ANNUAL RATES OF SUBSCRIPTION.—Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling,** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.

QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Anzac.

ON 25th April, the 23rd anniversary of the landing on Gallipoli of the Anzac troops—the Australian and New Zealand Army Corps—the young men of our race, who on that day and after offered their great gift of youth and life in the cause of human liberty, were remembered with pride and reverence. They were the men whom John Masefield, the Poet Laureate of England, described as of "the flower of this world's manhood, who died as they had lived, owning no man as master on this earth." In the commemoration was seen something of the nature of the structure underlying the British traditions which inspire so many memorable anniversaries. In it was felt, too, that the spirit of the Old A.I.F. lives on, and that the army of our dead also continues to live in glowing memory.

The Work of William Farrer.

LAST month was commemorated the anniversary of one of Australia's greatest benefactors—William James Farrer, a man of vision who had seen and assessed the opportunities of placing Australia among the great graingrowing countries of the world. It is impossible to place a

money value on Farrer's work, but it can be said that it has resulted in the establishment and extension of an industry worth many millions of pounds to the Commonwealth every year. Farrer sought no personal glory and no pecuniary reward. He thought only of the welfare of Australia and of the wheat industry. On receiving news of his mention for a high honour, he said: "I want only to feel, when the end comes, that my life has not been wasted." This unassuming agricultural scientist was famous throughout the world as a wheat breeder. One of the varieties he evolved—Federation—brought vast riches to Australia, while other drought and rust resisting types bred by him enabled wheat to be grown in districts which had been regarded previously as land unfit for extensive farming. Of his work it may be said that it changed Australia from a wheat-importing to a wheat-exporting country. As a result of it, many thousands of acres of pastoral land have been brought into cultivation, while hundreds of towns and villages have taken their impetus from fields of Farrer wheat.

The third oration in memory of Farrer was delivered by Dr. W. L. Whitehouse, Acting Dean of the Faculty of Agriculture, University of Sydney, and the first of the Farrer Research scholars. After discoursing eloquently on the life and work of Farrer, he said: "Great as the economic value is of Farrer's devoted and painstaking work, we owe far more to him for pioneering this great field of service and for the inspiration he has given us to carry the work forward. For we still have very serious problems facing us in our wheat industry. In some ways, I think they are even bigger problems than Farrer himself had to confront. The world has moved on rapidly since his day. Competition is keener. World demands have changed in many respects. Whilst Farrer bridged a great gap with his wheats, to now go further forward and make striking improvements is not easy."

On a modest three acres of experimental plots at Lambrigg, near Queanbeyan, New South Wales, the seeds of Australia's wealth in grain were sown by William Farrer. "My sole ambition," he told his first laboratory assistant, George Norris, "is to give to the poor man a loaf of bread containing twice the nutriment of the present loaf." His grave where he was buried on 17th April, 1906, overlooks the fields in which he toiled without reward and without esteem or honour to breed the plants that have made Australian grain a factor in the markets of the world.

Allocation of Production in the Sugar Industry.

AFTER having considered the Government Statistician's report on the equalisation scheme which was an outcome of the conference on control of production in the sugar industry in March last, the Premier, Hon. W. Forgan Smith, LL.D., has announced that the small majority in favour of the scheme did not justify substituting it for the existing plan. The Premier said that the Government had been reluctant to continue a scheme which apparently now is only favoured

by approximately half the industry, but felt bound to honour the Commonwealth Sugar Agreement recommended by the industry for acceptance.

The Cabinet was willing to consider sympathetically any other plan devised by the cane growers' and millers' organisations, as provided in clause 10 of that agreement, and in all the circumstances thought it not only necessary in the industry's own interests, but quite within the ability of those bodies, to effect a compromise.

Communications had been received from certain areas seeking some concession in railage charges as a set-off to lighterage charges allowed under the proposal.

A review of the various schemes showed that, while there were divergent views on principle, the actual monetary differences—especially when actual cane prices and returns were considered—were not so great as to prevent sugar executives compromising on some scheme with a majority sufficient to justify sympathetic consideration by the Government.

It was necessary to finalise this matter for the 1938 season, as arrangements for accepting delivery for paying for the sugar output depended upon the issue of the proclamation. This important matter could not await further discussions or tribunals, and the Government had decided to accept the recommendation of the industry regarding Inkerman mill peak, which was carried by 59 to 4, and had issued instructions that the proclamation, with this exception, should be issued on the lines of that of the previous season.

Peak year quotas were discussed at the conference of sugar interests in Brisbane in March. It was decided to adopt the equalisation scheme formulated last year. The voting was 36 to 30.

The conference also agreed to urge an addition of 2,500 tons to the Inkerman mill peak quota under the official proclamation.

The reason was that Inkerman had, through diversion of cane to another area, been deprived of the full benefit of its maximum production in the allocation of the 1929 quotas.

The equalisation scheme set out that the peaks and the pooling system should be unchanged, except for two suggested alterations, to give relief to certain sections.

The main alteration was that, if the No. 1 pool price could be declared at an average amount more than £17 a ton, that excess, provided it did not exceed 12s. 6d. a ton on No. 1 pool sugar, and subject to certain other minor provisos, should be made available for distribution to the producers of No. 2 pool sugar.

Another provision was that the lighterage on excess sugar should be met by the common pool instead of being, as at present, paid by the areas concerned.

Chloris Grasses in Queensland.

S. L. EVERIST, Assistant to Research Officer.

PART IV.*

THIS is the final part of the series. The species dealt with in this part are some of minor importance. They belong to various groups, and one new species is included. This was sent in during the course of the work.

CHLORIS UNISPICEA.

(Plate 150.)

Botanical Name.—*unispicea*, from Latin *unus* = one and *spica* = a spike, referring to the fact that the inflorescence usually consists of a single spike or raceme.

Common Name.—I have heard of no satisfactory common name for this species.

Botanical Description.—Slender, tufted grass, apparently perennial but perhaps sometimes annual, up to 60 cm.; rhizome very short, scaly, rhizome buds small; culms weak, slender, erect or drooping near the top, 3-5-noded, branched from the lower nodes, internodes terete, smooth, much longer than the leaf sheaths; leaf sheaths about 2 cm. long, flattened, keeled, striate, with loose cottony hairs on and near the margins, margins thin and scarious; auricles small, with long hairs; ligule a minute ciliolate rim with a few long hairs; collar rather conspicuous, glabrous, yellow; leaf blades conduplicate, conspicuously narrower than the sheath, 5-10 cm. long, 1 mm. broad at the base, tapering to a very fine point, glabrous except for a few long hairs near the base, scabrous above, particularly near the apex; flowering culms weak, up to 35 cm. long, slender, terete, smooth, terminating in one, two, or rarely three ascending racemes; racemes slender, with two rows of imbricate spikelets closely appressed to the rhachis; spikelets 2-flowered; lower glume 3 mm. long, acuminate, thin, membranous, 1-nerved, keeled, keel scabrous, tapering to a fine point; upper glume similar but 5 mm. long; lower floret hermaphrodite; lemma 5 mm. long, glabrous except for the scabrous tip, linear-lanceolate in profile, lanceolate in outline, 3-nerved, bluntly keeled, margins inrolled, tapering into a fine straight scabrous awn up to 10 mm. without or with obscure lateral lobes; palea thin and membranous, 5 mm. long, lanceolate, 2-nerved, 2-keeled; lodicules very minute, oblong cuneate, very thin; stamens 3; ovary flattened, styles and stigmas 2, stigmas laterally exserted; caryopsis 3 mm. long, linear-lanceolate in outline, with ridge on one side and groove on the other, dark brown in colour, embryo one quarter the length of the caryopsis; rhachilla terete, smooth, 1·5 mm. long; upper floret reduced to an empty lemma similar in shape and texture to lemma of lower floret but 1·5 mm. long with an awn up to 4 mm.

Popular Description.—A slender, tufted grass about 1-2 feet high, with long, slender, drooping seed head. Leaves very narrow and somewhat wiry. Seed heads of one or two slender spikes on top of a long slender stalk. Spikes narrow with two rows of small, narrow spikelets or "seeds." Each spikelet with two bristles.

* Part I. of this series was published in May, 1935 (Vol. XLIII., Part V., p. 474, *Queensland Agricultural Journal*); Part II., July, 1935 (Vol. XLIV., Part I., p. 18, Q.A.J.); Part III. in February, 1937 (Vol. XLVII., Part II., p. 181, Q.A.J.).

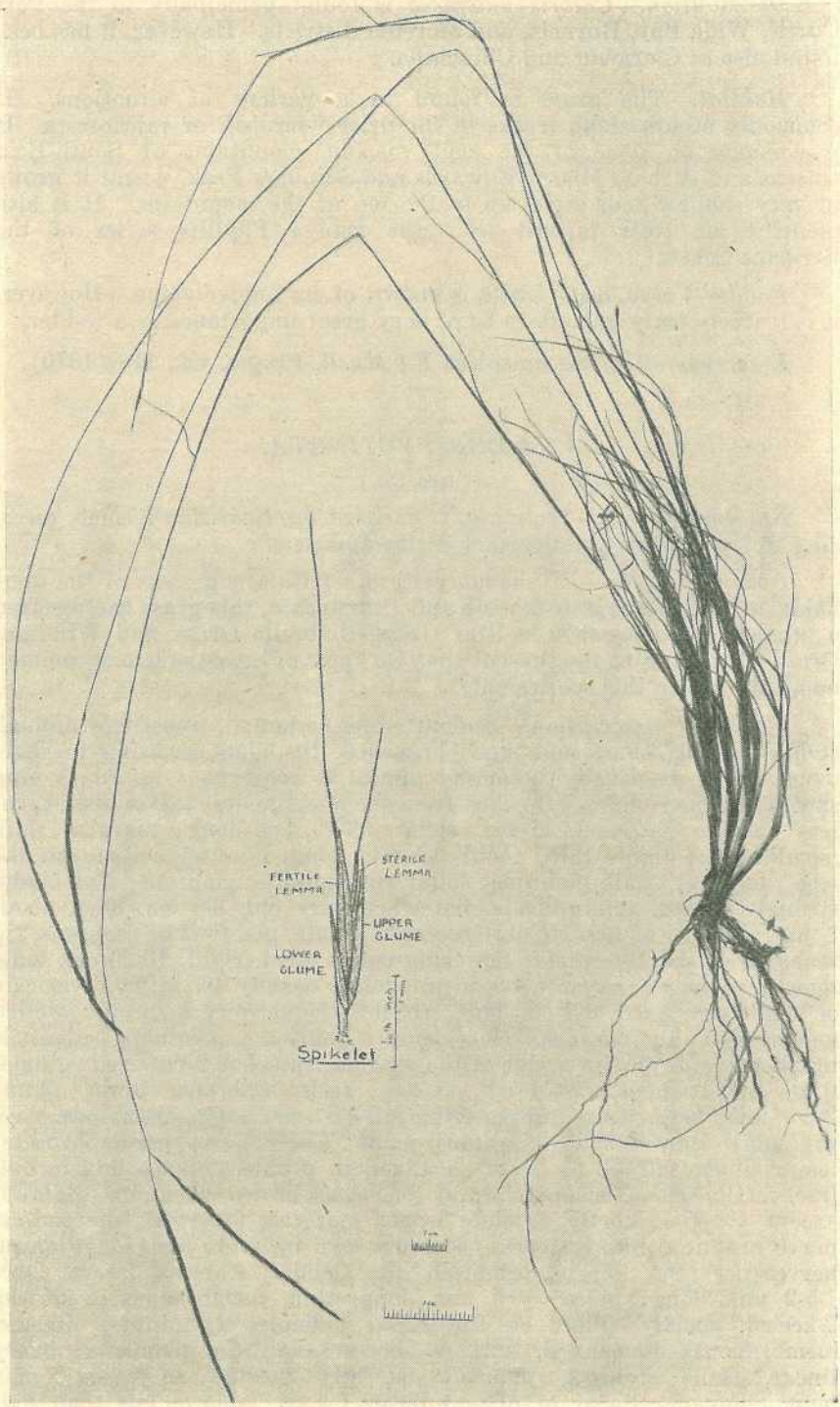

Plate 150.
Chloris unispicea.

Distribution.—Chloris unispicea is found principally in the Port Curtis, Wide Bay, Burnett, and Moreton districts. However, it has been found also at Clermont and Chinchilla.

Habitat.—The grass is found in a variety of situations. It commonly occurs along tracks in the drier "scrubs" or rainforests. It is common on some of the acid volcanic mountains of South-East Queensland such as Mount Edwards and Flinders Peak, where it grows in very shallow soils right up to the top of the mountains. It is also plentiful on soils derived from the Bunya Phyllite series of the Brisbane Schist.

Fodder Value, &c.—Little is known of its fodder value. However, it is scarcely leafy enough to be of very great importance as a fodder.

Reference.—Chloris unispicea *F.v.Muell. Fragm.* vii., 118 (1870).

CHLORIS PECTINATA.

(Plate 151.)

Botanical Name.—pectinata, from Latin *pectinatus* = a comb, referring to a comb-like arrangement of the spikelets.

Common Name.—In common with other Chloris grasses of the same habit, notably *Chloris divaricata* and *C. truncata,* this grass has received a number of names such as Star Grass, Umbrella Grass, and Windmill Grass. However, at the present time we know of no satisfactory common name applied to this species only.

Botanical Description.—Stoloniferous perennial, sometimes annual, stolons usually short and much branched, the plant growing in short dense tufts, eventually becoming almost a continuous sward; young shoots flattened: culms branched from the lower nodes; leaves distichous; leaf sheaths flattened, keeled, striate, 3-10 cm. long; margins thin, membranous; ligule thin, about 0·5 mm. long, minutely ciliate on the edge; auricles small, glabrous; collar very minute, glabrous: leaf blades strongly keeled, conduplicate, flat when very old, 3-8 cm. long, about 3 mm. wide at the base, linear-lanceolate, acute, glabrous or scabrous, tip scabrous or shortly ciliate: flowering culms erect, rigid, 10-20 cm. long, sometimes longer: racemes 4-9, in var. *fallax* usually 4-7, stiffly divaricate or slightly reflexed, 5-7 cm. long; rhachis triquetrous, scabrous, swollen and hairy at the base: spikelets densely imbricate, pectinate, subsessile in two rows on the lower side of the rhachis: spikelets 2-flowered; glumes thin, membranous, 1-nerved, keeled, keels scabrous, lower glume 2-2·3 mm. long, acute, upper glume 3-3·5 mm. long, acuminate, keel prolonged into a short, scabrous point: lower floret hermaphrodite; lemma linear-elliptic or linear-rhomboid in profile, oblanceolate in outline, cartilaginous, lemon-yellow or sometimes brown when ripe, glabrous except for the shortly ciliolate upper margins, 3-nerved, the central nerve produced into a slender, scabrous awn up to 15 mm. long, lateral nerves near the margin, produced into slender, scabrous lateral lobes 1·5-2 mm. long; palea 3-3·5 mm. long, thin, membranous, 2-nerved, 2-keeled, shortly ciliate on the keels; lodicules 2, minute, cuneate, membranous; stamens 3, anthers shorter than the filaments; ovary linear, sessile; styles 2, stigmas 2, laterally exserted; caryopsis 3 mm. long, trigonous, linear or oblong-linear, brown, embryo less than half the length of the caryopsis: rhachilla 1 mm. long, terete, smooth: upper

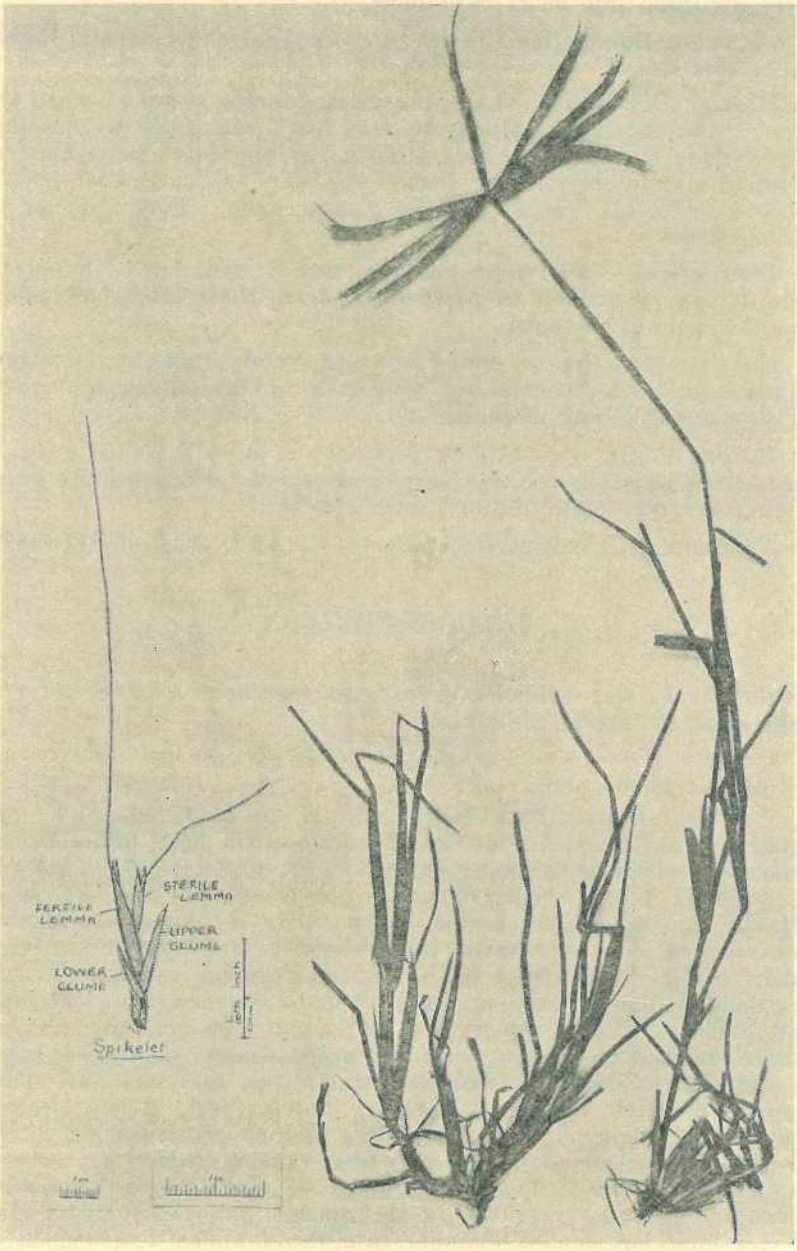

Plate 151.
Chloris pectinata.

floret reduced to an empty lemma; lemma 1·5-2 mm. long, thinly cartilaginous, elliptic in profile, oblanceolate in outline, 3-nerved, central nerve produced into a slender scabrous awn up to 10 mm. long, lateral nerves produced into short bunt lobes.

var. *fallax* Domin differs in having more slender racemes and slightly smaller spikelets.

Popular Description.—Creeping grass forming a sward when well grazed. Leaves short, pale-green, flattened; young shoots flattened. Seed heads of a number of short, stiffly-spreading spikes radiating from the top of a rigid erect stalk. Each spike bears two close, even rows of spikelets or "seeds" in a comb-like arrangement. Each spikelet has two long bristles.

Distribution.—*Chloris pectinata* is widely distributed in Queensland. It is very common in parts of Western Queensland, particularly along the edges of claypans.

Habitat.—The grass is found in a variety of situations but reaches its maximum development in low-lying areas of clay soils such as gilgais and claypans of Western Queensland.

Fodder Value, &c.—*Chloris pectinata* is quite a useful grass for sheep. It is generally too short for larger stock. When heavily grazed by sheep it tends to run out and form a sward.

Reference.—Chloris pectinata *Benth. Fl. Austr.* VII., p. 612 (1878).

CHLORIS PUMILIO.

(Plate 152.)

Botanical Name.—*pumilio,* from Latin *pumilio* = a dwarf, referring to the small stature of the plant.

Common Name.—This grass does not appear to have received any distinctive common name.

Botanical Description.—Tufted annual, up to 45 cm. high; roots fibrous; culms 3-5-noded, erect or geniculate at the base, unbranched or branched from the lowest nodes, internodes green, striate, nodes glabrous, not swollen: young shoots flattened: leaves distichous; leaf sheaths flattened, striate, acutely keeled, shorter than the internodes, 2-3 cm. long, edge of sheaths towards the apex with long silky hairs; ligule a short ciliolate rim with a few long hairs; auricles small, with a few long hairs; collar narrow and inconspicuous, lemon-yellow; leaf blades conduplicate, flattened when very old, rigid, 5-15 cm. long, 2·5 mm. wide at the base, tapering to a rounded apex, primary nerves 5-7, including the midrib, blades keeled, scabrous above, glabrous and smooth beneath, margins scabrous: flowering culms erect, striate; racemes exserted, 4-8, rigid, obliquely ascending and closely clustered, 2-5 cm. long, bearing spikelets from the very base, rhachis triquetrous, scabrous, with a dense cluster of short hairs at the base: spikelets closely imbricate in two rows on the lower side of the rhachis, 2-flowered; lower glume 2·5 mm. long, lanceolate-acuminate, thin, membranous, 1-nerved, keeled, keel thickened, scabrous; upper glume 4·8-5 mm. long, acuminate, thin, membranous, 1-nerved, keeled, keel scabrous, produced into a fine awn up to 1 mm.; lower floret hermaphrodite; lemma lemon-yellow when young, usually black when ripe, 4 mm. long, linear elliptic in profile, elliptic in outline, scabrous except for silvery hairs at base and at apex

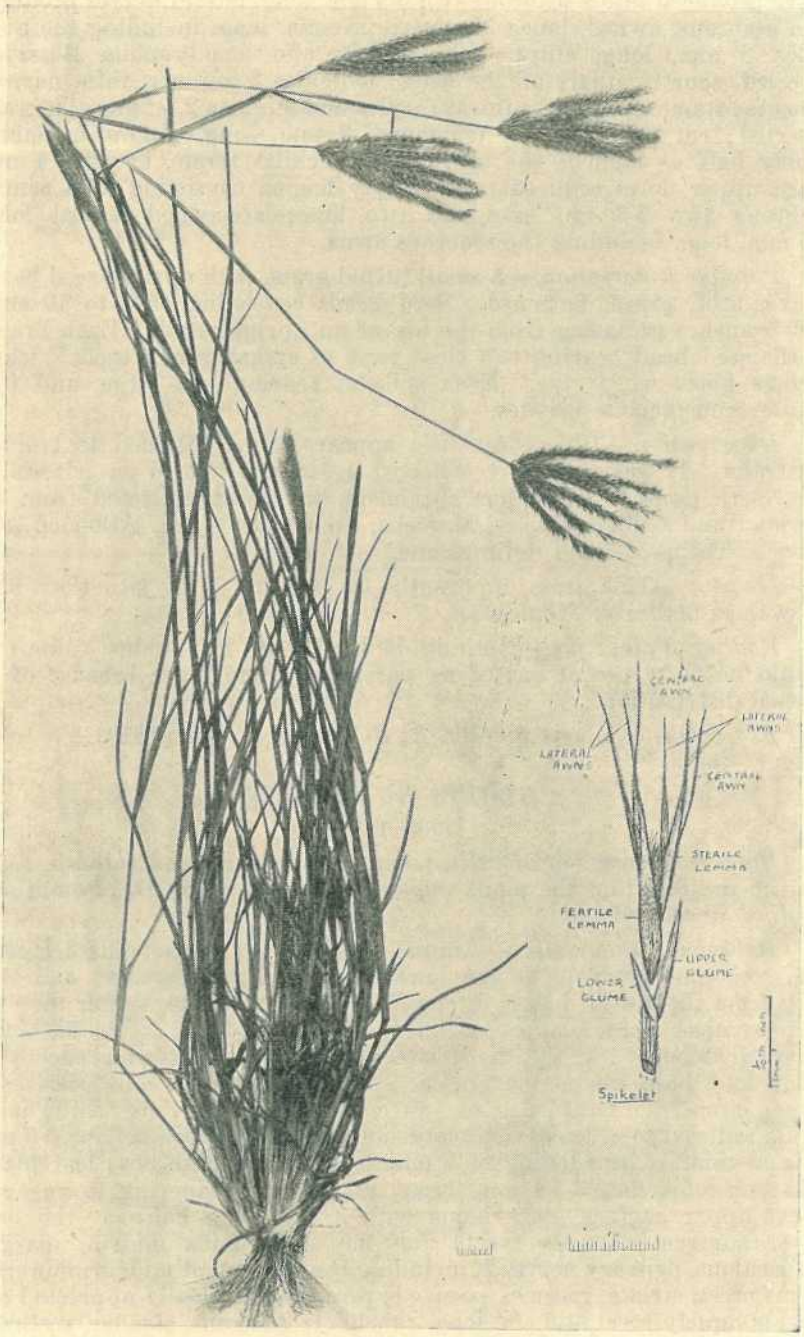

Plate 152.
Chloris pumilio.

of inrolled margins, 3-nerved, strongly keeled, margins inrolled, central nerve produced into a scabrous awn 6-8 mm. long, lateral nerves produced into scabrous, awned, lanceolate lobes 5-7 mm. long, including the awn; palea 3 mm. long, elliptic-oblong, thin and membranous, 2-nerved, 2-keeled, shortly ciliate on the keels; lodicules 2, minute, thin, narrow-cuneate; stamens 3; ovary linear; styles and stigmas 2, stigmas laterally exserted; caryopsis brown, trigonous, 3 mm. long, glabrous, embryo nearly half as long as the caryopsis: rhachilla terete, smooth, 1 mm. long; upper floret reduced to an empty lemma consisting of a central scabrous awn 5-6 cm. long and two lanceolate-awned lateral lobes, 4-5 mm. long, including the scabrous awns.

Popular Description.—A small tufted grass, with upright seed heads. Leaves stiff, green, flattened. Seed heads consisting of 4 to 10 short stiff branches radiating from the top of an upright stalk. Each branch of the seed head bearing two close rows of spikelets or "seeds" which become black when ripe. Each spikelet bearing two large, and four smaller conspicuous bristles.

Distribution.—Chloris pumilio appears to be confined to tropical Australia. It was originally collected by Robert Brown on Islands off the North Coast. Since then specimens have been collected from the Norman and Gilbert Rivers, Mareeba, Mount Mulligan, Atherton, and between Townsville and Rollingstone.

Habitat.—This grass apparently favours low-lying situations such as swamps and river frontages.

Fodder Value, &c.—Nothing is known of its fodder value. It should be quite useful but of no particular importance because of its limited distribution.

Reference.—Chloris pumilio *R. Br. Prodr.* i, 186 (1810).

CHLORIS RUDERALIS.

(Plate 153.)

Botanical Name.—ruderalis, from Latin *rudus* = old rubbish, referring to the fact that the plant was originally found by Dr. Domin as a weed of disturbed land.

Botanical Description.—Annual: culms erect or geniculate ascending, sometimes rooting at the lowest nodes, little branched and then only from the lowest nodes; internodes glabrous, striate, longer than the leaf sheaths; nodes glabrous, slightly swollen; young shoots flattened; leaves distichous; leaf sheaths striate, sharply keeled, glabrous except for a few long hairs on the margins near the apex, 2-5 cm. long, sheaths of upper culm leaves rather loose; auricles brown with long white hairs; ligule reduced to a densely ciliolate rim; collar brownish-yellow, 0·5 mm. long at midrib, broadening to 1 mm. on margins, glabrous; leaf blades 6-13 cm. long, flat, 3·5-4 mm. broad at the base, tapering to an acute apex, upper surface scaberulous with a few long hairs at the base, lower surface glabrous except for the scaberulous midrib, margins scaberulous, primary nerves 7, including the prominent midrib: flowering culms erect, striate, racemes exserted; racemes 4-8, closely appressed and thus obliquely erect, 4-8 cm. long, rhachis triquetrous, slender, scabrous, with short hairs at the base, bearing from the base two unilateral imbricate rows of closely appressed spikelets: spikelets 2-flowered; glumes thin, membranous, 1-nerved, keeled, scabrous on the keels, lower glume lanceolate-acuminate, 1·5-2·5 mm. long, upper glume lanceolate-acuminate,

3-5 mm. long, including the 1 mm. long, scabrous awn: lower floret hermaphrodite; lemma to the awn about 4 mm., cartilaginous in texture, keeled and laterally compressed, irregularly rhomboid in profile, broadly elliptic in outline, glabrous except for tufts of long hairs at the base and on the margins near the apex, margins inrolled, lemma 3-nerved,

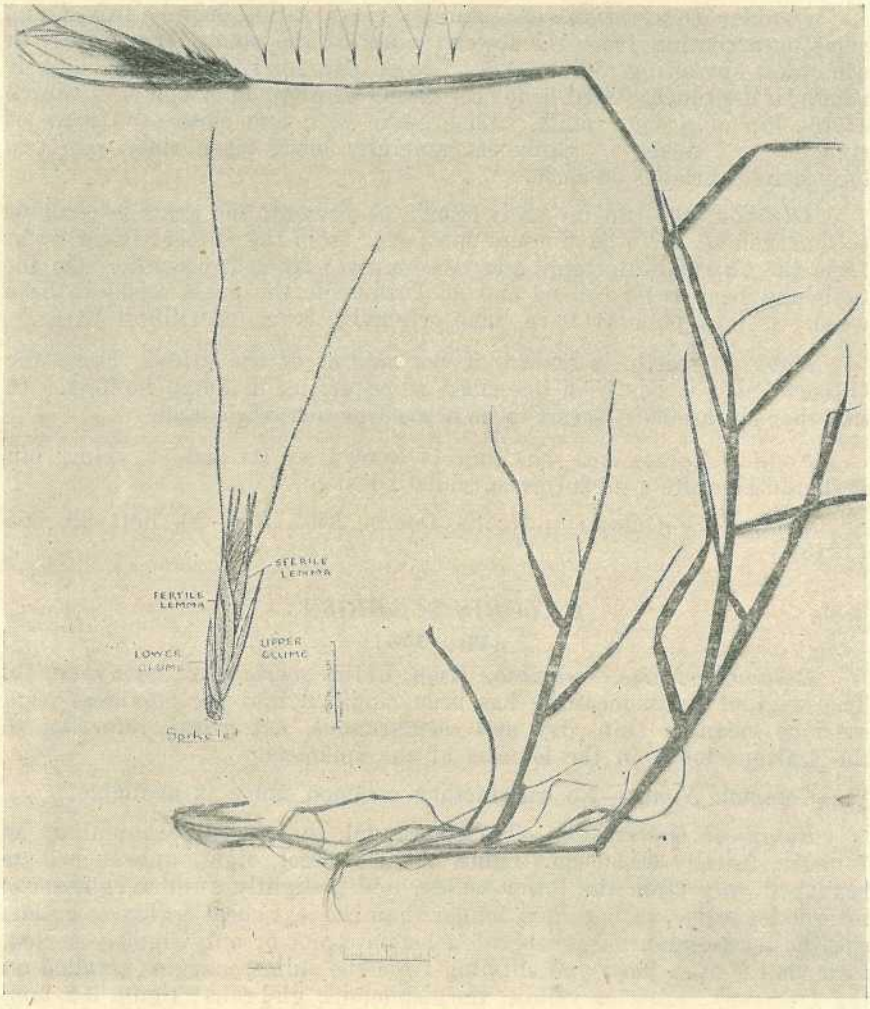

Plate 153.
Chloris ruderalis.

the central nerve prolonged into a slender scabrous awn up to 20 mm. long, lateral nerves near the margins, continued into the lanceolate-acuminate lateral lobes which terminate in a short awn or mucro, lateral lobes, including the awns, up to 4 mm. long; palea 3 mm. long, very thin, elliptic, 2-nerved, 2-keeled, glabrous; lodicules 2, 0·3 mm. long, thin, irregularly cuneate; stamens 3, anthers shorter than the filaments, linear-oblong, 0·4-0·5 mm. long; ovary small, oblong; styles and stigmas 2, stigmas laterally exserted; caryopsis dark-brown, trigonous, linear-elliptic in outline, minutely truncate at the apex, base acute, 2-2·3 mm.

long, embryo nearly half the length of the caryopsis; upper floret reduced to an empty lemma borne on a terete, 1 mm. long rhachilla, lemma linear, glabrous, 1 mm. long, excluding the lobes, 2-lobed with a scabrous central awn up to 15 mm. between the lobes, lateral lobes up to 2 mm. long, sometimes with a short scabrous mucronate tip.

Popular Description.—An annual grass, rather loosely tufted and sometimes rooting from the lowest joints of the stems, stems erect or somewhat spreading at the base. Leaves flat, fairly broad and slightly rough to the touch. Seed heads consisting of a bunch of spikes clustered at the top of a short stalk. Each spike with two close even rows of spikelets or "seeds." Spikelets generally black when ripe, with two long slender bristles on each.

Distribution.—So far as is known at present, the grass is confined to Queensland. We have many specimens from the Gilbert River, some from the Cairns hinterland, and two or three from Townsville. On the tableland back from Cairns and at Townsville the grass seems to be a weed. It may possibly have come originally from the Gilbert River.

Habitat.—Little is known of the habitat of the grass. From the Gilbert River it has been described as occurring in damp hollows. In its other situations it seems to be a weed of disturbed land.

Fodder Value, &c.—Nothing is known of its fodder value, but it should be quite a useful grass while it lasts.

Reference.—Chloris ruderalis *Domin Bibl. Bot.* 20, heft 85, 365 (1915).

CHLORIS SCARIOSA.

(Plate 154.)

Botanical Name.—scariosa, from Latin *scaria* = a thorny shrub. The original Latin meaning has been modified into the botanical term scarious meaning thin, dry and membranous, not green, referring to the scarious lobes on the lemmas of the spikelets.

Common Name.—No satisfactory common name is available.

Botanical Description.—Tufted annual, sometimes perennial up to 1 metre, usually 30-50 cm.; culms slender, erect, rigid, unbranched or branched only from the lower nodes; nodes slightly swollen, glabrous; internodes terete, scaberulous, longer than the leaf sheaths: leaves green; sheaths terete, glabrous, scaberulous, striate, not or only slightly keeled, towards the apex loose and slipping from the culms, margins inrolled on the free part: auricles yellow, inconspicuous, glabrous; ligule 0·8 mm. long, membranous, margin broken into numerous, fine irregular teeth; collar narrow and inconspicuous, glabrous: leaf blades flat, conspicuously narrower than the sheaths, scaberulous above, sometimes with long hairs at the base, smooth or slightly scaberulous beneath, 1·5-1·8 mm. broad at the base, 10-20 cm. long, tapering to a fine point, primary nerves 5, including the midrib: flowering culms rigid, erect, terete, terminating in 4-5 digitate racemes; racemes clustered, appressed, 3-5 cm. long, bearing unilaterally two rows of closely imbricate spikelets: spikelets 4-7 flowered; glumes thin, membranous, 1-nerved, scarcely keeled, lower glume 4 mm. long, elliptic-oblong, emarginate, upper glume 5 mm. long, broadly oblanceolate, apex shortly bifid; lowest floret hermaphrodite, borne on a 2·5 mm. long, densely hairy rhachilla; lemma 2 mm.

