you will be mothering at lambing.

(*d*) Cull the balance from the oldest age group after considering the points listed above.

Ram Replacements.

It is intended to keep 6-10 rams to serve the 400 nucleus ewes. After the 1956 April joining, three or more rams will be cast each year, but replacements cannot be effected from progeny bred in the nucleus until 1959. Thereafter it is preferable to allow each ram no more than two years' mating in the top stud. After that, he is passed down to the second stud to sire ewes which may be needed at some later stage as replacements in the nucleus. Replacements required up to 1959 can be selected from the best rams offering on visual appraisal and fleece measurement.

Supposing 120 ram lambs are born as a result of the April, 1956, mating; then:—

(1) At marking the hairy coated lambs or those with black wool will be culled and their parents noted.

(2) The ram lambs will be run together till after they are sampled at the second shearing.

(3) Prior to their second shearing they will be classed and the faulty sheep culled. Points to consider are:—

(*a*) Open back.

(*b*) Turkey hocks.

(*c*) Black or brown wool.

(*d*) Kemp and/or harshness of the wool.

(*e*) Undershot jaw.

(*f*) Devil's grip.

(*g*) Under size.

(*h*) Wool off type—too strong or too fine.

(*i*) Too much development.

(4) The remainder will be ear tagged.

(5) At their second shearing in February, 1958, they will be sampled and greasy fleece weights recorded. The sample will be forwarded to the laboratory for measurement of—

(*a*) Percentage yield.

(*b*) Staple length.

(*c*) Fibre diameter.

(*d*) Coefficient of variation.

They will also be assessed for trade type.

(6) When these results are returned the best rams for clean wool weight in the right quality range will be selected.

(7) These will enter the top stud nucleus for the April, 1957, joining.

(8) The next 15-20 best (to meet requirements) will be selected for use in the second stud.

The 400 nucleus ewes will be joined again in April, 1957. The same procedure will be adopted with their lambs. The best will be selected on their second shearing measurements. These will enter the nucleus for the April, 1959, joining. The next best year will be used in the second stud.

Casting Rams for Nucleus.

Three rams or more will be cast from the nucleus each year. The rapid replacement of rams in the nucleus is to decrease the generation length and increase the rate of progress. If your selection is accurate, the rams you use should leave sons better than themselves. Therefore the sooner you use the son the faster will be the progress.

As mothering will be practised at lambing, you will have some form of progeny test on your rams, especially as far as recessive faults are concerned. It is suggested that the rams with the worst record for this character be culled initially.

Because of the level of inbreeding that will result, it is unwise to keep rams for longer than three joinings in the nucleus, no matter how good. These will be accentuated if you have a nucleus flock of below 400 ewes.

[THIS SERIES IS CONCLUDED.]

"A NEW BUFFEL GRASS FOR QUEENSLAND FARMERS."

The author of the article carrying the above title in the April issue of the Journal wishes to point out that the recommendation for the regional testing of the grass concerned was made by Mr. J. F. Miles, of the Plant Introduction Section of C.S.I.R.O. Mr. Miles was officer in charge of the plant introduction station at Fitzroyvale from 1936 to 1946.

Dairying in England

By L. E. NICHOLS, Director of Research, Division of Dairying.

Dairying in the United Kingdom is based mainly on a market milk economy. Of approximately two thousand million gallons of milk produced annually, 80 per cent. is consumed as liquid milk and the remainder is diverted for manufacturing purposes, chiefly for cheese and butter.

The dairy cattle population of England and Wales numbers 3,600,000, with an average milk production of 640 gallons per cow. The main breeds are Friesians, Ayrshires, Shorthorns, Guernseys, Jerseys, and South Devons. There are about 150,000 milk producers. Intensive agriculture is practised, the average farm acreage being 70 acres carrying 15 cows per farm. Apart from good pasture, including clovers, ryegrasses, meadow fescue, timothy, and cocksfoot, much hay and silage is fed, together with concentrates.

Best use is made of hay and it is claimed a good year for hay making is indicative of a good year for dairy production. Wedge or clamp silage is proving popular and the method has been shown to be more economical than other methods of silage production. Topdressing of pastures with superphosphate, nitrogenous fertilizers and potash is a common practice in most dairying districts.

Dairy Production.

Pre-war milk production has increased from 525 gallons per cow to 680 gallons. Better feeding coupled with herd recording and progeny testing have been mainly responsible for the improvement in milk production. A concerted effort to eradicate diseases such as tuberculosis and brucellosis (contagious abortion) has also proved helpful. Improved grassland management, particularly strip-grazing, has also aided production.

Herd Recording.

Some 25,500 herds comprising 650,000 cows (approximately 22 per cent. of the cow population) are production recorded. The cost of herd recording is about 22s. per cow, of which the farmer pays 18s., compared with 7s. 6d. (37½ per cent.) paid by Queensland farmers, who record only 4½ per cent. of their cows. Purebred and grade herd recording schemes are combined and the stripout is not supervised. The general principles of the production recording scheme are similar to those of the Danish scheme, but two schemes operate—one for butterfat testing, which demands a daily weighing of milk by the farmer and eight visits per year by the tester, and another for milk yield, which involves six visits per year by the tester. Most farmers weigh the milk weekly and a check weighing is made at random intervals. Whilst a 305-day lactation is chosen for all breeds except the Friesian (365 days), there is a move towards testing right out, with the results to be reported annually. Culling is usually based on at least three lactation records.

Under the farmer's advisory herd recording scheme, it is now proposed to get the farmer to weigh the milk and prepare the lactation curve assisted by Milk Marketing Board or National Agricultural Advisory Service officers. Later these data are to be included in the official schemes.

Artificial Insemination and Sire Surveys.

Sire surveys are being conducted with progeny testing. The introduction of artificial insemination has helped the sire survey work. Well over a million cows were artificially inseminated in 1953-54, representing 46 per cent. of all cows. The selection of bulls is based on dam-daughter comparisons. However, other factors are taken into consideration; these include conformation, freedom from disease, a 700-1,000 gallon milk production, and a 4-4·5 per cent. test. Bulls are sparingly used till proven. Progeny testing is conducted, using 10 daughters with identical feeding practices. The cost per insemination is £1 sterling per cow, and 66 per cent. success is attained on the first insemination. Up to 15,000 inseminations are made per bull. Although the practice of artificial breeding is considered economical with herds up to 25 cows, larger farms and longer distances of transport present difficulties.

Developments in the deep freezing of semen for artificial breeding give promise of revolutionary trends not only in future dairy cattle breeding work, but in proving a sire before his widespread use. The technique also facilitates the transport of semen from proven sires as far afield as Australia.

Low Solids-Not-Fat Content of Milk.

There has been a tendency to breed for milk production only and the fat content and solids-not-fat percentages in milk have shown a decline. Because of the prevalence of this condition in recent years, it has been recommended that the solids-not-fat content of milk be taken into account in herd recording and in judging a bull's worth so that improvement might be effected by way of better breeding. A similar problem also exists in Australia and might best be tackled by including total solids estimations in herd recording work.

Economics of Good Feeding and Breeding.

It is claimed by the Milk Marketing Board that milk can only be produced at low cost with a high yield per acre if cows have the inherent capacity to produce high yields. Profit per gallon rises steeply when a high yield from each cow is obtained, because herd maintenance charges are spread over more gallons. Figures gathered under the Milk Investigation Scheme in England and Wales show that herds producing 480 gallons would have an annual margin between costs and sales of only £12 10s. per cow, while the 960-gallon herd has an average margin of £51 16s. That is, by doubling the yield of a cow giving 480 gallons, the margin of profit increases fourfold. On some farms, it has been possible to obtain milk yields up to 750 gallons per cow on home-grown fodder alone.

Similarly in Scotland, at the Hannah Dairy Research Institute, in a 10-year self-sufficiency drive it has been demonstrated how grassland farming alone may be used for high milk production. The average yields per cow have been 700 gallons per annum and the output has been reasonably developed throughout the year, winter production being well maintained. The results have been achieved simply by adopting a system of improved grassland management, rotational grazing, close folding and light application of fertilizers, together with conservation of hay, silage and dried grass for winter use. The results indicate that about 250 gallons of milk can be produced per acre of grass at the cost of 13d. per gallon.

The Feeding of Concentrates.

The feeding of concentrates is widely practised but when good grazing is available most cows are expected to produce at least 3 gallons of milk before feeding concentrates at the rate of 4 lb. per gallon. In winter, concentrates are fed above 1 gallon. A similar approach should be tried in this country.

The price of milk in England has encouraged the wider use of concentrates for the feeding of dairy cattle, and this has undoubtedly increased the production of milk.

Grass Drying.

The drying of grass of high protein content is receiving special attention in England, and although it is costly, interest in the method is still widening. The technique does assure a sound method of preserving grass (in bulk, ground or pelletted) at a protein content varying from 16 to 20 per cent. and at a period when the pasture has its highest feeding value. The cost of a dryer is approximately £1,200, with installation extra.

Milking Practices.

Research work being conducted in England is aimed mainly at effecting economies in farm production. Whilst bucket milking machines are still commonly used, pipe-line milking is developing, together with the use of elevated milking bails. In-churn milking is also becoming popular.

Milking machines are not dismantled daily and cleaning and sterilizing is conducted simply by recirculation through the assembled machine, using combined detergent-sanitisers or cold detergents and chemical sterilants. The in-place cleaning of dairy equipment is also being thoroughly tested in Australia. The practice does enable best use to be made of limited quantities of water; time and labour needs are also reduced by the method.

In-churn cooling of milk with chilled water from an ice tank is also finding favour. Such practices should find wide acceptance in Queensland, where warmer climatic conditions affect the quality of dairy produce.

