Queensland
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DEPARTMENT OF PRIMARY INDUSTRIES

Second year growth of a creeping guinea grass-siratro pasture on Mr. G. A. Robinson's farm at Mt. Mee. It is being inspected by Mr. T. H. McCosker, Agriculture Branch.

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Navy Beans

Part 1

by E. C. GALLAGHER, Agriculture Branch.

AUSTRALIA'S navy or canning bean industry began in 1941–42 to meet wartime demands. The main production areas were in Queensland and New South Wales, with smaller areas in Victoria.

Queensland, in particular the south Burnett, is now the main area of production. However, the industry is now expanding into other climatically favoured areas on the eastern extremity of the Darling Downs from Jandowae in the north to Toowoomba and Warwick in the south. Smaller areas are also being grown in the Biloela, Thangool, Monto, Gayndah, Biggenden, Dalby, Chinchilla, Taroom, Kalbar, Gatton and Inglewood areas.

The crop is also under assessment in northern New South Wales, and experimental work is in progress in the central-western and north-western areas of New South Wales.

The navy bean (*Phaseolus vulgaris*) is grown for the dry bean trade. World production of dry beans is estimated at 9,000,000 tons a year. The leading producers include Brazil, India, mainland China, U.S.A., Mexico and Japan. Most of Australia's imports come from the U.S.A. which produces approximately 240,000 tons a year. Michigan is the main producing area.

The bush type Kerman variety of navy beans showing full pod development.

Pod maturity. The Gallaroy variety approaching full maturity. Note the leaf drop that makes harvesting easier.

The principal use of the dried beans is in the manufacture of canned "baked beans". In the U.S.A. about 75% of the crop is canned and the remainder is sold through the package trade. The proportion of beans used for canning in Australia is even higher.

Dry beans have been part of man's diet for centuries. They are easily transported, keep well, can be readily prepared in a number of ways and are highly nutritious. Protein content is around 23%.

Production and Potential

Australian production since 1943 is given in Table 1. The acreage grown has been increasing steadily every year since the introduction of the new Queensland-bred bush-type varieties in 1966. The estimated production from the 1971-72 crop of some 6,900 tons (uncleaned basis) will be a record.

After seed requirements (400 tons) are met and impurities (12%) removed, a salable surplus of almost 5,600 tons is expected. Annual demand is estimated to be in excess of 6,000 tons; and a carry-over of several thousand tons is needed to ensure continuity of supply to the processors. Australian navy bean production can thus increase for some time before the home demand is satisfied.

A further increase in the area planted is expected in the 1972-73 season because of

The Kerman variety at the flowering stage. The row spacing is 36 in.

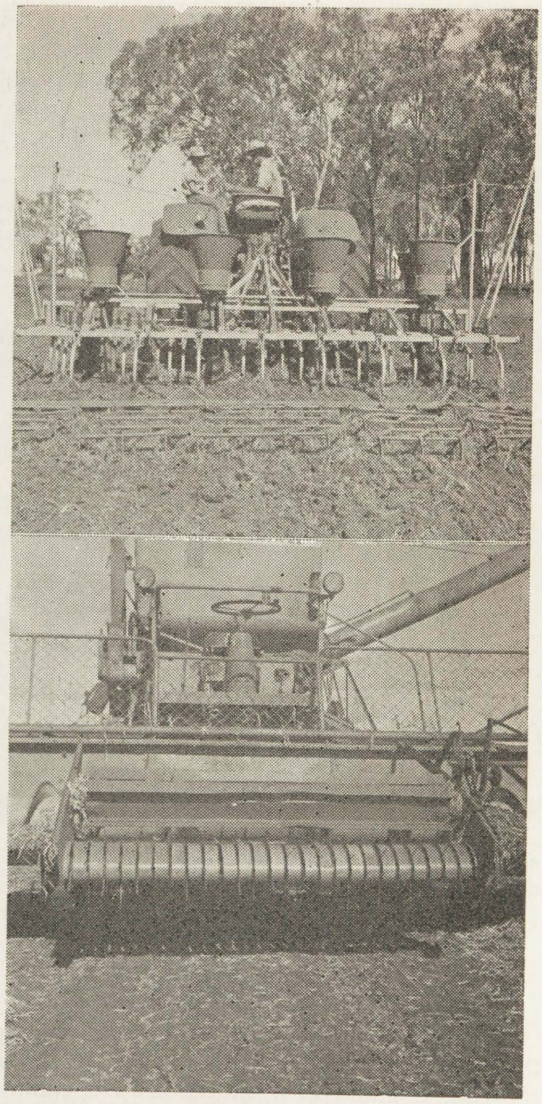
the successful 1971-72 season. In addition, the 2c a lb. increase in price to approximately 11c a lb. guaranteed by the Navy Bean Marketing Board is a further incentive to growers.