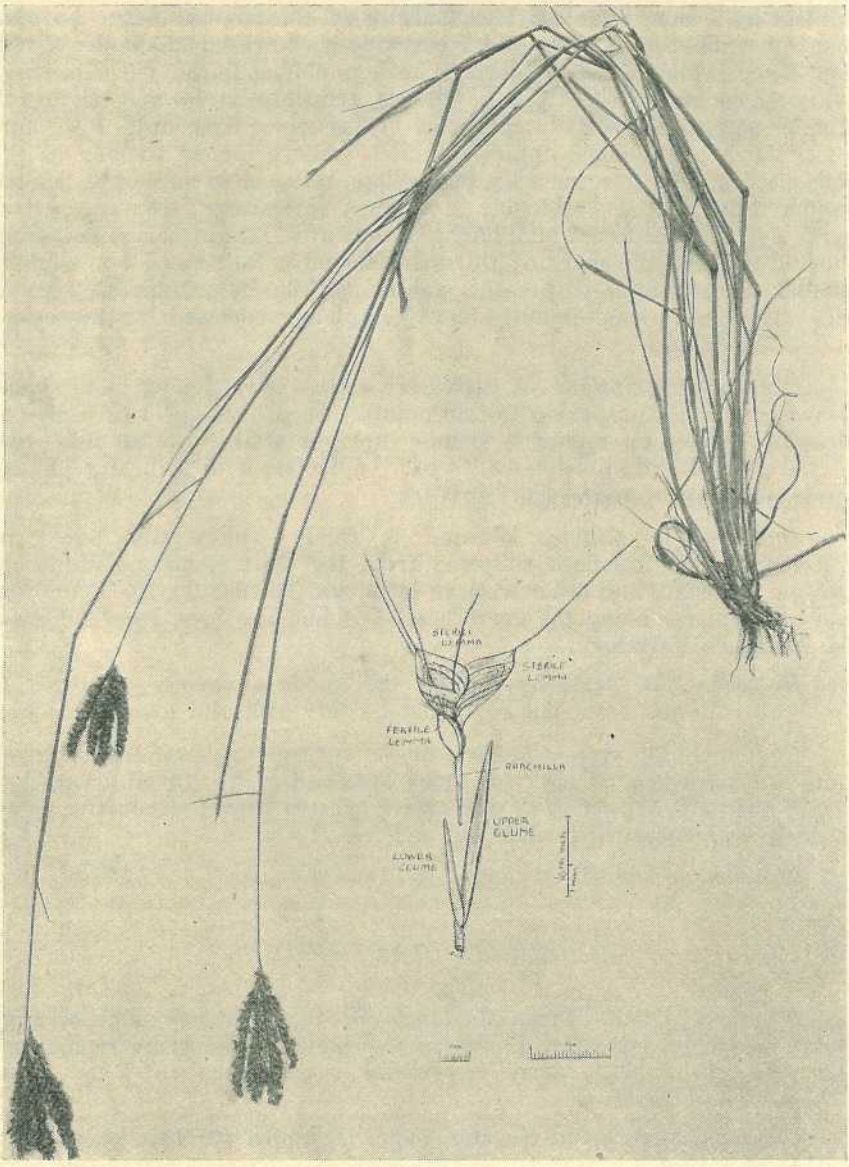

Plate 154.
Chloris scariosa.

long, folded and keeled, irregularly rhomboid in profile, ovate in outline, glabrous except for tufts of long white hairs at the base of the keel and a fringe of erecto-patent hairs on the margin near the apex, 3-nerved, central nerve prolonged into a slender scabrous awn up to 7 mm. long, lateral nerves near margins, margins scarious, base of central awn flanked by 1 mm. wide scarious margins of the lemma; palea 2·5 mm. long, obovate-elliptic, thin and membranous, 2-nerved: lodicules 2, 0·2 mm. long, cuneate, thin: stamens 3, anthers oblong linear, 0·8 mm. long; ovary sessile or shortly stipitate, obovate, truncate; styles and stigmas 2, stigmas laterally exserted; caryopsis brown when ripe, dull, 1·5-2 mm. long, obovate trigonous, angles rounded, embryo almost as long as the caryopsis: second floret shortly pedicellate, reduced to an empty lemma, lemma thin, scarious, orbicular in outline, spreading, 7-nerved, central nerve prolonged into a 2 mm. long scabrous awn, lateral nerves becoming shorter towards the margin: third floret similar to second but slightly smaller, fourth and, if present, subsequent florets similar to second, but considerably smaller and almost completely enclosed by the second and third florets.

Popular Description.—A tufted erect grass with slender rigid stems. Leaves green, flat, tapering to fine points. Seed heads of 4 or 5 closely clustered spikes on top of a slender upright stalk. Spikes with two very dense rows of spikelets or "seeds," spikelets with thin, dry papery husks and two or more short bristles.

Distribution.—*Chloris scariosa* is fairly widely distributed in Queensland. It has been collected from the Gulf country, Windorah, Quilpie, Blackall, and other western localities, Townsville, Rockhampton, and other places along the north coast. It has also been recorded from the Northern Territory.

Habitat.—The grass apparently thrives on a variety of soils. It has been collected from black soil flats, sandy soil, and gravelly ridges.

Fodder Value, &c.—*Chloris scariosa* springs up very rapidly after rain, and most reports say that stock are fond of it. In addition, it is one of the most attractive of our native grasses from a decorative point of view and keeps well when cut.

Reference.—Chloris scariosa *F. v. Muell. Fragm.* vi., 85 (1867).

CHLORIS DICHANTHIOIDES.

(Plate 155.)

Botanical Name.—From *Dichanthium,* the botanical name of Blue Grass, and oides from Greek *eidos* = resemblance, referring to the fact that the plant bears some superficial resemblance to Blue Grass (*Dichanthium sericeum*).

Common Name.—No common name is known for this plant.

*Botanical Description.**—Densely tufted perennial up to 60 cm.; rhizomes short; innovation buds mostly on outside of the tussocks, enclosed in stiff, hard, densely inbricate scales: culms somewhat wiry, erect or drooping towards the top, few noded, branched from the lowest nodes; lowest internodes shorter than, upper internodes longer than the leaf sheaths, internodes glabrous, terete, smooth or slightly striate; nodes glabrous: leaves pale green, rather stiff; leaf sheaths striate, keeled,

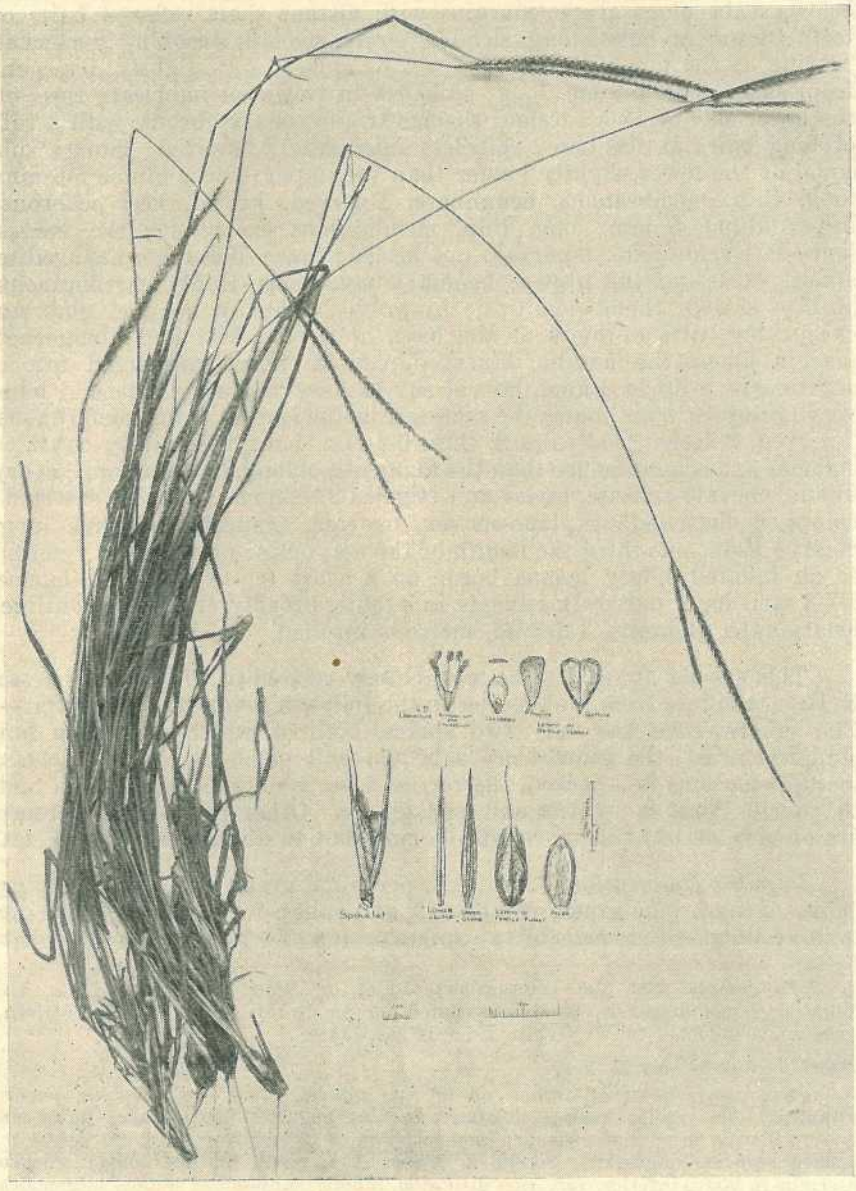

Plate 155.
Chloris dichanthioides.

scaberulous, upper part slipping from the internodes, margins thin; auricles narrow and inconspicuous; ligule reduced to a ring of dense hairs; collar not conspicuous; leaf blades 5-17 cm. long, flat, 2-2·2 mm. wide at the base, tapering to a fine scabrous point, glabrous and smooth below, scaberulous above, margins with distant short reflexed hairs or teeth: flowering culms long, slender, terete, smooth, drooping somewhat, bearing at the top 2 digitate racemes or spikes only slightly divergent from each other, 6-9 cm. long; spikelets in two even imbricate rows on the lower side of each raceme; rhachis triquetrous, scabrous, with a tuft of long hairs at the base: spikelets subsessile, 2-flowered: glumes subequal or the lower slightly longer than the upper; lower glume 5-6 mm. long, thin, membranous, acuminate, 1-nerved, keeled, keel scabrous; upper glume 5 mm. long, thin, membranous except for the nerves, lanceolate-acuminate, 3-nerved, not keeled: lower floret hermaphrodite, almost enclosing the upper; lemma 3 mm. long, thinly cartilaginous, bluntly keeled, rhomboid-elliptic in profile, ovate in outline, glabrous except for tufts of hairs at the base, along the keel and along each margin above the middle, 3-nerved, central nerve prolonged into a scabrous awn up to 3 mm., lateral nerves near the margin, lateral lobes very minute or none: palea the same size as the lemma, thin, membranous, 2-nerved, 2-keeled; lodicules 2, thin, 0·2 mm. long, irregularly cuneate; stamens 3, anthers shorter than the filaments, oblong, 0·3 mm. long; ovary sessile, obovate-cuneate, styles and stigmas 2, stigmas laterally exserted: caryopsis flattened or plano-convex, obovate, truncate, 1·5 mm. long, embryo about one-third the length of the caryopsis: upper floret reduced to an inflated empty lemma borne on a short terete rhachilla, lemma 1·7-2 mm. long, narrowly cuneate in profile, broadly cuneate in outline, emarginate, glabrous, 3-nerved, margins inrolled.

This species appears to be most closely related to *Chloris ventricosa* R. Br. It differs from that species in the following important respects:— The inflorescence has only two spikes, both of which are stiffly but obliquely erect, the glumes are subequal and much exceed the florets, the upper glume is 3-nerved, the fertile floret is only shortly awned and the sterile floret is awnless and emarginate. Other points of difference are observable but the above will be sufficient to distinguish the species.

Popular Description.—A tufted, perennial grass, of slender weeping habit. Leaves pale green, rather stiff and rough to the touch, tapering to fine points. Seed heads of two spikes on top of a long slender purplish

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* To comply with the International Rules of Botanical Nomenclature, the following Latin diagnosis, kindly translated for me by Mr. C. T. White, is given. I am much indebted to Mr. White for this assistance.

Chloris dichanthioides sp. nov.

Gramen perenne, caespitosum, ad 60 cm. altum: culmi erecti apicem versus nutantes: folia rigida; vaginæ striatæ; auriculae angustæ, inconspicuæ; ligula ad seriem ciliorum densiorum redacta; laminæ planæ, 5-17 cm. longæ, apicem versus in acumen scabrum-angustatæ: racemi 2, leviter divergentes, 6-9 cm. longi: spiculæ biseriatæ in latere inferiori ramorum dispositæ, biflorae, subsessiles; glumæ subæquales vel inferior leviter longior; inferior 5-6 mm. longa, 1-nervis; superior 5 mm. longa, 3-nervis; anthœcium inferum hermaphroditum; lemma 3 mm. longum, ovatum, ad basin et carinam et marginem in parte superiori fasciculis pilorum instructum, trinerve; nervus medius in aristam 3 mm. longam attenuatus; palea 3 mm. longa, 2-nervis; stamina 3, antheræ filamentis breviores, 0·3 mm. longæ; ovarium obovato-cuneatum; caryopsis plana vel plano-convexa, obovata, truncata, 1-5 mm. longa: anthœcium superum ad lemma vacuum, inflatum, 1·5-2 mm. longum, late cuneatum, emarginatum, marginibus incurvis redactum.

drooping stalk. Spikes with two close even rows of spikelets or "seeds." Spikelets with long outer husks enclosing two more inflated husks or lemmas and with one short bristle.

Distribution.—The species is named from a single collection made at Oakwood, north of Charleville, by Mr. W. White, in May, 1936. The type specimen is in the Queensland Herbarium, and co-type material has been forwarded to the Herbarium of the Royal Botanic Gardens, Kew, England.

Habitat.—Mr. White states that the specimens were collected on red soil along the edges of watercourses.

Fodder Value, &c.—According to Mr. White this is an uncommon perennial grass which appears to be relished by cattle.

Reference.—Chloris dichanthioides *sp. nov.*

KEY TO THE SPECIES OF CHLORIS NATIVE OR NATURALISED IN QUEENSLAND.

To aid in the identification of the species it has been thought desirable to include a key to the species, either native or naturalised, in Queensland. It is regretted that this was not given at the commencement of the work, but pressure of other work did not permit. The key is purely artificial although related species have been kept together as much as possible without sacrificing convenience of working.

A. Spikelets strictly two-flowered. Upper floret reduced to an empty lemma.

B. Lemmas unawned, dark brown in colour; racemes more than 30 .. .. *C. distichophylla*

BB. Lemmas, at least the lower, awned; racemes less than 30.

C. Lower lemma acuminate, often with acute or acuminate lateral lobes, never inflated nor truncate.

D. Inflorescence very slender and weak, racemes 1-3, very slender, not spreading .. .. .. *C. unispicea*

DD. Inflorescence not weak, or if so, then racemes divaricate and more than 3.

E. Lower lemma glabrous, or at the most scabrous, lateral lobes not prominent.

F. Racemes stiffly spreading in more than one plane. Lower lemma scaberulous, without lobes or lobes very obscure, tapering into a strong, rigid awn; leaf blades inrolled in the bud, not flattened; leaves glaucous .. .. *C. acicularis*

FF. Racemes divaricate but more or less in one plane. Lower lemma with small but appreciable acute lateral lobes; awns slender; leaf blades flattened in the bud, leaves green.

G. Racemes long, slender and somewhat weak, 8-15 cm. long, spikelets appressed to the rhachis, not obviously pectinate .. .. *C. divaricata*

GG. Racemes shorter, stouter, more rigid, often reflexed, persistent glumes obviously pectinate .. .. *C. pectinata*

EE. Lower lemma with tufts of hairs on the upper margins, lateral lobes usually prominent and awned.

H. Small, densely tufted plants; lemma with lateral lobes having awns nearly as long as the central awn; central awn up to 8 cm. racemes short and stout .. *C. pumilio.*

HH. Loosely tufted plants; lemmas with lateral lobes shortly awned, much shorter than the central awn; central awn up to 14 cm. .. .. *C. ruderalis*

EEE. Lower lemma with tufts of long hairs on upper margins; lateral lobes not conspicuous; central awn about 25 cm. .. .. .. *C. virgata*

CC. Lower lemma truncate, inflated, margins of the lemma inrolled, lateral lobes, if any, inrolled.

I. Lower lemma linear-oblong in profile, truncate, not enclosing the upper floret; racemes long and slender; creeping plants .. .. *C. truncata*

II. Lower lemma rhomboid elliptic in profile, totally or partially enclosing the upper floret; racemes shorter or stouter; robust, usually erect plants.

J. Lower glume shorter than the upper, not exceeding the florets; upper glume 1-nerved; racemes 3 or more, upper lemma awned .. .. *C. ventricosa*

JJ. Lower glume as long as or longer than the upper, much exceeding the florets; upper glume 3-nerved, racemes 2, upper lemma emarginate .. .. *C. dichanthioides*

AA. Spikelets usually more than two flowered.

K. Lemmas inflated, purple when ripe .. .. *C. barbata*

KK. Lemmas not at all or only slightly inflated, white or dark brown when ripe.

L. Upper lemmas without broad scarious margins.

M. Second floret always empty; lower lemma with tufts of long white hairs on margin and keel; awn about 25 cm. .. .. *C. virgata*

MM. Second floret often (not always) hermaphrodite; lower lemma glabrous except for very short marginal tufts of hairs; awn about 10 cm. .. *C. Gayana*

LL. Upper lemmas with broad scarious margins, spikelets 4-7 flowered .. .. *C. scariosa*

UTILISATION OF SWAMP LANDS.

Throughout a considerable stretch of the northern coastal country swampy areas of lesser or greater extent are encountered, particularly in the wetter regions where dairying is now being developed. These lands, to a large extent lying idle, could, at no great cost, be utilised by planting them with para grass. This grass is easy to establish, because of its habit of rooting freely at the nodes. It is a rather coarse, vigorous grower, but has succulent stems and leaves and gives a large quantity of green material per acre. Under favourable conditions, yields of over 30 tons per acre have been obtained in one year. It is easily cut back by frost, and is, therefore, most suitable for the warmer localities.

This grass grows well in swampy localities, the runners going out even into deep water. Once established, it holds its own with any other grass. It has a further advantage in that it is credited with completely drying out marsh lands.

Para grass is usually propagated by runners, which root readily. These runners can be easily planted in furrows about 3 feet apart and about the same distance between the rows.

—*T. G. Graham.*

Early Stone Fruit in the Warwick District.

C. SCHINDLER, B.Sc.Agr., Fruit Inspector.

THE light to medium sandy loams near Warwick are very suitable for the cultivation of apricots, plums, and peaches, and fruit grown there ripens earlier than at Stanthorpe. Loss from fruit fly is serious at times, but the pest can be controlled and kept in check during the ripening period of these early fruits by proper trapping, prompt destruction of fallen fruit, and as an aid to the latter the suppression of weeds around the trees. There is a keen demand for early stone fruit of good quality. One grower sent over 2,200 cases of early apricots to Brisbane and Rockhampton during the past season, obtaining up to 14s. a case, and the agents who handled this fruit reported that it was practically free from fly.

Suitable Soils and Sites.

Light to medium sandy loams are the best soils for growing good-quality fruit, and both the red and light-coloured types appear to be suitable. Good drainage is essential, and the systematic application of fertilizers is necessary. As the earliest fruit commands the best prices, an easterly aspect is advantageous. Planting in low sheltered spots should be avoided, as these are cold and likely to harbour fruit fly. If the area is subject to flooding by water from higher up the slope, there is danger of erosion. On the whole, it is better to plant high up the slope and provide wind breaks of quick-growing trees round the outside of the orchard to prevent damage by wind.

Some consider that the trees naturally grow larger in the Warwick district than in some other parts, and therefore should be planted further apart. However, if the trees are pruned reasonably heavily, the usual spacing of 20 feet (100 trees to the acre) can be used, and a greater yield per acre will be obtained.

Varieties.

For commercial plantings, only the earliest varieties of stone fruit are worth considering, as the price drops as soon as any quantity of fruit is forwarded from the Stanthorpe district, and fruit fly infestation becomes more serious as the season advances. Four varieties of apricots are grown successfully. The Glengarry is the earliest variety, and, given favourable conditions, will grow to a good size and be fit to market very early in November. The Newcastle Early follows this closely, and is of a good size and excellent flavour. This variety is a heavy bearer and the fruit carries well; it should constitute the bulk of any commercial planting. Oullin's Early and Moorpark are slightly later, but still command good prices; any variety which matures later than these is unprofitable.

Of the plums, Wilson and Santa Rosa (particularly the former) are worth a trial; there are no commercial orchards of these in bearing in the Warwick district, but as they ripen early there should be a good market for them. Mayflower and Brigg's Red May are the best of the early peaches. The earliest nectarines are grown locally, and an early variety of this fruit has a definite value.

Certain varieties of fruit trees harbour the fruit fly, and should on no account be grown amongst or adjacent to any orchard trees. Loquats and Early Gem plums are particularly subject to attack, and once the pest has gained a hold in these fruits it is well-established for the summer. Therefore, these fruits should be banished completely from any orchard property.

The climate of the Warwick district is unsuitable for the commercial production of apples and pears, and it is doubtful whether cherries would be a success. Almond trees grow vigorously, but rarely produce a crop; this is mainly due to lack of interpollination, and in some cases to frost injury when the fruit is setting.

Cultivation and Pruning.

Generally, clean cultivation throughout the year is practised, but the results of an analysis of soil from an orchard on rather shallow soil indicate that the addition of humus by the growing of a green manure crop during the winter and ploughing it under very early in the spring would improve the soil considerably; barley and field peas being recommended. Applications of animal manures (farmyard, sheep, and poultry) are also useful for this purpose. If a decline in vigour and productivity of the trees is noticed after some years, a complete fertilizer should be applied, but as an excess of fertilizer tends to make the fruit soft and slow to mature, it should be used with discretion.

The usual method of pruning deciduous fruit trees should be followed. Some trees bear very heavy crops alternately with light crops; this habit can usually be corrected by rigorous pruning just before a light crop is expected.

Pests and Diseases.

The greatest trouble of the stone fruitgrower is, of course, fruit fly. If the above recommendations as to the situation of the orchard and varieties planted are carried out, and the regulations for the control of fruit fly followed properly, this pest should give very little trouble while the early varieties are being harvested.

San Jose scale is found on the trees, although not common on apricots. It is effectively controlled by the compulsory winter spray of lime-sulphur, miscible oil, or tar distillate.

Both apricots and peaches are liable to "leaf curl," which is a fungus disease affecting the first-formed leaves. These become thickened, puckered, and discoloured, and soon fall off. Apricots and some varieties of plums may be affected by a rust which occurs on the young wood, leaves, and fruit. On the wood and leaves, golden-yellow postules form, while hard scabs are formed on the fruit, disfiguring it and thereby reducing its market value. A winter spray with lime-sulphur will help to control both these diseases, but if either become serious 6-4-40 Bordeaux mixture should be applied just as the buds commence to swell.

For the control of rust, a second spray may be required at petal fall. In the case of apricots this should be a 2-3-40 Bordeaux mixture, and for other stone fruits lime sulphur 1 in 50.

Some varieties of plums may suffer from bacterial spot, which produces cracks in the wood, a "shot hole" on the leaves, and large dark spots resembling a scald on the fruit. The use of Bordeaux mixture will control this disease, but rather more than the two applications mentioned above may be required to give satisfactory results. All wood showing the injury produced by prune rust or bacterial spot should be removed when pruning, and all prunings removed and burnt as soon as possible, as the diseases are carried over the winter in these lesions.

Banana Growing in Queensland.

H. J. FREEMAN, Senior Instructor in Fruit Culture, and Chief Inspector of the Banana Industry Protection Board.

[*Continued from page* 331, *April*, 1938.]

PROPPING.

GOOD shelter is an important factor in the production of good-quality fruit, but by this is not meant that it is possible for all winds to be excluded from the plantation.

Coupled with the weight of the bunch, occasional high winds often make it necessary to prop the plants to prevent them from falling or being blown over, with a consequent loss of the bunch. This applies particularly to plantations after the bearing of the first crop. Usually, the best time to prop is when the fruit is about half-developed. Before this, the weight of the bunch is not heavy enough to overburden the plant.

The Cavendish variety, being of dwarf type, needs less propping than Mons Marie or Gros Michel, while Sugars and Lady Fingers rarely require propping at all, as their bunches are usually smaller in comparison.

Round bush timber makes fair props, but split or sawn timber is better and will last longer.

Naturally, the steeper the land on which the bananas are growing, the longer the props have to be cut, but on average hillsides, for Cavendish, a 6-feet to 7-feet prop is satisfactory. For Mons Marie and Gros Michel 10-feet props are required for the first crop and up to 16 feet for subsequent crops. The props should be rigid and strong enough to bear the weight they have to hold. Round timber props should have a diameter of at least 4 inches at the butt end; while split or sawn timber props should measure 1 x 1½ inches. The props should be pointed sharply (chisel-shaped) at the top end. This point is pressed into the collar of the plant, just below the bunch stem, and pushed up so as to take the weight. The lower end should be slightly embedded in the ground. Care must be taken to see that the prop is placed at such an angle as not to come in contact with the side of the bunch; otherwise serious rubbing may damage the fruit. Other effective ways of propping are to use two props instead of one, or two props fastened together about 9 inches from one end to form a crutch or fork.

The removal of the bunch flower at half-maturity or even earlier is recommended, because it wastes the plant's energy, increases the weight which the plant stem has to carry, and provides a harbourage for insect pests. Besides, its removal hastens the maturity of the bunch.

BAGGING.

Among banana-growers the practice of bagging bunches is often a subject of discussion. It has its advantages and disadvantages. The fruit is subject to much less blemish when bagged and, in addition, the fingers all round the bunch are developed to an equal degree. The cost of the bagging and extra labour certainly increases the cost of production, but on some plantations the grower is handsomely repaid for this extra expenditure. The question of whether to bag or not to bag is

Plate 156.

CAVENDISH BANANAS, MACADAMIA NUTS, AND KIKUYU GRASS GROWING ON THE SAME AREA.

This interesting system of land utilisation suggests the possibility of the successful combination of fruit and nut production with dairying.

Plate 157.

The prop must be sufficiently strong to bear the full weight. This particular prop is too weak.

one for the grower to decide for himself, but from observations it is suggested that on those plantations subject to exposure during the late autumn and winter bagging should be seriously considered.

In such plantations leaf fall usually occurs to such a degree that the bunch loses its natural shelter and, as a consequence, becomes somewhat hardened, fails to mature properly, and often carries blemishes caused by sun scald. If bagged, the majority of these bunches will mature, the bags providing a satisfactory shelter. Normally, these coverings should be put on to all bunches likely to be harvested during a period—from the beginning of May and then onwards until the end of September. Chaff bags are suitable, provided the bottom seam is opened up, thus allowing a view of the bunch from underneath without removing the tie on the bag proper. Tubular hessian now sold for this purpose is better than chaff bags. It is priced at 5½d. a yard. Hessian covers last for about two seasons—i.e., twelve months' actual wear. Heavier material has been tried, but with less success because of lack of sufficient air penetration when the bunch and bagging have become saturated after rain.

A small experiment tried recently with a light watertight material proved satisfactory. The material was made up in tubular form, slipped over the bunch and tied round the bunch stem in a way similar to the ordinary method. The cost of these envelopes was 6d. each, and if they outlast hessian covers they should be more economical.

[TO BE CONTINUED.]

QUEENSLAND SHOW DATES.

May.

Ipswich	17th to 20th
Warrilview	21st
Biggenden	26th and 27th
Gympie	26th to 28th
Dirranbandi	27th and 28th
Kalbar	28th
Toogoolawah	27th and 28th
Maryborough	31st May to 2nd June

June.

Maryborough	31st May to 2nd June
Biloela	2nd to 4th
Lowood	3rd and 4th
Childers	6th and 7th
Boonah	8th and 9th
Bundaberg	9th to 11th
Wowan—	
Show	9th and 10th
Rodeo	11th
Gin Gin	13th and 14th
Gladstone	16th and 17th
Marburg	17th and 18th
Rockhampton	21st to 25th
Mackay	27th to 30th
Kilcoy	30th June and 1st July

July.

Kilcoy	30th June and 1st July
Proserpine	1st and 2nd
Nambour	7th to 9th
Cleveland	8th and 9th
Ayr	8th and 9th
Townsville	11th to 14th
Rosewood	15th and 16th
Esk	15th and 16th
Charters Towers—	
Show and Rodeo	19th to 21st
Laidley	20th and 21st
Maleny	21st and 22nd
Cairns	26th to 28th
Gatton	28th and 29th
Caboolture	29th and 30th

August.

Atherton	2nd and 3rd
Pine Rivers	5th and 6th
Home Hill	5th and 6th
Royal National, Brisbane	15th to 20th

September.

Imbil	2nd and 3rd
Ingham	2nd and 3rd
Pomona	9th and 10th
Tully	9th and 10th
Beenleigh	16th and 17th

Plate 158.
Cavendish bananas on a hillside plantation, showing method of propping.

Plate 159.

A Mons Marie plantation at Lacey's Creek, Dayboro'; second cut hanging. Props used in this plantation average from 14 to 16 feet.

Observations on the Dairy Industry of the Irish Free State.

E. B. RICE, Dairy Research Laboratory.*

THE chief dairy product of Ireland is butter, the demand for milk for the liquid milk market being comparatively small in proportion to the total production, as, apart from Dublin, which has a population of about 500,000, there are few other large cities and towns. As in Australia, New Zealand, Denmark, and other leading dairying countries, the creameries (factories) are almost entirely co-operatively owned by the farmers. Cheesemaking has not attained a very prominent position in the country's exports. Irish Cheddar cheese, practically the only variety made, is produced in relatively small quantities. The local market absorbs almost the total output, the export value of cheese amounting only to about £20,000 yearly.

The chief dairying districts, which are in the south of the island, are endowed with a bounteous rainfall, well distributed over the whole year.

Some Observations on Irish Dairy Farming.

In common with most European dairying countries, Irish dairy farming is much more intensive than dairying under our Queensland conditions and the farms are correspondingly smaller, the average area probably being from 60 to 100 acres. There is here, as in the south of England, a growing tendency to keep mature dairy stock in the open night and day throughout the year, but the young stock in their first year of life are allowed out of the byres only on warm, sunny days in the winter and are always housed indoors at night during that period of the year. Although animals in the fields on winter days may get a bite of grass, it is necessary to resort to hand feeding during this time. The winter maintenance ration consists of hay and roots, the production ration of concentrates fed in accordance with the individual milk yields of the cows.

Breeds of Cattle.—Owing to its close proximity to England, Ireland has built up an extensive export trade in store cattle which has encouraged the development of a dual purpose breed combining relatively high milk yield with desirable beef characteristics. More than 90 per cent. of the dairy cows belong to the dairy shorthorn breed, next in importance coming the Kerry breed, native cows, small, hardy, and especially well suited to some of the rougher parts of the country. The beef breeds are represented very largely by Aberdeen Angus and Herefords. The total cow population is about 1,500,000—about 1,000,000 calves are born yearly, of which about 250,000 are required for herd maintenance purposes, while the remainder are reared on the farms until they reach one to two years of age before disposal in the manner referred to later on. The average yearly milk yield per cow is about 485 gallons, though cows producing 1,600 gallons annually were shown to me on certain farms. Twice a day milking is the rule, though I was informed on the farms visited that any cows giving over 5 gallons daily are milked thrice. The herds are much smaller in size than Australian herds, the average numbers milked probably being from fifteen to twenty cows.

* Mr. Rice returned recently from a course of instruction at the Dairy Research Institute, Reading, England, and this article is a record of some of his impressions of a visit to Ireland.

The economics of the industry have led almost entirely to summer milk production, as in our own State, practically no attempt being made to regulate the calving times of the cows. This contrasts distinctly with dairying in England, where more than 80 per cent. of the milk produced is sold for the liquid milk market. The consequent higher prices obtaining and the need to keep production as uniform as possible throughout the year to meet requirements, are incentives for English farmers to regulate calving times. The age at which the heifers are calved down is two and a-half years, seldom over two and three-quarter years.

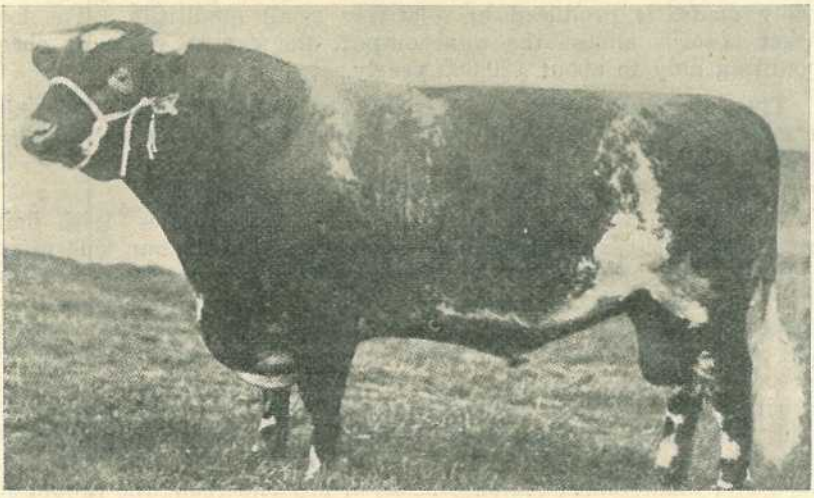


Plate 160.
The Head of a Shorthorn Herd on a stock farm in Ireland.

In Ireland the cows mostly calve in the spring. It is customary for the farmers to rear the female calves, subsequently selling in England or Scotland as yearlings or two-year-olds any heifers not required for replenishing their herds; on the smaller farms the heifers are as a rule sold as yearlings, while on the larger farms or where rough grazing is available it is more profitable to keep them until they are two years old. Heifers not purchased by English farmers and not utilised for herd replacement are fattened locally and sold for beef at about two and a-half years of age. Bulls with the best ancestry are retained for breeding purposes, the others being exported as stores to England, where they are fattened. Before any bull can be retained for breeding purposes it must be licensed, as the keeping of "scrub" bulls has been prohibited since 1925. Upon application being made for a license, the live stock inspector examines the animal at six months of age. To be approved it must be true to breed, and although half-breeds are passed at the present time it is anticipated that within a few years only pure-bred animals will be approved.

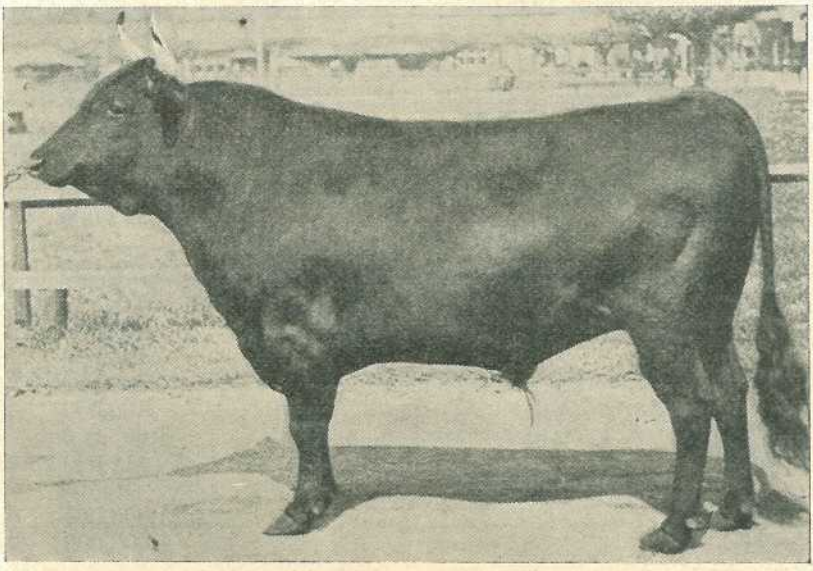


Plate 161.
A fine representative of the Kerry Breed.