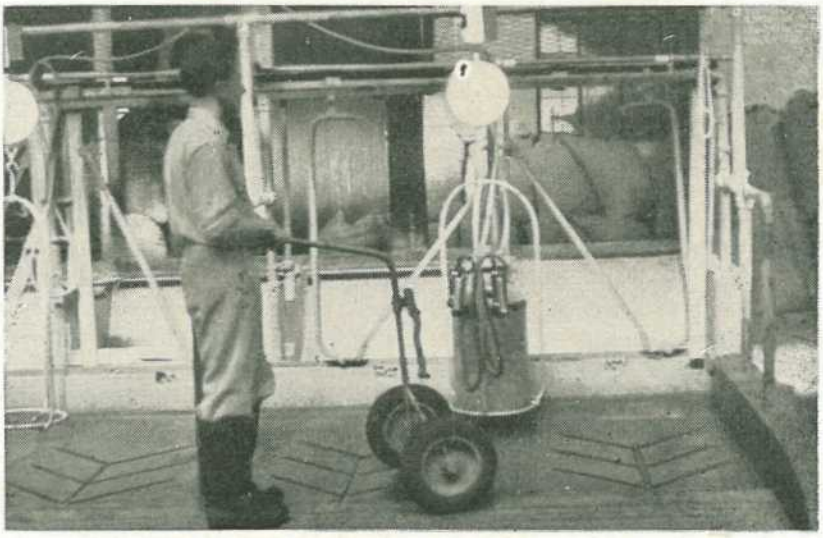

Plate 1.

An In-can Milker in use on an English Dairy.

Farm Bulk Milk Collection.

In some parts, the farm collection of milk by tanker, coupled with the enclosed cooling of milk in farm refrigerated storage vats, has eliminated the daily collection of bulk milk from the farm, with resulting economy in transport and handling. The exclusion of milk cans and the completely enclosed system of milking, cooling and storage of the product has also improved quality. The practice is extending and no doubt will find application in some parts of Australia. Cows can be milked by established methods and milk transferred to the refrigerated holding tank in the dairy by hand or direct pipe-line and immediately cooled to 38°F.-40°F. for storage.

Depending upon circumstances, the tanker would collect daily or on alternate days from one to four bulked milkings. The milk may be measured, agitated, tested and a sample drawn off by the tanker operator before the milk leaves the dairy. The milk is drawn by tanker pump through a connecting pipe-line into the collecting tanker, which then proceeds to the next farm on the pick-up route.

A limiting factor, of course, is the condition of the roads. It is also essential that the approach road to the farm dairy be strong enough to carry the collecting vehicle and that a turntable be provided. Incidentally, the maximum weight for a loaded 1,500 gallon tanker is approximately 12 tons. A farm electricity supply is required for the cooling and pumping.

The system provides not only a saving in handling and labour on the farm, but also an improved keeping quality milk with resultant increased revenue to the producer. Transport and processing costs at the depot can also be appreciably reduced.

Payment on Quality.

Premium payments are made for high quality milk supplied to factories. Milk satisfying accredited standards (that is, 4½ hours in summer and 5½ hours in winter on the methylene blue test) and classified as designated milk receives an extra 1½d. a gallon. Tuberculin tested milk is eligible for an extra 2d. a gallon. Additional winter and summer premiums apply to Channel Island milk and South Devon milk exceeding 4 per cent. butterfat test. In addition to the normal grading examinations on the factory platform, a platform rejection test is applied, involving the 10-minute resazurin test.

Other benefits enjoyed by milk producers include comparatively cheap transport costs (approximately 1d. per gallon), provision of milk cans, and a production bonus.

The Milk Marketing Board.

The Milk Marketing Board is the administrative authority concerned with most developments in the market milk industry. The Board comprises 15 producers and 3 Government appointees. A levy provides funds for administrative costs and general operations. The Board's wide sphere of responsibility is indicated by the number on the staff and the number of departments it supervises, including production, transport, machinery, quality, laboratory control, etc.

The wide variety of activities conducted by the Board include herd recording, artificial insemination, grass-drying, farm machinery, quality improvement, farm and factory advisory services and veterinary services. Milk transport is controlled by the Board.

It has 300 lorries and 30 tankers and in addition lets out transport contracts. Milk supplies are zoned to

factories. Wholesalers do their own vendoring and a zoning system in distribution operates.

Factories are not permitted to standardise milk prior to distribution.

The Board also operates several milk processing factories and has encouraged the powdering and condensing of milk and the drying of skim-milk and whey.

Technical Control Services.

Apart from technical control by the Milk Marketing Board and private organisations, the National Agricultural Advisory Service and National Milk Testing Service provide laboratory and technical advice for the farmer, whilst the Ministry of Food supervises the factories. The National Agricultural Advisory Service provides provincial specialist officers and dairy field officers to assist improvement of quality.

Laboratory quality control of market milk is well provided for by the Milk Marketing Board's laboratory and the industry's laboratories attached to each factory. The National Milk Testing Service has 74 laboratories operating throughout the country and these provide much technical service and guidance to the industry.

Developments in Dairy Manufactures.

Interesting new milk products are being developed. There are numerous varieties of market milk and apart from pasteurised and homogenised milk, cultured milk such as yoghurt and flavoured fermented milks are much in demand.

Sterilized milk is a notable development and its use is rapidly expanding in the United Kingdom. It offers interesting possibilities in the everyday dairy economy, with less frequent deliveries and a saving in refrigeration.

The milk diverted for manufacture is used for cheese, butter, condensed milk, milk powder, chocolate crumb, fresh and sterilized cream, and miscellaneous products, in that order. Uses for skim-milk powder and buttermilk powder in home cooking and bread manufacture are being examined.

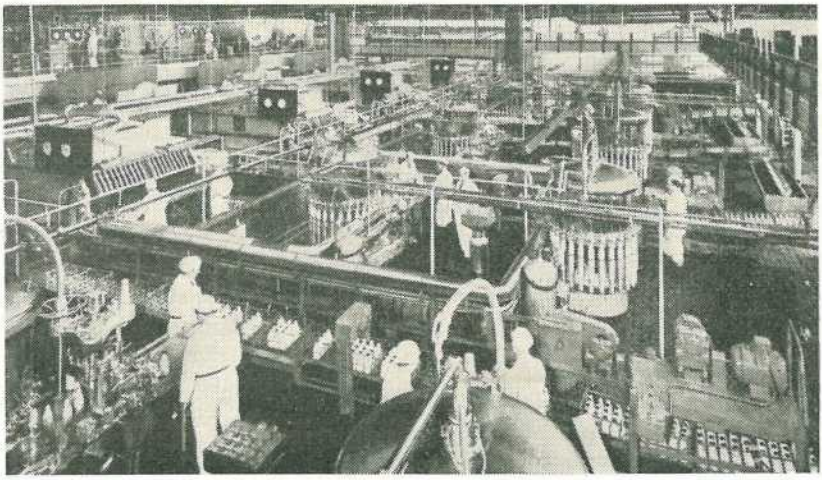

Plate 2.

A Milk Bottling Plant in London.

Despite limited milk supplies for cheese and butter manufacture, the United Kingdom produces about 80,000 tons of cheese and over 20,000 tons of butter annually.

Much attention is being given to fancy cheese types and to mechanisation, rapid manufacture and improved packaging. Cheddar cheese is being wrapped in a plastic covering with the aid of a specially devised vacuum packing machine. Such trends could also receive the earnest consideration of the Australian cheese industry.

In an effort to reduce milk processing costs, the chemical cleaning of equipment in place has been efficiently carried out, with a saving of up to £70 weekly in some large milk factories. Where wholly stainless steel equipment is in use and the factory water supply is chemically suitable, the method has much merit for application in Australia.

Recently developed automatic crating and decrating devices in the market milk industry should also be favourably received in Australia, as eliminating the tedious crating of individual milk bottles. The new equipment handles up to 12 bottles at a time, packs 528 cases per hour and reduces bottle breakages. It is claimed that five machines can save the labour of eight men.

Despite local dairy production, the United Kingdom still requires tremendous quantities of imported dairy produce to satisfy the demands of a large population. (The United Kingdom consumes over 250,000 tons of butter and over 200,000 tons of cheese annually). It is, however, most important if we are to compete on this market that our produce should be of the highest quality.

Dairy Education and Research.

The United Kingdom has made excellent provision for dairy education and research. Specialised courses have been developed at the Reading University which allow of a theoretical and practical training for either University degrees in dairying or the National Diploma of Dairying. Dairy courses are also provided at the West of Scotland Agricultural College at Auchincreuve, which also gives training for the National Diploma of Dairying.

Excellent research is being undertaken by the National Institute for Research in Dairying at Reading, which has two research farms, and at the Hannah Dairy Research Institute in Scotland.

At Reading, with a staff of nearly 200, a farm acreage of 800 acres and 300 stock, feeding, breeding and dietetic studies are being made with the object of expanding dairy production and improving quality. Much attention is also being given to improvement of processing methods with greater economy. Pasture feeding trials in relation to milk production are being examined. By using improved pastures containing white clover, ryegrasses, cocksfoot, timothy and meadow fescue, milk yields of up to 5 gallons per cow per day have been obtained. The effect of top-dressing with various fertilizers on the quality of the pastures is being demonstrated, as well as different forms of silage making. The benefits of feeding antibiotics to calves, pigs and poultry have received considerable attention and so far quite good results have been obtained in rate of growth and better food utilisation. Much experimental work is also under way in connection with various hormones and their effect on milk production.

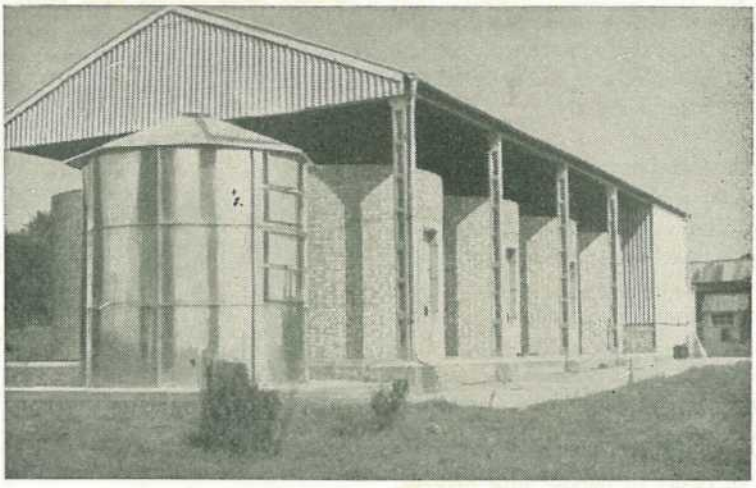

Plate 3.