TABLE 1

AUST. NAVY BEAN PRODUCTION (CLEANED BEANS)

Year	Production (tons)	Year	Production (tons)
1943	387	1958 ..	1,119
1944	235	1959 ..	812
1945	540	1960 ..	1,005
1946	335	1961 ..	571
1947	352	1962 ..	1,278
1948	243	1963 ..	1,004
1949	965	1964 ..	503
1950	365	1965 ..	242
1951	386	1966 ..	955
1952	501	1967 ..	1,445
1953	986	1968 ..	4,157
1954	496	1969 ..	831
1955	346	1970 ..	2,489
1956	265	1971 ..	1,102
1957	753	1972 ..	6,900*

* Estimated.
Source: Commonwealth Statistician.



TOP. A four-row planter and fertilizer-cultivator combination used for planting navy beans and other row crops. The implement is also used for inter-row cultivation.

BOTTOM. A modified autoheader fitted with a pick-up reel for threshing navy beans.

Growing The Crop

CLIMATIC REQUIREMENTS. The navy bean plant has a shallow root system, not deep-rooted like maize or sorghum. It grows rapidly thus requiring fairly frequent, though not prolonged, rainfall for best growth. The crop matures in 12 to 16 weeks depending on time of planting, seasonal conditions and variety.

Navy beans are frost-susceptible and consequently must be grown in the summer. Planting is generally restricted to the summer months allowing the crop to flower and mature in the autumn. Spring planting is not recommended.

Exceptionally hot, dry weather at flowering results in the shedding of young flowers and pods. The present varieties, in particular Gallaroy, perform better in these conditions than the old Californian Small White variety.

SOIL REQUIREMENTS. Friable soils of average fertility and good internal drainage will grow good navy beans. The use of poorly drained soils, even though they possess other suitable characteristics, is not recommended.

High yields have been obtained on a variety of soils varying from sandy loams to chocolate soils and including a large range of red and brown loams. Heavy cracking clays found on the Darling Downs and in other similar areas have not proved so suitable for this crop.

Although beans are fairly tolerant of soil acidity, good results can be expected from liming. Beans are less tolerant of very alkaline soils. The most favourable pH is 6·5 to 6·8, but navy beans are commonly grown on soils with pH of 5·8 to 7·5. For soils outside this pH range, small areas should be tried first.

Best results are obtained from the slightly acid, red and red-brown soils high in fertility and possessing good internal drainage as well as having a high moisture holding capacity.

LAND PREPARATION. Navy beans respond well to good cultural techniques and poor land preparation is often detrimental to the subsequent crop. Beans are commonly grown after a winter crop, usually barley, and the straw should be incorporated as early as possible before planting. When seed is planted among freshly-incorporated barley straw, seedlings can be rotted by *Rhizoctonia solani* and *Sclerotium rolfsii*.

A fine, level seedbed is essential for an even depth of planting and emergence.

FERTILIZERS. Superphosphate is generally required on most soils except dark grey, alluvial clays of basaltic origin. Rates of 100 to 200 lb. (10 to 20 lb. phosphorus) are recommended. Potassium is seldom necessary on good, red scrub and chocolate soils, the "black" soils and new cleared granitic (grey) soils. However, potassium is necessary on old, eroded scrub soils and many of the red-brown and grey forest soils of the south Burnett district. A 1·75:8·3:8·3 mixture at 100 to 200 lb. per acre for these soils is recommended.

Navy beans generally respond to applications of nitrogenous fertilizer. An application of up to 20 lb. nitrogen is recommended: sulphate of ammonia or urea for alkaline soils and ammonium nitrate for acid soils. Nitrogen is applied preferably as a side dressing 2 weeks after the crop has germinated.

A fertilizer containing nitrogen is recommended on land hastily prepared, on land used extensively for cereal grain crops and on land containing unrotted stubble. Most of the forest soils and heavy grey (black) soils of the south Burnett need nitrogen. Sulphate of ammonia is recommended on the black soils where superphosphate is not used as these soils are usually sulphur-deficient as well.

A nitrogen-phosphate mixture 17:14:0 or 18:20:0 is recommended on poorer red scrub and red forest soils at 100 to 150 lb. per acre and 18:7·8:0 on sandy forest soils at 50 to 150 lb. per acre. Where all three elements are required, as in the brown and grey forest soils, or where some doubt exists, a 12:14·8:10 mixture at 100 to 150 lb. an acre is recommended.

The maximum rates of nutrients which could give an economic return in any situation are 20 lb. nitrogen, 20 lb. phosphorus and 20 lb. potassium. Pot trials suggest that potassium used in the chloride form may have a detrimental effect. Where possible, it may be advisable to use the sulphate form if available, for example, 12-1 sulphate (12:14·8:10), Q5 (S) (5·0:7·1:4·0) or Top Dollar 4 Granular (S) (5:7:4).