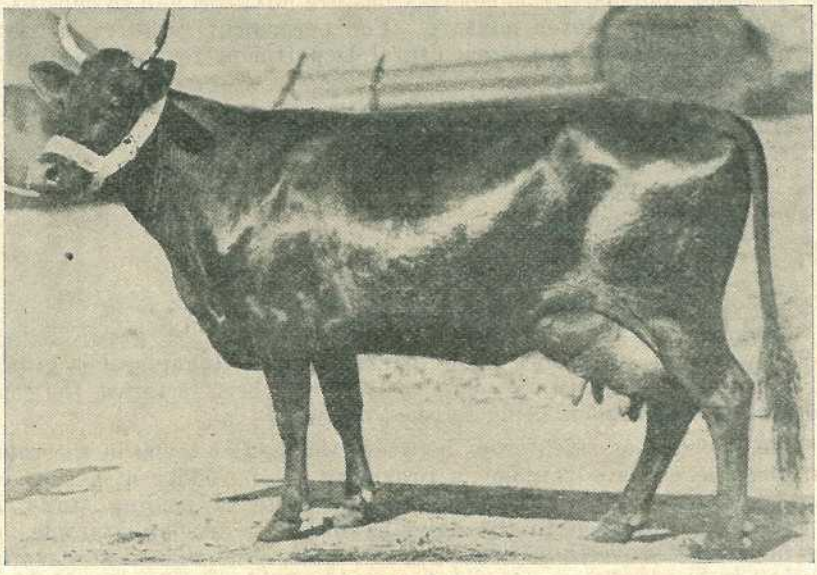


Plate 162.
A Kerry Cow.

To indicate the relative importance of cattle raising to the country, I give hereunder a table showing the values of some of the important agricultural exports in 1935:—

	£
Store bullocks and cows	2,000,000
Calves	35,000
Milch cows	483,000
Springers	167,000
Store heifers	900,000
Other fat heifers	173,000
Fat cows	173,000
Total value of cattle exported in 1935	5,500,000
Sheep	357,000
Pigs	428,000
Pig products (bacon)	1,500,000
Fresh pork and hams	400,000
Butter	1,658,000
Cream	112,000
Cheese	18,000
Eggs	1,000,000
Horses	1,000,000

Pig raising forms an important and ideal combination with dairying owing to the abundant supplies of skim milk which are returned to the farmers by the creameries and separating stations. The foregoing table shows that the value of pigs and pig products exported in 1935 amounted to £2,500,000. The Irish Large White is practically the only breed met with throughout the country.

Rye grass is the predominant constituent of pasture grass mixtures. In fact at several experimental farms visited it was observed that there is a tendency to depart from complex pasture mixtures and to substitute a simple rye grass-clover mixture. For permanent pastures, a seeds mixture advocated by the Agricultural Department for practically all dairying districts is:—

15 lb. perennial rye grass,
7 lb. Italian rye grass,
4 lb. meadow fescue,
3 lb. Timothy,
3 lb. Cocksfoot,
4 lb. Red clover,
2 lb. Alsike clover,
2 lb. White clover.

Cabbages, mangolds, turnips, swedes, and kale are grown extensively to provide succulence in the winter ration. Sugar beet is grown fairly extensively in districts close to the sugar beet factories, the tops and factory by-products being relished by stock.

The growing of catch crops between two regular crops in the rotation, because of its advantage in providing green fodder at a time of scarcity of grass and thus saving the purchase of feeding stuffs, is fairly widely practised in the dairying districts. As an example, at one farm visited vetches, beans, winter oats, and wheat were sown together in September (autumn) to provide fodder in April and May (spring and early summer).

Schemes for Improvement of Dairying.

The following schemes, full particulars of which have been obtained by me, are designed to promote better efficiency in the dairy industry of the Irish Free State.

1. Scheme for the registration of purebred dairy cattle. The object of this scheme is to raise the standard of pure-bred herds.
2. A scheme for the registration of non-pedigree dairy cattle aims at encouraging the grading-up of such stock.
3. Scheme for encouraging improvement in the breeds of cattle.
4. Loans for the purchase of premium bulls.

The two lastmentioned schemes, it is hoped, will stimulate improvement in cattle breeding mainly by inducing farmers to keep suitable bulls of a high degree of excellence. Loans may be granted to approved applicants with limited capital who desire to purchase a bull.

Creamery Butter Manufacture.

There is one great fundamental difference between the systems of butter manufacture in Australia and Ireland. Whereas in Australia the milk is separated on the producing farm, allowed to ripen spontaneously, and delivered to the factory by cream carriers who pick up all cream on a defined route, the Irish farmer takes the whole milk to the creamery (factory) or separating station daily and has the separated milk returned to him on the following day. This system gives a sweet cream butter as against the Australian ripened cream, neutralised product. Again, unlike the Danish method, the use of starter for ripening the cream at the creamery to produce an acid, full-flavoured butter is not practised in Ireland.

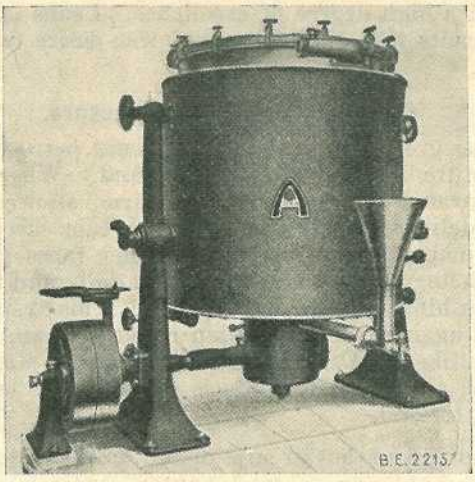
Large quantities of butter are placed in cold storage during the period of peak production to meet winter requirements, when butter manufacture declines sharply owing to the diversion of milk for city requirements. The Irish Butter Testing Station has had considerable success in using determinations of the pH value (a measure of degree of acidity) for selecting butter which will maintain its quality in cold storage. It is now also recognised that the pH value, combined with the action of small traces of copper and iron contamination, may be a potent factor in the deterioration which sometimes occurs in Australian butter during the voyage to England. Occasional samples of degraded butter obtained by me from Tooley street and examined at the National Institute for Research in Dairying have shown the importance of controlling acidity and metallic contamination.

The creameries are on the whole rather smaller than Australian butter factories, the larger plants being capable of producing about 20 tons of butter weekly.

Each central creamery, besides purchasing milk from farmers in its own neighbourhood, is also surrounded by a number of auxiliary creameries or separating stations, which receive milk from their own suppliers, separate the cream therefrom, pasteurise and cool it, and forward the pasteurised cream to the central creamery for churning. Few of these separating stations are equipped with facilities for brine-cooling of

the pasteurised cream, so that in summer it is only possible by water cooling to reduce the temperature of the cream to about 56-60 deg. F. As probably five hours elapse before the cream reaches the central creamery to be thoroughly cooled, much difficulty arises in producing a butter of firm texture in the warmer months.

Payment for milk is based on the butter-fat content, the Gerber test being used for fat determination. The Babcock test so widely employed in Australia and America is replaced in all European countries by the Gerber test. The present price for butter-fat is 1s. 2d. per lb. Daily samples of each supplier's milk are taken, placed in composite sample bottles containing preservative, and the fat analyses made fortnightly on the composite sample. There is no price differential for quality of milk as measured by the methylene blue-reductase or other



[*From "The Butter Industry" (Otto F. Hunziker).*

Plate 163.

Flash Pasteurizer, Astra type "U."

tests, nor are these tests applied with a view to effecting improvement in the quality of the milk supply. Nevertheless, on account of daily delivery (including Sundays) of milk, the mild climatic conditions, and pasteurisaton of the milk before bacterial spoilage shows up, the quality of the butter is uniformly good.

The separated milk returned to the farmers is not pasteurised, there being no legal regulation compelling it to be submitted to this treatment. This is in distinct contrast to Denmark, where, with a view to combating the spread of tuberculosis amongst live stock, regulations relating to the compulsory pasteurisation of skim milk returned to farmers by creameries have been strictly enforced for many years.

A brief outline of the method of butter manufacture is as follows. The milk upon arrival at the creamery is sampled, weighed, and tipped into a vat. Neutralisation, essential in the processing of ripened cream in Australia, is unnecessary in the manufacture of sweet cream butter, so that the milk is pumped straight from the tipping vats through a

preheater whereby its temperature is raised to about 110-120 deg. F. before it is passed through the separator. However, there seems to be wide variations in separating temperatures—some factories apparently separate the milk without prewarming it at all in the summer weather, but warm it up to 70 deg. F. prior to separation in the colder weather. After separation the skim milk is pumped to special tanks located outside the factory, while the cream is immediately flash pasteurised at temperatures varying from 190-200 deg. F. The pasteurisers used are of the closed type, like the Astra, the dome-type machine, so frequently found in Australia, not being used in Ireland. The cream after the heat treatment, passes first over water-cooled tubular or conical surface coolers and then over brine-circulating tubular surface coolers to reduce the temperature to 38-40 deg. F. If required, further cooling to 34-38 deg. F. is effected by means of brine-circulating swing-coil coolers in the holding vats themselves. After being held overnight in the attemperating vats, the cream rises 2-4 deg. F. in temperature in the warmer weather and is churned at temperatures varying from 38-42 deg. F.

Wet parchment is used for lining the boxes, sufficient for a week's requirements being boiled in a saturated brine solution and allowed to soak in the solution until used. This prevents mould contamination of the butter after package.

A typical example of the marking of the boxes is illustrated below:—

IRISH FREE STATE

X5 CREAMERY BUTTER

MADE BY

KILMALLOCK Co-operative Creamery Ltd.

Kilmallock, Co. Limerick.

Registered No. C 332

Plate 164.

Each box must bear in the left-hand corner of the marked side a letter to indicate the month of manufacture and a figure or figures to denote the serial churning number of the month. The registered number of the creamery must also appear.

Condensed Milk.

Partially condensed skim milk and whole milk are also produced at several of the creameries, the milk being reduced to about 9·5 per cent. fat content. This product is then despatched in churns (cans) to a large condensery at Limerick, which further condenses the product, sweetens it, if necessary, and is equipped with the necessary machinery for canning the milk.

Butter Grading.

A few comments on the official system of butter grading may be of interest. All butter exported has to be graded at the outgoing port. The Dairy Produce Act stipulates that the butter must not be over 52 deg. F. at the time of shipment. It is usual for the boats to load butter on a set day each week at the ports, and three inspectors visit each port weekly to grade all butter awaiting export. Each inspector independently examines a box from each churning and, when all grading is completed, the individual inspector's scores are compared. Should there be any disagreement in the scoring, the affected butter is jointly re-examined before its grade is finally decided upon. The grading points, which differ somewhat from the Australian system, are:—

Flavour	60
Body and texture	30
Colour	5
Packing	5

Surprise Competitions.

In addition to the grading of all butter exported, every creamery is visited periodically by the inspector for the district, who selects at random a box of butter in stock and forwards it to the Irish Butter Testing Station in Dublin. The boxes are held there for about ten days at 40 deg. F., and then scored. Before grading all distinguishing marks are covered and each box is numbered. As with export butter, the inspectors independently grade each box of butter, and when their cards are handed in, if there is any disagreement in the score of any particular box, this butter is jointly re-examined. The method of working is for the first inspector to start with the first box, the second with the eighth box, and the third with the fifteenth box. The results of the first scoring are averaged for the purpose of the competition. This system has much to commend itself by enabling actual scorings for flavour and other properties of the butter to be correlated with the findings of any scientific investigation being carried out. The creameries are informed of the marks awarded, and any comments made by the judges and the boxes are returned so that they may also examine the butter, knowing the marks awarded and the condition in which it would normally reach the consumer.

At the actual time of grading, samples of the butter are taken for bacteriological and chemical examination. The managers are also advised of the results of these tests, so that they will know the moisture and salt content of the butter, the degree of cleanliness exercised in manufacture, and the freshness of the cream used for making the butter.

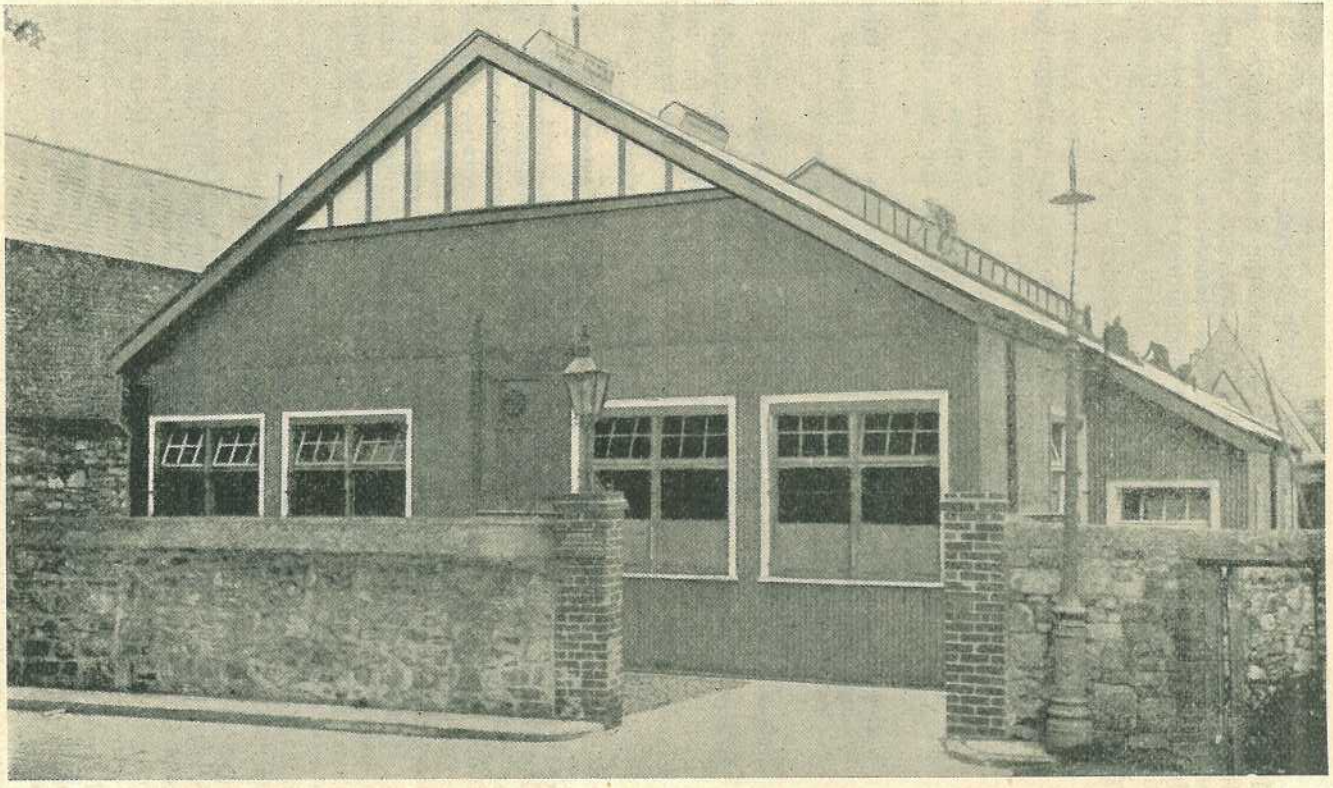


Plate 165.
The Butter Testing Station, Dublin.

Based on the results obtained in the surprise competitions, a cup is awarded annually to the creamery manufacturing the highest quality butter, and medals are given to the manager and the head butter-maker.

The Irish Butter Testing Station.

It is the function of this station to make the regular chemical and bacteriological examinations required in connection with the surprise competitions, to afford technical advice concerning manufacturing problems, to carry out analytical and biological tests on various materials used in the dairy industry, and any other special scientific investigations.

The routine work done at this station includes:—

1. Determination of moisture on samples of butter taken by inspectors at the shipping ports to see that the maximum legal moisture content of 16 per cent. is not exceeded.
2. Systematic bacteriological and chemical examinations of creamery and separating station water supplies with the object of ascertaining their suitability for use in the manufacture of dairy products.
3. Regular bacteriological examination of samples of cream taken by inspectors at creameries to check the efficiency of pasteurisation, the sanitary conditions of manufacture, and the cleanliness of the milk supply.
4. Bacteriological control of starters used in cheese factories.
5. Miscellaneous bacteriological and chemical analyses, such as (*a*) fat content of cream samples; (*b*) cheese; (*c*) milk products like milk powder, malted milk, &c.; (*d*) vegetable parchment; (*e*) salt.

Research Work Relating to the Dairy Industry.

Various institutions in the Irish Free State have made important contributions to dairy science. Arising from the investigations at the Butter Testing Station, the pH value was adopted to determine the suitability of butter to maintain its quality in cold storage. Another study has revealed that wide variations occur in the rate of growth of micro-organisms in Irish butter when submitted to ordinary temperatures. It is now known from work done in various parts of the world that a major factor governing the rate of bacterial proliferation in butter is the state in which the moisture exists, the bacteria present in butter in which free moisture or large droplets are present, due to insufficient working, multiplying with greater rapidity than is the case in well-worked butter, in which the moisture is thoroughly dispersed.

Irish butter is made from unneutralised, sweet cream, and it has been shown that the flavour score is closely correlated with the pH of the butter—that is, the degree of acidity. Increase in acidity (low pH) generally gives butter of lower grade than when the pH is from 6·7 to 7·0. Investigations have also been carried out to test bacteriologically and chemically the effect of cold storage on the keeping quality of butter and on the analysis and composition of vegetable parchment used for packing dairy products.

Studies at the Animal Nutrition Department, University College, Dublin, have dealt with mineral metabolism in the calf and the effect of the addition of inorganic materials to calf's diet. In experiments on the

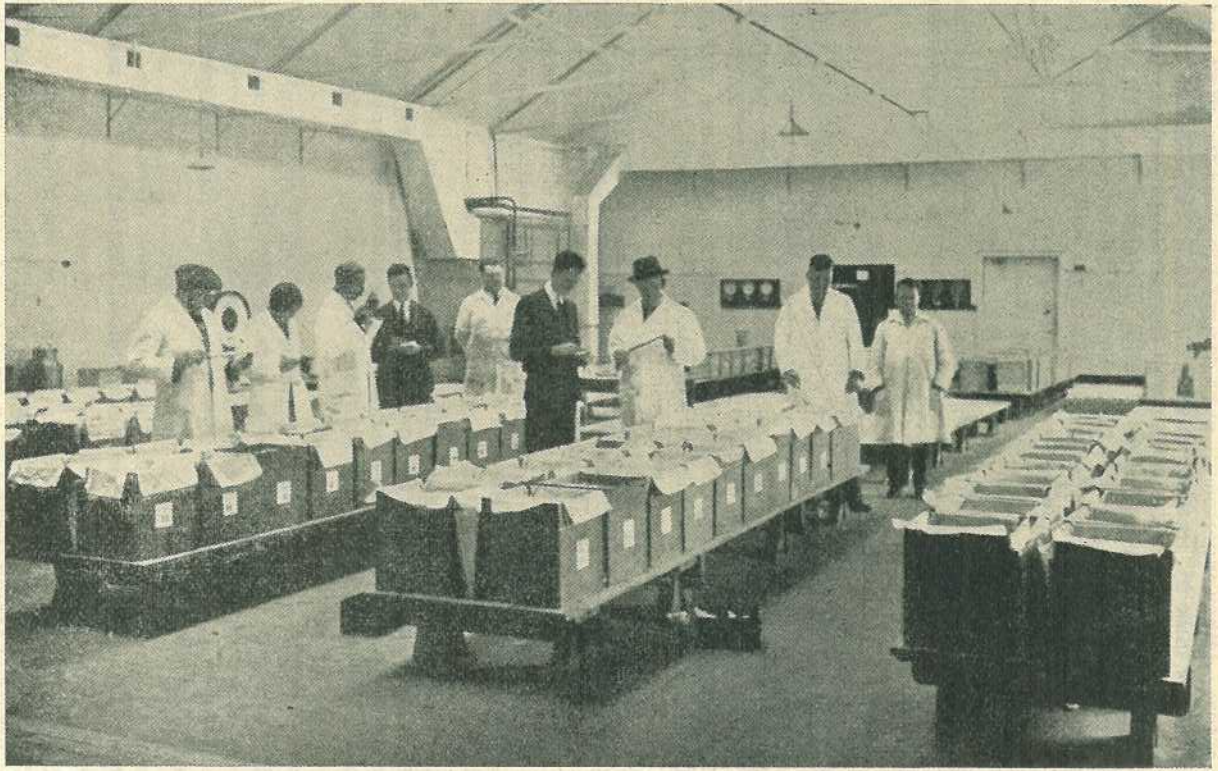


Plate 166.
Grading Butter for a "Surprise Competition."

effect of codliver oil feeding on the calcium and phosphorous content of cow's milk, it was noticed that there was no effect on the calcium or phosphorous content of the milk, but the percentage of fat in the milk was seriously depressed, a fact which has been observed by several other investigators. Other experiments were designed to show the effect on the fat content of milk by feeding various materials. Neither the amount of water consumed with the ration nor the succulence of the foods is capable of affecting the richness of milk in butter-fat. Although a sudden change from a high to a lower level of feeding may or may not reduce the milk yield, the proportion of fat in the milk remains constant. Conversely, changing from a low level of feeding to an abundant ration may increase the milk yield, but is without influence on the fat percentage.

A number of important investigations connected with butter manufacture have been carried out in recent years at the Dairy Technology Department, University College, Cork.

Dairy Education.

The Faculty of Dairy Science, University College, Cork, undertakes the technical training of youths desirous of qualifying for employment in creamery work. Each year applications are invited from prospective candidates, who are selected on the results of a written examination and personal interview by the Dean of the Faculty. Previous creamery experience is not a prerequisite for admission to the course, the students being chosen on their apparent suitability for employment in the industry. The number of students is limited to fourteen each year, this number being regarded as sufficient to fill available openings. The duration of the course for the Diploma in Dairy Science is two years, and since 1925 the possession of the certificate granted to students who complete the course and who have had sufficient practical experience, certified by a Departmental Inspector of Dairy Produce, is the recognised qualification for employment as a creamery manager.

A limited number of students also study a four years' course for the degree of Bachelor of Dairy Science. The Department does not undertake to find employment for anyone completing the course, but graduates are usually absorbed in the Agricultural Department, or as teachers in State or private colleges.

The College creamery which purchases cream from co-operatively-owned separating stations, is conducted exactly like any commercial creamery, and students are also sent to co-operative creameries for practical experience. There are also well-equipped bacteriological and chemical laboratories.

In addition to the training of students, much investigational work having an important bearing on the technical problems of the industry has been carried out by members of the staff in recent years.

Rather unique is the Munster Institute, on the outskirts of Cork, a residential college for young ladies, which provides courses of instruction in poultry-keeping, farm butter-making and dairy practice, such as care of cows, calves and pigs, and domestic economy. The primary purpose of the institute is to fit young women to perform the duties devolving upon them in ordinary farm life. Students who show special aptitude are, however, afforded further training to qualify for appointments under County Committees of Agriculture.

This institute has a tuberculin tested herd of dairy shorthorn cows, the average milk yield being 700 gallons per cow. The area of the farm is 160 acres and 140 head of dairy stock and 100 pigs are kept. The property being overstocked, it is the policy to break up the temporary pasture—Italian ryegrass and red clover—every two years and renew it.

Acknowledgment.

Grateful thanks are due to all those with whom I came into contact during my visit for their ready response to my inquiries, and for the full information afforded me; in particular, I should like to mention Mr. T. O'Connell, Chief Inspector, Department of Agriculture; Professor Boyle, University College, Cork; Dr. Arup and Dr. Gilmour, Irish Butter Testing Station; and Dr. Hennerty, Dairy Produce Inspector.

A COMMON WINTER DEFECT IN MILK AND CREAM.

Now that cooler weather is approaching, a flavour defect which is likely to be a frequent cause of trouble in milk and cream is tallowiness —a defect which, depending upon its intensity and stage of development, is usually described as metallic, oxidised, oily, mealy, cardboard, and "cappy" taint. Although tallowy and related flavours may be brought about by other influences, they are usually traced to the exposure of milk products to metallic contamination, notably copper from factory appliances and iron from dairy farm equipment.

The more common occurrence of these faults in winter depends upon the ability of minute traces of metals in solution in milk and cream to accelerate chemical changes between the oxygen normally present in these liquids and a certain constituent of butter-fat, with the formation of compounds which impart the characteristic flavours. Such low concentrations as 0·2 part per million of copper and 1·5 parts per million of iron will impart an objectionable taint. In summer, when microbial development is most active in milk, the dissolved oxygen is rapidly used up by the organisms for their own growth, and so they actually help to prevent the onset of tallowiness. Their action in this single instance in retarding rather than promoting the deterioration of milk and cream is in striking contrast with their usual behaviour, as they are responsible for almost all the major faults which occur in milk products.

The most up-to-date factory processing is quite unable to renovate tallowy cream, which, therefore, is always classed as second or pastry grade. Dairy farmers should look over all metal utensils with which milk comes into contact, and any from which the tin coating has worn off, or which show signs of rusty patches, should be retinned if their condition warrants the expense. Any piece of equipment which is too old or in a state of disrepair which does not justify the cost of retinning should be immediately dumped. The continued use of such unsatisfactory utensils during the winter months will almost certainly mean degraded cream and substantial monetary loss.

—*E. B. Rice.*

A Note on Fodder Crop Experiments at Meringa Station.*

THE provision of suitable fodder for farm animals constitutes an ever-present problem for the cane grower, outside the crushing season and also towards the end of the season, when chop chop is scarce as a result of a large proportion of the cane crop being burnt prior to harvesting. Some growers try to provide off-season fodder by allowing their old ratoons to volunteer until sufficient cane and top is produced for chop chop purposes, after which the old stools are hurriedly ploughed out and the block replanted. This practice has many disadvantages inasmuch as diseases may be carried over to infect the next year's crop; pests are subjected to little or no check, and the growth of a green manure crop is prevented. These facts have impressed us with the desirability of farmers setting aside a small acreage for the growing of fodder crops and it was deemed desirable to initiate some experiments along these lines at the Meringa Station.

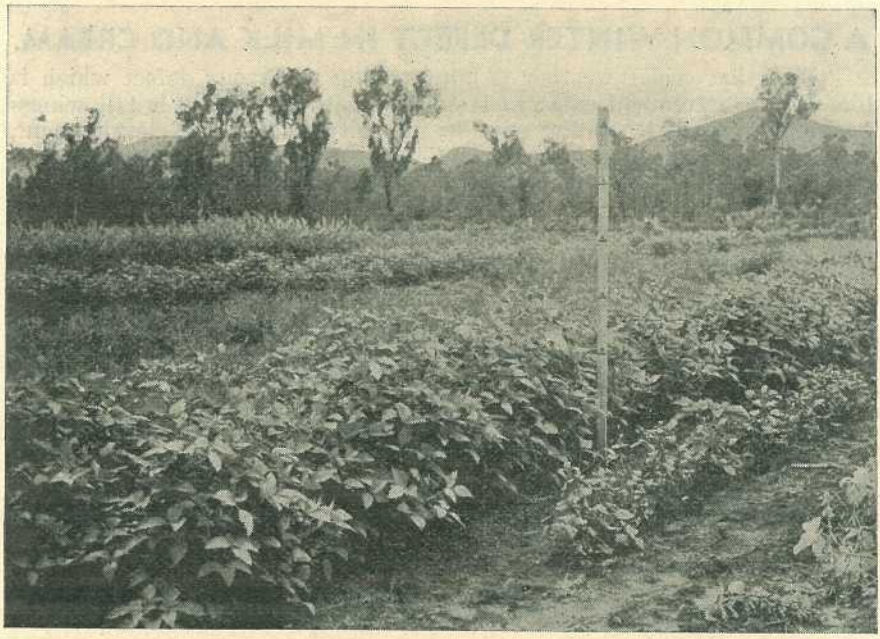


Plate 167.

Soybean, variety Otootan, eight weeks after sowing. The soybeans were sown in drills 3 feet apart and 6 inches deep, but only a light covering of soil was given. (Note:—The row of soybean to the right is of another variety.)

Considerations of disease control decree that there should not be grown on a cane farm any crops which are closely related to sugar cane and which might act as hosts and sources of infection of diseases of sugar cane, or the insects which spread them. For this reason therefore, maize and sorghums should be excluded. Our experimental programme is only in its infancy, but it is thought that even the very early results may be of interest to farmers.

* From *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock) for April.

Trial sowings have been made with panicums and digitarias (obtained through the courtesy of the Bureau of Tropical Agriculture), soybeans, lespedezas and clovers. To date none of the tested varieties of lespedeza and clover have performed satisfactorily. Soybeans, especially the variety Otootan, show some promise, and selected varieties will be given further trial with monthly plantings. In Plate 167 is reproduced a photograph of the variety Otootan taken eight weeks after sowing; the crop was then some 2 feet 6 inches to 3 feet high and still making growth. This particular variety is widely used overseas for hay production; the other varieties are not so vigorous but are worth consideration as seed producers.

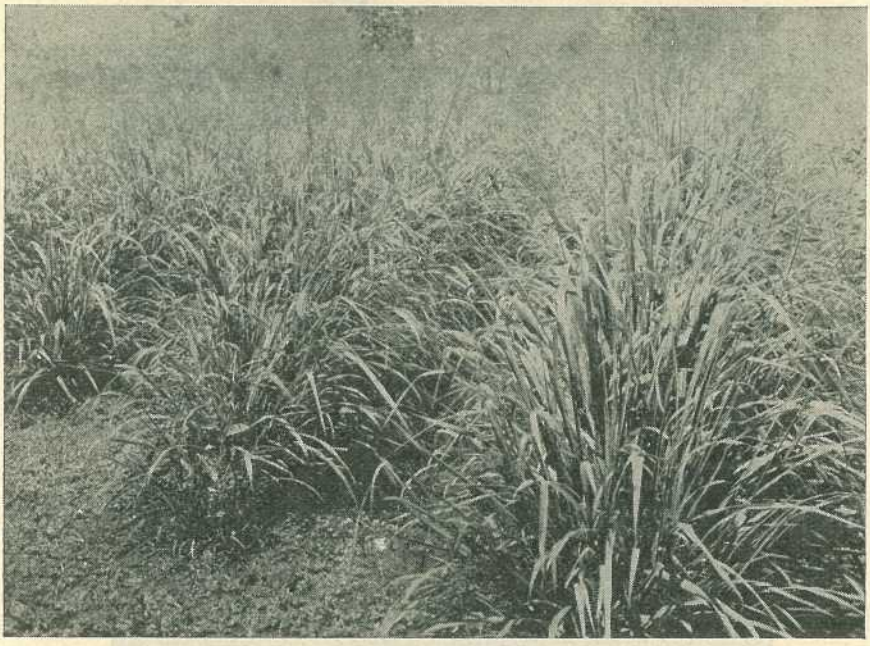


Plate 168.

Panicum coloratum ready for harvest. This grass was grown from seed planted in very shallow drills some 3 feet apart.

Two digitarias (valida and Pole-Evansii) were planted from root clumps. These grasses send out runners which take root and later form a continuous mat of grass. Under Meringa conditions valida appears superior to Pole-Evansii, but neither grew well during the dry spring weather; their stems became hard and were difficult to chaff. Both have rather thin coverage and allow the growth of other grasses and weeds. In addition the type of rooting might be such as to cause trouble in subsequent cultivation of other crops and they may possibly prove better for grazing than for hay purposes.

Panicums comprised *Panicum coloratum, Panicum maximum* (fine stemmed Guinea grass, and *Echinochloa crus-galli* (white panicum). The fine stemmed guinea grass is reputed to have made good growth at South Johnstone, but owing to the small amount of roots available it has been necessary continuously to subdivide our stocks for further propagation. Consequently we are unable to furnish much information

regarding its growth and palatability. However, its reputation is good and it is being extensively propagated on the Tableland and the Daintree.

Coloratum is reputed to give rather indifferent germination but our first sowing (under irrigated conditions) gave excellent results in August; midsummer sowings under natural rainfall conditions did not germinate nearly so well and some portions had to be re-seeded. This grass did well under average rainfall conditions, and horses readily eat it. The first cutting (see Plate 168) was made on 20th December, and in

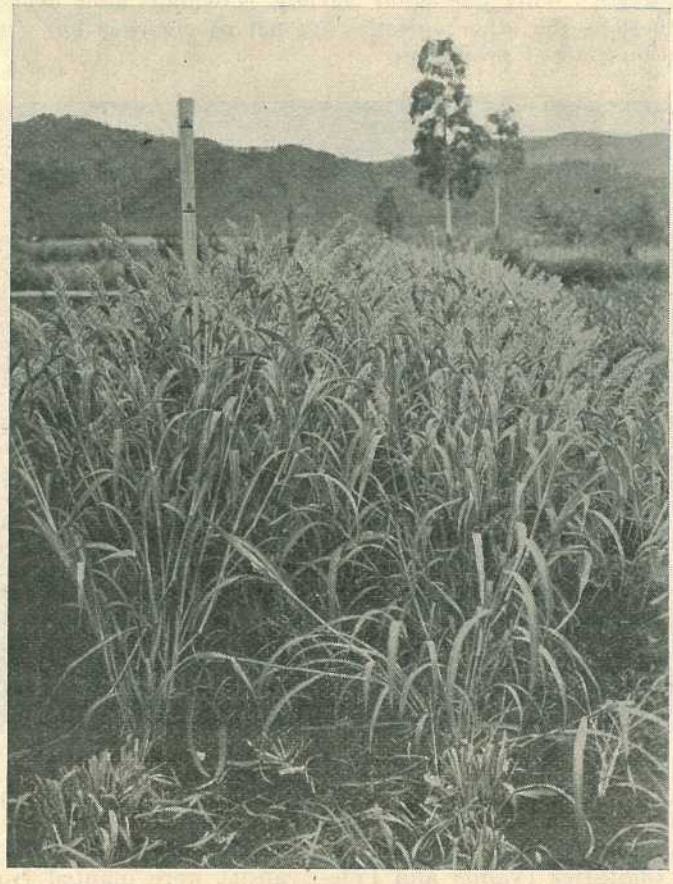


Plate 169.

White Panicum, seven to eight weeks old. Seed sown in very shallow drills 3 feet apart.

a month's time the ratoons had grown to a height of 2 feet 9 inches and commenced to flower again. A second cutting of a portion was then made, but heavy rains fell immediately afterwards and grass clumps rotted badly and ratoons came away sparsely. The remaining portion of the plot received the second cutting about a week later, but on this occasion it was cut higher (about 9 inches from the ground) and the ratooning greatly improved. Additional plots of this grass, planted towards the end of December, commenced to flower in mid-February.

White panicum is a very promising grass under Meringa conditions. Its rapid growth, high fodder value, and the readiness with which stock will eat it strongly suggest that it should be a valuable summer fodder crop for North Queensland coastal conditions. The seed germinated well, the young plants quickly became established and choked out any foreign weeds. One crop, planted towards the end of December, grew 4 feet to 4 feet 6 inches in seven to eight weeks (see Plate 169). It is a prolific seeder and if the crop is not cut before the seeds mature they will germinate later and possibly compete seriously with other crops (if any) later planted on the same land.

WINDBREAKS AND SHELTER TREES ON THE DARLING DOWNS.

For the comfort of stock in cold weather windbreaks are a necessity, especially on open plain or high tableland country. In timbered country, provision should be made for windbreaks when the land is being cleared, by leaving suitable stands of the original forest covering. Otherwise, the expense of establishing shelter belts will have to be incurred later on. Meanwhile, stock will have to suffer all the discomfort caused by winter's frigid westerlies, which blow usually for days on end.

In country which has already been cleared the planting of suitable trees on the prevailing windward boundaries of farms on tablelands, plains, and undulating country is, therefore, worth serious consideration. If edible trees are planted they might be used in times of drought. A farmer would naturally hesitate before destroying shelter trees for feeding purposes, but, if the necessity arises, edible trees may be lopped without destroying them.

The undermentioned trees are mainly suitable for planting on the Darling Downs. Edible types are the kurrajong, bottle tree, Portuguese elm, honey locust, and carob bean. Less palatable trees are the cypress (*Cupressus torulosa*), *Pinus radiata*—commonly known as *Pinus insignis*—white cedar, and *Bauhinia hookeri*. The well-known and admirable western tree, the wilga, should be added to this list if it is available in the local forests. Although there is a considerable amount of variation in the palatability of individual trees, the wilga is both a useful and extremely ornamental species.