An Experimental Aluminium Silo at the National Institute for Research in Dairying, Reading.

Research into milking techniques is being continued with the object not only of increasing efficiency in milking but also of speeding the process.

Performance testing of dairy machinery is conducted by the dairy engineering department of the Institute and valuable advice is afforded to both the manufacturer and the farmer.

Physical characteristics of dairy products are also under examination with a view to overall improvement of quality. Problems in both texture and body of cheese and butter are receiving attention.

By-product Utilisation.

Some dairy factories in England utilise by-products to best advantage Most outstanding is the utilisation of whey from the cheese factory at Bailey Gate. Whey is condensed to 68 per cent. solids, lactose is crystallised and purified, whilst the residue containing 25 per cent. protein and 60 per cent. solids is reserved for calf food. Any waste products from the factory are effectively disposed of with the aid of trickling filters.

Conclusions.

Although dairy factories, laboratories and standard of equipment may be less elaborate than those on the Continent, there is, nevertheless, an equally high standard of dairy education and dairy research work in the United Kingdom.

Many dairy factories have concentrated on diversification of dairy products and milk can be readily diverted to cheese, butter, milk powder or condensed milk as the market demands.

Factory personnel are well qualified and many possess degrees in dairy science.

The Cream Separator as Used on Dairy Farms in Queensland

By J. D. ELRINGTON, Senior Adviser (Machinery), Division of Dairying.

I. PRINCIPLES OF SEPARATION.

The force of gravity tends to attract (or pull) all matter to the centre of the earth. If two liquids which do not mix are placed in a vessel, the heavier liquid settles to the bottom and the lighter is forced to the top because the force of gravity exerts a stronger pull on the heavier liquid. This accounts for the rising of the fat globules in milk which is left standing in a vessel; but as the fat globules are extremely small and have only a slightly lower specific gravity than the milk serum, they are forced slowly to the surface.

Centrifugal force is the force generated when an object revolves around a fixed centre. In the separator this force can be built up to many times greater than the force of gravity and thus effect rapid separation of the fat from the milk serum.

The separation of the fat from the remainder of the milk serum in the centrifugal separator is based on the fact that when liquids which are insoluble in each other and of different specific gravities revolve around the same centre, the greater force exerted on the heavier liquid causes it to go as far as possible from the centre.

Specific gravity is the ratio of the weight of a volume of liquid to the weight of an equal volume of water. The specific gravity of water is 1·0, of butterfat 0·95, and of milk serum, which is that portion of milk containing the water and solids-not-fat, 1·036.

Thus in separating milk, the lighter fat stays nearer the centre and can be run off separately through the spout provided at this point. The milk serum or the skim-milk passes away through another spout from an opening nearer the outside edge of the bowl. A portion of the milk serum is also mixed with the butterfat to form cream, which usually contains approximately 40 per cent. butterfat and 60 per cent. milk serum.

II. DEVELOPMENT OF THE MODERN FARM SEPARATOR.

Cream was first removed from milk by pouring the milk into large shallow pans and allowing it to remain for some time so that the cream rose to the top; this top layer of cream was skimmed off and used for making into butter. Known as the gravity system, this was the only one in use for ages—in fact, until centrifugal force was understood and applied.

The first machines used for mechanical separation, about the middle of the 19th century, employed cans or buckets which were filled with milk and rotated quickly. This brought the butterfat more completely to the surface than in the old gravity method. These early model separators had to be stopped while the cream and skim-milk were removed and the buckets refilled with wholemilk. This resulted in low capacity, which was a major weakness.

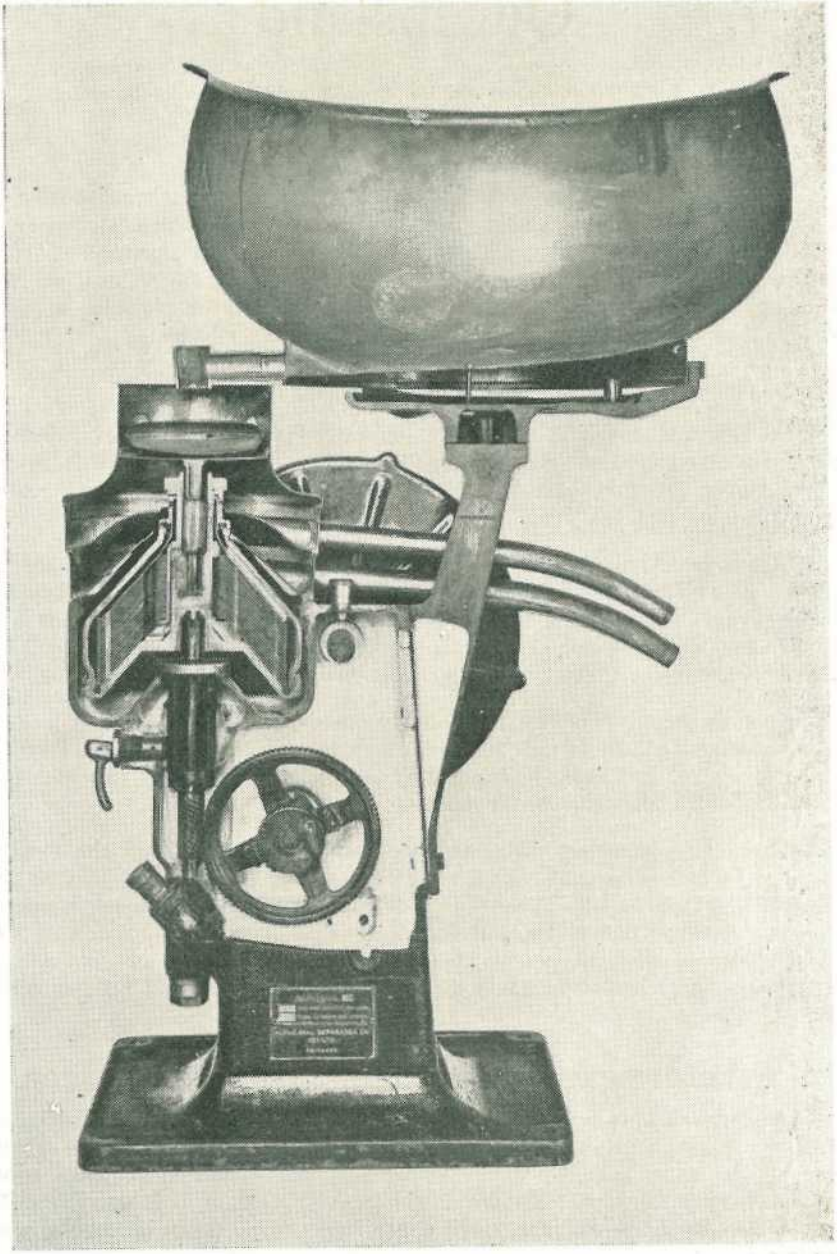

Plate 1.

A Cream Separator Sectioned to Show the Component Parts.

A machine employing a hollow bowl, so that the milk could be separated in a continuous process, quickly displaced the first type of separator. The bowl of this machine was rotated at approximately 800-900 revolutions per minute. The use of discs in the bowl in 1888 was the next major alteration in the principle of centrifugal separation, and in 1907 holes were provided in the neutral portion of the discs. Changes in the shape and improvements in the skimming efficiency have been made in the farm separator, until now it will extract almost all of the butterfat from milk fed to it at the rate of 120 gallons or more of wholemilk per hour while travelling at a speed which has been increased to approximately 7,500 revolutions per minute.

III. TYPES OF FARM SEPARATORS.

All farm separators are of the open type—that is, cream and skim-milk are discharged from the bowl directly into the air. The two main types differ chiefly in the method of driving the bowl.

In the most common type the bowl is supported by the driving spindle and the driving mechanism is located underneath the bowl. A modification of this type is the machine which has the handle mounted above the driving gears and connected to them by means of a chain drive.

In the second type the driving gears are above the bowl and the bowl is suspended on a hook. These separators have not been available for some years, and there are very few in use at the present time.

IV. PARTS OF A SEPARATOR AND THEIR FUNCTIONS.

Farm separators consist of the following parts:—

(1) The frame, containing the bearings and forming the oil sump.
(2) The driving gears.
(3) The bowl.
(4) The screw for adjusting the butterfat percentage of the cream.
(5) The spouts for delivery of the skim-milk and cream.
(6) The reservoir or float chamber, and feed tube.
(7) The float.
(8) The supply vat and tap.

(1) The Frame.

The frame serves as a support for the separator parts, and also forms the reservoir for the oil. It is mounted either on a cast iron stand or a concrete block, and must be firm and level. (See Installation and Care.) It would appear to be everlasting, but it does wear, particularly when bearings seize and turn in their housings, or when bowl vibration causes neck and bottom bearings to move. It is usually discarded when the bowl reaches the end of its useful life.

(2) The Driving Gears.

Where power is supplied from an external source, the separator is driven either by a handle or via a clutch on the secondary shaft. Handle and clutch shaft speeds are shown in Table 1. The reverse worm gear transmits the power to the spindle which drives the bowl. Most modern separators are fitted with ball races in all bearings, and the neck bearing at the top of the bowl spindle is spring mounted

TABLE 1.

CREAM SEPARATOR DATA.

Name of Separator and Q'ld. Agent, in alphabetical order.	Type.	Capacity (g.p.h.).	Handle Speed (r.p.m.).	Intermediate Shaft Speed. (r.p.m.).	Remarks.
ALFA—					
Alfa Laval Separator Co. (Q) Pty. Ltd., 266 Roma St., Brisbane	5	55	55	576	(1.) Type 100 series also available as all-electric, no handle.
	6	75	45	556	
	7	100	45	556	
	8	120	45	518	
	23	50	55	576	
	24	70	45	556	(2.) Type 100 series replaces the black type 5 to 8 models
	25	90	45	556	
	26	110	45	518	
	27	135	45	518	
	105	60	47–50	523–553	
	106	80	45–48	593–628	
	107	100	45–48	593–628	(3.) When engine-driven (or external electric motor), adjust speed close to the top limit.
	108	120	45–48	553–586	(4.) When replacing existing separators with type 100 series safety feed covers must be adjusted
	109	150	45–48	553–586	(5.) There is no balance weight in stainless steel bowls.
BALTIC—					
The Baltic Simplex Machinery Co. Ltd., 179 Mary St., Brisbane	OH 10	10	70	..	
	NW 15	15	65	..	
	NW 22	22	60	..	SD—Stainless discs.
	NW 31	30	55	..	
	NW 55	55	50	480	SB — Stainless bowls and discs
	AW 75	75	45	556	
	AW 100	100	45	556	
	AW 120	120	45	518	SC—Stainless complete
	359	60	50	523–553	
	369	80	48	593–623	
	379	100	48	593–623	
	389	120	48	553–583	

TABLE 1.—*continued.*

CREAM SEPARATOR DATA—*continued.*

Name of Separator and Q'ld. Agent, in alphabetical order.	Type.	Capacity (g.p.h.).	Handle Speed (r.p.m.).	Intermediate Shaft Speed. (r.p.m.).	Remarks.
CROWN DAHLIA—					
No agency in Queensland	40	15	60	700	
	41	25	60	700	
	42	35	60	540	
	43	50	55	575	
	44	75	45	550	
	45	100	45	550	
	46	135	45	550	
DAHLIA—					
Dalgety & Co. Ltd., 291–301 Elizabeth St., Brisbane	50	17	60–65	558–604	SD—Stainless steel discs
	51	25	60–65	558–604	SB—Stainless steel bowl
	52	35	60–65	578–626	
	53	55	55–60	576–628	
	344	75	45–48	556–593	
	345	100	45–48	556–593	
	346	125	45–48	518–552	
DIABOLO—					
Alfa Laval Separator Co. (Q.) Pty. Ltd., 266 Roma St., Brisbane	130	75	48–53	500–555	
	140	100	45–48	555–590	
	150	125	45–48	555–590	
	230	75	45	556	
	240	100	45	556	
	250	120	45	518	
	554	60	47–50	523–553	
	564	80	45–48	593–628	
	574	100	45–48	593–628	
	584	120	45–48	553–586	
	594	150	45–48	553–586	
LISTER—					
Winchcombe, Carson Ltd., 99 Eagle St., Brisbane	10	45	60	690–700	RS—Bowl partly stainless steel.
	11	55–60	56	720–730	
	12	70–75–80	48–50	530–535	SS—Bowl all stainless steel.
	13	90–100–105	48–50	530–535	
	14	110–125–135	48–50	530–535	
	15	135–150	48–50	530–535	
	PS 12	80	..	1450–1510	PS—Power-separator; no handle.
	PS 13	105	..	1450–1510	
	PS 14	135	..	1450–1510	
	PS 15	150	..	1450–1510	PSM—Power driven by inbuilt electric motor.
					PSB—Power driven by belt from external electric motor or engine.
					Tachometer controller on PSB and PSM models (72–75 r.p.m.)

TABLE 1.—*continued.*

CREAM SEPARATOR DATA—*continued.*

Name of Separator and Q'ld. Agent. in alphabetical order.	Type.	Capacity (g.p.h.).	Handle Speed (r.p.m.).	Intermediate Shaft Speed. (r.p.m.).	Remarks.
McCORMICK DEERING—					
International Harvester Co. of Australia Ltd., 278 Roma St., Brisbane	2	50	60	752	
	3	75	48	678	
	4	90	48	678	
	5	120	48	678	
	6	150	48	678 Gear.	
	2S	50	48	672 1730	
	3S	75	48	672 1730	
	4S	100	48	672 1730	
	5S	125	48	672 1730	
RENFREW—					
Gippsland and Northern Ltd., Toowoomba	3A	30	60	770	Power drive available all models.
	14K	60	54	715	
	16K	75	54	715	
	18K	90	54	715	14K, 16K, 18K have stainless steel discs.

to allow the spindle and bowl to become centralised at high speed. The base of the bowl spindle is mounted either in a ball race resting on a single steel ball or only on a single steel ball. This steel ball can be moved up or down to adjust the bowl height.

In recent years most separator companies have built a range of models containing an electric motor as an integral part of the separator, and usually with no provision for the application of external power. These separators have either a variable speed motor or an inbuilt clutch to drive the bowl gradually to the correct speed. Some have a vertically mounted motor directly coupled to the bowl spindle, some have a vertically mounted motor and a belt drive to the spindle, while others drive from a horizontal motor through a clutch and gears. Some of these separators have no oil sump, the bearings being factory lubricated to last the life of the separator, while others still retain the oil sump.

(3) The Bowl.

The bowl consists of the following parts in order of assembly:—

(*a*) Bowl bottom with central tube.

(*b*) Rubber ring.

(*c*) Distributor (sometimes combined with (*a*)).

(*d*) Conical plates, dishes or discs.

(*e*) False top and cream screw.

(*f*) Bowl top and milk screw.

(*g*) Bowl nut.

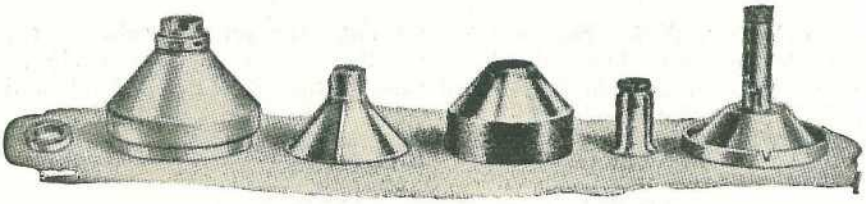

Plate 2.

Parts of a Separator Bowl.

(*a*) *Bowl Bottom with Central Tube.*—This part is cast in one piece, the stem is bored and threaded and slots are cut at an angle to lead the milk into the bowl itself. It contains a bottom plug and bar to rest in the slot on top of the spindle.

(*b*) *Rubber Ring.*—This ring acts as a seal between the top and bottom sections of the bowl.

(*c*) *Distributor.*—This part slides over the stem of the bowl and is located in position by a pin. In some American separators the distributor and bowl bottom are combined. The function of the distributor is to receive the wholemilk from the stem of the bowl and guide it down and outwards into the holes located in the neutral portion of the discs. The spaces between the discs then fill from the bottom. The distributor also collects the cream and guides it up to the cream outlet.

(*d*) *Conical Plates.*—These plates increase the friction between the bowl and the milk, and cause the milk to rotate at bowl speed. Separation actually takes place between these plates. The centrifugal force causes the heavier milk serum to flow to the outside of the bowl, forcing the cream to the centre. The plates are kept a suitable distance apart by distance pieces or caulks.

(*e*) *False Top or Top Disc.*—This part keeps the separated milk apart from the cream and guides the separated milk and the cream to their respective outlets. Where a cream screw is fitted, this screw is located in the false top. The centre hole must be a good tight fit around the bowl stem and the three bars supporting the bowl cover must be firmly soldered in their correct positions. These bars act as a pump to remove the separated milk from the bowl and their length is critical. In some makes of separators the only difference in the false tops of different models is the length of these bars. For example, the difference in these bars between a 75 gallon and an 80 gallon separator of one particular make is about $\frac{1}{8}$ inch in length.

(*f*) *Bowl Top or Bowl Hood.*—This part is the outer cover of the bowl. It has a locating pin to fit into a socket in the bowl bottom. The inner surface of the bowl top is used to balance the bowl, either by adding solder weights to the light side or, in some stainless steel bowls, removing portion of the steel from the heavy side.

(*g*) *Bowl Nut.*—This nut screws onto the central tube of the bowl bottom, and locks the bowl together. It is usually made of different material from the central tube so that it will not bind, and as it is cheaper to replace than the bowl bottom, it is made of softer material so that it will wear rather than the central tube.

(4) The Cream Screw or Milk Screw.

The cream screw is a small fitting threaded outside and with a square hole through the centre. This fitting screws into the cream outlet of the "false top." The milk screw is a small screw fitted in one or both of the milk outlet ports of the bowl cover.

Adjustment of the Cream Test.—By turning the milk screw or cream screw, the percentage of butterfat in the cream is altered. These screws must be turned in opposite directions to obtain the same results. The directions are:—

Cream screw—To increase the test, turn the screw IN or clockwise. To decrease the test, turn the screw OUT or anti-clockwise. A quarter of a turn will alter the test approximately 2 per cent.

Milk screw—To increase the test, turn the screw OUT or anti-clockwise. To decrease the test, turn the screw IN or clockwise.

If there are two screws, each should be adjusted by an equal amount.

The test of the wholemilk, which is dependent on many conditions, varies considerably from time to time. All other factors being constant, the milk test governs the test of the cream. The normal setting of the separator is such that for every 100 lb. (10 gallons) of milk separated there will be 90 lb. (9 gallons) of skim-milk and 10 lb. (1 gallon) of cream. This is a proportional division and is not a function of test (butterfat percentage). An efficient separator will remove almost all the butterfat from the milk regardless of the test of the cream. All the cream or milk screw does is alter the amount of skim-milk delivered by the separator through the cream outlet with the butterfat. If the wholemilk test is 4 per cent. and the abovementioned proportions are obtained, then the cream will test approximately 40 per cent.

100 lb. milk, 4 per cent. test = 4 lb. butterfat.

4 lb. butterfat in 10 lb. cream = 40 per cent.

Should the milk test fall to 3·5 per cent. the cream test will fall to 35 per cent. butterfat. It would then be necessary to adjust the cream or milk screw to bring the cream test back to 40 per cent. Approximately 8¾ lb. of cream would then be obtained.