In most cases the trees mentioned can be purchased from nurserymen. In the event of expense proving an obstacle to adequate planting, the trees can be raised from seed in an improvised nursery on the farm. The seeds could be germinated in shallow boxes or tins about twelve months before the young trees are required for planting. In frost-free areas June, July, and August are suitable months for planting out the young trees in their permanent locations. Some protection must, however, be given to the plants in frost-susceptible districts if midwinter planting is attempted.

Protecting the young trees from stock is most important. If the trees are planted near a boundary fence, it might be found most convenient to erect a second inner fence to keep stock away from the trees until they are high enough to be out of reach. Smaller farm stock, such as sheep, can be let into the enclosure once the trees have attained sufficient height for their foliage to be above the reach of the animals.

—*W. D. Francis.*

Cattle Fattening on Coastal Pastures.

OBJECTS AND RESULTS OF TULLY EXPERIMENTS.

F. W. BULCOCK, Minister for Agriculture and Stock.

MUCH has been written and said about the possibility of satisfactorily fattening cattle on the far northern coast, and opinion has ranged from enthusiastic support to utter condemnation. In the early stages all opinions were based on theory and were therefore of little value, but realising that the project was worthy of test and trial, an organisation, both practical and scientific, was built up, with instructions to investigate all possible avenues of research.

Naturally, because he was the pioneer of the project, the property of Mr. Brice Henry at Tully was chosen for the research work, and I propose to tell the story of this enterprise from its visionary dawn up to the present.

Plate 170.
Molasses grass, showing height of growth.

In order to present a complete picture it will be necessary to indicate just for what we were striving. In order to do this, a few words of explanation will be necessary. In the old days we had a frozen beef trade, which was of more importance to Queensland than to any other State in the Commonwealth.

Then came chilling of beef and the rapid contraction of the frozen beef market. Experiment and research followed, and a system was evolved under which Queensland found it possible to export beef in the chilled state. Having overcome all the difficulties associated with this venture, we placed chilled beef on the English market. Then followed comparisons with the product of our chief competitor, the Argentine.

Plate 171.
One of the fattening paddocks, showing growth of Para grass.

That the Queensland beef suffered by these comparisons is well known. Argentine supplied a young, well-bred carcase of good appearance and finish. Queensland, generally speaking, supplied an older carcase of less attractive appearance. Bearing in mind that Queensland's trade depends, in the last analysis, on the goodwill of the housewife, a judicious purchaser, the question of how to raise our carcase standards to Argentine levels immediately forced itself upon us. Argentine finishes its export cattle by topping up on artificial pastures in favoured localities. The question was: Could we do the same, and, if so, where could we bring any portion of our export chilled beef appreciably closer to Argentine standards? Hence the work at Tully was undertaken.

The Chosen Grasses.

Mr. Brice Henry of the Tully had a vision sufficiently strong to induce him to back it to the tune of many thousands of pounds.

Scrub, forest, and open lands were cleared and prepared for artificial grasses. Here was the first problem: What grasses should be planted? Discerning eyes were cast over the North and Para grass (*Panicum muticum*), Guinea grass, and Molasses grass were selected. Anxious observers watched the development of these grasses and their reaction to grazing. Pessimists said, "They'll never stand up to heavy grazing," or "They'll be choked out by the comparatively worthless native grasses."

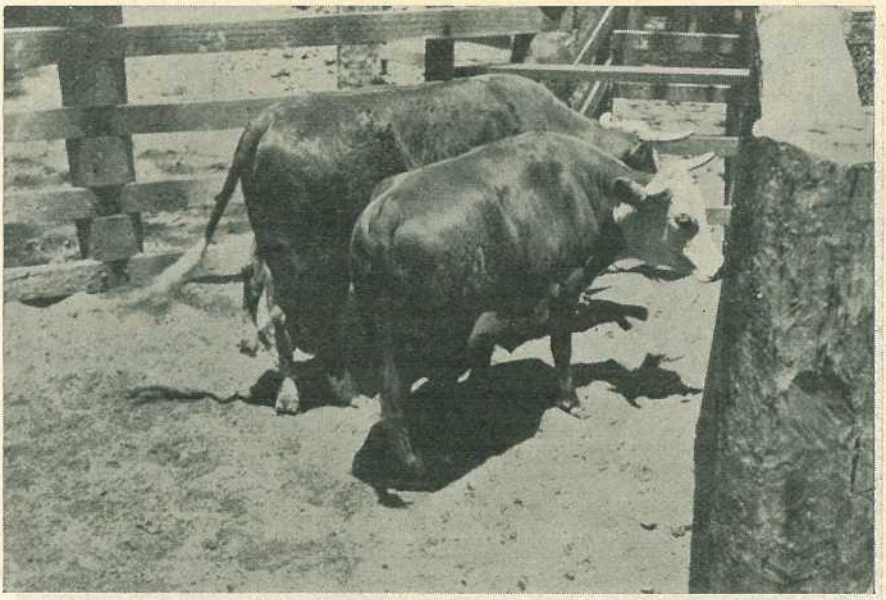


Plate 172.
Bullocks in process of fattening.

At length, however, the grasses appeared to be established. The absence of a legume in the pastures constituted a source of worry, but the stage was set for the real test. Accordingly, a veterinary surgeon was sent from Brisbane to Cloncurry to assist in the selection and inoculation of the first draft of cattle it was proposed should be placed in the pastures. This initial step, simple as it may appear, was again attended with difficulty. Two bleeders were reared at the Animal Health Station at Yeerongpilly.

These animals were reservoirs for the organism that causes tick fever, and their blood had to be injected into the Gulf cattle to protect them against the dreaded "redwater." Pleuro-pneumonia risks had also to be attended to by inoculation, and at length the first draft, 100 strong, left the Gulf for the artificial pastures of the Tully.

Veterinary and agricultural services had now to be concentrated on the cattle and the pastures, and probably no experiment of modern times attracted such attention as this Tully venture.

Shortly after the Gulf cattle were turned on to the introduced pastures, Dr. Bull (Chief of the Animal Husbandry Section of the Council for Scientific and Industrial Research), Dr. Turner (for the same organisation), Professor Seddon (Dean of the Faculty of Veterinary Science at our University), Professor Goddard (Officer in Charge of Research Co-ordination), Mr. Wilson (Acting Under Secretary of the Department of Agriculture and Stock), and veterinary and agricultural officers in North Queensland met at Tully.

We inspected the cattle. To all of us they appeared to be thriving. The grasses claimed our attention. They were not only satisfactorily established, but were choking out the natural grasses. One felt that here was the spearhead of our attack on the United Kingdom markets; that here, in a small experimental way, a new development of national importance not only to the cattle industry, but to the State, was taking place. But conviction was not proof.

I gave instructions for a consignment of the cattle to be forwarded to Brisbane abattoir for slaughter and observation. The cattle arrived here and certainly did not please many observers. They were hollow, and on arrival certainly did not look "the goods." We held them for a week giving them lucerne hay at a cost of 1s. per head and bought half the consignment in on abattoir accounts.

On slaughter a great surprise awaited us. All the cattle killed out a great deal better than appearance would suggest. Subsequent observation has shown that Para-fed cattle always look better on the hook than on the hoof.

Tully Cattle Topped Market.

We then shipped the consignment to the United Kingdom, and arranged for special reports. The contents of these reports can be gauged by the fact that realisations were higher for this small shipment than for any sold that week. In other words, our Tully cattle topped the market.

But the very success of the work indicated how necessary it was to experiment further. Although the year's work had proved satisfactory, it had left many questions of an urgent nature unanswered. The work of the investigations had to be directed towards finding an answer to certain qutstions.

Broadly speaking, these questions were—

(*a*) Was there a nutrition deficiency in the pasture that could be bridged by the use of licks?

(*b*) The influence of breeding on fattening.

(*c*) The best way in which fully to conserve and utilise the pastures.

(*d*) Could production be directed towards flattening out the export peak period?

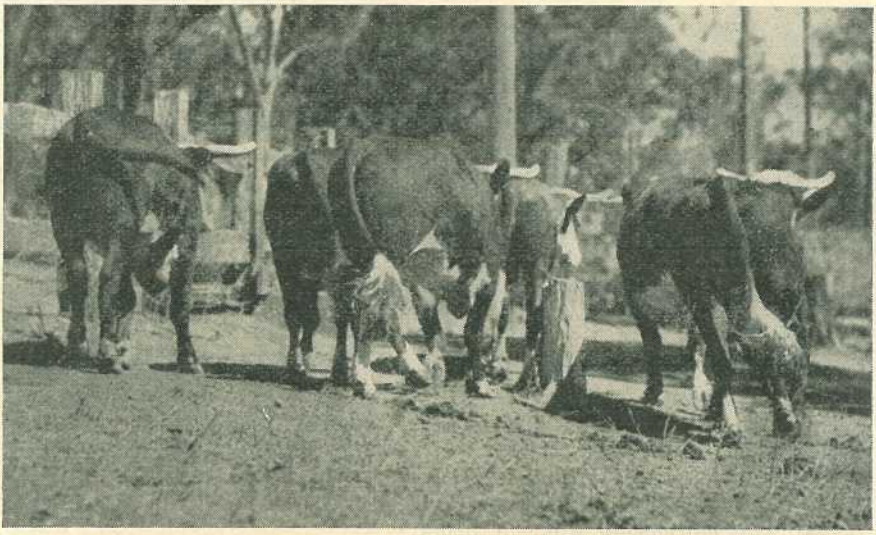


Plate 173.

Some of the Camboon bullocks on arrival at Brisbane after the thousand-mile journey from the Tully, North Queensland.

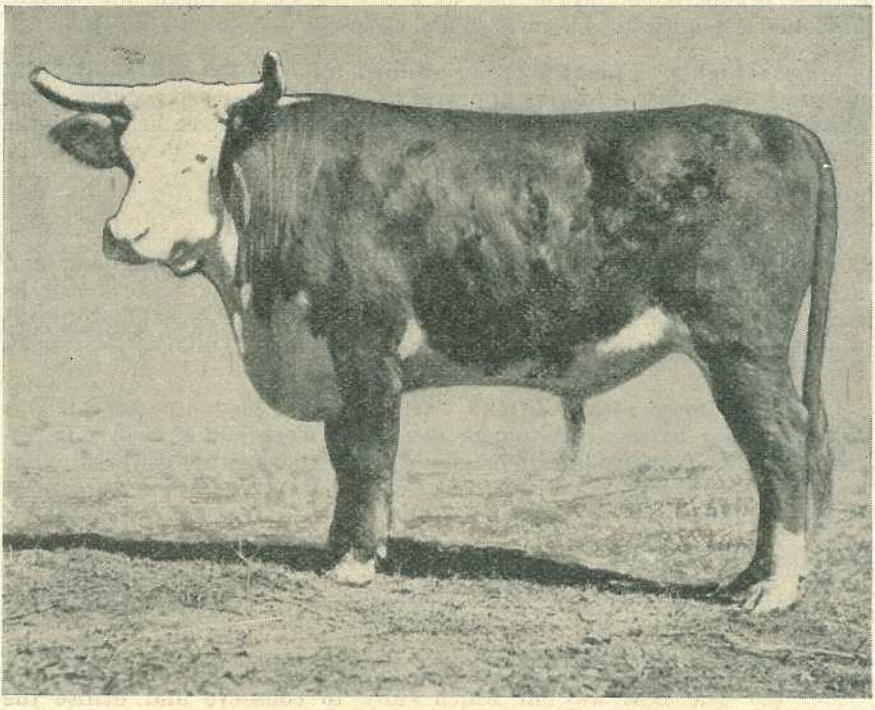


Plate 174.

One of the bullocks on arrival at Brisbane after a rail journey of a thousand miles.

It was to find an answer to these questions that last year's research programme was framed. Let me endeavour to indicate to what extent these questions have been answered.

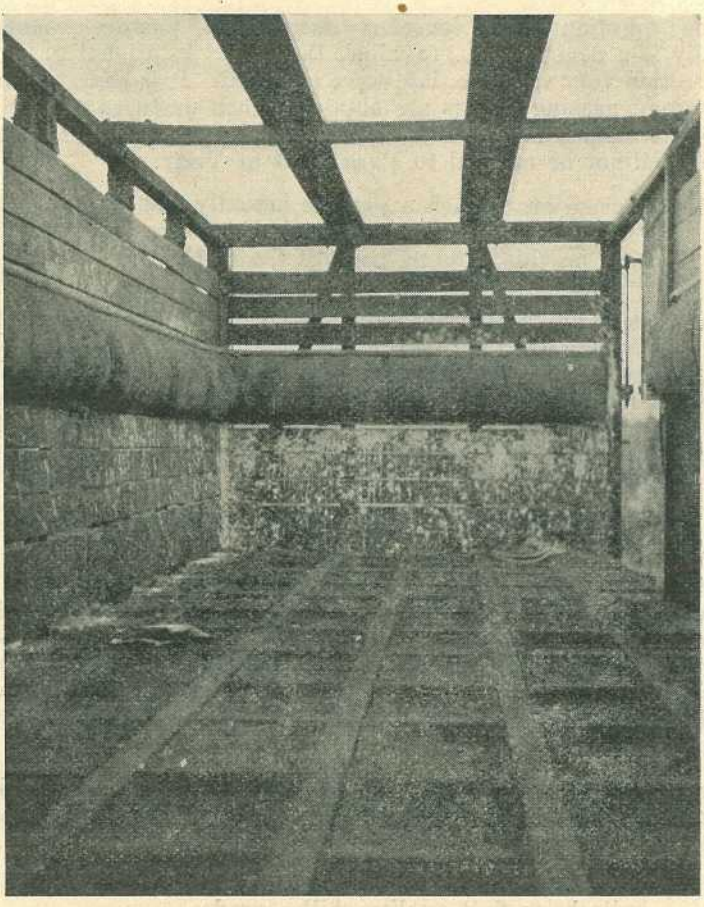


Plate 175.
Interior of railway cattle truck specially padded.

Licks and Breeding.

During the past season licks, consisting of salt and bonemeal in varying proportions, were tested. The cattle developed a decided preference for a lick of one part salt to three parts bone meal, and the use of this was certainly justified. This lick, once determined, was kept constantly supplied, but the consumption was not great.

Next came the importance of breeding in relation to fattening, and in order to obtain reliable data a truck of well-bred Herefords was secured from Camboon. As chillers they proved the necessity of obtaining well-bred stock, and certainly did prove that the better the breeding the more chance there is of success. It was difficult to secure the right type of beast in the North, as many that were available were definitely larger framed than is desirable in animals that are to supply well-fattened carcases of 630 to 650 lb.

This question of breeding certainly does present a major problem, but I am of opinion that types will improve as the economic necessity for such improvement manifests itself.

The question that concerns itself with pasture management obviously is a complex one, to which the key is rotational grazing. In this direction very valuable data were obtained. It is generally believed that the best grazing results are obtained when pastures are kept down to about 6 inches high. But sound as this general rule may be, it certainly cannot be applied to Para grass at Tully.

Cattle turned on to such a pasture actually lost weight, but when placed on pastures 18 inches high weight increases were surprisingly good. In fact, on this type of pasture the cattle gained 2 lb. weight per day.

In view of this experience the plan adopted was always to have available pastures of this description. The real test of pasture is, of course, just how they influence growth, and taking four experimental lots, which may be regarded as typical of the whole weight increase, the weight gain over the whole period of the test was a little over 1 lb. per day, the best group showing a gain of 1·4 lb. and the worst a gain of 1·02.

Why the Work Should be Continued.

We now come to what may reasonably be regarded as one of the major reasons why we should continue with this work. This matter concerns the spread of beef exports. It is clear that the United Kingdom will not tolerate our continuing to ship our total yearly allocations during four or five months of the year. A spread of exports is essential if we are not to face real export difficulty. Experience has shown that the older methods cannot possibly give us the necessary spread, but by fattening on artificial grasses that spread can be obtained.

So we come to the conclusion of our second year's experimental and research work and can state certain determinations that have been possible as a result of our observation. These are—

(*a*) That the artificial pastures at Tully and Innisfail will fatten bullocks to first quality chiller grade.

(*b*) That carcases of such animals are well fleshed and have adequate covering.

(*c*) That given suitable pasture management there is no reason why fat stock should not be turned off during any month of the year.

(*d*) For the best results rotational grazing is indicated.

(*e*) Contrary to general belief, cattle do well and make substantial gains during the wet season and when the weather is hottest.

(*f*) Research has shown that pastures of the type described can fatten cattle at three years of age.

These conditions give rise to the belief that cattle fattening on the far northern coast will expand from year to year and play an important part in the development of this territory, where large areas of land exist, eminently suited for this purpose.

Plate 176.

Inspecting carcases of cattle from the Tully pastures—left to right: Mr. F. W. Bulcock, Mr. Brice Henry, Professor E. G. Goddard, Professor H. R. Seddon, Mr. E. F. Sunners, and Dr. M. White.

The cattle from the Tully slaughtered last week in Brisbane graded out: 79·4 per cent. G.A.Q.; 19·1 per cent. F.A.Q.; 1·5 per cent. reject for export owing to a scar from an old wound.

These figures are very encouraging, so encouraging, indeed, that a further programme of research, based largely on economics, is now being devised.

The thanks of the Department are extended to Mr. Brice Henry for his co-operation in these important experiments, and the gratitude of the State is his due for the part he has played in developing a theory to success and in making such a valuable contribution to the welfare of a district, an industry, and a State.

DRYING OFF A DAIRY COW.

This is a problem that often arises with the dairy farmer. The question has recently been under investigation by the University of Minnesota, U.S.A., which studied the following methods, viz.: Incomplete milking, intermittent milking, and complete cessation of milking. Replies from 300 dairy farmers showed that 76 per cent. adopted the intermittent plan, 16 per cent. the complete cessation method, and 8 per cent. the incomplete system. Experiments were then begun on different methods, including a study of the udder at the commencement of the next lactation period, and the rate of milk production. The results were republished with the authority of the Royal Agricultural Society of England. The experimental method adopted was that of milking one half (left or right) of the udder by one method, and ceasing to milk the other half. This plan was based on the knowledge that the left and right halves of the udder are independent of each other. The results of the experiment, using eighteen cows, show that complete cessation of milking can safely be recommended as a method for drying off cows producing up to 20 lb. of milk daily, and that the drying off process will be accomplished more quickly than by the incomplete, or intermittent, milking. When milking is discontinued the udder will fill up until a pressure great enough to stop secretion is caused in the milk gland; after secretion is stopped the milk is gradually resorbed from the gland until it becomes dry. On this basis it is a mistake to milk out a cow during the resorption period, as this releases the pressure within the gland, secretion is again encouraged, and the drying off period prolonged. No significant difference was noted in the quantity of milk either as a whole, or from the different halves of the udder, in the lactations following the drying off of the cows by the three methods used.

Further study of the subject indicates that drying off by complete cessation of milking had no marked effect on the bacterial content of milk obtained in the subsequent lactation period.

—*The Australian Dairy Review.*

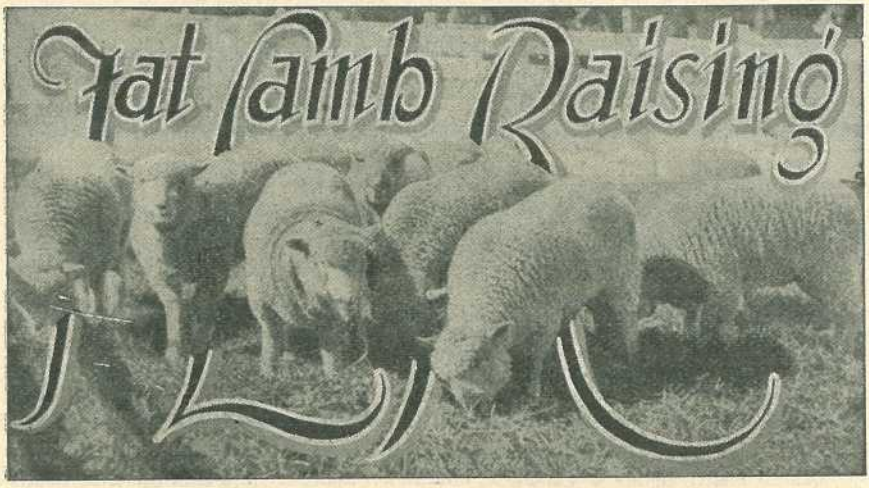
RADIO SERVICE FOR FARMERS.

From National Station 4QG (or 4QR) (Relayed to 4RK Central Regional and 4QN North Regional).

Arrangements have been made with the Australian Broadcasting Commission (Queensland) for the regular delivery, in interesting dialogue form, of talks to farmers by officers of the Department of Agriculture and Stock during the

COUNTRYMAN'S SESSION 4QG (or 4QR) EVERY SUNDAY MORNING,

Beginning at 9.10 a.m.



Pink Eye in Sheep.

ROSS NOTT, B.V.Sc.

"PINK EYE," or infectious ophthalmia, has been known for many years in Australia, and though the mortality is very slight, deaths may and do occur in drought or semi-drought areas where, owing to blindness, sheep are unable to get to water.

A great deal of trouble follows outbreaks in travelling mobs of sheep or during mustering for shearing, &c., for the disease is then very difficult to check.

Material from the infected eye of a sheep transferred to the healthy eye of another sheep reproduces the disease and healthy sheep grazing on tall pasture (for instance, most seeding grasses, &c.) and running with infected sheep may also suffer. If, however, the grass is kept well cropped down, the liability to infection is considerably reduced. It is presumed, therefore, that, in the field, "pink eye" is not transmitted from sheep to sheep by direct contact, but by the material from the infected eyes being brushed off by the grasses, &c., and thus conveyed to the eyes of healthy sheep. Flies also may play a part in spreading the disease.

An attack of the disease appears to convey an immunity, but if only one eye of the sheep is affected, this is the only eye which possesses the immunity.

It is also known that the exudate from the eye becomes non-infective after drying for a short period. Thus, in fine weather, healthy sheep can be turned into previously infected paddocks or driven over stock routes without risk twenty-four to forty-eight hours after infected sheep have been moved out of these places. There is also some evidence to show that any injury to the eyes through dust, grass seeds, &c., increases the liability to infection.

The symptoms can be divided into three stages which ordinarily follow one another, although it is quite common for the trouble to clear up at the second stage and not proceed to the final stage of ulceration.

The first stage is characterised by a discharge from one or both eyes, and on examination the membrane surrounding the eye is found to be inflamed and the eyelids swollen. These symptoms are followed by the second stage, in which the front of the eyeball becomes smoky or opaque. A scum is gradually formed through which small branching blood vessels may be seen and a varying amount of pus is present in the corner of the eye.

By this time the sheep is quite blind in the affected eye, and shows signs of acute pain, while the least sound will disturb the animal, causing it to rush blindly in any direction with its head held high, progress being stopped only by violent contact with a fence or some such object.

The third stage, which is not seen in all affected sheep, is one of ulcer formation in the front of the eye. Sometimes the ulcers appear to burst, and the eye becomes practically covered in pus.

Many cases, however, do not go as far as this, and even if left untreated the animal may recover with little or no loss of sight, although complete recovery probably takes a month or even longer.

As in many other diseases of sheep, treatment depends on the facilities for handling the sick animals. All affected sheep should be at once isolated and cut up into small hospital mobs held in small shady paddocks, handy to water, where they can be supervised easily.

A few drops of a 2 per cent. solution of zinc sulphate in water, made by dissolving 1 oz. zinc sulphate in 1 quart of water, should be dropped into the affected eyes by means of a shearer's oilcan. All pus and other matter is wiped from the eyes by means of cotton wool soaked in the same solution.

This treatment should be carried out as frequently as possible, and usually the disease will clear up after about a week.

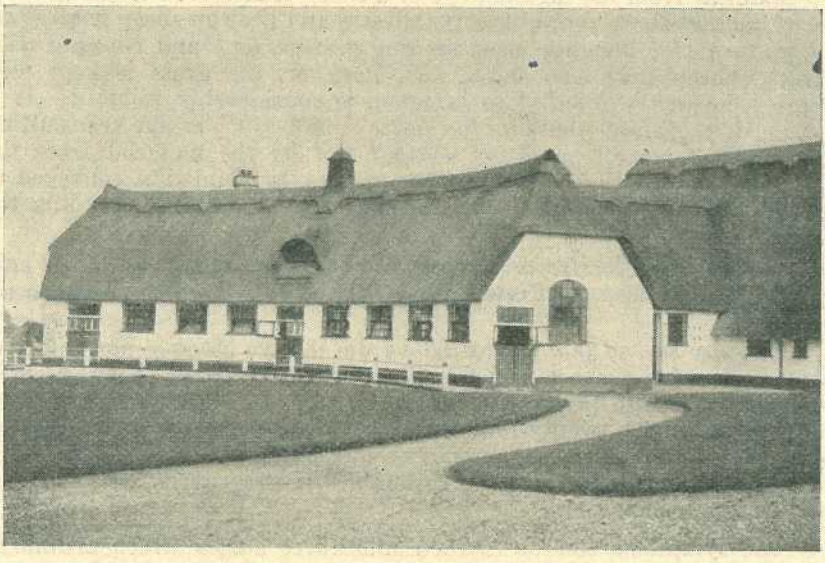


Plate 177. [*Photo.: L. F. Andersen.*
Thatched Farm Buildings on an English Estate.

A LAMB-MARKING AND BLOWFLY SPECIFIC.

A lamb-marking and blowfly specific should be an antiseptic as well as a healing agent; and, besides killing the maggots present, it should give some protection to the sheep or lambs against maggots developing from a future strike, and should be easily washed from the wool during the scouring process.

A mixture recommended for use is made up as follows:—40 per cent. Shell dieselene oil or Vacuum 28-38 fuel oil; 55 per cent. fish, herring, or cod oil; 5 per cent. cresylic acid; and 0·1 per cent. sodium arsenite, or 1 lb. to 100 gallons.

For convenience in making 5 gallons of the mixture, take 22 pints fish oil, 16 pints fuel oil (not more than 875 specific gravity), 2 pints cresylic acid, and 1 oz. sodium arsenite.

To Mix.—Place the fish oil in a 5-gallon drum and add the sodium arsenite; shake well, and then add the cresylic acid and fuel oil. Should the weather be cold, heat at least some of the fish oil, and add the sodium arsenite and shake to secure a good suspension, and then add the other ingredients as above. The mixture should be well shaken before using, and shaken up occasionally to keep the sodium arsenite in suspension while in use. Apply with a clean brush or swab. In purchasing in quantities to make 100 gallons of the specific, the approximate price per gallon, including the container, has worked out at 3s.

—*Jas. Carew.*

LAMB-MARKING.

Lamb-marking should be done under the most hygienic conditions possible. The work consists of castration and the insertion of the registered earmark on the off ear of ram lambs, and of marking similarly the near ear of ewe lambs. In addition, an age mark is frequently placed on the ear opposite the registered mark. Tails are removed from all lambs.

The ewes and lambs should be mustered and yarded the night before marking, thus avoiding operating when the lambs are in a heated condition, which leads to excessive bleeding.

All instruments should be cleaned and disinfected thoroughly. Ear-marking pliers should be frequently dipped in a prepared disinfectant in the course of operations.

There are two recognised methods of castration—viz., slitting and tipping.

Slitting has its advantages in that it leaves the wether with a more pronounced cod. However, when flies are bad there is a greater tendency for the lamb to become flyblown. In tipping, the tip of the purse is entirely removed. Tipping is the better method of the two in the opinion of many sheepmen, as it leaves a cleaner wound with better drainage. The wound so made also heals more satisfactorily. Moreover, tipping is faster—a fact which counts when thousands of lambs have to be marked.

The best age at which to mark is from a fortnight to three weeks. A proved fly remedy, both curative and antiseptic, should be applied to all wounds. The use of old yards should be avoided if practicable.

—*J. L. Hodge.*

IMPROVEMENTS ON THE SMALL SHEEP PROPERTY.

When money is available a small grazing selection frequently carries improvements fit for a much larger property. On the other hand, when money is scarce, the small holding often lacks even the bare improvements essential to the well-being of the sheep and the handling of the clip.

A property has a certain capital value, and unnecessary improvements merely means over-capitalisation. Interest has either to be paid or allowed for this excess expenditure.

Certain improvements are, however, essential in all cases.

A substantial boundary fence and, should the district be dingo infested, netting and top netting are obviously necessary.

Next in importance is the water supply. Should there be adequate natural water the selector is fortunate. Failing natural water, wells, sub-artesian bores, surface tanks, or bore drains to conduct supplies from neighbouring bores must be provided. The type of watering facilities to be used is essentially a matter of economics. What pays best, particularly in drought emergencies, should be a guiding principle in the grazier's choice.

A horse paddock and yards for the handy working of house cows are among the first provisions to be made. This paddock should, of course, be handily situated to the homestead and should contain water.

Subdivisions of the property for the convenient working of sheep is seldom given sufficient thought. It involves not only the running of fence lines, but their construction in such a way that water is easily and continuously available to the stock. The fences should be substantially erected to obviate continuous drafting and boxing. Too much money may be spent in wrongly thought-out subdivisions, but, generally, the smaller the paddocks the better. The posts used for fencing should be of timbers proved in the district for their durability.

The shearing shed and drafting yards may, on a small holding, be close together. The shed should be well constructed and properly designed, but not larger than necessary for the competent handling of the numbers of sheep ordinarily run on the property. The yards also should be constructed substantially, and their correct design for the drafting of sheep is of first importance. Where shed and yards are together, the latter should be so placed that the shed can be conveniently filled with woolly sheep.

The situation of the homestead should permit the easy working of the property, and its cost should be no greater than the improved value of the holding warrants.

—*J. L. Hodge.*

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How to Judge a Dairy Cow.

THERE is only one way to find out the productiveness of a dairy cow, and that is to test her, over her lactation period, by the Babcock method.

There are points, besides productiveness, to be considered in judging a dairy cow, however. Her capacity to produce must be supported by a sound constitution, a roominess of frame—a capacity for feed—by a good blood circulation system, and she must have dairy temperament and ability.

Constitution.

Constitution depends upon the amount of fresh air that is taken in through the nostrils, and upon the way in which the lungs use this air in purifying the blood. It follows that the cow with the big nostrils, and the ample windpipe, and the capacious lungs, is the sort of cow needed. Moreover, that part of the body which holds the heart and the lungs must be roomy. To ensure room for these organs a cow must be deep from the top of the shoulders to the floor of the chest, and she must be thick through this part, too.

The eye is another index to the constitution. One does not see alert, bright eyes on cows of poor constitution.

Capacity.

Capacity means capacity for feed. We must have large roomy cows with big mouths and strong jaws, large barrels, and well-sprung ribs. These cows are always keen for feed. They are the leaders of the herd when they go out to graze after leaving the milking yard.

A cow that is flat-ribbed never makes a milker; she has not the room to hold the feed, and she has not the digestive apparatus with which to handle large quantities of feed if she could take them in.

Is there any sign by which one can tell whether a cow has a good digestion or not? The skin is a great test of digestive ability. Take the skin of a cow between the fingers. Some cows' hides are so hard and tightly drawn that it is well-nigh impossible to pull it out an inch, let alone take a handful of it. Such hides are an indication of poor digestions. As a rule, they are covered with coarse, wiry hair that grows at right angles to the skin. On the other hand, some cows have hides so soft and pliable, so elastic, covered with such rich, soft hair, that there is no difficulty in deciding that they are making good and proper use of their feed.

Digestion room, as indicated by the large barrel, the well-sprung ribs, the quality of the skin, and the quality of the hair, is highly desirable.

We say that a beef cow turns her feed into beef, and the dairy cow her feed into milk. Digging deeply we find an interesting reason. When a cow has digested her feed in the fourth stomach the nutrients in the feed are absorbed by the blood. The blood carries and distributes the nutrients to those parts of the body where nature has need of it. It carries the nutrients to the back of the beef cow and to the udder of the dairy cow.

How can we tell what sort of circulation a cow has? Mainly by her "milk" veins and her milk wells. The so-called milk veins are not milk veins at all, of course. They are blood veins. These milk veins are usually two in number and convey the blood from the udder to the heart and lungs. The openings through which they enter the body are known as milk wells. If the flow of milk is large, the milk veins are developed and the milk wells, too. Many cows have extensions of the vein system under the belly—quite a network of large tortuous veins that have every appearance of being heavily worked. These are great cows. These are the producers. No matter how big a cow's mouth, no matter how deep her ribs, if she has not the proper development of her circulating system she will never be a producer.

Dairy Temperament.

Dairy temperament is not a trait that stands alone. It is dependent on some of the other factors that we have mentioned, more particularly on the circulation of the blood. A vigorous constitution, a large capacity, an ample supply of blood to the lower part of the body indicates a good producer. A cow will not be a good producer if she lacks the dairy temperament and a capacious udder of the proper texture and shape.

The dairy ability is indicated by the bright eye, the fine withers free of beef, the thin thighs, the large udder that is hung high at the back and runs well forward, by the alertness of the step, by the anxiety for more and more feed, and by the demonstrated capacity to turn that feed into milk instead of into beef.

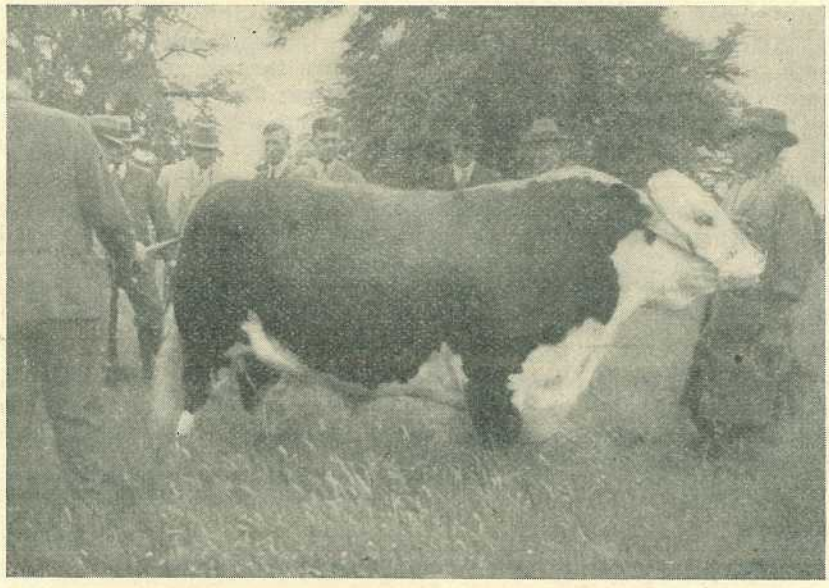
A fleshy, pendulous udder is not indicative of good producer. Such an udder has only a scanty attachment to the body, and therefore little room in which to receive the arteries through which are being borne the materials for milk making. On the other hand, the udder that

extends well forward and high up at the back provides a large area for the entrance of the arteries and has ample room in which to attach itself to the body.

Width of udder development is determined by the build of the thighs. If they be thin they leave room for a broad udder. If they be beefy there is naturally no room for proper udder development. There should be a large arch between the thighs if the cow is to be a producer, and this arch should be filled with a vessel which, when milked out, collapses into a thin, soft-skinned, silky empty bag.

A good udder is an even udder. The four quarters are of equal size, or nearly so. It is a bad udder that makes twice as much milk in the hind teats as in the fore teats. The division of the quarter should not be noticeable, i.e., there should be no "bottle teats."

The shape of the udder is largely determined by the shape and conformation of the rump. The cow that has a great length between hip and pinbone and is level along this line usually has an udder that is well attached and that carries forward to a considerable extent. It is rarely that the forepart of the udder is any further forward than the hips, so that if the space between the pinbones is short, the udder must be short.