(5) The Cream and Skim-milk Spouts.

These parts collect the cream and skim-milk respectively as delivered from the bowl, and provide a path to the respective cans. The skim-milk spout is placed in position; then the cream spout fits on top of it. Underneath the skim-milk spout are a number of

curved vanes. These vanes collect the draught of air caused by the bowl rotation and guide it up and out through the skim-milk spout, to disperse the froth and assist the delivery of the skim-milk through the spout.

(6) The Milk Reservoir and Feed Tube.

This part is placed on top of the cream spout. It holds the float, and guides the milk into the bowl.

(7) The Float.

The float is used to keep the supply of milk to the bowl constant, by regulating the height of milk above the feed tube.

(8) The Supply Vat and Tap.

These will be dealt with in a later section of this article.

[TO BE CONTINUED.]

The Case for Poultry Supplements

Results of Supplementing Greenfeed with Vitamin A Supplements.

By B. W. MOFFATT, Assistant Adviser, Poultry Branch.

Because of Queensland's variable climatic conditions, the growing of greenfeed for poultry has its limitations. Besides the problem of keeping up a regular supply, there is also the question of quality. Most greenfeed is largely an unknown quantity in this respect. What is its vitamin A content? As it is fed mainly to supply this vitamin, its vitamin A potency is of paramount importance. Very often the material used is left standing too long before cutting and consequently its vitamin A content is frequently low. To make the position worse, its fibre content is usually higher when this happens. Thus the balance of the ration is upset by the high fibre content and often a lowered intake of mash results, with a consequent lowering of egg production.

The Vicious Circle Continues.

It is not difficult to imagine the effects of feeding large quantities of greenfeed of doubtful quality.

The writer can recall a case in the Brisbane area of a farmer who complained of poor growth in his young replacement stock. On examination of his birds, it was evident that their growth was greatly retarded. When his ration was inspected, the cause was obvious. Mixed with the mash was a high percentage of stalky lucerne chaff of poor quality. Because of the high fibre content of the chaff, the mash intake was low, as also was the vitamin A.

The feeding of such poor greenfeed causes trouble not only through the lowered intake of food but also through the deficiency of vitamin A.

What is Vitamin A Deficiency?

Vitamin A is required by the fowl for many body functions. These include promotion of growth, resistance to certain diseases and stimulation of egg production. When a definite deficiency of this vitamin occurs, characteristic symptoms appear and disease is obvious in the flock.

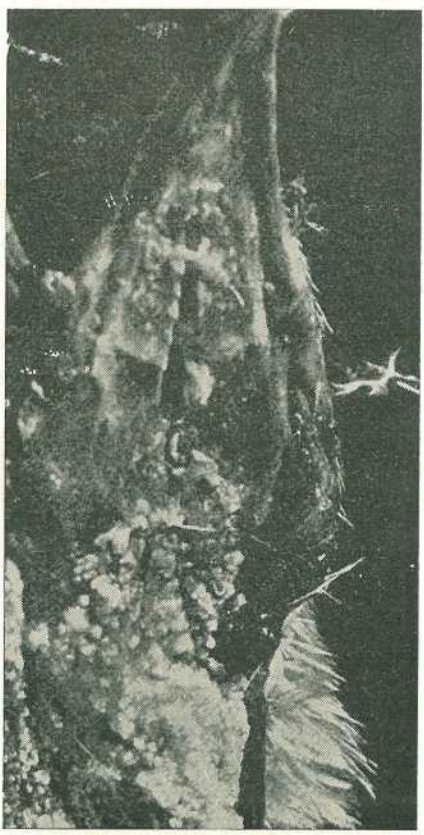

Plate 1.
Vitamin A Deficiency. Yellowish-white pustules in the gullet are an early sign.

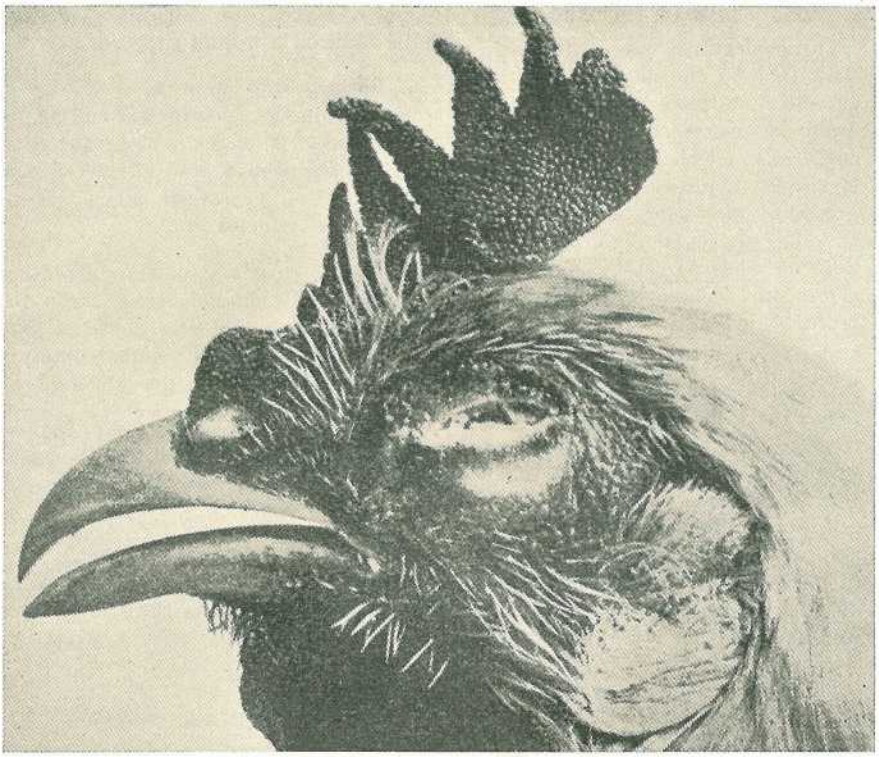

Plate 2.

Vitamin A Deficiency. As the disease progresses, the eyelids become distended with white cheesy material.

One of the most characteristic signs of vitamin A deficiency in adult birds is the presence of yellowish-white pustules in the gullet or oesophagus (Plate 1). These are easily scraped off and do not bleed, as is the case with fowl pox canker. As the disease progresses, the eyes become involved and the lids become distended with white cheesy material (Plate 2).

Birds suffering from a deficiency of this vitamin are usually in poor condition and their feathers lack the normal sheen. On post-mortem, the kidneys are usually pale, swollen and flecked with white spots and the ureters distended with urates.

Borderline deficiencies occur where the vitamin intake is not sufficiently low to produce the characteristic disease, but low enough to cause a decrease in egg production and lowered resistance to disease generally. Experience has shown us that birds suffering from a borderline deficiency are more susceptible to respiratory diseases and roundworms than are birds on a high level of vitamin A.

Borderline cases usually go unnoticed and the lowered egg production is attributed to some other factor. Often the inheritance of the bird is blamed.

Borderline Deficiency in Queensland.

As mentioned previously, greenfeed in Queensland is often a problem. Young succulent greenfeed is not available throughout the year and consequently much of the greenfeed that is used is of inferior quality. With this thought in mind, it was considered that many of our flocks might be suffering from a borderline deficiency of vitamin A.

The Proof of the Pudding.

Demonstrations were designed to show that by the more liberal use of vitamin A supplements, egg production could be increased on farms where borderline deficiencies were present. Health of the flock could also be improved by the use of such supplements. In other words, these demonstrations were designed to show that greenfeed alone could not be relied upon as the source of vitamin A.

Four farms were chosen on which to demonstrate the fact. On these farms the birds were being fed greenfeed that the farmer considered would supply their vitamin A requirements. For the demonstration on each farm, portion of the flock was divided into two even groups with the same number of birds, the management and housing of each being similar. Both groups were fed the same mash and greenfeed, but one group on each farm received in addition a fish-oil supplement.

Records were kept in each case of egg production, deaths and culling for a period of 26 weeks to assess the value of the supplement and greenfeed over the use of greenfeed alone as the source of vitamin A.

Plate 3 clearly shows the advantage gained. Production from birds fed fish-oil supplement and greenfeed was in all cases higher than that obtained from birds receiving greenfeed alone.

Although the management of the two groups on any one farm was the same, the management on different farms varied.

The feeds listed for Farm A were not all fed at one time, but according to availability. This farm is situated at Peachester.

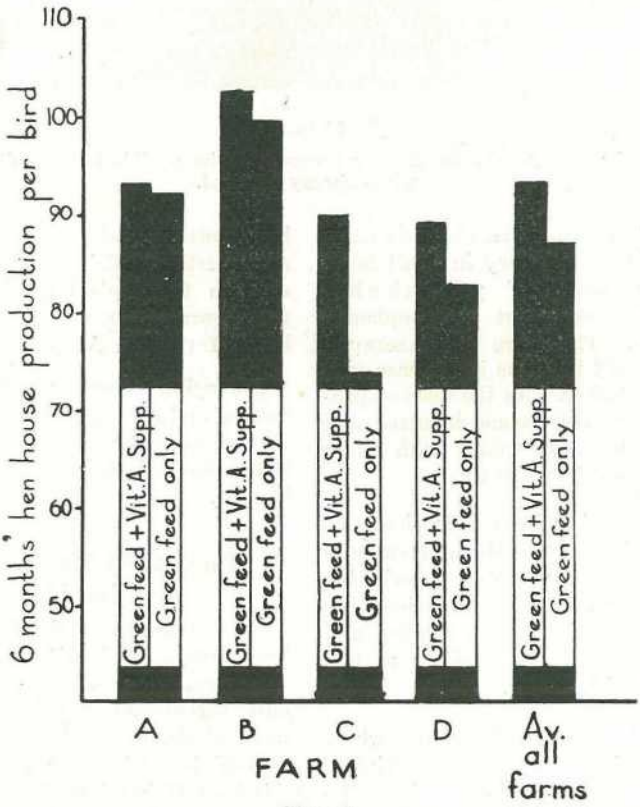

Plate 3.