[*Photo.: L. F. Andersen.*

Plate 178.

One of the King's Herefords on the Windsor Castle Estate.

Cleanliness in the Milking Shed.

E. C. DUNN, Instructor in Dairying.

OBSERVATIONS at milking time on some dairy farms reveal carelessness which is dangerous from a viewpoint of infection from bacteria. Bacteria in milk and cream are well-known causes of low-grade, inferior products, and safeguards against their introduction are essential.

The milking bucket should on no account be used as a washing utensil, either for the udder and teats of the cow or the milker's hands. The act of washing the udder transfers innumerable bacteria with the dirt and loose hair to the bucket, and a simple rinsing in cold water is not sufficient to remove them all. The need for separate milking buckets and washing buckets is therefore very obvious.

A bucket and cloths for washing the udders and a wash basin for washing the hands before milking each cow are hygienic necessities in the bails. The dairyman may well ask himself the question: "Would I take my meals with hands unwashed after completing milking operations?" The answer would be an emphatic "No!" Yet the cleanliness of his hands during milking is at least as important, for milk and cream are foods which may be easily contaminated. Clean hands are just as essential during milking as at the dining table. It is therefore remarkable that many people who are scrupulously clean in the home are lamentably careless in the cowyard and dairy.

Another very common practice is the wiping of soiled, milky hands on the clothing. These same clothes, if worn throughout the day, soon acquire a most objectionable smell and attract flies. Sugar-bag aprons —which are easily made, inexpensive, and long-wearing—are suggested for use by all milkers. The aprons should, of course, be washed frequently.

The protection of milk against flies is also a matter for consideration. Most dairymen have in use a large, shallow milk vat, and this should be provided with a lid in which an opening has been left for the milk strainer, or, if milking machines are in use, for the releaser. This lid keeps out dust and vermin, and also is a help in maintaining the temperature of the milk before separating.

Hand milkers frequently moisten the cows' teats during milking from the milk in the bucket. This practice cannot be condemned too strongly, as the hands are usually soiled, and bacteria from the udder of the cow are transferred to the bucket.

The following points are all practised by the most successful dairymen:—

Wash the udders in buckets used only for that purpose.

Wash the hands after milking each cow.

Wipe the hands on a clean cloth, not on the clothes, and wear either an apron or overalls.

Aprons and overalls are easily boiled; so keep them clean.

Don't use on uncovered vat. Under the Dairy Regulations a cover for the vat *must* be provided.

WHAT IS A FAIR OVER-RUN?

The over-run paid out by butter factories is a much-discussed subject among dairy farmers. A question frequently asked is: "What is the maximum over-run obtainable by a factory where all weighings, tests, and other operations are carried out correctly?" Here is the answer:—

Over-run in Queensland is the excess butter actually manufactured over the amount of commercial butter (estimated from the approved chart) obtainable from all cream received at the factory. Butter of legal composition must contain at least 82 per cent. of fat, and to obtain the maximum over-run a factory must, therefore, convert every ounce of fat which it receives in the cream into butter containing exactly 82·0 per cent. of fat. Under commercial conditions this is impossible, as there is a proportion of the fat lost in various ways. There is a certain amount of cream spilt, or lost in other ways, during sampling, tipping, and processing; a further quantity of fat is lost in the buttermilk and, finally, there is a loss of butter in the packing process. The percentage of the total fat lost in these ways is approximately 0·2 per cent. in spillage, &c., 1 per cent. in the buttermilk, and 0·25 per cent. in packing—making a total fat loss of approximately 1·45 per cent. The effect of this loss is best illustrated by an example.

One thousand lb. of cream with a fat test of 40 would be paid for as 489 lb. of commercial butter. The actual quantity of fat in this weight of cream is 417 lb. A loss of 1·45 per cent. of this fat means that 6 lb. of fat is lost during handling and manufacture, leaving 411 lb. of fat which can be manufactured into butter. The maximum weight of butter of legal composition which can be manufactured from this quantity of fat is 500 lb., and the maximum over-run is therefore 11 lb. of butter on the estimated quantity of 489 lb.—equivalent to 2·25 per cent. It is not possible for a factory working under commercial conditions to consistently obtain this over-run, and it can be taken for granted that the over-run obtainable should be no higher than 2 per cent. A factory can only consistently exceed this figure by one or more of the following practices:—

(*a*) Cutting the weights of the cream.

(*b*) Cutting the fat tests.

(*c*) Manufacturing butter of illegal composition.

In the manufacture of unsalted butter, the over-run obtainable is considerably less than the figure given above. The maximum over-run obtainable on unsalted butter is 1 per cent., but under commercial conditions it is doubtful whether it could exceed 0·75 per cent. A factory which manufacturers both salted and unsalted butter should, therefore, have a lower over-run than one which makes salted butter exclusively.

—*L. A. Burgess and O. St. J. Kent.*

VALUE OF FARMYARD MANURE.

It has been estimated that although British farmers spend at least £4 millions annually in the purchase of chemical fertilizers, that amount is considerably less than the value of the plant food contained in farmyard manure made each year in the country. In spite of this, says a writer in the London "Times," farmers take much greater care of the plant food which they buy in a bag than of that produced in their own stock yards and paddocks.

FEEDING OF CALVES.

About 87 per cent. of cows' milk is water. Of the remainder, nearly one-third is fat, and a good separator, if properly operated, will remove about 98·5 per cent. of this fat. Very little protein is removed. It follows that, if the separated milk is to be made equal in feeding value to the original milk, either the fat or its equivalent must be replaced. There is no need to replace protein, and for this reason it is not good practice to feed such protein-rich materials as linseed meal in conjunction with skim milk to very young calves.

Dripping obtained from a reputable meatworks, or cod liver oil, may be incorporated in the milk, but they are rather expensive and difficult to mix properly. A better system is to use finely ground maize. Maize meal from good-quality grain contains as much as 5 per cent. high-grade oil and 70 per cent, of easily digested carbohydate which, to some extent, serves the same purpose as fat.

The new-born calf should get whole milk for a fortnight if it is to be given a good start in life. For the first few days it may be fed three times daily; after that, twice daily is enough. A safe level to feed is 1 gallon to each 100 lb. live weight. At the end of the second week a little maize meal is stirred into the milk and the change to separated milk begun. By the end of the third week the maize meal may be built up to a handful, and the change to separated milk completed. By the end of a month the calf begins to nibble grass, and can consume about ½ lb. of meal.

From then on to the eighth week the milk can be replaced progressively by water and a meal mixture. By the eighth week the calf will be able to eat up to 2 lb. daily of a suitable meal mixture.

Such a mixture may contain 35 lb. of linseed meal and 65 lb. of a cereal meal. Pollard and bran should not constitute more than one-half of the cereal meal. The remainder may be crushed oats, barley, or maize. About ½ lb. of salt and 2 lb. of sterilised bone meal should be included in the mixture.

As the animals take more grass or hay, the supply of the meal mixture is restricted. At six months, unless an adverse period is encountered, the calf should be able to fend for itself.

INFERIOR GRADE CREAM.

One of the most common sources of the contamination of cream, and one that if often overlooked, is the badly washed cream can. More cream is spoilt by being stored or carried in a badly washed can than by most other ways. This applies to cans in good order as well as those that are dinted and rusty.

The reason is not far to seek. Hundreds of cans pass through the same rinsing water of the mechanical can-washer at the butter factory daily, and although a final steaming is carried out in the last stage of the washing process, it is not of sufficient duration to sterilise thoroughly all of the cans thus treated.

It should be obvious that cans which have contained second-grade cream will require extra attention, in order to prevent the transmission of taints due to bacterial activity—such as cheesiness and rancidity—to the fresh supplies of cream.

A tallowy smell which is often found in returned cans may be due to inefficient washing, followed by exposure to the heat of the sun, causing deterioration of the fat.

It is, therefore, advisable in order to safeguard the quality of cream, to rinse all cans on their return from the butter factory with boiling hot water to which a little washing soda has been added. The cans should then be rinsed with clean boiling water to remove all traces of the soda.

The storage of the cleansed cans is important. They should be placed upside down on a suitable rack to allow for cooling and drying. On no account should anything but boiling water be used for the final rinsing, nor should any attempt be made to dry the cans with a cloth. The storage rack should be placed in such a position as to be well removed from any possibility of contamination from the stockyard.

—*C. L. Moran.*

DRY MILKING IS CLEAN MILKING.

Milking with hands which are moistened with milk at the beginning of and during milking is known as wet milking. Dry milking—which is used always by the cleanest and most efficient milkers—means commencing with clean, dry hands, which are kept as dry as possible during milking.

The method of milking with unwashed udders and teats and moistening the unwashed hands with milk is an objectionable and dirty habit and seriously contaminates the milk, as well as chapping the teats. To anyone who doubts this no further evidence is necessary than a glance at the accumulation between the fingers of a person who practises wet milking. In some countries where milkers' competitions are held at agricultural shows and elsewhere, deliberate wet milking disqualifies a competitor.

It should be remembered by the dairy farmer producing milk for city or town requirements that wet milking causes loss of keeping quality, a serious disadvantage in a warm climate.

It is often claimed that dry milking is difficult for anyone unaccustomed to it, and in attempting a more hygienic method, vaseline is used as a lubricant to make stripping easier and to help keep the teats soft and flexible. This is certainly to be preferred to careless wet milking, but if the teats are washed before starting to milk and the milker also washes and dries his hands frequently during milking—as required by the Dairy Regulations—both are generally sufficiently pliable and the use of vaseline should be unnecessary.

Injured or chapped teats should be protected during milking by placing round them a piece of cotton wool and afterwards applying a suitable ointment. The ointment hastens healing and softens the teats for the succeeding milking.

—*E. B. Rice.*

IMPORTANCE OF STIRRING CREAM.

Some dairy farmers show by the cream which they send to a factory that they lack knowledge in regard to the care of cream on the farm. Clean methods in production may be nullified by the spoiling of good cream in the dairy.

As butterfat is the lightest constituent of cream it rises gradually to the top as soon as the cream enters the can. Therefore, in unstirred cream the lower layers, rich in separated milk—which contains a high proportion of casein, and consequently a low proportion of butterfat—are at the bottom. Changes in the separated milk due to bacteria are often such that when the cream reaches the factory it is graded down as sour and curdy.

A dry film on the top of the cream or layers of different colours and texture through the can tells the grader at once that the cream has not been stirred, and he is immediately impressed by the defects in it.

To keep a uniform consistency of cream and to ensure the best possible ripening conditions the cream should be cool before it is added to any existing supply. Regular stirring is then necessary to liberate accumulated gases and aerate the mass, which ensure uniform consistency. Aeration not only reduces the temperature of the cream, but also retards the growth of undesirable bacteria.

Stirring pays because no dairy farmer can afford to lose the difference in price between choice and lower grade creams on each consignment that he sends to the factory.

—G. B. Gallwey.

MEAT AND BLOOD MEALS FOR DAIRY CATTLE.

Meat meals and blood meals sold under a variety of names are rich in digestible protein. A high-class meat meal with a crude protein content of 65 per cent. has about twice the digestible protein of commercial cottonseed or linseed meal. In farming terms, this means that 1 lb. of high-grade meat meal has about the same feeding value as 2 lb. of linseed or cottonseed meal.

The cost of meat or blood meal is not greatly different from that of the vegetable meals, and if they can be conveniently included in the ration of dairy cattle feeding costs will be reduced.

Only dairy cattle which have been consistently underfed take kindly to meat or blood meals. Cattle which have been accustomed to small quantities of these meals from birth also present no difficulty. As a general rule, however, dairy cattle only slowly acquire a liking for concentrates containing meat and blood meals and at first only a few ounces should be included in the regular ration. The amount can be gradually built up to the required level, which will, of course, depend upon the quality and quantity of other foods used. Advice on suitable rations may be obtained from the Department of Agriculture and Stock, but the dairy farmer can usually adjust the concentrates in the ration to conform with the milk yield of the individual cow.

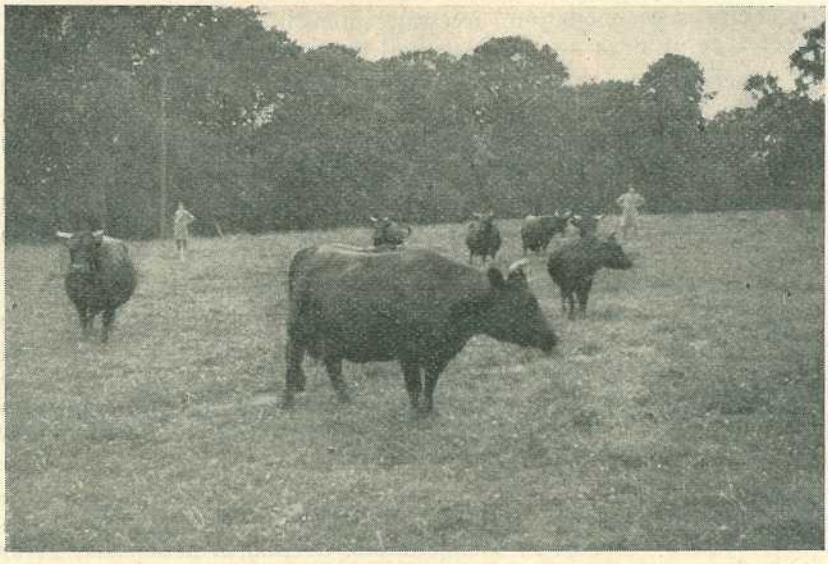
Grain and molasses, grain and salt, milling by-products—such as bran and pollard or such attractive meals as linseed, cottonseed, or cocoanut—may be mixed with the meat and blood meals to attract unwilling cows.

Animals which still refuse to eat these meals may be kept for a short time without any food, other than that offered, if allowed plenty of water. It is important that the feed should be changed night and morning, so that a fresh mixture is always before the cow. If this system appears too drastic, the nose-bag method may be used. Freshly-chaffed green maize and the meal are mixed before using, and the contents of the bag should be changed night and morning. Most cattle can be induced to eat meat or blood meals by one or other of these methods.

Both meat and blood meals should be fresh, free from objectionable odour, finely milled, and sterile. An undue greasiness is not detrimental, but, in general, the higher the fat content the less palatable the meal.

Meat meals should show a good analysis. Any preparation with a crude protein content of less than 50 per cent. is not a true meat meal, but a meat and bone meal. Blood meal should show a minimum of 75 per cent. crude protein. It should be almost without smell.

As both meals decompose when allowed to remain in a moist condition they should be stored in a dry place and any excess in the feed boxes should be removed each day. Material which has been "fouled" by moisture soon becomes a source of danger and is then only fit for fertilizing.



[*Photo.: L. F. Andersen.*

Plate 179.

Dexter Cattle on a Farm in England.

Some Economic Factors in Pig Raising.

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

THE production of pigs is a business requiring specialised knowledge and application. It, however, is not one requiring a large capital or an expensive outfit, particularly where it is associated with dairying and mixed farming. Abundant supplies of suitable food and water, satisfactory accommodation, necessary utensils, a conveyance, and the correct type of stock are the principal requirements.

A larger amount of capital and more extensive plant will be needed by the specialist who intends devoting the whole of his time to raising pigs on a commercial scale, and by the breeder engaged in the production of stud pigs for breeding purposes.

There are relatively few, however, who become specialists, or who are really expert with this class of stock, although thousands of farmers are actively engaged in dairying pursuits who appear to be quite satisfied that pigs are a payable adjunct to the farm stock.

While some farmers are prepared to lay out from £2,000 to £3,000 on a 60 to 100 cow dairy farm, and do all within their means to bring the dairying side of the farm up to date, they "fall down on the job" when it comes to providing efficient accommodation and the correct class of breeding stock for the piggery, where between £200 or £300 is all that is necessary to establish an up-to-date pig section.

Quite a wide variety of crops are available to the pig farmer which are resistant to variable weather conditions in a very large degree. Among these are lucerne, sweet potatoes, Jerusalem artichokes, arrowroot, and mangel wurzels—all hardy and providing excellent food for growing animals and breeding stock; while saccharine sorghums, soft varieties of cow cane and sugar-cane, rape, maize, and similar fodder crops are useful in satisfying the hunger of brood sows and boars, and adding variety to the rations of younger stock, while many other crops also might be included among the available foodstuffs.

Pig Raising in Queensland.

Pig raising in Queensland is mostly conducted along the following lines:—

Dairy farm piggeries are carried on in conjunction with dairying, in which skim milk, whey, or in fewer cases buttermilk, form the major basic portion of the food used. This system combines the feeding of dairy products and farm-grown crops, and is invariably regarded as the safest and surest road to profit in the keeping of pigs; in fact, more than 90 per cent. of the pork produced in Queensland could be classed as "dairy-fed," a food product in universal demand the world over at payable prices.

Pig raising on mixed farms is another method largely in vogue, and becoming still more popular. It involves the cultivation of corn, barley, and wheat, green crops, root crops, &c., and for that reason is more dependent on seasons of liberal rainfall.

In what may be classified as commercial piggeries, pigs are regarded as a special line, being fed on buttermilk, grain, greenstuffs, &c. This system operates in conjunction with butter factories, and, in fewer instances, in conjunction with cheese factories, where supplies of whey are available, and under expert management it is a profitable undertaking. It, however, requires a much wider knowledge of the business and closer detailed attention with, possibly, a good deal more trading capital.

Slaughter-house piggeries may also be classed as commercial piggeries in the sense that they are dependent upon the by-products of a butchering business—soup, meat, and burnt or charred bones. This latter type of piggery is the least satisfying, because most slaughter-houses are situated in areas unsuited to the cultivation of crops and the amount of offal available is often strictly limited.

Suburban pig farms are holdings on which pigs are fed on the waste food from hotels, cafes, manufacturing establishments, markets, &c. Under expert control such undertakings are likely to be profitable.

Stud piggeries are usually associated with dairy farming and commercial pig farm ventures, or on a small scale under the general heading of suburban pig farms, or as a specialised business at Agricultural colleges and Government farms. The stud pig business is one requiring a special knowledge and routine, and needs to be conducted on strictly business lines to be a success.

Junior pig farmers comprise another section in which is included those enthusiastic and progressive members of Pig Clubs whose operations, while conducted on a strictly limited scale, are of great importance to the industry. As the Pig Club and Junior Farmer movement expands, many more members will be enrolled, who will eventually enter the ranks of senior pig farmers, equipped with better knowledge and understanding than would otherwise be possible.

Breeding for Profit.

In the selection of breeding stock only purebred boars from productive, prepotent strains should be chosen. The brood sows should carry all the breeding possible and be of a prolific, matronly type, well able to suckle and rear thrifty, profitable litters. The sows should be pure bred or first cross only, because mongrel pigs pay no profits and they lower the standard and generally discourage those associated with the business. It is fortunate that, in the pig industry, reliable breeding stock of the very best quality are readily procurable at rates within the reach of every farmer.

Preparing the Piggery for Winter.

T. ABELL, Field Assistant, Pig Branch.

BEFORE winter comes, some preparations should be made to ensure comfortable quarters for the pigs on the farm. Although in Queensland the stock may not use the shelters for a long period, when they do have need of cover it should be ready for them.

First of all, the drainage from the piggery should be inspected. After the wet season the drains are often silted up, and pools may have been turned into deep, foul wallows. The drains should be cleared, and the wallows drained and filled in. This will prevent water from lying in the yards after winter rains. Wet, sloppy yards in the winter time make the pigs uncomfortable, and consequently more or less unthrifty. In addition, the discomfort to the men who have to carry on routine feeding, &c., in the piggery is of some importance.

Where the sheds and feeding troughs are movable, they should be shifted to a fresh site. If the sheds and troughs are fixed, any holes or wallows against them should be filled. Then the sheds themselves should be inspected for cracks in the lower walls and floor, and any such cracks should be closed. Guard rails should be examined in the farrowing sheds, and all troughs cleaned and examined for necessary repairs.

At the end of summer there is usually a quantity of rank grass growing. If cut and stacked, this will be useful as bedding for winter litters.

Fences in a piggery generally need some attention during the year, and while the other work is being carried out it is advisable to inspect the fences for loose wires and posts, and to fill in holes made by pigs trying to root under the fence lines.

Where foods are boiled for pigs, it is a good plan to examine the fireplace and boiler and ensure that it will not be necessary to make repairs during the winter months when the boiler will be in daily use.

Although much of this labour may appear unnecessary, the farmer who understands animal management will realise that, apart from the fact that equipment is receiving an overhaul, the work is being done with one main object—to ensure the comfort of the stock. Where pigs are kept under comfortable conditions they generally prove more economical growers than those which are neglected, for the contented pig is a quicker grower and usually requires less feed per 1 lb. gain in live weight. Thus, for his own benefit, the pig-raiser should make sound preparations for the winter months.

SALT FOR WORKING HORSES.

A good farm horse is well worth his feed. Most farmers realise this, but all too frequently plough horses may be seen licking the dried sweat from each other.

Working horses are incapable of sustained effort without a liberal supply of salt, and when the food is low in this mineral they try to remedy the deficiency by licking the saline deposit from evaporated sweat round the collar, saddle, and other gear of a team mate.

It is, therefore, sound practice to keep rock salt in a convenient place for working horses.

THE FARROWING SOW.

During pregnancy the sow should be given as much freedom as possible, for activity promotes health and good digestion, to the advantage of the sow and its prospective litter.

Her food should not be stinted, but she should be kept in moderate condition. Sows which are too fat at farrowing will probably have trouble in delivery, and may also suffer from many other troubles, of which milk fever is only one. On the other hand, if the sow is kept too short of food she cannot nourish the young pigs properly while carrying them, nor can she suckle them properly when born.

At the time of farrowing a close watch should be kept by the usual attendant—strangers upset the sow—who should not interfere unless there is evidence of trouble in parturition or the sow attempts to bite her young. This sometimes happens when some of the pigs remain to be born and one of those already dropped tries to get to the teats; especially if it squeals, the sow—usually a young one—will seize the piglet in her mouth and quickly squeeze the life out of it. Should she break the skin and taste blood, she may turn on the rest of the litter and eat them. The attendant can prevent this by taking each piglet as it is dropped and putting it aside in a straw-lined box until all are born, when they may be put on to the teats and all will be well.

For the first two weeks after farrowing the sow does not require more food than she received during the last two weeks of pregnancy, but after this the supply should be gradually increased as she requires it.

Pig feeding is dealt with in detail in a pamphlet obtainable on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

Draughts, dampness, and uncleanliness, as well as unsuitable food for the mother, will cause scouring, which may lead to death.

Given reasonable care and attention, no trouble should arise, and this little extra care means the difference between a strong, healthy litter and a few stunted, unthrifty runts.

—*W. Dixon.*

POINTS OF A GOOD BOAR.

When selecting a boar the best available should be bought, for during his life he may be the sire of hundreds of pigs, while the sow can only produce a limited number. If the boar is good he will improve the standard of the herd. His selection, therefore, is of very great importance.

The boar should come from a large, thrifty litter, and be obtained from a reliable breeder. He should be a little more on the compact side than the sow, not too chunky or short, but showing full development at every point, and of a strictly masculine type representing the full type of his breed. He must show quality, smoothness, and evenness in every part, have a typical masculine head, with eyes and ears wide apart, the jowl reasonably full and well laid on to the shoulders, which should be smooth and free from wrinkles. He should have a full heart-girth extending well down to the bottom lines, nearly or quite on a level, with as deep a flank as possible. He should possess rather short or medium length legs, with bone of fair size and quality, pasterns short and straight, and the hoofs well set, legs standing square, straight, and well under him. A long, wide and deep ham, and tail well set up are also desirable characteristics.

OBJECT OF REGISTRATION.

THE registration of hatcheries has for an object the distribution of healthy chickens, the progeny of parent stock of good type and production ability.

The following clauses of Regulation 29 of "*The Disease in Poultry Acts, 1923 to 1937,*" will indicate the obligations of owners of Registered Hatcheries:—

(iv.) He shall have all poultry at or upon or kept at or upon such hatchery tested for pullorum disease at the times and in the manner from time to time required by the Chief Poultry Expert. He shall pay to the Minister the cost of every such test.

(v.) He shall not place, permit, suffer, or allow to be placed in any incubator at such hatchery for the purpose of incubation, any egg which shall be less than 2 oz. in weight.

(vi.) He shall not sell or offer for sale any chickens other than chickens which are healthy and normal, and shall not sell or offer for sale any chickens which are deformed or injured in any way, or which have weak navels.

(vii.) He shall at all reasonable times permit the Chief Poultry Expert, any inspector, or any officer to enter into or upon such hatchery and inspect the same.

Following is a list, giving the name of the owner, of the hatcheries registered up to and including 30th April, 1938:—

Name and Address.	Name of Hatchery.	Breeds kept.
G. Adler, Tinana	Nevertire ..	White Leghorns, Australorps, White Wyandottes, Rhode Island Reds
F. J. Akers, Eight Mile Plains ..	Elmsdale ..	White Leghorns and Australorps
N. Cooper, Zillmere road, Zillmere	Graceville ..	White Leghorns

Name and Address	Name of Hatchery.	Breeds kept.
G. Pitt, Box 132, Bundaberg ..	Pitt's Poultry Breeding Farm	White Leghorns, Australorps, Langshans, White Wyandottes, Sussex, Rhode Island Reds, and Brown Leghorns
T. Westerman, Handford road, Zillmere	Zillmere ..	White Leghorns and Australorps
W. J. Martin, Pullenvale ..	Pennington Stud Poultry Farm	Australorps, White Leghorns, and Black Leghorns
A. Malvine, junr., The Gap, Ashgrove	Alva	White Leghorns and Australorps
F. S. Morrison, Kenmore, *via* Indooroopilly	Dunglass ..	Australorps, Brown Leghorns, and White Leghorns
C. L. Schlencker, Handford road, Zillmere	Windyridge ..	White Leghorns
H. A. Springall, Progress street, Tingalpa	Springfield ..	White Leghorns

Following is a list of persons who have applied for registration:—

Name and Address.	Name of Hatchery.	Breeds kept.
J. Cameron, Oxley Central ..	Camerons ..	Australorps and White Leghorns
M. H. Campbell, Albany Creek, Aspley	Mahaca Poultry Farm and Hatchery	White Leghorns and Australorps
R. B. Corbett, Woombye ..	Labrena ..	White Leghorns and Australorps
Mrs. G. Crawford, Stratford, *via* Cairns	Rho-Isled ..	Rhode Island Reds
Rev. E. Eckert, Head street, Laidley	Laidley ..	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah ..	Woodlands ..	Australorps and White Leghorns
Gisler Bros., Wynnum	Gisler Bros. ..	White Leghorns
Gustafson, C. E. and C., Box 24, Tannymorel	Bellevue ..	White Leghorns and Australorps
F. J. Lambert, Acacia Vale, Townsville	Lamberts ..	Australorps and White Leghorns
H. L. Marshall	Stonehenge ..	White Leghorns and Australorps
J. W. Moule, Kureen	Kureen ..	White Leghorns and Australorps
J. A. Miller, Charters Towers ..	Hillview ..	White Leghorns
F. J. Mottram, Ibis avenue, Deagon	Kenwood ..	White Leghorns
J. McCulloch, White's road, Manly	Hindes' Stud Poultry Farm ..	White Leghorns, Brown Leghorns and Australorps
E. K. Pennefather, Oxley Central		Australorps and White Leghorns
E. E. Smith, Beerwah	Endcliffe ..	Australorps and White Leghorns
T. Smith, Isis Junction ..	Fairview ..	White Leghorns and Langshans
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkins ..	White Leghorns and Australorps
R. H. Young, Box 18, P.O., Babinda	Reg. Young's ..	White Leghorns, Brown Leghorns, and Australorps

FINED AND PILLORIED.

Because of its being the first of its kind in London, widespread publicity was given to a police court decision in England in February last. A food retailer, summoned for having exposed for sale and intended for food thirty unsound eggs which were obviously unwholesome, was fined £15 and ten guineas costs, or three months in prison. The court also directed that a notice be placed on defendant's door warning the public to keep away from his shop.

Nutritional Requirements of Poultry.

POULTRY-RAISERS as a whole have a very fair idea of the principles and practice of feeding, and take into consideration factors that make for efficient and economic production.

The present-day values of cereals may induce some to depart from old and accepted practices in order to reduce costs. There are three points, however, that must not be lost sight of if the best results are to be obtained and the general health of the stock maintained—viz., the vitamin content of the ration, the protein content, and the quantity supplied.

Vitamins.—Vitamin A is of outstanding importance at the present juncture, for a shortage in the ration may cause outbreaks of nutritional roup as well as lowered egg production. The feeding of yellow maize and green feed ensures a sufficient supply of this vitamin. The price of maize will, however, preclude its inclusion in the ration to the same extent as in past years. Wheat will be used to replace this cereal, and so one source of vitamin A is lost.

On most poultry farms during the winter months green feed is not plentiful; consequently, under normal circumstances the loss due to a shortage of maize cannot be overcome. It is, therefore, of paramount importance that the poultry-raiser should make a special effort to supply the birds with good, succulent green feed. Green feed is the cheapest form in which the birds' requirement of this vitamin can be supplied. In cases where home-grown feed cannot be obtained, poultry-raisers should use at least 10 per cent. of good green lucerne chaff or meal in the mash fed to their birds.

Protein.—To obtain the maximum economic production, laying birds should have in their ration (i.e., grain and mash) a total of approximately 15 per cent. of crude protein. Maize has about 10 per cent. and wheat about 13 per cent. of protein. Where maize has been used extensively and is replaced with wheat, it may be desirable to reduce slightly the protein content of the ration. This is most easily brought about by a slight reduction in the meat meal fed.

Generally speaking, however, the protein-rich meat meal is not overfed, and its greater use is advisable in certain circumstances. This is particularly so in the case of the poultry-raiser who feeds extensive quantities of skim milk to his birds. With the approach of winter the milk supply will probably diminish. In such cases the loss of protein of animal origin in the form of milk should be supplemented with meat meal.

Quantity.—Providing the right kind of food is being used, economic production is only possible by feeding the birds all they will consume. Do not be afraid of making your birds unduly fat. The good producer will convert the food supplied in excess of body requirements into eggs. Birds which cannot do this should be culled and sold for table purposes.

Points for Poultry Breeders.

J. J. McLACHLAN, Poultry Inspector.

THE poultry farmer, in selecting birds for breeding purposes, should reject any bird which does not measure up satisfactorily in constitutional vigour, irrespective of other considerations.

A strong bird has adequate size, is well-fleshed, with prominent eye, full face, a sprightly carriage, and is very alert and active.

Although there actually is no egg-laying type of bird, there are some very definite laying characteristics which are valuable in the selection of birds for either breeding or production. For instance, capacity is essential to permit of the necessary expansion in the reproductive organs of a hen. The ovary develops from about the size of a two-shilling piece to approximately the full circumference of a teacup, and the oviduct from about 9 inches long and ½ inch wide to about 18 inches long and 1¼ inches in width. In addition to this it may be mentioned that a laying fowl consumes more food than a non-layer; thus the intestines would contain more food. A bird should have a long, deep, wide body, or, in other words, capacity.

The head is another valuable guide, particularly in respect to health. The face should be full, red in colour, and fairly free from feathers. Sallow or sunken-faced birds should be avoided. The eye should be full, round, bright, prominent, and expressive.

Strict attention should be paid to the colour of the eyes, particularly with breeds that should have red eyes, as there is a tendency for such breeds to have greenish-coloured eyes. Birds with green or light-coloured eyes are prone to become short-sighted and even go blind early in life. The skull should be strong but fine, and birds with overhanging eyebrows should be avoided.

The plumage of the bird, as it walks around the pen, should be examined, and careful notice taken as to whether the plumage fits close to the body or is loose and fluffy. As the tight or close-feathered bird usually is a better layer than the loose-feathered bird, it is only natural that only the former should be bred from. To the inexperienced person the contrast in feathering is more easily noticed in heavy breeds such as Australorps than in White Leghorns.

The thickness of the shanks is a good guide with respect to the coarseness or fineness of the bone. A coarse-shanked bird is a coarse-boned bird, and generally a poor layer. A layer-breeder has fine shanks, and the undersized bird, as a general rule, has over-refined or spindly shanks.

Any bird which is a known layer of small eggs should be passed over. As far as is possible only birds which lay eggs slightly above 2 oz. in weight should find their way into a breeding-pen.

Special care must be given to the selection of the male bird. All the features mentioned regarding type of females apply also to males. An active, alert bird should be selected, as such males will give better fertility and stronger chickens than will dull, slow birds. Young males can be mated with more females than older birds. Twenty females can be mated with a White Leghorn cockerel and sixteen females with an Australorp cockerel, if in each instance a vigorous male is used.

Male birds, the sons of known producers of large eggs, are most valuable as the characteristic of production is transmitted from the hen, through her son, to her granddaughters.

Should pullets be used as breeders? is a question that is frequently asked. The answer to that is that if they are fully matured and up to standard in respect to type and size, and produce eggs of the recognised weight of 2 oz., they should be equal to older birds as breeders. Why object to breeding from pullets and at the same time use cockerels for mating purposes? It must be admitted, however, that where records are kept of egg production, breeding from hens which are heavy layers has proved more profitable than breeding from pullets, which more or less are an unknown quantity.

BREEDING FOR EGG PRODUCTION.

In breeding poultry the farmer should exercise the utmost care in order to establish and maintain a high quality flock. The progress made in the past has been considerable. Egg production has been increased from about 60 eggs to over 200 eggs per bird per annum, many individual pullets laying over 300 eggs in a year.

In dealing with the egg production in a flock of birds consisting of an equal number of pullets and hens, many authorities quote 12 dozen as a fair average annual production. It is doubtful, however, whether there are many poultry farmers in Queensland who obtain an average production per bird of less than 13 dozen eggs yearly. In some experiments conducted at the Animal Health Station, using White Leghorns purchased from a poultry farmer as day-old chickens, the average production over the two years was 181 eggs per bird, the variations being—pullet year, from 194 to 209 eggs; second year, from 155 to 162 eggs. There were 116 pullets used in this experiment, and it will be noticed that the average of the two years was over 15 dozen eggs, and even these birds in their second year laid over 13 dozen. These birds were kept under poultry farm conditions.

The poultry farmer should be able to obtain an average production at least equal to those figures. A constant high average production is only obtainable by good breeding in conjunction with good management and feeding.

The chief considerations in arriving at the standards of good breeding are:—Type, constitutional vigour, action, and laying characteristics. Having selected birds that are reasonably true to type, care must be taken to see that they are of strong constitutional vigour. This is indicated by the vitality, stamina, health, brightness, and alertness of the bird, and is of equal importance to the knowledge of the actual number of eggs laid. As an example, some years ago the first three birds in a laying test laid 302, 296, and 294 eggs respectively. An examination of these birds at the conclusion of the test showed that the first and second birds were weak in constitution, whereas the third bird was very strong. All these birds were used as breeders, but while the progeny of the first and second hens were disappointing layers, the descendants of the third bird have performed very well in laying tests every year since. That example should emphasize very clearly the necessity for rejecting birds that are weak constitutionally.

Admittedly it takes courage not to breed from a 300-egg bird. If such a bird produced the eggs without a heavy drain on her body she would be constitutionally strong. If, however, the bird rapidly loses

condition during the year, she is obviously weak in constitution and consequently would probably be an indifferent breeder. Any bird that is unable to stand up to a heavy season's laying without losing condition cannot be expected to give high-laying progeny and should be discarded irrespective of other characteristics.

TYPE IN THE BREEDING BIRDS.

Type is an important consideration in breeding birds, and they should be reasonably typical of the breed. Although any type of a bird will lay eggs, White Leghorns should resemble White Leghorns rather than white fowls lacking any uniformity. This applies to all breeds as well as White Leghorns.

In selecting birds for trueness-to-type it is necessary to become conversant with the standard of the breed, and a good illustration depicting the outline of the bird will prove most helpful. Breeding birds should be fairly uniform in type, showing length, depth, and width of body in accordance with the breed standard. Birds having these features always make better breeders than those without them. In the flock there will be some birds which are very long with very deep and wide bodies. Such birds ("beefers" as they are termed) are too large and coarse. Big coarse birds are poor layers and are of little value as breeders. Coarse birds can easily be detected when handled because of their excessive body weight—about 2 lb. above the standard weight. Coarse birds utilise foodstuffs more for the storing of body fat than for production of eggs, and should therefore be disposed of for table purposes.

In contrast to the big bird, there is the small or undersized bird which is frequently an excellent layer, but is valueless as a breeder because it is seldom that small birds produce progeny that will be profitable layers. To learn to differentiate between a coarse, good, or small bird, an inexperienced person may pick out one of each as they appear in the pen and handle each one several times, noting the length, depth, and width of body as well as the weight. Much will be learnt from such a systematic method of handling. It will be found that whilst there will only be a few coarse birds, as a general rule there will be a large number of small birds in every flock unless special care has been taken previously in the selection of breeding birds. This tendency to deterioration in the size of body is very common and can only be overcome by paying special attention to the size of the birds used in the breeding pen.

VENT PICKING.

Every year numerous pullets are lost as a result of vent picking, an acquired vice, which is easily checked when correct control measures are adopted in the early stages. If neglected or overlooked until it is firmly established, control is much more difficult. This vice is confined chiefly to pullets and starts shortly after they commence laying. At times outbreaks will occur among older hens, but in these it is usually less extensive.

Vent picking starts as the result of one bird picking the vent of another bird when it is expelling an egg. The picking causes bleeding and frequently protrusion of the oviduct follows. Once the birds acquire the taste of blood, they are ever on the alert for victims. The pecked

bird may be able to get away from the attacker, but in all probability egg laying will keep the wound open and it often becomes septic, resulting in a whitish watery discharge from the vent. Eggs laid by the injured bird will frequently be smeared with blood.

Treating seriously injured birds is of little value, because they seldom make a complete recovery. If considered advisable, however, the injured parts of birds that have been pecked may be painted with Stockholm tar twice daily.

All nest boxes should be darkened by hanging bag curtains in the front of the openings. These curtains encourage the birds to lay in the nests, and, to some extent, reduce the liability to pecking.

As pecking is usually the outcome of idleness, a handful of small grain should be scattered twice daily in the litter on the floor to keep the birds busy scratching for food. If the quantity of litter is insufficient, open a bale of straw in the centre of the shed and allow the birds to scatter it over the floor. The litter supplied should cover the floor to a depth of about 4 inches. At the present time litter is costly, but it would be cheap in comparison with the value of the birds that may be lost from vent picking without its aid. Where litter is not available, some relief may be obtained by feeding a very small meal of wet mash twice each morning for several days. The feeding times could be at approximately 8 a.m. and 11 a.m., the quantity fed at each meal need not exceed 4 lb. dry weight per 100 birds.

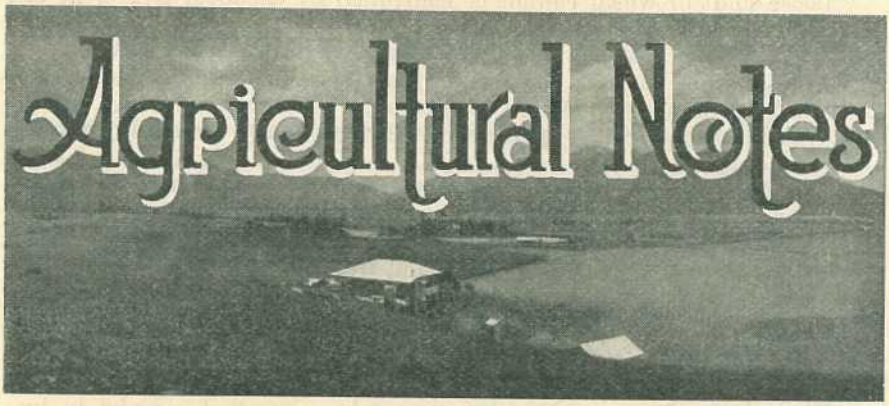
BRITISH POULTRY INDUSTRY PROBLEMS.

The serious mortality occurring in the poultry flocks of Great Britain was responsible for the appointment of a technical committee to investigate problems confronting breeders, and in the report that has been furnished to the Ministry for Agriculture recently, drastic proposals, including the establishment of a poultry stock improvement commission, were made. The commission would be charged with the following duties and applications:—

(*a*) The compulsory registration of every distributor of stock, hatching eggs, and day-old chickens, subject to such exemptions by reason of small number or otherwise as the commission may decide.

(*b*) Suspension or withdrawal of registration from distributing centres, which, after inspection, were deemed unsuited to carry out such distribution by reason of disease or of the obvious unfitness of stock for breeding purposes, or of grossly unhygienic conditions.

(*c*) The application of such conditions of registration of hatcheries as were calculated to ensure that the hatching eggs were obtained from pullorum-free stock of reasonably good quality.



Fungicidal Treatment of Cereal Seed.

NOW that the normal sowing season for wheat and other winter cereals is approaching, it is necessary to point out the advisability of treating seed for the prevention of smut, unless the seed available was harvested from a crop known to be perfectly free from the disease.

Ball smut or bunt of wheat can be prevented effectively by the use of a seed dressing, but grain which is highly contaminated should not be used as seed.

Reasonably clean seed should be treated with one of the bunticidal dusts marketed in Queensland, all of which are effective. They include three brands of copper carbonate, a copper oxychloride named Smutal, and the mercury dusts Agrosan and Ceresan.

The mercury preparations are somewhat more expensive than the others, but have the advantage of being less unpleasant to use. They float less in the atmosphere, and do not tend to clog or grind the cogs of the seed drill. Drill breakages likely to occur owing to excessive accumulation of dust in the seed cups can be prevented by throwing the drill out of gear before commencing the day's work and turning the drive shaft with the crank handle supplied for cleaning purposes.

All treated grain should be regarded as poisonous, and not feed to domestic animals. When handling mercury dusts care should be taken not to allow the dust to accumulate between the fingers, as it will blister tender skin on prolonged contact. The wearing of a dust mask is also advised for use during all dry seed treatments.

From 1 oz. to 2 oz. of the bunticidal dust should be mixed thoroughly with each bushel of seed. This may be done by rotating the seed and dust together in a dust-tight cask, box, or drum, mounted so that it may be easily revolved, but is most expeditiously carried out in a special machine in which the dust is incorporated with the grain as it runs through a series of baffles.

Modern seed graders are fitted with attachments for applying dust to the seed and save the trouble of any additional operation. Growers not equipped with the necessary plant may arrange with contractors for the grading and dressing of wheat seed.

Loose smut of wheat cannot be controlled by chemical treatment of the grain, as infection with the disease is carried over from season to season within the seed. A hot-water treatment has been devised to free it from infection, but it is somewhat cumbersome and cannot be recommended for general use. Details are given for those who may wish to try it, but, owing to the risk of spoiling the germination of the seed, growers are warned against using it on a large scale until thoroughly conversant with the method. The seed to be treated should first be soaked in cold water for five hours. Prepare a boiler of hot water, and have a supply of cold water ready and a vessel to hold the seed for treating. Fill the last mentioned with water at a temperature of 129 deg. Fahr. by mixing the hot and cold water. Place the soaked seed in this, and stir it for ten minutes, maintaining the temperature by suitable additions of hot or, if necessary, cold water. Finally, cool the seed by plunging it in cold water; drain and plant it as soon as possible.

The smuts of oats and barley cannot be controlled completely by copper carbonate; some mercury seed dressings, including Agrosan and Ceresan, are, however, effective in dealing with these diseases, and all farmers growing oats for seed purposes or barley are advised to treat their seed with this material unless they are certain that it came from a clean crop. When planting only a few bags of seed, some growers prefer a wet treatment, and with oats and barley the use of formalin—not bluestone—is permissible. The method of application is as follows:—Turn the seed out on to a tight floor and sprinkle it with formalin solution made up by adding one part of commercial formalin to 40 gallons of water. Continue turning and sprinkling until all the seed is just moist. Cover the heap with bags moistened in the solution and leave it overnight. The seed should be planted the following day. As the seed swells to some extent, the drill should be set to a higher planting rate than when using untreated seed or seed treated with a mercury dust.

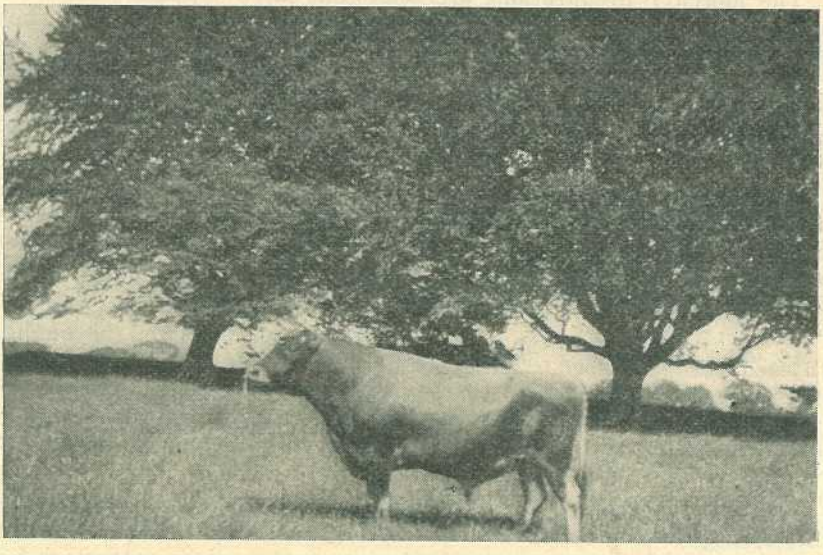


Plate 180. [*Photo.*: *L. F. Anderson.*
The Head of a Jersey Herd on an English Farm.

The Trench Silo.

W. H. BECHTEL, Instructor in Agriculture.

LARGE quantities of suitable fodders—comprising maize, sorghums, panicum, lucerne, and useful native grass and herbage mixtures on cleared pasture areas—are growing at present throughout most of the coastal districts. That interest is being taken by some farmers in the conservation of the season's abundance is shown by the number of pit silos constructed recently for the reception of the summer fodder surplus. There also is, however, some evidence of apparent apathy in respect of the establishment of fodder reserves. As much of this material has now reached the prime stage, the best way to conserve it would be to place it in a trench silo, and the attention of dairy farmers is directed towards this cheap and effective method of storage.

A few important points in the construction, method of filling, and emptying of the trench is briefly given for the benefit of interested farmers.

Select a reasonably level and well-drained site as near the place of feeding as conveniently possible. Mark it out according to the capacity required. A trench 30 feet in length, 8 feet wide at bottom, 12 feet at top, and 8 feet deep, having an outslope at each end of 1 in 3 grade, would hold approximately 45 tons. By altering the length and retaining the other measurements, the capacity may be increased a ton for each additional foot length.

To construct the trench, excavate according to the desired dimensions, using plough and scoop and depositing the spoil along either side to back up the logs, which should be placed lengthwise to raise the walls 2 feet above the surface. Complete the job by trimming the walls smooth with mattock and spade.

The cost of construction involves labour only, and the time taken would vary according to the nature of the ground. In ordinary circumstances, two men equipped with suitable plant should excavate a trench of 45-tons capacity in about two or three days.

In filling the trench silo there is no necessity to chaff the material, full-length crops being loaded in the field and drawn through the trench, off tipped, and spread in even layers lengthwise, the empty vehicle passing out the other end. Thus each layer is consolidated as a result of the trampling of the horses action throughout the whole filling process.

Should the crop be at all dry through over-maturity or as a result of frost, a sprinkling of water may be added during the filling process. The filling should continue well above the surface, forming a parapet of about 3 feet high, sloped towards the sides of the trench.

Complete the filling by covering it with grass well watered, finally topping with a 9-inch to a 12-inch layer of earth.

The material so stored will be fit to use as silage in from two to three months after filling, if so desired, or it may be safely stored for many years without undue deterioration or loss.

To remove the silage for use, the trench should be opened up at one end, taking the earth and grass covering from a portion only as required, and cutting down vertically with a sharp implement, such as a spade or hay knife. When a complete face section from top to bottom has been removed, an adze may be used to slice off additional material in a semi-chaffed or short-chopped form, resulting in its being in a more acceptable condition for feeding direct to stock without further preparation.

The silage may be fed as it is to practically all classes of stock. For cows in full milk, however, better results are obtained by the addition of a small quantity of protein-rich fodder and concentrate—such as lucerne chaff and cotton-seed meal.

DODDER IN LUCERNE SEED.

Lucerne is grown from seed and is usually sown with the object of providing a stand for several years. With this in mind, only the best seed should be bought with an assurance that it is free from dodder.

Dodder is an annual parasitical plant found in the warmer parts of the world. Its seed germinates in the soil, sends up a stem and attaches itself to the host plant which, in Queensland, is mostly lucerne. It is leafless, with twining thread-like stems, which attach themselves to the host plant by means of tubercles; from then onwards the parasite draws its nourishment from this source and severs its connection with the soil. The immediate effect is that the host plant is called on to support not only itself but also the dodder until ultimately the exhausted plant dies, in most cases smothered in a tangled mass of light brown threads. Dodder produces seed quickly, so that it can run the full life cycle (seed to seed) before the host plant dies from starvation. Dodder seeds are borne in a globular capsule with four seeds in each. These seeds are pressed together, giving them their characteristic flattened surfaces.

Unfortunately, this parasitical growth is common in lucerne fields. Experience shows that the dodder seeds cannot be removed satisfactorily from lucerne seed with cleaning machinery, or by sieving; this statement is based on many unsuccessful attempts to make saleable dodder-infested lucerne seed.

Growers of lucerne seed, in fairness to themselves as well as to those who may buy their seed, *should never harvest seed from a dodder-infested field.*

It should be borne in mind that any seed for sowing, or any material found to be dodder-infested, is subject to immediate seizure, and the person offering infested seed for sale is liable to prosecution. A £50 fine is provided for the sale of lucerne seed containing dodder. No excuse can be accepted for the presence in seed or feed of such a destructive parasite which can well be considered as lucerne's worst enemy.

Buyers should always insist on an assurance that the seed they are purchasing is dodder-free.

Samples of lucerne seed representing seeds purchased by farmers for their own sowing are examined free of charge, at the Seed Testing Station, Department of Agriculture and Stock, Brisbane. Samples should be of not less weight than 4 oz., and marked as follows:—

Sample of seed drawn from bags
representing a total of bags marked .
Purchased from of on .

Name and address of sender, and date.

It is better to send a sample for examination as soon as it is purchased, rather than wait until the crop has grown, and then find it contains injurious weeds.

—*F. B. Coleman.*

ONION-GROWING.

As onion sowings are usually made during April and May, the incidence of the rainfall received during the winter months is of the utmost importance, and, when deficient, has to be supplemented by irrigation. Owing to its deep-rooting habit, the onion can withstand limited dry spells, but the best results are obtained where the growing period is fairly moist, with drier conditions towards maturity and during harvest.

Rich, well-drained, sandy loams, friable and easy to work, have proved the most suitable, producing onions of good appearance and better keeping qualities than where grown on heavier soil types. Sandy soils tend to produce bulbs of good size but low keeping quality, while heavy soils will induce thickened or bull-necked plants.

The preparation of land intended for onion cultivation will now be nearing completion, and it must be remembered that deep cultivation should be avoided as the sowing period approaches.

The seed may be broadcast in seed-beds from which the plants are transplanted to their permanent positions in the field. Alternatively, the seed may be sown in the permanent drills. The latter method is usually adopted in Queensland utilising the "Planet Junior" type of hand seeder, and placing the seed in drills 12 inches to 15 inches apart, which will be found to call for 2 lb. to 3 lb. per acre. The seed should only be lightly covered with not more than ½ inch of soil, as deeper sowings germinate very poorly.

When the young plants are 4 inches to 5 inches high they are thinned out to a distance of 4 inches to 6 inches in between plants, a practice usually carried out with the aid of a 2-inch chipping hoe.

In the southern districts sowings may be continued during May, while in the central and northern districts the period can be extended to July. If sown too early, losses may result from flowering, while if too late, the bulbs may be small owing to insufficient time in which to mature before the hot weather causes scalding. Sow late-maturing varieties early and early-maturing varieties late. Only freshly-grown, tested seed should be utilised, as onion seed deteriorates rapidly, and it is therefore preferable to buy seed from reliable sources.

The Brown Spanish type, including "Early Hunter River Brown Spanish," is the most popular, the onions being of good appearance and flavour and possessing good keeping qualities.

The hand cultivators of the "Planet Junior" type are useful for inter-row cultivation, as all weed growth must be kept in check. The soil should not be thrown up against the bulbs, the object being to draw the soil away rather than towards the plants, thus inducing the formation of bulbs. If the soil is not drawn away, bending over the tops with a twisting motion will assist in the formation of bulbs. When the seed-bed has been thoroughly prepared it will be found that very little hand weeding is necessary. Further information may be obtained on application to the Department of Agriculture and Stock, Brisbane.

The Problems of Arsenic Applications to Soil.*

R. W. MUNGOMERY.

IN certain areas in Queensland there are some canegrowers who strongly advocate the application of white arsenic to the soil as a method of control for cane grubs. Now it is obvious that any method of soil treatment must be closely examined from two viewpoints, firstly, the immediate effect on the pest and, secondly, the permanent effect on the soil. As for the first point, it is a fact that the advocates of arsenic treatment have not been troubled with what can be regarded as heavy infestations of cane grubs while, in addition, their particular fields have usually been of a soil type which—due to its clayey nature—allows a small number of grubs to feed on the cane roots without the stool showing noticeable injury. That is to say, in their case, the degree of grub infestation usually fluctuates somewhere around the point where grub damage may or may not result.

Systematic diggings have shown that applications of white arsenic at the rate of 100-200 lb. per acre will kill some 60-70 per cent. of the grubs. Consequently if arsenic be applied under conditions of light to medium infestation it will reduce the grub population to numbers from which little or no damage will be sustained. Where, however, the grub population is such that the killing of some two-thirds will still leave sufficient grubs to cause appreciable damage it follows that arsenic treatment is ineffective as a method of control.

Added to such limitations is the question of costs. The arsenic must be applied to the field before it is known whether grub attack is probable or even possible. This arsenic must be applied to the whole of a field, whereas in practice it is often found that dangerous grub infestation is found to be restricted to a small portion of a field. The object of this note, however, is not to discuss costs but to draw attention to the second point mentioned above, namely, the effect of this treatment on the soil.

Some two and a-half years ago we had occasion to institute experiments with white arsenic applications to red schist soil at the Meringa Sugar Experiment Station, where small plots were treated with varying quantities of arsenic ranging from nil to 1000 lb. per acre. The arsenic was applied to the surface of the soil and lightly hoed in. About a month later (December, 1935) sorghum was sown and an excellent germination was secured in all plots. The growth of sorghum in the different plots was very uneven, ranging from, say, very poor in the 1000 lb. plots to very good in the non-treated plots. Eight months later (August, 1936) the plots were planted with Badila cane, and again the growth of the crop was very variable; a definite stunting occurred in the 250 lb. plots, while only about half a crop was obtained from the 1000 lb. plots. After harvesting these plots the stools were dug out, and this experimental area was then included in the adjacent field, and the whole was planted to Badila in August, 1937. At the present time (January,

* From *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock) for April.

1938) the plots where arsenic was applied in 1935 still stand out clearly, the cane being much smaller and stooling less vigorously than in the non-treated plots.

It is true that few, if any, farmers make applications of arsenic equal to the minimum of 250 lb. listed above, but nevertheless the continuous usage of even the lightest dressings as used by farmers will soon give an accumulated soil content greatly in excess of 250 lb. per

Plate 181.

Section of arsenic-treated plots at Meringa Station. The slow growth and small stooling of cane in the foreground (planted in August, 1937) shows the continued ill-effects of arsenic applied in 1935.

acre. Under such conditions harmful effects must be expected, since arsenic is not dissolved out by rain and irrigation water but accumulates in the soil.

There is little doubt that crop damage as a result of arsenic accumulation is now commencing to become evident on certain farms in the Giru area. The cane is showing a yellow, unthrifty appearance long before grubs are present in the soil, and there is no doubt that sub-normal crops will result, at least for some years, whether grubs are present or not.

EASY SCRUB FEEDING.

Thoughtless men cut down useful fodder trees; others merely lop off the top branches. Both ways are wasteful, and regrowth is a matter of months, or even years. The most economical method is to flail the leaves off. By stripping the foliage in this way, the twigs remain to make new growth within a few weeks, when the process can be repeated.

Lime on the Farm.

F. B. COLEMAN and R. A. TAYLOR, Seeds, Fertilizers, Veterinary Medicines, Pest Destroyers, and Stock Foods Investigation Branch.

RECENT amending legislation relating to the sale of lime for agricultural purposes provides that every bag of lime shall have a label attached to it setting out the following information:—

The kind of lime.
The percentage of lime and forms in which it occurs.
The neutralising value.
The net weight.
The fineness (unless prepared by burning).
The name and address of manufacturer or dealer.

The chief original source of lime for agricultural purposes in Queensland is limestone rock, from which the following principal kinds of lime are derived:—

Burnt lime.—This is made by burning lumps of limestone, and providing it is packed and railed when freshly burnt, is a "concentrated" source of lime.

An average quality burnt lime should analyse—

90 per cent. lime (CaO) as calcium oxide, and neutralising value, 160.

When burnt lime is exposed to the air, the lumps crumble to a fine powder—which is *air-slaked* lime. An average quality air-slaked lime should analyse—

50 per cent. lime (CaO) as calcium carbonate.
10 per cent. lime (CaO) as calcium hydroxide, and neutralising value, 107.

Old samples of air-slaked lime contain all the lime (CaO) in the form of carbonate.

Rain and moisture added to burnt lime indiscriminately will merely assist in the formation of air-slaked lime, but when moisture in equivalent amount is added to burnt lime—under controlled conditions—a true slacked lime, or hydrated lime is formed.

This is usually too expensive for application to the soil, but is of higher quality than air-slaked lime. An average analysis would show—

70 per cent. lime (CaO) as calcium hydroxide, and neutralising value, 125.

This type of lime in time will also gradually alter until the lime (CaO) is all in the form of carbonate.

It is important to remember that burnt lime when purchased should be in *lumps*, and slaked lime in powder form.

Burnt lime is used in certain chemical processes; the resultant by-product is known as *processed* lime, and contains the calcium oxide (CaO), chiefly in the form of carbonate.

An average quality processed lime should analyse—

46 per cent. lime (CaO) as calcium carbonate, neutralising value, 86; fine, 50 per cent.; coarse, 50 per cent.

Pulverised limestone is the original rock quarried and ground.

An average quality material should analyse—

50 per cent. lime (CaO) as calcium carbonate, neutralising value, 90; fine, 80 per cent.; coarse, 20 per cent.

Other important limes for agricultural purposes are—

Earthy lime, which is an impure form of lime carbonate that can easily be worked by digging, being softer than limestone, and usually requiring screening only. An average quality material should analyse—

45 per cent. lime (CaO) as calcium carbonate, neutralising value, 80; fine, 65 per cent.; coarse, 35 per cent.

Magnesian limes for agricultural purposes are pulverised limestones or earthy limes containing appreciable quantities of magnesia.

The maximum percentage of magnesia (MgO) as magnesium carbonate must be declared on the label, and this should be considered by the farmer with a view to the application of the material for particular purposes.

Limes which have been burnt may be compared on a neutralising value basis only.

Other forms of lime may be compared within their own respective groups on a neutralising value and fineness basis.

Neutralising value is a figure expressing the capacity to neutralise the soil, and ranges from about 80 in an earthy lime to about 160 in a burnt lime.

Fine material is that which will pass through an aperature of one one-hundredth of an inch square.

Buyers of lime of a greater value than 10s. should receive an invoice bearing the warranty required by the Act in respect of its quality.

On no account should purchasers accept delivery of lime for agricultural purposes that is not labelled and invoiced in the manner outlined in this note.

All complaints as to the quality, &c., of any lime purchased for agricultural purposes should be forwarded to the Fertilizer Investigation Branch, Department of Agriculture and Stock, William street, Brisbane.

THE USE OF CONCRETE IN FARM BUILDINGS.

The general use of concrete in all manner of modern structures suggests that this material might be used to even greater advantage on the farm than is the case at present.

In addition to its high degree of permanence and low maintenance cost, it offers other distinct advantages not shared by timber or iron buildings. For tropical conditions a cavity-wall concrete building provides a degree of personal comfort in hot weather which no single-walled structure as instanced can give. The accompanying photographs

Plate 182.
Illustrating the construction of barracks with pre-cast cavity blocks.

(Plates 182 and 183) illustrate the use of pre-cast cavity concrete blocks in the construction of farm barracks and cookhouse. These were erected on a farm in the Burdekin area, where a readily available supply of sand and gravel were at hand. The farmer claims that these buildings cost little more to erect than the standard barracks.

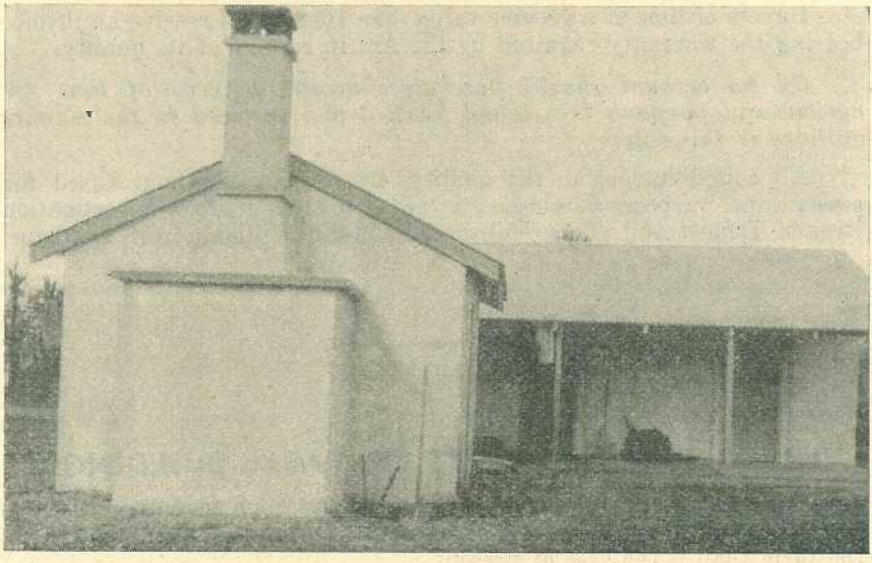


Plate 183.
Another view of the barracks and cookhouse constructed of concrete.

Full constructional details will be supplied to any canegrower interested in the subject.

—H. W. K., in "The Cane Growers' Quarterly Bulletin."

LUCERNE ON THE DOWNS AND MARANOA.

Although comparatively few settlers in the Western Darling Downs and Maranoa districts have established lucerne stands, it is significant that most of those who have done so plan a considerable increase in acreage. The qualities of lucerne as a grazing proposition, both for sheep and cattle, are gaining wider appreciation outside the recognised agricultural regions. The results obtained on scrub and forest lands during the dry spells of 1936 at Gulguba, Columboola, Wallumbilla, and other localities are very encouraging. An adaptation of lucerne to a wide range of soils and a capacity for giving good results under adverse climatic conditions were clearly demonstrated.

In sowing lucerne high seeding rates are unnecessary and have been the cause of many failures in the past; 3 to 4 lb. per acre is quite heavy enough for the districts named.

With the wide variation in farming conditions and soil types that obtain in these districts, hard and fast rules regarding sowing are not practicable. The following points are, however, important:—Deeper sowing than ¾ inch is inadvisable in all soils, except those of a self-mulching nature where, if necessary, the depth may be a little greater—provided that there is sufficient moisture to give the plant a good start in addition to germinating the seed.

Where old wheat land is to be converted into pasture it is usual to sow the lucerne with the last crop of wheat. This method reduces costs to some extent, but in soil that has a tendency to pack or cake after rain it is advisable to drill the wheat in first and then follow with the lucerne—having the drill hoes out of the ground and covering with light harrows. This avoids planting the lucerne at the same depth as the wheat—i.e., 2-2½ inches.

When broadcasting it is difficult to get an even sowing with the small seed; but if two sowings are made, one across the paddock and the other in the opposite direction, a more even crop can be obtained. Only light harrows should be used to cover the seed.

On small holdings where more intensive culture is practised a method of sowing which might commend itself to dairymen, particularly in the Maranoa district, is to plant lucerne in rows 18 inches to 2 feet apart. Inter-row cultivation may then be practised, when necessary, after rain. Established in this way, the plant has exceptional drought resistance, and an area of green feed for emergency use is assured.

All settlers in the reclaimed prickly-pear country might well turn their attention to lucerne as a grazing crop. With light seedings it is not expensive to establish, and is well worth a trial.

—*C. H. Defries.*

A GREAT COW.

One of the most remarkable dairy cows tested under the standard herd test belongs to a Victorian Jersey herd—the Finchley Herd, at Maffra. The cow is Finchley Handsome Lady, and she completed a test recently with 8,180 lb. of milk, 7.11 average test, and 582 lb. of butter-fat. This cow has had five official tests and each has averaged over 7 per cent.

A Seasonal Reminder to Central Queensland Tomato-growers.

W. J. ROSS, Senior Instructor in Fruit Culture.

THE commencement of the tomato season in Central Queensland has been seriously delayed this year because of unfavourable weather conditions. The absence of adequate spring and summer rains has caused growers to defer the sowing of seed and the raising of plant supplies. However, the bounteous March rains have stimulated preparations for an early planting-out of seedlings. Many growers will, in all probability, look to nurseries for supplies, but the majority will raise their own plants.

If seedlings are sought from outside sources, they should be obtained from reliable growers offering varieties true to type and free from crop-reducing pests and diseases. Correct attention to the seed-bed is of paramount importance in the production of strong, healthy plants. Hygienic practices in the seed-bed will greatly assist in reducing losses from diseases and pests.

When preparing the seed-bed, select a small area of newly-burnt virgin scrub land on which no lantana had previously grown. Level or slightly sloping ground is preferable. Oblong beds only wide enough to permit the grower to reach to the centre without undue exertion are advisable. They should be dug to the depth of an ordinary garden fork, and raised about 4 inches above the natural surface of the ground to ensure drainage. The soil in the beds should be reduced to a fine tilth and the surface levelled and firmed with the back of a spade before sowing the seed. When seed has been evenly and not too thickly scattered over the beds, cover lightly with fine soil. Treatment of seed with a solution of corrosive sublimate before sowing is a desirable practice. Information on seed treatment methods may be had on application to the Department of Agriculture and Stock.

To assist even germination of seed, the bed may be lightly covered with dry grass or hessian. Should hot sunshine prevail after the young seedlings appear, remove the covering from immediately above them to a higher level on a framework made with light forked sticks and cross-pieces.

Harden the developing plants, so that they can withstand conditions in the field, by gradually reducing the grass or hession covering until they are fully exposed to the sun for a short period before transplanting. Frequent watering of the seed-bed to maintain an even and ample soil moisture condition is essential. During the time the young plants are growing in the seed-bed they should be sprayed and dusted as a safeguard against pests and diseases. A 2—3—40 formula of Bordeaux spray mixture is recommended as a control of tomato plant diseases in seedlings. The chief seedling pest is the tomato mite, for which dusting with a good grade of dusting sulphur is recommended. The sulphur may be conveniently applied with a dust gun or by shaking it over the seedlings from a sugarbag or some similar container which allows the dust to filter through the mesh.

When plants have grown to a height of 6 or 7 inches, they are ready for transferring to their permanent location in the field. In removing plants from the seed-bed, care should be exercised to ensure the minimum amount of damage to root hairs during the operation. A thorough wetting of seed-beds before removing plants will greatly assist in reducing undue disturbance of the root system.

A convenient tray for the transport of seedlings from the seed-bed to the field can be made with a shallow box and by affixing two small uprights and nailing a cross-piece between them at the top to serve as a handle. Such a tray will protect plants against damage during transplanting operations.

Sowing seed directly into permanent positions within the field has advantages where irrigation can be practised or where good soil moisture conditions obtain, but it is not a recommended practice for the Central district, because of the unreliability and erratic nature of the rainfall.

CABBAGE-GROWING FOR MARKET.

C. N. MORGAN, Fruit Branch.

The cabbage is one of the most important vegetables for the market gardener. It grows best in the cooler districts, but by carefully selecting varieties the crop may be grown in most parts of Queensland.

The seed should be sown in beds of well-drained, deeply and thoroughly worked soil. The soil, if heavy, should be improved by the addition of sand or decayed vegetable matter; if poor and sandy, the addition of a loamy soil or well-rotted manure will be beneficial.

The surface of the bed should be fertilized and firmed, and the seed sown thinly in shallow drills about 4 inches apart. After sowing, mulch the bed with well-rotted leaf mould to prevent excessive evaporation of moisture.

The seed-bed must be watered regularly, for a check in the growth of young seedlings is often followed by unsatisfactory results.

When large enough to handle, the seedlings should be thinned to an inch apart, for if grown too thickly they develop into long, spindly, weak plants.

Shading during the hottest part of the day is often necessary, but this shade should be removed as soon as the plants are strong enough to withstand the heat. Overshading also produces spindly plants. Approximately 1 lb. of seed will provide sufficient plants for an acre of cabbage.

In about six weeks the young plants should be large enough for transplanting. They should be hardened off by restricting water supplies for some days before their removal to the field. Transplanting should be done in cloudy or showery weather, but if weather conditions are unfavourable the young seedlings should be watered in, and, as a further precaution, the top half of the leaves may be trimmed off to lessen transpiration until the root system is established.

Loosening of the soil in the seed-bed with a fork before lifting the plants helps to save many of the small roots. If the bed has been well soaked previously, the plants will lift with a ball of soil adhering to the roots, which will help to keep them moist.

The roots of the young plants should be kept damp after removal from the bed, and this may be done by standing them in a bucket containing a puddle of soil and water.

In planting, a hole is first made in the ground with a dibble—an old spade or digging fork handle is suitable. The hole should be only deep enough to allow the roots of the seedling to reach the bottom of the hole. Turn in a little earth, and then draw the plant slightly upwards before pressing the soil firmly around it. This ensures that the main root will not be doubled up.

The plants should be in rows 3 feet apart; in the rows the smaller varieties should be spaced 2½ feet and the larger varieties 3 feet apart. The growth of cabbages should on no account be checked. Regular cultivation and watering are, therefore, essential.

Correct varieties should be selected for different times of the year. Winter-planting types should be early and quick maturing.

In the cooler areas, seed of the early varieties is sown during autumn. Main crop varieties are sown between August and December. The coastal districts are best suited to the winter crop.

Cabbage should be marketed as soon as possible after cutting; and only good, firm-hearted vegetables should be sent for sale. Care in handling is essential, and when placed in bags for railing they should be packed as firmly as possible.

Recommended varieties are:—

Early.—Early Allhead and Early Drumhead, both of which are large, early, and quick growers.

Main crop.—Succession is the most popular variety, and may be grown almost any time. It is a good large Drumhead type.

Surehead is slightly larger than Succession. It is hardy, and may be planted closer in the rows, as it has fewer outside leaves.

RIPENING OF BANANAS.

To ripen bananas on a large commercial scale a properly constructed room, or rooms, with insulated walls are necessary. Probably the most convenient size for such a room would be 12 feet long by 8 feet wide by 7 feet 6 inches high, such measurements allowing for 100 cases capacity. Factors that must be taken into consideration, when building ripening rooms are insulation, air circulation, ventilation, cooling, heating, and humidity control. Details are set out in the C.S. and I.R. Bulletin, No. 64, which is available to anyone interested.