Results of Supplementing Greenfeed with Vitamin A Supplements.

The types and amounts of greenfeed fed on each farm are set out below:

Farm.	Greenfeed.	Amount.
A ..	Barley .. Wongbok .. Lawn clippings Japanese millet Young maize	6–10 lb. per 100 for at least 4 days per week
B ..	Green lucerne	6 lb. per 100 per day
C ..	Green lucerne	3 lb. per 100 per day
D ..	Small crop waste (cabbage and cucumber leaves)	No record

On Farms B, C, and D, a high percentage of maize was fed in the mash as an additional source of vitamin A. These farms are on the Atherton Tableland.

Table 1 gives a comparison of the deaths and culling rates in the groups on each farm. It will be seen that results slightly favour the groups fed fish-oil supplement.

increased production per bird by 16.6 eggs over a period of six months. The cost of supplementing 1,000 birds for 1 day would be approximately 2s., or £18 5s. 0d. for the 6 months, during which time almost an extra 1,400 dozen eggs would be obtained.

How Should We Supplement?

The use of lawns to produce greenfeed has much to recommend it. Lawns enhance the appearance of a farm and thus its value. If a portion of the lawn is cut every day, a continuous supply of fresh succulent greenfeed is available. This material does not need chaffing. Thus capital expenditure is less and also less time is wasted in obtaining the greenfeed. Approximately 5 lb. should be fed per 100 birds per day. The feed value of this material will be greater if the lawn is sown to a mixture of clovers and grasses.

In addition to this greenfeed, a fish-oil supplement should be fed in the mash. Stable preparations are now available which will remain potent for some months.

TABLE 1.

CULLING RATES AND DEATHS.

Farm.	Culling Percentage.		Mortality Percentage.	
	Greenfeed.	Supplement and Greenfeed.	Greenfeed.	Supplement and Greenfeed.
A	23·4	23·5	2·4	1·4
B	14·5	12·18	3·62	3·18
C	3·9	1·0	3·6	2·8
D	30·7	33·3	2·4	2·4
Average ..	18·12	17·49	3·0	2·44

What Does it Signify?

It is evident from the demonstrations that an increase in production resulted from the use of fish-oil supplement in addition to greenfeed in supplying vitamin A requirements of laying fowls.

Farm C is a good example of borderline deficiency. On this farm, the use of the fish-oil supplement

In a Nutshell.

Greenfeed alone cannot be relied upon to supply the vitamin A requirements of laying fowls.

Fish-oil supplements are a necessity but are not expensive.

The use of lawns for supplying greenfeed is recommended in conjunction with the feeding of a fish-oil supplement in the mash.

Buying a Stud Beef Bull.

By K. HOWARD, Adviser, Cattle Husbandry Branch.

"Eight hundred guineas—and the bull goes to the gentleman in the grey sports coat!"

If it is you who have bought that bull, what will be your next move?

You'll be anxious to get him home to mate with some of your best cows.

Somehow your patience must last until the first calves come along. When these arrive, you will certainly get some idea of the quality of the bull's progeny, but you will have to wait for quite some time after that before you can be assured you have invested your 800 guineas wisely.

It's not until the calves are over 18 months of age that you get much idea of the real worth of the sire. If you buy the bull with the object of breeding good 2-year-old bulls or steers, you won't be in a position to judge him accurately until you see some of his 2-year-old progeny.

Almost three years must elapse before you have any real idea of the bull's worth.

Sale-ring v. Stud Inspection.

Is buying a bull through the sale ring the cheapest method in the long run? It's certainly convenient, but that should not be the sole consideration.

Is there any way in which you can make your 800 guineas a safer investment?

Hundreds of bulls are sold through the sale ring each year at Brisbane and at cattle centres throughout the State. Unless you have a thorough knowledge of the stud with which you are dealing, your purchase will be quite a gamble.

Suppose, on the other hand, you visit a stud with the intention of buying a bull. In visiting the stud you will have the opportunity of watching for several very important points.

If the stud master has nothing to hide, he'll give you a look at his stud herd. There, you should get a good idea of the general standard of the stud animals. A short look through the stud herd will show you if the essential factor of uniformity is present. Are they as alike as peas in a pod?

The top sires of the stud will most likely be in a paddock that is handy for inspection. As a prospective buyer, you can decide if the bull's progeny are "chips off the old block". If the calves are not of uniform type, then the bull cannot be classed as a good sire.

Now that you've decided you like a particular bull that is for sale, have a look at his sire. There should be a close similarity that shows there is consistency in his breeding make-up.

Have a good look at the bull's mother. Is she carrying sufficient condition considering her age? Possibly she has another calf at foot. Does the calf's condition suggest that it is receiving plenty of milk from its mother?

Almost certainly there will be a paddock of young bulls on the property that are by the same bull as the one you like. Examine these to see if these half-brothers consistently show good quality. There may be an opportunity of seeing also some steers that are half-brothers to the young bull.

The young half-brothers should be judged for appearance and weight-for-age. Their condition should be compared with that of other bulls of the same age. It is quite probable that there are some half-brothers already being used as sires in other studs. Enquire to find out what type of calves they are producing.

One of the most important points is to look at the performance of his half-sisters. See if they are in good condition. If they have calves, see if the condition of the calves reflects a good milk supply. If a bull's half-sisters are good milkers, the bull is likely to be able to pass on the breeding character for good milk production. Ample milk production is lacking in many of our beef herds.

Uniformity of a young bull's closest relations, particularly his half-brothers and half-sisters, is the surest guarantee of the bull being a reliable sire.

A trip to one or more well-run studs, and the selection of a bull on the basis of the appearance and performance of his close relations, will greatly reduce the risk in your next bull purchase.

SHEEP GRAZING AND CROPPING ROTATIONS.

Additional sheep will be purchased for the Hermitage Regional Experiment Station, near Warwick, to enable controlled grazing of the pastures, which are now producing very satisfactorily.

Commenting on the grazing studies at Hermitage, the Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) stated that the introduction of improved pastures would benefit large areas of the Darling Downs.

On the cultivated upper slopes, mixed pastures of both summer and winter producing grasses combined with clovers and lucerne have increased productive capacity. It is desirable to apply superphosphate on such areas to assist clover growth, and inoculation of the legumes is essential. The native medic gives highly valuable seasonal production.

On the lower cultivated slopes, especially on inferior soils and on overworked or deteriorated farm lands, mixed grass-legume pastures should be included in the crop rotation. Three to four years of pasture will assist in restoring soil structure and fertility and ensure an improved pattern of agriculture.

Rotations being studied at Hermitage comprise grain crops followed by lucerne alone, and lucerne combined with Rhodes grass or green panic. Other pastures of phalaris, ryegrass and clovers are also established. The pasture phases of these cropping systems allow for sheep grazing, and in addition the animals utilise crop residues and headland growth of weeds and grasses on the property.

A small set of yards now being constructed at Hermitage should interest district farmers who contemplate using small flocks of sheep in conjunction with grain production.

Honeybees in Queensland*

By C. ROFF, Adviser in Apiculture.

Early Introductions.

In beekeeping literature[1] there is reference to black bees (*Apis mellifera* var. *mellifera*) being kept near Montague Road, South Brisbane, in 1854. Queensland was then part of New South Wales and there is no definite information as to how these colonies came to Brisbane. Probably they were brought from Sydney by early settlers some time after 1824, when Brisbane was first settled. Black bees were landed first in Sydney in 1822[2] and from these original colonies stocks were propagated elsewhere in Australia.

Mr. J. Carrol of Enoggera imported a colony of Italian bees (*Apis mellifera* var. *ligustica*) from the United States of America in 1866, but it did not survive. Between 1866 and 1872 Messrs. A. Mackay, M. Blasdall and J. Carrol of Brisbane succeeded in importing safely an Italian colony from which Mr. Carrol subsequently introduced the coloured Italian queens to all his hives. From 1872 to 1880 he sent many of these Italian colonies to different parts of Australia.[3]

Mr. C. Fulwood of Brisbane, on paying a visit to Europe in 1880, secured five queens of *Apis mellifera* var. *ligustica*, from Liguria, Italy, and subsequently succeeded in landing all these alive at Brisbane, via Liverpool and Melbourne. Following this success, Mr. Fulwood in 1882 imported direct from Belonga, Italy, 12 Ligurian queens, of which five arrived alive; again in 1883 he obtained a second consigment of 12, of which seven arrived safely.[1]

In an early edition of the Queensland Apicultural Journal[1] it is recorded that the South Australian Chamber of Manufacturers in 1883 imported the first colony of Ligurian bees into South Australia from Mr. Fulwood of Brisbane and succeeded in establishing them on Kangaroo Island. This island now has pure Ligurians in a wild state, and the South Australian Government has established on the island a Ligurian queen breeding apiary.[4]

Specific records of the original introductions of Caucasian bees (*Apis mellifera* var. *caucasica*) and Carniolan bees (*Apis mellifera* var. *carnica*) are not available.

Present Situation.

All honeybees found in Queensland are introduced sub-species or varieties of *Apis mellifera* L., 1758 (=*mellifica* L., 1767), and during extensive inspections of apiaries in Queensland the following have been recorded:—

1. *Apis mellifera* var. *mellifera* L.: German, Dutch, Black, Brown or Dark Bee. This bee, which originated in Central Europe north of the Alps, is sometimes encountered in Queensland apiaries. It is large, dark coloured and inclined to resent interference. The overhair is exceptionally long and the tongue is short. This variety is

* Address to Annual Conference, Queensland Beekeepers' Association, 21st May, 1953.

[1] "The Introduction of Bees into Queensland," by D. Jones. Qld. Apicultural Journal, October, 1916.

[2] "Australasian Bee Manual," by I. Hopkins, 1886.

[3] "The Introduction of Italian Bees into Queensland," by M. Blasdall. Qld. Apicultural Journal, January, 1917.