To ripen bananas for home consumption, or a small local trade, is an entirely different proposition. Directions covering such work are as under:—

Allow the fruit to become fully matured prior to cutting. After harvesting, cut the hands off and allow them to drain for one hour. Obtain a 50-lb. tea chest or similar box. Stand it upon two pieces of 3 feet by 2 inches timber to permit a current of air to pass between it and the floor. Pack the hands of bananas carefully round the inside of the chest, being sure to leave the centre open. Next, place a small handful of carbide in the centre of the chest and cover over in a manner that makes the inside of the chest or box as near to airtight as possible. Two or three thicknesses of canvas, or four thicknesses of corn sacks, are usually satisfactory.

Take the covering off after sixteen hours and recharge by placing another small handful of carbide on the floor of the chest. Recover it and allow it to stand for a further twelve to sixteen hours, after which uncover it and the fruit then will be almost ready for sale. If not quite ready, recover it but without carbide.

In very warm weather, only one application of carbide may be necessary. Ventilating the chest after sixteen hours is very necessary. Keep the chest under shade.

—H. J. Freeman.

THE SUGAR BANANA.

The sugar banana has been grown profitably for all the "bunch" trade markets in Queensland. Small, sweet, and delicately flavoured, this fruit claims many staunch supporters.

For the production of this banana deep, warm alluvial flats, favoured with a generous rainfall or watered by irrigation, are most suitable. As with other varieties, good drainage is essential. As the sugar banana possesses a slender stem, damage by wind must be guarded against, and where there is no permanent windbreak it is worth while establishing one at the time of planting. For this purpose double border rows of lady fingers or sugar banana plants may be planted 7 feet apart in the row and 7 feet between the rows. The spacings in the inner row should actually lie between the spacings in the outside row—i.e., planted according to the septuple system. These two rows close quickly in towards each other and rapidly form an effective windbreak. Of course, the planting of a permanent windbreak of suitable trees would be far more valuable on account of their permanency, provided the cultivated area is reconditioned from time to time.

Prior to planting, the soil should be worked to a depth of at least 12 inches and reduced to as fine a tilth as possible. The holes for the young plants in the plantation area should be 14 feet apart, 15 inches deep, and 18 inches square. The rows should be lined out as straight as possible each way, thus allowing the greatest convenience in working horse-drawn cultivating implements.

Opinions differ somewhat in the matter of selection of planting material, but generally a vigorous young sucker about 4 feet high dug from a matured stool is most favoured. The top portion of the sucker should be removed, leaving a plant of 3 feet in height to place in the hole. The plant is placed in position within the hole and sufficient surface soil placed in around it to fill approximately two-thirds of the actual cavity. The rest of the cavity is filled in gradually as the ground is cultivated during the ensuing year. According to the quality of the soil, one or two followers are allowed to come away, and, normally, the first bunches will be harvested seventeen or eighteen months after planting.

Farmyard manure applied judiciously to sugar banana plantations will repay the grower handsomely. Light horse-drawn implements are satisfactory for cultivating, and green crops, such as Poona and field peas, are excellent soil invigorators, provided they can be turned back into the soil at the correct time—i.e., when still very soft and succulent.

As the sugar banana is usually marketed in the bunch and the fruit possesses a thin, delicate skin, special care in handling is necessary in order to obtain the best market returns.

—*E. P. Williams.*

HANDLING OF CITRUS FRUITS.

The harvesting of citrus fruits is now in progress, and for several weeks to come growers will be chiefly concerned in the marketing of their crops.

Care in the handling of citrus fruits pays the grower handsomely. Rough handling contributes towards wastage losses in export fruit and in fruit being held by local markets, because, chiefly, of green and blue moulds, which are familiar to every citrus-grower.

These moulds are fungal parasites disseminated by means of spores which chiefly gain entrance to the fruit through bruises and skin abrasions.

The healthy unbroken skin of the orange is proof against almost all decays.

Abrasions may be caused during picking operations by the finger nails of careless pickers, or by allowing the clippers to cut into or prick the rind of the fruit when cutting the stem.

By the use of clippers with cup-shaped blades and rounded points, there is no excuse for the fruit being clipper-cut, whilst the gloves on the hands will prevent finger-nail injury.

All stems should be cut off short and smooth, otherwise they are likely to puncture the skin of other oranges during handling.

Another source of damage is protruding nails on the inside of the picking boxes, the points pricking into perfectly good oranges, causing punctures through which spores may enter.

The picking boxes should be well made; the internal surfaces of the boxes should be finished smooth to avoid friction during transit of the fruit from the orchard and the packing shed.

It is not only necessary for the orchardist himself to be careful, but he must also see that his employees are not negligent.

In the packing shed most growers make some provision to ensure cleanliness; nevertheless, there are some who do not appreciate the obvious necessity for hygiene. Occasionally uncovered buckets and tins are observed containing mouldy fruits in various stages of breakdown which are allowed to accumulate from day to day. Where this occurs those responsible for the cleanliness of the shed fail, apparently, to realise the enormous number of spores produced from mouldy fruit which are dispersed in the form of "mould dust" capable of reproducing the same decay in all punctured and bruised fruit with which it comes in contact. It is essential that all waste and reject fruit which accumulates during each day's work should be effectually destroyed daily. Moreover, a frequent washing of the floors of the packing shed with a ½ per cent. caustic soda solution, or other suitable fungicide, will reduce mould contamination within the shed.

—R. L. Prest.

THE ORPHAN TREE.

Many failures are observed where replacements are made in a bearing deciduous fruit orchard. Frequently, the young tree remains like an unwanted orphan and shows only stunted growth. If it is to catch up to the other trees and fill in an unsightly and unprofitable blank space in the orchard, careful attention must be given to all details in its management.

The main causes of failure are:—

1. The lack of natural plant food for the young tree.

2. If the old replaced tree died from the attacks of some particular diseases, the replant may be attacked in turn and suffer an initial setback.

3. Searching roots of adjacent trees may compete successfully with those of the young tree for the available plant food.

4. Lack of attention.

When digging out the unhealthy tree, carefully remove and burn all the roots together with the tree. Leave the hole open and exposed throughout the winter, and just prior to planting in spring fill with a load of virgin soil to which may be added some well-rotted animal manure. Virgin soil is obviously richer in plant nutrients than soil which has been cropped exhaustively for some considerable time.

The young tree is very often forgotten and does not get the necessary attention at the right time. Weed growth may tend to choke it, but this difficulty can be simply overcome by the use of an old fertilizer bag. The bag is opened out and, after making a cut in the middle, is slipped over the young tree. This makes an excellent mulch which keeps down weed growth in the vicinity of the tree and conserves the moisture so necessary for its progress.

—A. M. Richardson.

In Memoriam.

ERNEST GRAHAM.

Plate 184.

Mr. A. Ernest J. C. K. Graham, Under Secretary of Agriculture and Stock, and Director of Marketing, passed away in St. Martin's Hospital, Brisbane, on Sunday, 1st May. He was in his office as recently as the previous Tuesday when he was obliged to give up the heroic struggle which he had waged for two years against failing health.

Mr. Graham's name will go down in the annals of this State as one of the framers of much of its present-day marketing schemes and the development of agriculture generally. He was

closely associated with the framing of the Dairy Produce Act of 1920, which has been used as a basis for similar legislation overseas, and for many years he had had charge of the administration of other important measures bearing on dairying.

The late Mr. Graham was born at Wagga, New South Wales, and would have been sixty-two years old next month. He was educated at the Bega public school and Grammar School, on leaving which he entered the service of the New South Wales Creamery Butter Company. He also studied agricultural chemistry. Before coming to Queensland in 1906 he had held important managerial positions in the dairy industry of New South Wales, where he was the first to introduce the practice of grading cream and to apply the principle of payment according to quality. He was for some time instructor in dairying at Gatton College. Then he took over the managership of the Queensland Farmers' Co-operative Dairying Company at Booval. He, however, soon afterwards was appointed a dairying expert in the Department of Agriculture, and rising step by step, became on 1st January, 1925, the occupant of the principal permanent position in the department, following Mr. E. G. Scriven. Meanwhile, he had filled the offices of Chief Dairy Expert and Director of Dairying and Cold Storage.

When the Council of Agriculture (the executive of the Queensland Producers' Association) was formed, Mr. Graham was appointed Government representative on that body. He was a member of the standing committee of agriculture of the Commonwealth Council for Scientific and Industrial Research, and one of the Queensland representatives on that council. He also was member of the standing committee of agriculture of the Australian Agricultural Council, of the State Nutrition Council, and of the Faculty of Agriculture within the University of Queensland, besides being chairman of several important committees associated with departmental services and administration.

In addition to other offices, Mr. Graham was a member of the Australian Dairy Council and chairman of the State Dairy Board.

His knowledge of the primary industries was as varied as it was sound, for he was an accepted authority on the growth of fodder crops, animal husbandry, and modern dairy factory practice. For many years he lectured on these subjects, in which he combined academic knowledge with a sound practical training; his administrative powers were quite as outstanding. Both as author and collaborator he was responsible for the publication of numerous bulletins and pamphlets on various aspects of agriculture and animal husbandry, of which among the more notable were "The History of Dairying in Queensland," "Dairying in Queensland" (an economic survey), and

several on the economics of cotton-growing, sugar production, and poultry and pig raising. Besides being associated with the initial organisation of farmers under the Primary Producers' Organisation and Marketing Acts, he remained in close touch with the legislative machinery which the several commodity pool boards constituted under the Acts have, from time to time, found necessary in connection with their marketing operations. His annual reports on the operations of these pools were remarkable for their lucidity and able presentation of the facts of the contemporary agricultural situation, particularly in relation to the special and extremely intricate economic problems with which agriculture is confronted the world over.

The late Mr. Graham was a keen student, an omnivorous reader, and something of an authority on English and classical literature, and was gifted with unusual powers of observation and a remarkably retentive memory. He was a prodigious worker, a great home lover, with an extraordinary capacity for friendship. He won his way to success through sheer merit and fine character—a success that left him quite unspoilt. He remained the same unassuming, courteous gentleman to the end.

He was laid to rest in the Bulimba Cemetery in the presence of a very large gathering of his friends and former associates, among whom were the Minister for Agriculture and Stock, Hon. Frank W. Bulcock (representing the Government and State Parliament), representatives of other departments and every branch of the Department of Agriculture and Stock, of the Council for Scientific and Industrial Research, the Council of Agriculture and associated farmers' organisations, the Royal National Agricultural Association, the University of Queensland, Ex-Students' Association of the Queensland Agricultural High School and College, and the professional and commercial life of the city. To his bereaved relatives, deep sympathy is extended.

The Minister's Tribute.

A tribute to the work of the late Mr. Ernest Graham as Under Secretary of Agriculture and Stock was paid by the Minister.

"Agriculture in Queensland has lost one of its most faithful servants," Mr. Bulcock said. "Mr. Graham was intimately associated with the development of the department for a number of years, and during the six years I have been Minister for Agriculture he has been a tower of strength, more particularly on the economic side of agriculture in the development of which he played a very material part. The department will be the poorer for his death, but the value of the work he did for agriculture will never be forgotten.

"The sympathy of all in my department is extended to Mrs. Graham and family on their loss of a very fine gentleman."

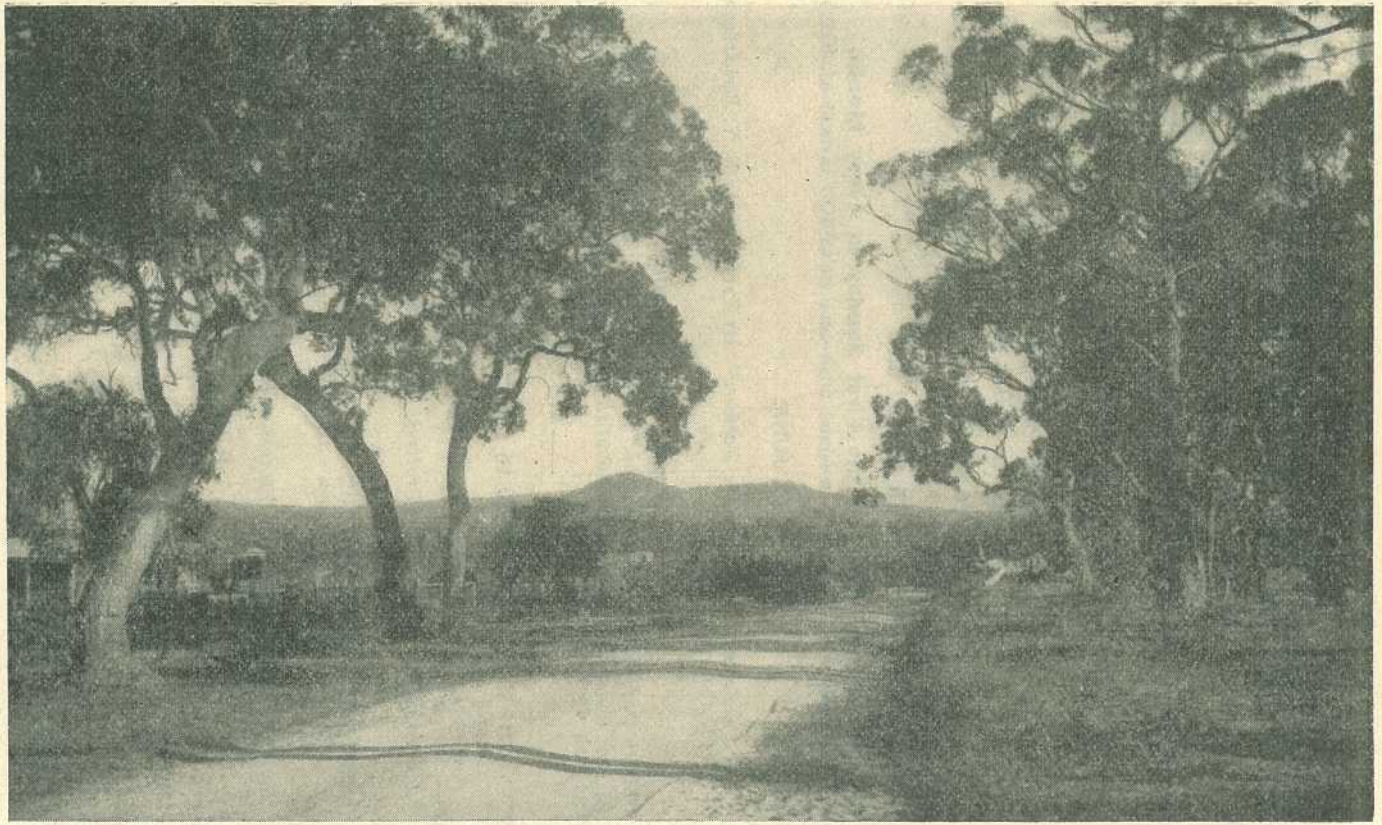


Plate 185.

ON THE ROAD TO GLEN NIVEN, NEAR STANTHORPE.

NATIONAL RADIO TALKS.

The following programme of national talks, supplied by courtesy of the Australian Broadcasting Commission, will be given over the national network of broadcasting stations, including 2BL, 2NR, 2CO, 3AR, 3GI, 4QR, 4RK, 4QN, 5AN, 5CK, 7ZL, 7NT.

National talks for Mondays and Wednesdays, 7.40 to 7.55 p.m., are arranged for three or four months in advance. For other days and at other times, they are arranged from month to month.

All times stated are *Eastern Standard Time.*

SUNDAYS.

9.10 to 9.30 a.m.

Countryman's Session each Sunday.

(Queensland Listeners tune in to 4QG, 4RK, or 4QN.)

9.15 to 9.30 a.m.

Special National Talk on the First Sunday in every Month.

(For this Session South-Eastern Queensland must tune in to 4QG instead of 4QR.)

JUNE.

5th—

"How the Scientist Can Help the Farmer." By Professor A. E. V. Richardson (Melbourne).

3.0 to 3.20 p.m. every Sunday.

"With Our Cricketers in England." By Mr. F. S. Burnell (Sydney).

(A chat about the cities or the counties in which the Australian Team will be playing each week.)

6.30 to 6.45 p.m.

MAY.

15th—

"Science in the News." By Professor W. J. Dakin (Sydney).

22nd—

"MEMORIES OF THREE CITES (Series). *"Rome."* (First Talk.) By Professor Walter Murdoch (Sydney).

29th—

"Science in the News." By Professor W. J. Dakin (Sydney).

JUNE.

5th—

"Paris." (Second Talk in the series "Memories of Three Cities." By Professor Walter Murdoch.

12th—

"Science in the News." By Professor W. J. Dakin (Sydney).

19th—

"London." (Third Talk in the series "Memories of Three Cities.") By Professor Walter Murdoch.

26th—

"Science in the News." By Professor W. J. Dakin (Sydney).

JULY.

3rd—

"AN AUSTRALIAN CREED" (Series). *"Drifting or Steering."* (First Talk in this Series.) By Professor Walter Murdoch.

10th—

"Science in the News." By Professor W. J. Dakin (Sydney).

17th—

"The Enemies of Progress." (Second Talk in the series "An Australian Creed.") By Professor Walter Murdoch.

24th—

"Science in the News." By Professor W. J. Dakin (Sydney).

31st—

"Wanted—A Common Platform." (Third Talk in the series "An Australian Creed.") By Professor Walter Murdoch.

AUGUST.

7th—

"Science in the News." By Professor W. J. Dakin (Sydney).

8.30 to 8.50 p.m. every Sunday.

"INTERNATIONAL AFFAIRS."

MAY.

15th—

Dr. E. R. Walker.

22nd—

Dr. G. L. Wood.

MONDAYS.

7.40 to 7.55 p.m.

MAY.

16th—

"THE VIEWPOINT CHANGES" (Series). *"War."* By Mr. J. A. McCallum (Sydney).

23rd—

"Morals." By Professor G. V. Portus (Adelaide).

30th—

"Home Life." By Mrs. Clarence Weber (Melbourne).

JUNE.

6th—

"YOUTH AS CRITIC." (A Series designed to give the young men an opportunity to criticise). *"Our Universities."* By Mr. L. F. Crisp (Adelaide).

13th—

"Is Democracy a Sham?" A Discussion between Messrs. K. Ditterick and Montague Brown (Melbourne).

20th—

"The Distribution of Wealth." A discussion between Messrs. E. Ward and Horace Brown (Melbourne).

27th—

"Our Pleasures." By Mr. N. T. Lovell (Sydney).

JULY.

4th—

"Religion." By Mr. F. W. Coaldrake (Brisbane). (To be broadcast from Sydney.)

11th—

"AMERICA TO-DAY" (Series). By Mr. C. Hartley Grattan. *"A Chat on America's Economy."*

18th—

"A Chat on America's Cultural Life."

25th—

"NEW ZEALAND'S NEW DEAL" (Series). By Mr. N. M. Richmond (Brisbane). *"New Zealand's New Deal"*—Part I.

AUGUST.

1st—

"New Zealand's New Deal"—Part II.

8th—

"An American's Views on New Zealand's New Deal." By Mr. C. Hartley Grattan.

TUESDAYS.

A National Talk will be arranged somewhere between 9.30 and 10.0 p.m. each Tuesday.

WEDNESDAYS.

7.40 to 7.55 p.m.

MAY.

18th—

"GREAT AUSTRALIANS" (Series). "And still they Live." *"Sir Charles Kingsford Smith."* By Mr. Norman Ellison (Sydney).

25th—

"MY VISIT TO GERMANY" (Series). By Professor S. H. Roberts (Sydney). *"Adventures in Nazidom."*

JUNE.

1st—

"Interviews with Nazi Personalities."

8th—

"IN THOSE EARLY DAYS" (Series). By Professor Ernest Scott (Melbourne). *"What Napoleon Bonaparte may have said to Bougainville."*

15th—

"Two Races that were never Run."

22nd—

"Amalie Dietrich."

29th—

"Why not an Australian Culture?" By Mr. P. R. Stephenson (Sydney).

JULY.

6th—

"Why not an Australian Culture?—Another View." By Mr. J. I. M. Stewart (Adelaide).

13th—

"SOME 'OUT OF THE WAY' BOOKS." *"The Saga Spirit."* By Mr. Ian Maxwell (Sydney).

20th—

"Folly in Old France."

27th—

"THIS, CHANGED THE WORLD" (Series). *"Discoveries by Stone Age Man."* By Mr. F. S. Shaw (of Hobart). (Broadcast from Melbourne.)

AUGUST.

3rd—

"Gunpowder." By Professor E. J. Hartung (Melbourne).

10th—

"Coal." By Professor E. J. Hartung (Melbourne).

17th—

"Vaccination." By Professor W. A. Osborne (Melbourne).

24th—

"Bacteria." By Professor W. A. Osborne (Melbourne).

31st—

"The Engineer through the Ages." By Sir Henry Barraclough (Sydney).

SEPTEMBER.

7th—

"Steam." By Sir Henry Barraclough (Sydney).

14th—

"Electricity." By Sir Henry Barraclough (Sydney).

THURSDAYS.

7.40 to 7.55 p.m.

The National Talk on each Thursday evening during May will be a Review of "CURRENT BOOKS WORTH READING."

As from 5th June, the National Book Review will be broadcast on Sundays at 10.15 a.m.

FRIDAYS.

7.40 to 7.55 p.m.

A National Talk will be arranged every Friday evening at this hour.

MAY.

13th—

"Are you Superstitious?" By Mr. Hermon Gill (Melbourne).

WEDNESDAYS AND FRIDAYS.

2BL, 2NR, 2CO, 3AR, 3GI, 4QR, 4RK, 4QN.

6.0 p.m.

"A FORUM FOR TEACHERS AND STUDENTS."

National Talks on Wednesdays and Fridays are arranged specially to interest young people. Usually these Talks will be broadcast by young people themselves. During May the subject of the Talks and Discussions will be:

"OUR SCHOOLS—WHAT WE THINK OF THEM."

MAY.

13th—

"How we would deal with the Examination Problem." A Discussion by some Young People (Melbourne).

18th—

"The Winnetka Schools, Chicago." By Rev. C. T. Parkinson (Sydney).

20th—

"Would the Winnetka Plan Work in Australia?" A Discussion by some Young People (Melbourne).

25th—

"The Ideal School for Australia." By Rev. C. T. Parkinson (Sydney).

27th—

"Our Conception of an Ideal School for Australia." A Discussion by some Young People (Melbourne).

The Tropics and Man

Adventures in Science—The Discovery of Vitamins.

DOUGLAS H. K. LEE, M.Sc., M.B., B.S., D.T.M., Professor of Physiology, University of Queensland.

THE word "adventure" calls to mind swash-buckling privateers, storm-tossed voyagers, fever-ridden explorers in tropical forests, in hourly peril from savages or treachery. What place is there in this reckless, glorious living for the cool calculated pursuit of scientific discovery? What matter the shadowy truths of an unseen, ill-understood world when life turns on the accuracy of the native's aim, and the loyalty of hired bearers?

To the vast majority of these restless pioneers no doubt science, as such, was unknown, and yet, they depended upon the science of their time for their very lives—navigation and firearms were obvious examples if they had but thought of it. Nevertheless, true scientists were not wanting amongst these careless warriors, for science is not an exclusive possession to be purchased from special instructors, it is the product of a scientific mind, and anyone who takes the trouble to observe carefully, to consider his observations and their possible explanation, and to put his conclusions to the test of experiment has that mind, be he soldier, sailor—or thief.

Recognition of Deficiency Diseases.

In the writings of these scientist-pioneers are to be found from time to time accounts of diseases produced by lack of certain foods—deficiency diseases we call them to-day. The significance of many of these observations were not appreciated at the time, but bit by bit experience drove home the lesson and confirmed their statements.

In 1720 an Austrian physician, Kramer, wrote that 3 or 4 oz. of orange or lime juice would cure the dreadful disease of scurvy without other help. Captain Lind wrote a "Treatise on Scurvy" in 1757, giving for the first time the results of experiments conducted on sailors and proving that the disease was cured or prevented by the use of salads, summer fruits, &c., while Captain Cook was awarded the Copley Medal of the Royal Society for his dealings with scurvy in his famous voyages commencing in 1768.

Listen to these extracts from the writings of these voyagers and imagine yourself before the mast on the old windjammer.

Although the existence of two other diseases—beri-beri and rickets—had been known for a long time (beri-beri was described in the year 2600 B.C.), they were not recognised as deficiency diseases until much later. In 1878, 300 out of every 1,000 men in the Japanese navy were sick with beri-beri. In 1882 another sailor—Admiral Takaki—carved himself a niche in medical history, by abolishing beri-beri from the

Japanese navy in much the same way as James Cook and his contemporary navigators had banished scurvy from the British navy. There was one important difference, however, which was to prove the forerunner of our present-day concepts. Scurvy had been prevented by the addition of one specific item to the diet—lemon juice; beri-beri was stopped by substituting a mixed diet of vegetables, meat, fish and barley in the place of one consisting largely of rice. There was one other difference. Admiral Takaki lived to enjoy the material benefits of a peerage conferred upon him by a grateful Emperor.

Experimental Production of Deficiency Diseases.

In the history of almost any medical discovery, you will find that the first stage has been careful observation of what occurs in nature. The scientist notices that if certain things are done—or, as in the case of vitamins, not done—certain disease symptoms appear. From this knowledge, some sort of prevention or cure often springs—thus, to cure or prevent scurvy, it was found necessary to have fresh fruit and vegetables.

If knowledge remained at this stage, however, medicine would stay in a very rough and ready state. The next stage in progress is usually to see if one can produce and cure the condition at will, preferably in animals, but if that is not possible, it is sometimes necessary to use human beings. There have at all times been men of sufficient faith and nobility to offer themselves for such experiment—but that is another chapter of medical adventure.

In the case of the vitamins, the next step forward was taken almost accidentally. Eijkman, a Dutch scientist in Java, noticed in 1897 that when the hens in the prison yard were fed the same diet as the prisoners —polished rice—they also developed a kind of beri-beri, but when the hens' diet was changed, they got better. Here, he said to himself, is an opportunity to find out just what it is about the rice diet which produces beri-beri. Fowls are plentiful, they eat much less food and they do not suffer from so many diseases as man; they will make my work much easier. And so he and his colleagues set to work. Even so, it was nine years before they discovered the truth, that rice husks contain a substance which is essential for the heart and nervous systems, and that this substance is necessary if polished rice forms the major part of the diet.

Although the observation which started Eijkman off on his trail of discovery was an accident, the same "accident" must have happened hundreds of times before, but none had realised its meaning, and the opportunity awaited Eijkman's acumen. This happy "accident" in the case of beri-beri was followed in 1907 by an equally happy accident in respect of scurvy, this time at the hands of Norwegian investigators, and the guinea-pig was the animal. This was a very fortunate accident, as the guinea-pig is one of the few animals which do get scurvy, and the investigators were looking for beri-beri at the time.

Of the work of these Dutch and Norwegian scientists, English and American workers were daily bringing confirmation. Hopkins' account of his milk experiments published in 1912 have been described as ranking æsthetically beside the best short stories of H. G. Wells. He fed rats on a diet which should have been quite sufficient for them, but which consisted of highly purified foods. The rats refused to grow until a small portion of milk was added to the diet.

At this time, a Polish bio-chemist, Casimir Funk, was working in London, and showed that a substance which prevented beri-beri could be obtained in concentrated form from rice husks. He was an imaginative man and, thinking over all that had been written about beri-beri, scurvy, and the like, perceived a single principle behind them all. For the first time he put forward the idea that food, to be adequate to the body's needs, must contain more than carbohydrate, fat and protein—it must contain certain other substances which are only required in minute amounts, but which are essential for health. These substances he called vitamins. Thus Funk brought together into a single class governed by a single principle of prevention, diseases which were very different in their appearance. How true was Funk's flash of inspiration we now fully realise. Funk postulated four vitamins, we now recognise at least ten, and many others will probably soon be admitted to the fold.

The World War.

Just when scientists of all nations had crossed the threshold of a new discovery, a discovery of the greatest importance to all mankind, there came to the world those dread dark days of 1914 and the subsequent holocaust. The shrill of the bugle, the roll of the drum, merged with the reverberation of gun-fire to drown the silvery pipings of peace-time science. This was no time for the prosecution of obscure imaginings, it was far more important to invent new ways of killing men than of saving rats. Yet how completely was this titanic struggle to vindicate the scientists' contentions. Read accounts of the sufferings of those caught in the toils of the blockade, see their emaciated frames swelling with the dropsy of beri-beri, their gums bleeding from scurvy, infection of all kinds steadily mounting as the body's resistance drops, the collapse of morale and the outbreak of red revolution as the last glimmer of hope dies.

How right were the scientists with their stress on the importance of food and of the minute necessary factors of food—but what a price to pay for proof! A proud nation brought to its knees and the health of thousands upon thousands ruined. Here indeed was adventure—but disastrous adventure of the wrong kind. Once more Science had been pressed into the victor's service and her humanitarian gifts converted into a death-dealing weapon.

The Atonement.

People are fond of stressing this subjugation of Science to the art of destruction, but there is another side to the picture. It is undoubtedly true that the demands of war forced the development of very many scientific discoveries which would have lagged behind in peace. So also the catastrophe of war famine drove scientists to further efforts in their examination of foods, vitamins and other accessory factors, as they are called. But so vast is the knowledge, so delicate the technique required that the day of the brilliant individual discoverer is well-nigh over. One man, working alone, cannot examine his work from all the different angles which are necessary, and, in any case, what he could accomplish depends upon all the other discoveries which have gone before. In the place of a few inspired enthusiasts there is hardly a place of learning which has not its group of vitamin or other nutrition investigators.

It may seem to you that with this factory-like development of Science, that romance and adventure have become mere legends, that it is no longer possible to sail a valiant lone voyager on the uncharted seas of natural science. This is not necessarily true as I shall show in a minute, but first let me say a word or two as to where this team-work is taking us in the matter of vitamins.

The outstanding development is the increasing number of vitamins being accepted by even the most cautious scientists. There are a large number of others still on trial as it were. We can sympathise with the candidate who, being asked where the six B vitamins were to be found, replied, "In Professor Peter's brain, Sir!" What was formerly thought to be a single vitamin has more than once turned out to be two or more similar but distinct vitamins. Then new ones altogether have been discovered. To make matters worse, it is no longer possible to draw a sharp dividing line between vitamins and certain other food constituents.

The second outstanding point about recent developments is the stress laid upon the mixed or balanced diet. Vitamins are not things to be added to the diet out of a bottle; a well mixed diet, containing the different foods in the proper proportions or balance, will generally ensure that a sufficiency of all is obtained.

The third feature of modern work is the manufacture in the laboratory—synthesis, the chemists call it—of some of these vitamins. As much as 1 lb. of vitamin C has been manufactured at a time, but of this, the adult requires only one thousandth part of an ounce daily—1 lb. would last him forty-five years.

Modern Adventure.

As I mentioned before, you may feel that the days of adventure in Science are over. You may say that it was all very well for Captain Cook to notice that lemon juice prevented scurvy; all he had to do was to look; everything as simple as that has been found out already.

In the first place, I doubt whether everything that is observable has been observed. There is a vast difference between seeing and observing. In the second place, there is just as much adventure in complex science as in simple observation. Think of the thrill that must have come to Szent-Gyorgy when he first isolated vitamin C, or to the team of chemists who first manufactured it artificially. You can see them working away day after day, month after month, now trying this line of work only to meet with failure, now trying a different line, to fail again. Some member of the team lying awake at night turning the problem over and over, sees a suggestive link. He persuades his colleagues that it is worth following up. Is it worth while? Will it mean the dashing of yet another hope, the loss of more months of futile work? They try, they persevere. At last the final product! Will it work? Is it what they have been looking for? They give it to an animal with scurvy. Just imagine how anxiously they watch the animal, how fearfully they will go to its cage each morning. On the fourth day the animal is better, in two more it is cured—Eureka: We have found it!

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.

Plants from Morven Named.

W.C.C. (Morven)—

(1) *Amphipogon sp.*—This is a very widely-spread grass in Western Queensland, particularly in the mulga country of the south-west, and in the sandy land of the central-west. It is sometimes known as Neverfail, at other times as Porcupine grass, but both these local names are applied to other grasses. It has little value as a fodder, although it is eaten in its younger stages of growth in the absence of more palatable feed.

(2) *Neurachne mitchelliana*, commonly known as the Mulga Mitchell, one of the best grasses of the Mulga country.

(3) *Danthonia bipartita*, a common grass of the Mulga country. We have not heard a local name applied to it. It should be quite a good fodder but we have no particular information about it.

(4) *Aristida anthoxanthoides*, a species of wire grass or three-prong spear grass. The wire grasses, on the whole, have little value as a fodder although stock will sometimes eat them in the absence of better feed.

Elephant Grass.

A.H.B. (Mount Ossa, Mackay)—

The specimen bore no seed heads but there is little doubt that it is elephant grass, *Pennisetum purpureum*, grown to a limited extent as a fodder in many parts of Queensland.

Elephant grass is not now grown to the extent that it was some years ago, probably owing to its very cancy nature. Kept regularly cut, however, it is a useful grass for either feeding off or chaffing. It is not known to possess any poisonous or harmful properties at any stage of its growth.

"Fish Weed."

G.R.S. (Biggenden)—

The specimen is *Chenopodium triangulare*, a native plant sometimes seen in the ordinary pasture, but most frequent as a weed of cultivation, around cowyards, or where the ground has been disturbed. It is commonly called fish weed, due to the peculiar flavour and odour it gives to milk and cream.

"Devil's Claw."

W.D.R. (Springsure)—

The specimen is devil's claw, *Martignia lutea*, a native of South America, now fairly common in some parts of Australia. In Queensland, it is most abundant on the Darling Downs, particularly about Dalby, where it is sometimes known as pumpkin vine, from the pumpkin-like growth of the plant. It is also known as unicorn plant, elephant's trunk, and devil's grip. The seed vessels often become entangled in sheep's wool, particularly the neck wool, and their presence may not be discovered until shearing time, with consequent breakages of the teeth of the shears and temper of the shearers. The plant is an annual.

"Wild Grape." Pandanus.

W.R.H. (Gordonvale)—

The vine described and known about Cairns as wild grape, is, we think, *Vitis opaca*. This forms a very large tuber. The only thing that we cannot reconcile with your description is where you say that the vines have a few blunt spines on them here and there.

The *Archontophœnix Alexandræ*, which is very common in swamps near Cairns, we have always regarded as the same as that found on the hillsides at Freshwater Valley. The common pandanus about Cairns we are not too sure of. We have quite a number of species in Queensland. Your best plan is to send a few droops or "nuts" taken from under the trees.

General Notes

Staff Changes and Appointments.

The approval of the Executive Council has been given to the appointment of Mr. Robert Wilson, Assistant Under Secretary, to be Acting Under Secretary for Agriculture and Stock and Acting Director of Marketing in succession to the late Mr. E. Graham. Following his appointment as Acting Director of Marketing, Mr. Wilson will also be a member of all commodity boards established under "*The Primary Producers' Organisation and Marketing Acts,* 1926 *to* 1935," a member of the State Wheat Board, and also of the Committee of Direction of Fruit Marketing.

The appointment of Mr. H. P. N. Hindmarsh, "Wingfield," Monto, as an Honorary Acting Inspector of Stock at Rawbelle, has been cancelled.

Mr. T. W. Case, Ravensbourne, has been appointed an honorary ranger under the Native Plants Protection Act.

Mr. E. B. Rice, assistant analyst, Dairy Research Laboratory, has been appointed dairy technologist, Department of Agriculture and Stock.

Mr. S. H. Scougall, care of Plane Creek Mill, Sarina, has been appointed millowners' representative on the Plane Creek Local Sugar Cane Prices Board, vice Mr. A. Innes, resigned.

Mr. E. R. Hollamby, inspector of slaughterhouses, Maryborough, has been appointed also an inspector under the Diseases in Stock Acts and the Brands Acts.

Constable W. S. Johnson, Bowen, has been appointed also an inspector under the Brands Acts, and Constable W. Kearney, of Mitchell, an inspector under the Slaughtering Act.

Mr. R. T. Smith, Bingera Sugar Mill, via Bundaberg, has been appointed millowners' representative on the Bingera Local Sugar Cane Prices Board, vice Mr. A. J. Gibson, resigned.

Messrs. A. J. Anders (Maroon, via Boonah), A. G. Maddox (Clumber), A. J. D. Philp (Wyaralong), and J. Stenzel (Mount Alford) have been appointed honorary protectors under "*The Fauna Protection Act of* 1937."

Diseases in Plants Inspectorships.

An examination for inspectorships under "*The Diseases in Plants Acts,* 1929 *to* 1937," will be held in Brisbane and principal towns of the State on Monday, 25th, and Tuesday, 26th July next. The estimated number of vacancies for which qualified men will be required is three.

Application forms and a copy of the Regulations containing a list of the subjects in which candidates will be examined may be obtained from the State Public Service Commissioner's Department, Brisbane.

The prescribed text-books are:—

"Insect Pests and their Control, and Plant Diseases and their Control"; and

"Principles of Botany for Queensland Farmers."

These publications may be obtained on application to the Under Secretary, Department of Agriculture and Stock.

Those candidates who succeed in obtaining the requisite minimum number of marks for the written portions of the examination will subsequently be required to undergo *viva voce* tests and, before appointment, successful candidates will be required to pass a medical examination. No person will be appointed who is not competent (or willing to learn) to ride a horse or a motor-cycle.

Applications for admission to the examination, together with the fee of 15s., must be received by the Acting Secretary to the Public Service Commissioner, Box 488H, G.P.O., Brisbane, not later than 4th June, 1938.

Rural Topics

Technologist to Lecture to Queensland Dairy Farmers.

Mr. E. Brooke Rice, a young Queenslander who is one of the technologists in the Department of Agriculture and Stock, and who returned recently from England after a twelve-months' course at the famous Reading Dairy Research School, and who visited Denmark, Holland, Germany, and other European countries while he was abroad, will shortly commence an educational lecture programme. Mr. Rice will visit the chief dairying centres of the State, starting off in the Darling Downs division. His lectures, illustrated profusely with lantern slides, have been prepared with the object of encouraging dairy farmers to aim at producing the choicest quality butter. This is part of a general educational scheme planned by the Minister for Agriculture and Stock (Mr. Frank W. Bulcock) for the purpose of helping the dairy industry to maintain its footing on the Imperial market—an object which can only be realised if the industry exports butter—and cheese, too—of the quality required by British consumers.

Queensland Products at the Sydney Show.

The Queensland farming and forestry and Tourist Bureau exhibits attracted great public attention at the Sydney Show. There was always a large crowd about it and many interesting comments on the various displays were voiced. One amusing remark by a young fellow was heard. Turning to a friend he said, "There you are, Bill, I told you that pineapples don't grow under the ground. Look at that"—pointing to a pineapple on a plant in the fruit section of the Queensland exhibit.

A frequent question asked was whether cotton is grown by coloured labour in Queensland. The officers with the exhibit of the Department of Agriculture and Stock (Messrs. S. Burchill and J. H. Gregory), had the pleasure of telling inquirers that Queensland is the only country in the world exclusively employing white labour in the production of cotton—cotton, by the way, equal to the world's best.

Queensland-bred Wheat Awarded Commonwealth Championship.

With a sample of Flora variety, Mr. J. W. Wilson, of Gilgandra (N.S.W.), won the Commonwealth champion prize for medium-strong white wheat at the Sydney Royal Show.

In the championship class Mr. Wilson gained a total of 171½ points out of a possible 200. For grain quality he was awarded 53½ points out of a possible 60, and for milling 118 out of a possible 140. The wheat, which was sown on black semi-mulching soil, weighed 66½ lb. to the bushel. It yielded 11 bushels to the acre, and the rainfall during growth was only 2.10 inches. Seed at the rate of 50 lb. per acre was sown on fallow.

The Flora variety of wheat was bred at the Roma State Farm by Mr. R. E. Soutter, Research Officer, Department of Agriculture and Stock. It is a result of the crossing of the Bobs and Florence varieties. Flora covered the second largest wheat acreage in Queensland in the 1936-7 season. A sample once scaled 69½ lb. to the bushel. Numerous prizes have been won in Queensland with this variety.

The Cause of Erosion.

A lot is heard about soil erosion and washaways these days, and there is no doubt that it is a serious matter from both the farmer's and the State point of view. A committee has been investigating the trouble in Victoria, and has arrived at the conclusion that there is no single cause of soil erosion; neither is there one sovereign remedy. In the final analysis, the real cause of soil washing must be admitted and that the cause is the mistreatment of the soil and other natural resources by man himself. We are all trying to get from our soil—and also from our timber lands—the highest return in the shortest time. To be quite fair to ourselves, however, it must be said that most of the damage to our farming land is done unwittingly, or, at least, because of our lack of knowledge of how to prevent or correct erosion. To plead ignorance of the laws of nature is, however, as useless as pleading ignorance of the laws of the land. In both cases, we cannot dodge the penalty. The remedy is to study causes of soil washing on our own farms and in our own locality, so that, at least, something may be done in the way of minimising the damage.

Whitewashes for Farm Use.

Whitewash has a wide application to farm use and deserves a much greater popularity than it at present enjoys. Its ingredients are inexpensive and readily obtained; it is not difficult to make, and it is easy to apply it. In addition to these advantages, it protects the surfaces to which it is applied, brightens up dark interiors, and is sanitary. A fact not generally known is that whitewash may be coloured provided that light tints and shades are used and that the pigments aren't affected by lime. Among such are yellow ochre, raw and burnt umber, and raw and burnt sienna.

How to Use Whitewash.—The surface to be whitewashed should be just as clean as one that is to be painted, and it is a first essential to good results that all dirt, dust, grease, and scaly material be removed before there is any attempt to apply the wash. This implies a liberal use of scrapers and stiff brushes. When the cleaning is finished and the surface dusted, it is well to dampen it slightly just before applying the wash.

Whitewash may be applied with the brush or sprayer. In applying with the brush, use one at least 4 inches wide, and work rapidly, making no attempt to "brush out" as in painting. Let the coat be fairly thin and transparent, and it will be opaque when dry. Small hand or power sprayers may be used. In using sprayers it is quite necessary that the wash be strained through at least two thicknesses of cheesecloth.

Spraying has many advantages over brushing under certain conditions, and it forces the material into cracks and crevices that would not be reached by the brush. In using the sprayer always hold the nozzle so that the wash is applied at right angles to the surface; this gives even application. The sprayer should be thoroughly cleaned after use, and especially the nozzles, as a small particle of dirt clogging one side of the nozzle will cause it to send out a lopsided stream and the work will be patchy.

Estimating Quantities.—In estimating the quantity of material required many problems and conditions are encountered, but the following general figures may be used as a basis. One gallon of whitewash will cover approximately 225 square feet of wood, 180 square feet of brick, and 270 square feet of plaster. Using a 4-inch bruch, a man will cover 200 square feet of ceiling, 200 square feet of rough wall, or 350 square feet of smooth wall in one hour.

How to Make Whitewash.—(*a*) Prepare the lime and water paste a few days before you wish to use it.

(*b*) Where casein, glue or formaldehyde are to be used, the solutions must be brought together only when they are quite cold. This is very important.

(*c*) The solutions mentioned in (*b*) should be added quite slowly and at the same time they should be stirred vigorously and constantly.

(*d*) In no case should you mix more of the wash in one day than you can use in that day when any of the solutions mentioned in (*b*) are used.

(*e*) Skim milk may be used as a substitute for casein, but it is not quite so effective.

(*f*) In place of one sack (50 lb.) of hydrated lime, you may use the paste made by slaking one-half bushel (38 lb.) of fresh quicklime with about 6 gallons of water. This slaking is sometimes done by placing the quicklime in a barrel and adding the water boiling hot. If cold water is used the water may be added a little at a time, stirring each time; when heat ceases to be given off the lime is slaked.

Before using, strain this paste through a fine screen.

(*g*) Alum tends to prevent rubbing, and is used in proportion of 1 oz. to 1 gallon of the wash. It would not be needed in the formulæ C, D, or E given below.

(*h*) If a gloss is desired, dissolve 1 lb. of bar soap in a gallon of boiling water, and when it is cold add it to 5 gallons of the thick wash.

Some Common Formulæ.—A. (1) Dissolve 15 lb. of common salt in 7½ gallons of water. (2) Slowly add one sack of hydrated lime, stirring vigorously. (3) Thin this to milk-like consistency with water.

B. (1) Make a paste of one sack of hydrated lime and 7 gallons of water. (2) Dissolve 1 lb of common salt and ½ lb of zinc sulphate in 1 gallon of boiling water. Allow this to cool. (3) Pour this last solution into the lime paste solution a little at a time, stirring vigorously. (4) Stir in 2 gallons of skim milk.

C. (1) Soak 5 lb. of casein in 2 gallons of hot water for two hours. (2) Dissolve 3 lb. of trisodium phosphate in 1 gallon of water. (3) Mix these two and allow

the casein to dissolve and cool. (4) Make a cream of one sack of hydrated lime and 7 gallons of water. (5) Slowly add (3) to (4), stirring vigorously. (6) Just before using, dissolve 3 pints of formaldehyde in 3 gallons of water and add it very slowly to (5), stirring vigorously. Do not mix more than can be used in one day.

D. (1) Soak 5 lb of casein in 2 gallons of hot water for two hours. (2) Add 3 pints of household ammonia to 1 gallon of water. (3) When cold mix (1) and (2). (4) Make a cream of one sack of hydrated lime and 7 gallons of water. (5) Slowly add (3) to (4), stirring vigorously. (6) Just before using dissolve 5 pints of formaldehyde in 3 gallons of water and add it very slowly to (5), stirring vigorously. (7) Thin to a milk-like consistency.

E. (1) Dissolve 3 lb. of glue in 2 gallons of hot water and allow to cool. (2) Make a cream of one sack of hydrated lime and seven gallons of water. (3) Mix (1) and (2), stirring vigorously. (4) Thin to a milk-like consistency.

F. (1) Make a cream of 1 sack of hydrated lime and 8 gallons of water. (2) Slowly add 1 quart of crude carbolic acid, stirring vigorously. The quantity of acid may be doubled if desired. (3) Thin to a milk-like consistency.

G. (1) Make a cream of 1 sack of hydrated lime and 7 gallons of water. (2) Dissolve 6 lb. of salt in 3 gallons of boiling water. (3) Mix (1) and (2) when cold. (4) Stir 3 lb. of Portland cement into (3).

Uses for the Different Formulæ.—Formulæ A and B: Unimportant outdoor work, sheds, fences, and trees. C and G: Higher grade of work on dairies, buildings, and trees. D: Basements that tend to be damp. E: Dry basements. F: As a disinfectant wash but liable to rub.

Flushing the Separator.

The test or percentage of fat required in cream should be not less than 38 per cent. during the hot summer months and not less than 34 per cent. during the cooler months of the year. Whatever make of separator is used, during the process of separating satisfactory results can only be obtained when the cream screw is adjusted so that the driven speed of the separator conforms with the corresponding number of revolutions per minute recommended by the maker of the machine.

At the completion of separating, flushing with cold or warm water so as to remove the last of the cream from the patties is an undesirable practice. If the cream bucket is not removed during the process, some of the impurities and slime adhering to the bowl may be removed and deposited in the cream. This applies particularly if warm water is used. When separated milk is used for flushing, excessive milk solids are introduced into the cream, and these will act as a starter and affect the quality. Thus the proceeds of flushing should be fed to the pigs or calves on the farm. The maintenance of cream quality is too important to be impaired by laxity in this respect.

Wholesome Milk.

Normal milk can only be produced by a normally healthy herd, fed on wholesome and non-taint producing fodders. If only one cow in the herd is not in normal health her milk production will be sub-normal, and, if mixed with the milk from the remainder of the herd, the quality of the whole may be seriously affected. Cleanliness should be exercised during the whole process of milking, and all utensils and surroundings kept clean.

If the milk is intended for human consumption, cooling and aerating will allow the feed flavours to be given off, and the reduction in temperature will check bacterial development.

Isolation Pen for Sick Pigs.

The distance between isolation pens for sick pigs and the pig yards or dairy structures is not so important as the relationship of these structures from another point of view. Thus, while advising a minimum distance of, say, 150 feet, it should be emphasised that such isolation pen should be so placed that:—

(*a*) No drainage from it can spread to the main sties or any of the dairy buildings; and

(*b*) That if healthy pigs are allowed to wander, the isolation pen should be so guarded that they cannot make contact with it.

Ordinarily, therefore, the isolation pen should be on lower ground, and, if in the paddock in which pigs wander, should be protected by fencing in such a way that healthy pigs cannot come in contact with it.

Orchard Notes

JUNE.

THE COASTAL DISTRICTS.

IF the weather is dry, citrus orchards should be kept in a good state of tilth and any winter green manure crops turned under. Old worn-out trees may be dug out and burnt. Custard apples will be ripening more slowly as the nights get colder. If the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and become valueless. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

The pineapple plantation should be shallow worked and kept free from weeds. The fruit takes longer to mature at this time of the year; consequently it can be allowed to remain on the plant until partly coloured before gathering for the Southern markets.

Banana plantations also should be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now may mean small fruit later on. Bananas should be allowed to become full before the fruit is cut. The necessity of proper handling, grading, and packing of the fruit should be kept in mind. Land intended for planting with bananas or pineapples during the spring should be got ready now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall, they should be watered regularly. Where not already done, vineyards should be cleaned up ready for pruning. It is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt area. Thin out young trees properly, and cut them back hard. Many good trees are spoilt by insufficient or wrong pruning during the first three years. If in doubt as to the correct method of pruning consult the district instructor in fruit culture. In old orchards, do not have too much bearing wood; cut out severely, especially in the case of peaches. Planting may be commenced where the land is ready as early-planted trees become well established before spring, and thus get a good start. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour or badly prepared land.

Slowly acting manures—such as bonedust, meatworks manure, or phosphates—may be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when they start growth in spring. Lime may also be applied where required. Badly drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees may be pruned now, and vines also may be pruned in any district where there is no risk of late frosts. Prunings should be gathered and burnt, and the vineyards ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the western districts. The trees should be watered if they show signs of distress; otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should have been picked by this time.

BULL RECORDING.

As every breeder knows, it is not always what an animal appears to be, but what class of animal it breeds that really matters. We should, therefore, attempt to record all our bulls (on the average yield of their daughters) and give them a figure for milk yield in the same way as we do for cows.—*Dr. John Hammond.*

Farm Notes

JUNE.

FIELD.—Winter has set in, and frosts will already have been experienced in some of the more exposed country of the Maranoa and Darling Downs. Wheat sowing should now be in full swing. Full directions for "pickling" seed wheat are available on application to the Department of Agriculture, Toowoomba. Land intended for the production of early summer crops may now receive its preliminary preparation, and every opportunity taken advantage of to conserve moisture in the form of rainfall where experienced; more particularly so where it is intended to plant potatoes or early maize. Where frosts are not to be feared the planting of potatoes may take place in mid-July; but August is the recognised month for this operation. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them under cover and in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size, and finally cover with either straw or fresh hay. The sand excludes the air, and the potatoes will keep right through the winter.

Cotton crops are now fast approaching the final stage of harvesting. Growers are advised that all bales and bags should be legibly branded with the owners' initials. In this matter some consignors are careless, causing much delay and trouble in identifying parcels, which are frequently received without address labels.

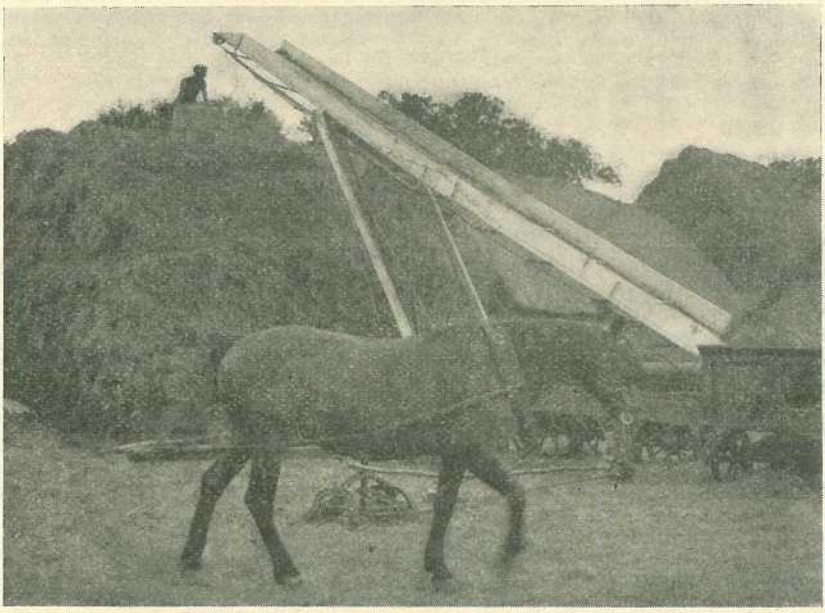


Plate 186. [*Photo.*: *L. F. Anderson.*

STACKING HAY ON AN ENGLISH FARM.—The hay is tied in bundles by machinery and carried on to the stack, a horse-gear providing the power.

Our Babies.

Under this heading a series of short articles, by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

HEALTHY MOTHERHOOD.

Australia wants healthy babies—all and more than those arriving at present.

The first requirement of a healthy baby is healthy parentage, but as important as this undoubtedly is, it is only a beginning. There is now a much wider diffusion of knowledge regarding midwifery amongst the general public. There are now many women who know much more about themselves than their mothers ever knew, who demand—and rightly—that they shall be helped to go through the strain, in some cases the danger, and in all cases the irksomeness of bearing children with complete safety and with as much comfort as medical knowledge can give.

The unborn baby can be reached only through the mother who carries it. So the life of the child and the life of the woman in pregnancy are closely bound together and depend one on the other. Although the baby is hidden from sight it is possible, through the mother, for it to be influenced for good or ill. So it is clear that ante-natal care is the care of the expectant mother in health and disease and the care of the child before it is born.

Bearing this in mind the expectant mother should, early in her pregnancy, put herself under the care of her doctor or pay a visit—the first of several it is hoped—to an ante-natal clinic. She should welcome the medical examination which is made, both for the sake of her general health and for the prevention of any discomforts associated with her pregnancy and of any dangers to herself and her child. She should

realise too that in having her urine tested and blood pressure taken at each visit, a very important part is played in keeping guard over her health, for by these tests early signs of danger are found.

Even a woman in apparently good health may develop kidney trouble which, if recognised early, makes it possible for steps to be taken by her doctor so that her pregnancy may be brought to a safe and happy conclusion.

The teeth of the expectant mother should be carefully examined, for no one with defective teeth can satisfactorily digest food—entirely apart from poisons which may be absorbed from infected gums.

Her diet is of the greatest importance. Many women neglect to take suitable food for the development of a strong healthy baby.

One of the greatest advantages an expectant mother derives from obtaining advice in good time is peace of mind. She will know what she may safely do and will be able to do it without worry. She will feel that someone outside the family, who knows exactly what she needs, is sharing her responsibility, and that she is doing what is right for herself and her unborn child.

She should always report at once to her doctor or ante-natal clinic if at any time during her pregnancy she notices—

Persistent headache,
Dimness of vision,
Diminution in quantity of urine,
Frequency of passing urine,
Swelling of the feet and legs,
Pains in the abdomen,
Persistent vomiting,
Discharge of blood from the vagina.

It is well known that the new baby is cared for at the ante-natal clinics, but not realised by many that the care of the mother should not cease at the end of the lying-in period. She should present herself to her doctor or the clinic which she attended before the birth of her child for a post-natal examination—which means that about six weeks after her confinement she should be examined to see that her organs are again in their right position. So frequently simple treatment prescribed by her doctor can prevent small troubles developing into big ones which may in the end need operation to restore her to comfort and good health.

IN THE FARM KITCHEN.

THE EVER USEFUL EGG.

Eggs Chasseur.

Take 4 eggs, 1 tablespoonful butter, 2 tomatoes, 2 tablespoonfuls grated cheese, 1 small onion, 2 rashers bacon, ½ lb. potatoes, pepper and salt to taste.

Melt the butter in a saucepan. Add peeled and diced onion and fry lightly, then add diced bacon. Cook till well browned. Add peeled and diced potatoes and chopped, peeled tomatoes. Cover and simmer until potatoes are soft. Meanwhile, poach eggs and stir grated cheese into the mixture. Season to taste with pepper and salt, if required, and pour into a shallow, hot dish. Arrange eggs neatly on top.

Egg and Shrimp Toast.

Take 8 rounds fried bread, 2 oz. butter, 1 small pot shrimp paste, 3 hard-boiled eggs, a little chopped parsley.

In smoking hot fat fry bread until golden brown. Drain on paper. Mix shrimp paste, egg-yolks, and butter together, and rub through a sieve. Rub whites of eggs through a sieve. Chop parsely very finely. Put shrimp mixture in a forcing tube and decorate edge of toast thickly with it. Fill up centre with whites of eggs and garnish with parsley. Serve hot or cold.

Eggs St. Michel.

Take 3 hard-boiled eggs, grating of nutmeg, 2 tablespoonfuls butter, 3 tablespoonfuls chopped fried mushrooms, 1 egg-yolk, 1 small cupful milk, ¼ teaspoonful salt, 2 tablespoonfuls flour, 1 tablespoonful minced parsley. Fried bread to serve.

Melt the butter in the top of a double boiler. Stir in flour, and when well blended gradually stir in milk, warmed till tepid. Stir constantly until sauce is smooth and boiling, then add chopped eggs, lightly fried mushrooms, parsley, and seasoning, and, when thick, the beaten egg-yolk. Pile mixture on slices of fried bread or hot buttered toast.

Eggs with Sauce.

Take 2 onions, 3 oz. butter, pepper, and salt, 1 tablespoonful vinegar, breadcrumbs, new-laid eggs.

Thinly slice the onions and fry until brown in 2 oz. of butter. Add vinegar, and cook for 3 minutes. Butter an earthenware baking dish. Place in it the fried onions and vinegar. Break the eggs separately, allowing one to each person, and put them, one at a time, over the onions. Sprinkle with pepper and salt. Add a thin layer of breadcrumbs, and bake in a hot oven until the eggs are set.

Eggs and Tomatoes.

Take the required number of fresh eggs, firm tomatoes, slices of fried bread, salt and pepper, salad.

Cut a slice off the end of each tomato, scoop out some of the pulp, and season the inside of the tomatoes with salt and pepper. Into each one carefully break an egg, put on the lids, and bake in a moderately hot oven until the eggs are set. When cold, serve garnished with salad.

Coddled Egg.

Take 1 new-laid egg.

Place the egg in boiling water, put on the lid, and let the saucepan stand for seven or eight minutes, when the water will keep hot without simmering. An egg cooked this way is more easily digested than when boiled in the ordinary way.

Poached Eggs a la Princesse.

Take 4 new-laid eggs, 4 round slices of bread (fried in butter), 1 dessertspoonful grated cheese, seasoning of pepper and salt, a little liquid butter. For poaching: 1 dessertspoonful vinegar, 1 teaspoonful salt, 1 pint water. Let the vinegar, salt, and water boil sharply, slip in eggs from a cup, let water reboil, lower heat, and simmer gently for three or four minutes; this should keep eggs a good shape. Take out with a slice, drain on a cloth, and trim neatly. Put each egg on toast, shake over a little cheese, season to taste, sprinkle with a few drops of liquid butter, and slip under the grill a minute until cheese is just melting and lightly brown.

Anchovy Eggs.

Take 6 eggs, 4 oz. butter, ¼ teaspoonful lemon juice, 1½ tablespoonfuls anchovy sauce, salt and pepper, lettuce, tomatoes for garnishing.

Boil the eggs hard and cut them in half lengthways. Remove the yolks and beat up with butter, lemon juice, pepper, and anchovy sauce. When thoroughly mixed, return to the prepared egg-whites and arrange on a bed of fresh salad and garnish with tomatoes.

Eggs with Irish Puree.

Take 6 hard-boiled eggs, 1½ gills milk, ½ oz. flour, ¾ oz. butter, 1 onion, 1 peeled potato, minced parsley, seasoning.

Melt the butter in a saucepan. Add peeled and sliced onion. Fry for ten minutes, stirring frequently. Add flour, and, when frothy, stir in the milk and sliced potato. Bring to the boil. Season to taste with salt and pepper. Cover and simmer for half an hour or until tender, stirring occasionally. Rub through a sieve on to a hot dish. Arrange eggs and sprinkle with parsley.

Scrambled Eggs and Asparagus.

Take 1 teacupful asparagus-tops, 1½ oz. butter, 2 slices toasted bread, 4 eggs, ½ gill cream, salt, pepper, and a little grated nutmeg.

Cut the asparagus tops in pieces about half an inch long; cook well in salted water with one teaspoonful sugar; when done, drain, then re-heat in a little butter. Beat eggs, add cream, and season with salt and pepper and grated nutmeg. Put 1 oz. of butter in a small saucepan, melt, and add egg mixture. Stir continually with a wooden spoon; as soon as it thickens, add asparagus tops; mix carefully and serve on neatly-trimmed pieces of toast. If tinned asparagus is used, merely cut off the tops and re-heat in the butter; the remainder may be used for a white soup.

Some Ways with Eggs.

1. Poach or steam. Serve one per person on a cake of boiled rice, seasoned to taste, and moistened with bacon fat.

2. Serve poached or steamed eggs on a fillet of smoked fish.

3. Serve a steamed or poached egg, allowing one per person, on a round of fried bread, spread with potted ham or fish paste.

4. Scramble eggs, allowing one per person. Add a teaspoonful of milk and a teaspoonful of butter or margarine to each egg. Serve with grilled gammon rashers or fried sausages.

A NEW BOOK ON QUEENSLAND BOTANY.

Principles of Botany for Queensland Farmers. By C. T. White, Government Botanist. (Issued by direction of the Hon. F. W. Bulcock, Minister for Agriculture and Stock.) Government Printer, Brisbane; pp. 232, plates 103. Price, 2s.

When the Government Botanist's articles on the principles of botany for Queensland farmers were appearing serially in the *Queensland Agricultural Journal* last year numerous enquiries as to when they would be published in book form were received. They have now been issued in the form of a small volume, available at 2s. a copy.

Botany is one of the most fascinating and at the same time useful of the natural sciences, of which even a little knowledge makes every place of interest. It also helps towards a proper understanding of the needs of plants.

In his *Principles of Botany for Queensland Farmers*, Mr. Cyril White has produced a work that should go far in assisting Queenslanders towards a knowledge and proper appreciation of the rich native flora of the State. The book is divided into five parts. The first part deals with the morphology or the study of the form and external appearances of plants; the second with the anatomy or the internal structure of the plant organs; the third with physiology or the study of the various life processes of the plant, particularly the two great factors of nutrition and reproduction; the fourth with the classification of plants or their arrangement into groups according to their natural affinities; and the fifth with distribution and the various plant associations of Queensland.

The volume is profusely illustrated with photographs of common Queensland plants, both native and cultivated. It is the standard text-book set for the examination for the appointment of inspectors under the Diseases in Plants Acts, and is obtainable from the Under Secretary, Department of Agriculture and Stock.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1938 AND 1937, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.	No. of years' records.	Mar., 1938.	Mar., 1937.		Mar.	No. of years' records.	Mar., 1938.	Mar., 1937.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	8·72	37	1·46	7·45	Clermont ..	3·07	67	2·10	4·06
Cairns	18·06	56	3·61	15·80	Gindie	2·59	39	..	3·45
Cardwell	15·87	66	1·39	32·23	Springsure ..	2·88	69	4·75	3·64
Cooktown ..	15·30	62	2·07	17·75					
Herberton ..	7·74	52	0·65	6·38					
Ingham	16·08	46	5·77	33·74					
Innisfail	26·73	57	11·10	48·99					
Mossman Mill ..	18·15	25	0·97	19·98	*Darling Downs.*				
Townsville ..	7·20	67	1·64	9·74					
Central Coast.					Dalby	2·67	68	3·94	6·92
					Emu Vale ..	2·27	42	2·20	4·11
					Hermitage ..	2·06	32	2·73	5·34
Ayr	6·48	51	1·90	9·63	Jimbour ..	2·48	50	5·73	4·96
Bowen	5·78	67	7·93	6·98	Miles	2·68	53	2·24	6·79
Charters Towers ..	3·75	56	4·21	6·30	Stanthorpe ..	2·62	65	0·71	4·52
Mackay	12·07	67	20·06	21·19	Toowoomba ..	3·72	66	3·90	9·84
Proserpine ..	12·51	35	13·97	24·88	Warwick ..	2·47	73	0·66	6·94
St. Lawrence ..	5·19	67	11·26	10·59					
South Coast.									
					Maranoa.				
Biggenden ..	3·94	39	6·76	14·95					
Bundaberg ..	5·18	55	8·61	16·60	Roma	2·64	64	1·28	7·32
Brisbane	5·62	86	4·24	7·26					
Caboolture ..	7·48	51	8·98	9·15					
Childers	4·65	43	8·79	17·95					
Crohamhurst ..	11·00	45	10·89	14·17					
Esk	4·67	51	4·72	9·38					
Gayndah	2·99	67	4·05	5·36					
Gympie	6·19	68	5·87	16·87	*State Farms, &c.*				
Kilkivan	3·86	59	3·57	9·82					
Maryborough ..	5·86	67	8·72	13·03	Bungeworgorai ..	1·82	24	..	6·15
Nambour	9·25	42	12·32	19·77	Gatton College ..	3·05	39	2·30	7·12
Nanango	3·34	56	4·60	6·74	Kairi	..	..	..	..
Rockhampton ..	4·36	67	8·83	7·37	Mackay Sugar Experiment Station	11·10	41	17·82	18·03
Woodford ..	7·70	51	10·00	8·67					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MARCH, 1938.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·77	87	76	92	27	70	14	207	8
Herberton	..	82	62	88	17	55	1, 14 30	65	5
Rockhampton	29·88	89	72	101	14	66	16	883	12
Brisbane	29·99	83	67	91	15	60	15	424	15
Darling Downs.									
Dalby	29·98	88	62	96	4	45	15	394	6
Stanthorpe	..	79	56	90	8	35	15, 16	71	7
Toowoomba	..	79	60	90	17	43	15	390	14
Mid-Interior.									
Georgetown	29·81	94	69	97	13, 16, 17,18,19	63	1	132	2
Longreach	29·86	97	68	103	13	58	16	17	2
Mitchell	29·94	89	62	100	4	43	15	78	4
Western.									
Burketown	29·81	98	74	102	20	68	19	Nil	
Boulia	29·87	98	72	106	3, 12	61	15	2	1
Thargomindah	29·87	96	70	109	5	53	16	2	1

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	May. 1938.		June. 1938.		May. 1938.	June. 1938.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					MOONRISE.	
					a.m.	a.m
1	6·18	5·20	6·36	5·2	7·3	8·58
2	6·18	5·19	6·37	5·2	8·8	9·46
3	6·19	5·18	6·37	5·2	9·13	10·32
4	6·20	5·17	6·38	5·2	10·11	11·12
5	6·20	5·17	6·38	5·2	11·3	11·51
						p.m.
6	6 21	5·16	6·39	5·2	11·50	12·30
7	6·21	5·15	6·39	5·2	12·34	1·7
8	6·22	5·14	6·40	5·2	1·13	1·42
9	6·22	5·14	6·40	5·3	1·51	2·21
10	6·23	5·13	6·41	5·3	2·29	3·5
11	6·24	5·12	6·41	5·3	3·14	3·44
12	6·24	5·11	6·41	5·3	3·43	4·30
13	6·25	5·11	6·42	5·3	4·22	5·21
14	6·26	5·10	6·42	5·3	5·3	6·10
15	6·26	5·10	6·42	5·3	5·48	7·5
16	6·27	5·9	6·43	5·4	6·35	7·56
17	6·27	5·9	6·43	5·4	7·25	8·48
18	6·28	5·8	6·43	5·4	8·18	9·40
19	6·29	5·8	6·43	5·4	9·10	10·34
20	6·29	5·7	6·44	5·4	10·1	11·27
21	6·30	5·7	6·44	5 5	10·53	..
						a.m.
22	6·31	5·6	6·44	5 5	11·47	12·22
23	6·31	5·6	6·44	5·5	..	1·22
					a.m.	
24	6·32	5·5	6·44	5·5	12.42	2·22
25	6·32	5·5	6·45	5·5	1·37	3·28
26	6·33	5·4	6·45	5·5	2·36	4·26
27	6·34	5·4	6·45	5·6	3·37	5·37
28	6·34	5·3	6·45	5·6	4·41	6·38
29	6·35	5·3	6·45	5·6	5·56	7·33
30	6·35	5·2	6·45	5·6	6·54	8·23
31	6·36	5·2			7·56	

Phases of the Moon, Occultations, &c.

7th	May	☽	First Quarter	7 24 a.m.
14th	,,	○	Full Moon	6 39 p.m.
22nd	,,	☾	Last Quarter	10 36 p.m.
29th	,,	●	New Moon	11 59 p.m.

Perigee, 2nd May, at 11.0 p.m.
Apogee, 18th May, at 7.0 p.m.

Very seldom a so-called black eclipse occurs; as a rule, even at totality, a copper-coloured light predominates, more or less luminous according to the condition of the atmosphere in which the Sun's rays are refracted, bent inward. It may be as colourful, in various shades of red and silvery-grey, as a total eclipse in Queensland some years ago. At the greatest phase, 8.43, the stars may shine out brilliantly until 9 min. past 9 o'clock, when the light that rules the night emerges from the last vestige of dark shadow.

Throughout this month Venus and Mars will be very near each other, especially on the 8th, when they will set almost at the same time.

On the 19th, Mercury will reach its greatest distance west of the Sun, 26 deg. It will rise at 5.15 1 hr. and 14 min. before the Sun.

At the end of the month Jupiter may be called an evening star, rising at 11 p.m. among the small stars of Aquarius.

In the early evening the ecliptic may be traced from north-west to the south-east by Venus and Mars, by Regulus, in Leo, near the zenith, and Spica in Virgo south-east. The Centaur, the Southern Cross, and Argo Navis are enmeshed in the Milky Way, and while Orion is going down in the west the Scorpion rises in the east.

Mercury rises at 5.14 a.m., 1 hr. 3 min. before the Sun, and sets at 4.40 p.m., 41 min. before it, on the 1st; on the 15th it rises at 4.30 a.m., 1 hr. 56 min. before the Sun, and sets at 4.0 p.m., 1 hr. 10 min. before it.

Venus rises at 7.57 a.m., 1 hr. 39 min. after the Sun, and sets at 6.33 p.m., 1 hr. 13 min. after it, on the 1st; on the 15th it rises at 8.22 a.m., 1 hr. 56 min. after the Sun, and sets at 6.44 p.m., 1 hr. 34 min. after it.

Mars rises at 8.15 a.m., and sets at 6.47 p.m., on the 1st; on the 15th it rises at 8.4 a.m., and sets at 6.24 p.m.

Jupiter rises at 12.51 a.m., and sets at 1.54 p.m., on the 1st; on the 15th it rises at 12.6 a.m., and sets at 1.2 p.m.

Saturn rises at 4.9 a.m., and sets at 4.3 p.m., on the 1st; on the 15th it rises at 3.22 a.m., and sets at 3.12 p.m.

5th	June	☽	First Quarter	2 32 p.m.
13th	,,	○	Full Moon	9 47 a.m.
21st	,,	☾	Last Quarter	11 52 a.m.
28th	,,	●	New Moon	7 10 a.m.

Apogee, 15th June, at 4.0 a.m
Perigee, 28th June, at 11.0 a.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]