[4] "The Ligurian Bee," issued by Department of Agriculture, South Australia.

particularly susceptible to wax moths and disease and is generally less prolific than other varieties.

2. *Apis mellifera* var. *ligustica* Spin.: Italian, Ligurian or Leather Coloured Bee. It is native to the Apennine Peninsula and is characterised by three abdominal bands varying in colour from dark straw, golden to deep yellow; the third band occasionally may be obscured. Queensland beekeepers have developed by selective breeding several strains as follows:—

(*a*) Bright-banded Italian Bee.—Similar to the above although much brighter in colour; the three abdominal segments usually clear yellow.

(*b*) Golden Italian Bee.—This strain has a full four to five segments showing colour.

All bees of the Italian variety are usually industrious, docile, and with prolific early spring brood rearing characteristics. They are, however, poor wintering bees and are disposed towards robbing. Due to their bright colouring, queen bees of this variety are easily recognisable on the brood combs. This feature is popular with many beekeepers, though of little importance economically.

3. *Apis mellifera* var. *caucasica* Gorb.: Caucasian Bee. This grey mountain bee is from the Caucasus region in South Russia. It is a large grey-haired bee and has been imported and cultivated for its good temper and exceptionally long tongue. This most gentle variety of honeybees is industrious, prolific and tolerant of severe winters. A detrimental characteristic is the use of large quantities of propolis, which hinders the easy removal of hive parts.

4. *Apis mellifera* var. *carnica* Polm., Karntner Biene: Carniolan Bee. This bee originated from the province of Carniola in Austria, south-east of the Alps. It is also found in the Balkans as far north as the Carpathians, and east along the Danube Valley to Bulgaria. It is slightly smaller than the other varieties described herein, although the legs and tongue are longer. The chitin is dark and covered with short thick greyish hairs. This variety is gentle, prolific and overwinters well. It does possess, however, bad swarming tendencies, necessitating expert management during early summer months.

5. *Apis mellifera syriaca* v. Butt. R. (=*A. mellifera cypria* Bollm.): Cyprian, Syrian or Palestinian Bee. This bee is native to Asia Minor, the favoured common name being derived from its geographical centre, the island of Cyprus. It possesses a strong, slim, wasplike abdomen, is golden-orange to yellow with pronounced yellow-orange on the underside; the top of the abdomen is shiny black. The queen bee has a deep orange shield on the thorax. As this industrious bee is vicious and difficult to handle, only limited introductions have been made into this State.

6. *Hybrid Bees.*—The most common hybrid bee in Queensland, a cross between Italian and Black varieties, is industrious, but rather inclined to sting. This is especially so with the darker coloured individuals. The well-known Bush Bee is a Black-Italian hybrid.

Other hybrids noted are Italian x Caucasian, Italian x Carniolan, Italian x Cyprian, and Caucasian x Carniolan. After several generations these commence to show recessive characteristics, and at this stage breeding back to the Italian variety is the usual procedure.

Which is the Best Variety?

Pure Black or Cyprian bees have too many undesirable features for commercial beekeeping.

The Carniolan and Caucasian varieties are highly recommended by the few beekeepers utilizing them, and they do possess a number of attractive features. At present there is no factual information available which illustrates the desirability of these over the Italian bee.

When first imported, the Italian bee was found promising, and through selective breeding has been improved further. Most beekeepers consider the Italian to be superior and this variety is now the most popular in Queensland.

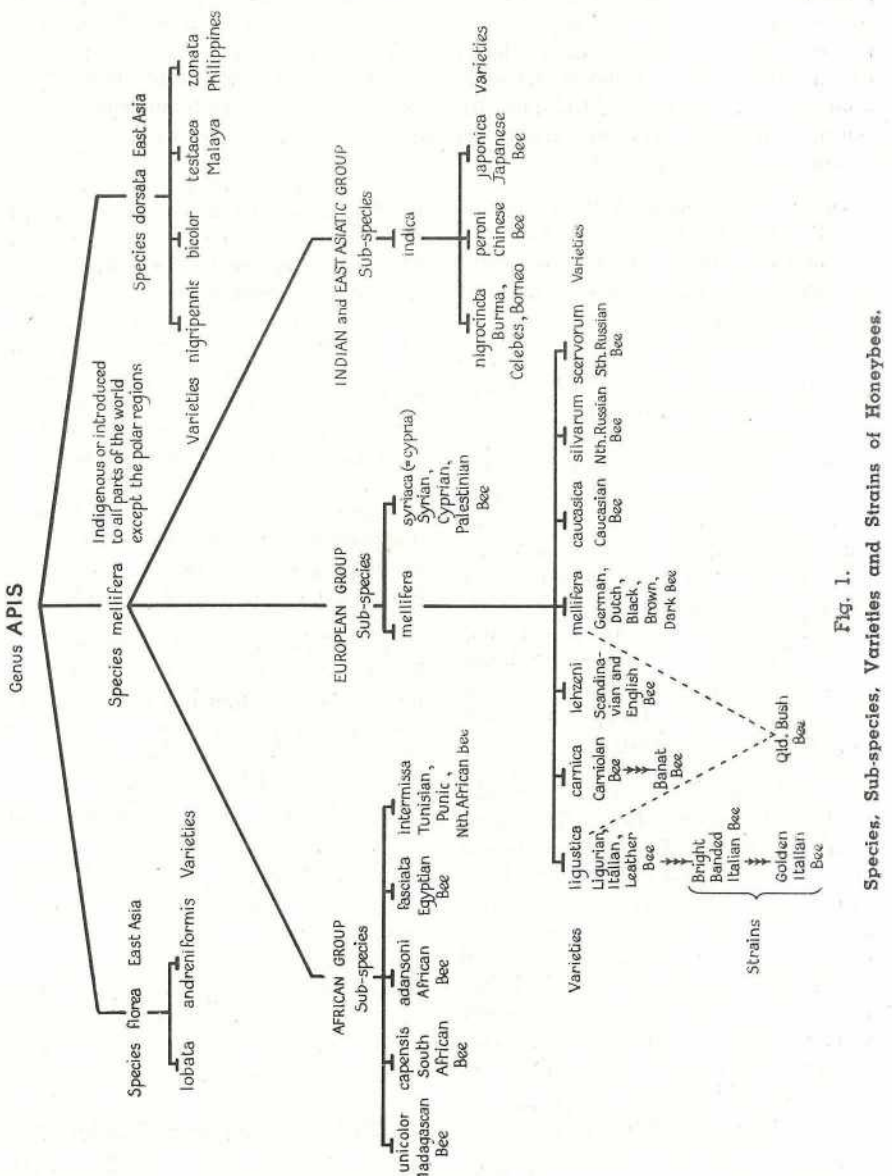

Fig. 1.
Species, Sub-species, Varieties and Strains of Honeybees.

The Honey Flora of South-eastern Queensland

By S. T. BLAKE (Botanist), and C. ROFF (Adviser in Apiculture).

(*Continued from page 206 of the April issue.*)

Small-fruited Grey Gum.

Botanical Name.—*Eucalyptus propinqua* Deane & Maiden.

Other Common Names.—Grey gum, grey irongum.

Distinguishing Features.—A tall tree with bark of a sugar-like texture shed each year in patches leaving a bright salmon and grey variegated surface that soon turns dark grey and lighter grey. The leaves have a paler underside, the buds are small, nearly round, borne in stalked bunches along the twigs, and the capsules are small with protruding valves (Plates 149-151).

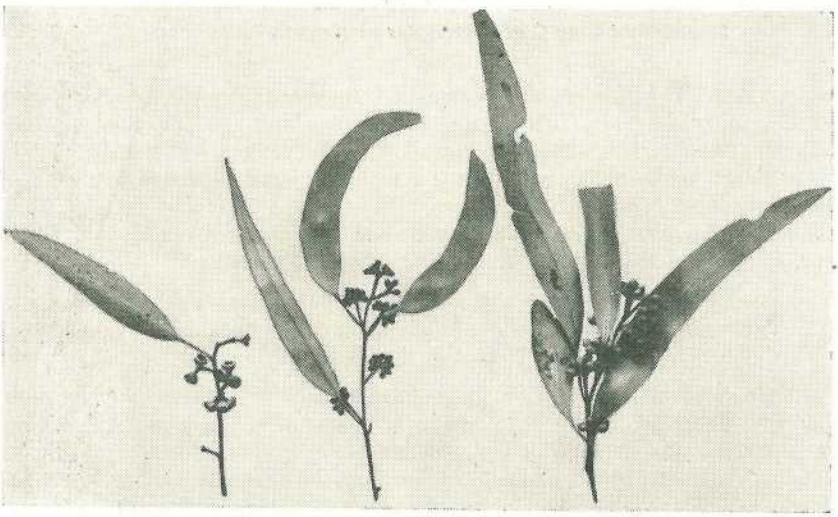

Plate 149.

Small-fruited Grey Gum (Eucalyptus propinqua). Branchlets with leaves, flower-buds and seed-capsules.

Description.—This is a tall straight tree up to 100 ft. or more high with dark green crown and bark with a slightly granular surface that is shed each year; when fully shed the bark is bright orange or salmon-coloured with grey patches, but later it becomes grey with dark grey patches. The leaves are dark green on the upper surface with a paler undersurface, pointed, mostly 2½-4½ in. long and ⅜-1 in. wide, usually 4-8 times as long as wide, and spread more than in

Plate 150.

Small-fruited Grey Gum (Eucalyptus propinqua). Portion of trunk.

most gums. The flowers are borne in bunches along the twigs and are about $\frac{1}{4}$ in. wide when fully out; the flowers and the bunches all have stalks. The buds are nearly round with a very short point, the lid being about as long as the lower part. The seed-capsules are stalked, with 3-4 short protruding valves, the part below the valves being widest at the opening, rounded towards the stalk, in all about $\frac{1}{8}$ in. long, $\frac{1}{8}$-$\frac{3}{16}$ in. wide, usually a little shorter than wide.

Distribution.—Moreton and Wide Bay Districts in forest country, usually associated with other tall-growing eucalypts in hilly country. It also occurs in northern New South Wales.

Note.—There is another grey gum—*Eucalyptus major* (Maiden) Blakely—that grows in the same areas under apparently similar conditions to *E. propinqua* but, so far as is known, never with it. It resembles *Eucalyptus propinqua* so much that it is not readily distinguished from it, but the buds and capsules are slightly larger and taper more to their stalks, there is a ridge on the lid, and the leaves are often coarser.

Usual Flowering Time.—January-March.

Colour of Honey.—Medium amber.

Importance as Source of Honey.—Minor.

Importance as Source of Pollen.—Medium.

General Remarks.—The pollen obtained is creamy and fairly abundant. Grey gum is a good supporting species when present amongst other better-class honey flora.

The honey has a pleasant flavour and moderate density.

Plate 151.

Small-fruited Grey Gum (Eucalyptus propinqua). Lone Pine.

Turnip Weed.

Botanical Name.—*Rapistrum rugosum* (L.) All.

Other Common Name.—Wild turnip, a name better used for another plant.

Distinguishing Features.—An annual or biennial herbaceous, somewhat bluish, hairy weed with many irregularly lobed leaves at ground level, upright leafy branched stems carrying clear yellow flowers with four petals and six stamens, and small pointed knob-like "seeds" (Plates 152-153).

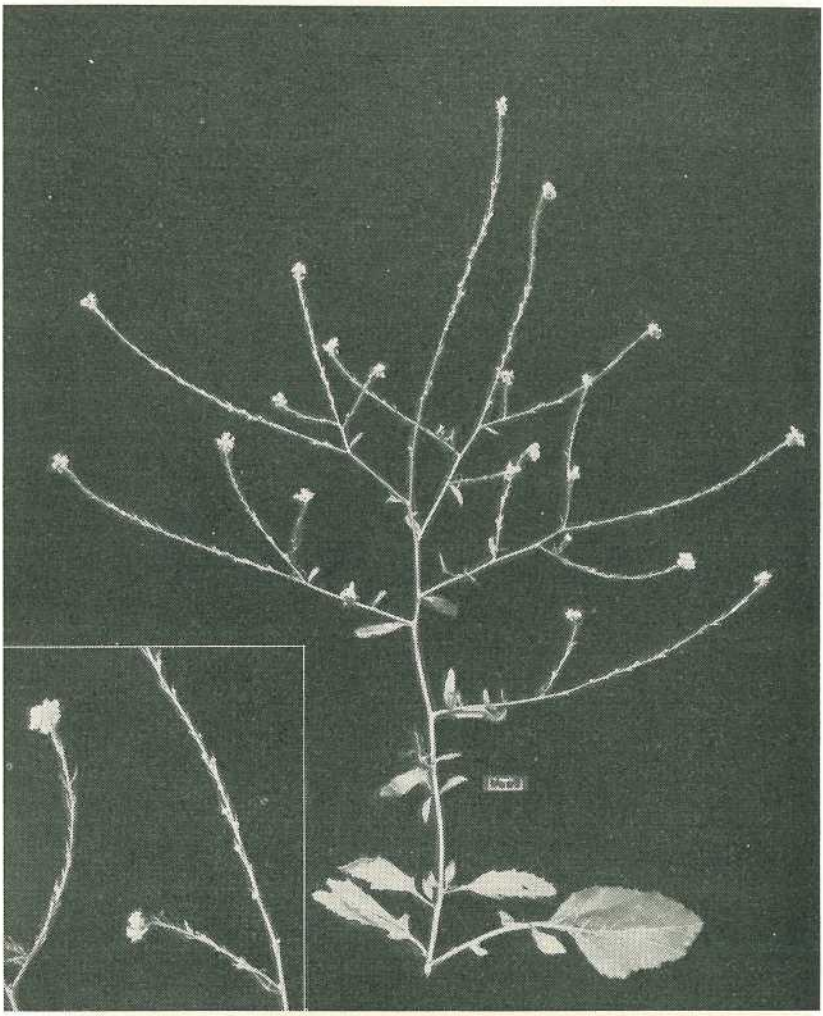

Plate 152.

Turnip Weed (Rapistrum rugosum). Flowers, fruits and leaves. Inset, flowers and fruits enlarged.

Description.—This is a bluish-green annual or biennial plant up to 4 ft. high but often much smaller, with a large number of leaves at ground level and a few along the stems which are branched. The lower leaves are deeply cut or lobed with the uppermost lobe the largest, and as well as the lower part of the stems they have a large number of short bristly hairs; the leaves on the upper part of the stems are much smaller and not lobed. The flowers are crowded at the ends of all the branches. They are about $\frac{1}{4}$ in. long and wide with four green sepals, four lemon yellow blunt petals spreading in the upper half, six stamens and a narrow ovary and style between

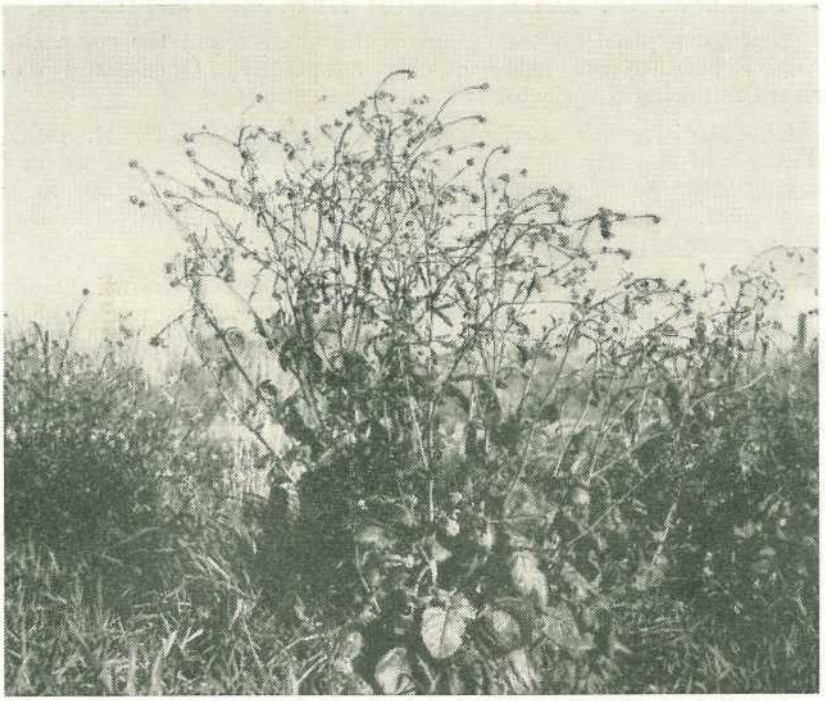

Plate 153.

Turnip Weed (Rapistrum rugosum). Millmerran.

them. The seed-pods are small and numerous, pressed against the branches, pointed, wrinkled, nearly round and about $\frac{1}{8}$ in. wide below the point and a stalk-like object below this again.

Distribution.—This is a common weed and sometimes a pest in cultivation and along roadsides in south-eastern Queensland, especially on the Darling Downs. It is a native of the Mediterranean region now naturalized in many parts of the world.

Usual Flowering Time.—Spring, summer and autumn months.

Colour of Honey.—Light amber.

Importance as Source of Honey.—Minor.

Importance as Source of Pollen.—Major.

General Remarks.—In the Darling Downs District, turnip weed is the most important pollen plant and is much sought by beekeepers during the extensive flowering period. The large and reliable quantities of pollen, together with the nectar, quickly stimulate broodrearing and strengthen weak colonies. As a regular practice, itinerant apiarists move colonies to locations where turnip weed is plentiful.

The honey has a characteristically strong flavour and aroma.

[TO BE CONTINUED.]

BENEFIT OF DAIRY FARM DEMONSTRATIONS.

New farm practices that improve the quality and the composition of dairy produce are being quickly adopted by Queensland dairy farmers following a series of farm demonstrations.

The Minister for Agriculture and Stock (Hon. H. H. Collins, M.L.A.) said recently that the demonstrations have been set up in all dairying districts of the State by the Division of Dairying in the Department. The work is financed by the Commonwealth Dairy Industry Extension Grant.

The response has been so encouraging that plans are now in hand to increase the number of demonstrations. The scope of the work will first be extended in the Brisbane, Darling Downs, South Burnett and Atherton Tableland areas.

The principal methods of quality improvement that are being demonstrated are: Farm cooling of milk and cream; the cleaning of milking machines; and the value of supplementary mineral feeding and improved pasture in improving the composition and production of milk.

Cream cooling devices are at present being demonstrated on 25 farms throughout the State and a further 11 farms are being brought into the scheme. The new farms will display modified charcoal coolers, pit extensions under water cooling towers, cool water troughs in the dairy, and three American-design farm refrigerators.

The use of improved dairy detergents has been demonstrated on 12 farms. These will be increased to 18 demonstrations and will include three types of re-circulation systems of cleaning milking machines, which will be set up in the South Burnett and on the Atherton Tableland. Re-circulation cleaning is already a project in the Brisbane district and on the Darling Downs. Promising results are being obtained from re-circulation and the use of improved detergents, both in overcoming the problem of hard water and in helping to reduce the development of milkstone on dairy equipment.

The benefits accruing from the use of improved quality dairy rubberware on milking machines are also to be demonstrated on six farms situated in the Brisbane and South Burnett districts. The object of this work is to show how the working life of the rubber can be extended, milk quality improved and milking efficiency maintained.

With a view to improving the composition of milk for cheese manufacture, improved pastures have been laid down in the Pittsworth district. Results have been so promising that these are being increased from three to six. It is also proposed to set up another demonstration for this purpose in the South Burnett.

On the coast, demonstrations of the value of supplementary mineral feeding have produced encouraging results. The fat content has improved and the length of lactation has increased. After extended feeding, there has been an improvement in the solids-not-fat content.

Mr. Collins said the practices demonstrated are proving popular with farmers and it is encouraging to note that they are rapidly being adopted in the districts in which they are being demonstrated.