It is essential for the planting fertilizer (in particular phosphates) to be banded from 2 to 4 in. to the side of the seed for maximum utilization (phosphates) and the least damage to the seed (nitrogen and potassium).

A side dressing of nitrogen at 20 lb. per acre could be beneficial, especially under

irrigation or waterlogged conditions, but it must be applied soon after emergence.

Widespread zinc deficiency of varying severity has been observed in navy bean crops in the Biloela, Thangool, Chinchilla, Taroom, Aubigny, Gatton and Inglewood areas. Other areas where zinc deficiency has been suspected are Warwick and Brookstead.

Navy beans are highly susceptible to zinc deficiency and, where zinc is known to be deficient, it should be applied automatically. The deficiency symptoms are most likely to occur on dark grey clay soils alkaline in reaction and high in phosphates and carbonates, and on long fallowed land.

Zinc-deficient plants are stunted, have shortened internodes, show excessive branching and have somewhat pointed leaves. The disorder is further characterized by interveinal yellowing and subsequent necrosis. The veins remain green.

Very little work has been done on zinc deficiency in navy beans so far. Initial work, however, has suggested the best response is to a spray application. The present recommendation is for two applications, one 3 weeks after emergence and the second 2 weeks later. The spray consists of 1 lb. of zinc sulphate monohydrate and 1 lb. of urea in 10 gal. of water per acre.

The present varieties Kerman and Gallaroy are very susceptible to zinc deficiency while the Actopan-Sanilac crosses appear tolerant.

Crop Rotation

Navy beans can be used to advantage when changing from summer to winter cropping and the reverse. Lack of soil moisture usually limits continuous double cropping.

Navy beans should not be grown continuously on the same ground. This practice increases the build-up of disease and leads to a deterioration in soil structure. This deterioration is caused by the relatively short-term nature of the crop, the consequent excessive soil working during the long fallow, and the small amount of organic matter residue being returned from the bean crop.

Navy beans fit in well with overall crop rotation and the general farm management programme. The planting, inter-row cultivation and harvesting are usually outside the rush periods for the other major summer crops. Some clashing between the navy bean harvest and that of peanuts can occur.

Some rotations in common use in the south Burnett are: peanuts, wheat or barley, navy beans; navy beans, maize, sorghum; peanuts, barley or wheat, navy beans, maize; peanuts, barley or wheat, navy beans, soybeans or fodder crop or sorghum; navy beans, barley.

The winter cereals, field peas and rye corn as green manure (and cover) crops are being used increasingly in the winter phase of the rotation. This practice has much to commend it provided, of course, the crop is adequately fertilized and is ploughed in before maturity.

The use of a pasture phase in the rotation also has much to commend it. However, the eventual rotation followed will usually depend on variable factors such as economic and seasonal conditions.

Varieties

California Small white was the main variety planted in Queensland until 1965. This variety produces a dense mass of fine vines, is a prolific yielder and, until recently, was resistant to rust.

It has the following undesirable characteristics which led to the industry becoming unstable: an indeterminate growth habit (vines kept on growing giving uneven maturity); pods were in contact with the ground allowing rapid deterioration in wet weather; and a relatively poor processing quality in the bean.

This variety had to be cut with bean cutters when most of the crop had matured. It had then to be allowed to dry out in the windrow for 10 to 14 days and finally threshed with a header fitted with a pick-up attachment. This operation proved risky as continued wet weather caused deterioration of bean quality, and even complete crop loss.

Two other varieties, Michelite, a vining type, and Sanilac, a bush type, were tried. These varieties, however, were very susceptible to rust and rarely produced satisfactory yields, although the beans were of excellent quality.

In 1959, a plant breeding programme was initiated by Mr. H. M. Groszmann, of the Department of Primary Industries, in an

endeavour to combine the desirable characteristics of the varieties available. A bush-type bean of good quality with resistance to rust was wanted. To get this type of bean the Sanilac variety was crossed with Californian Small White and Actopan, another rust-resistant bean.

After many years of selection and progeny testing in the South Burnett district, two Californian Small White x Sanilac selections were released, Kerman and Burnia.

Kerman is a late-maturing, bush-type bean of high yielding ability. It is spreading in habit and, under ideal conditions, will cover a 36-in. row interspace completely. Seed size is similar to that of Californian Small White, small to medium.

Burnia is a much less vigorous plant, early maturing with small seed. It has now been discarded as the small seed size is not acceptable to processors who have recently indicated their seed size requirements.

The seed size now wanted is that of the Michigan pea bean from U.S.A. which is larger than any variety available at present. This size will be a reasonable objective.

In the meantime, Gallaroy, an early maturing variety with a larger seed than Kerman, and some 23% larger than Burnia, has been released. The Gallaroy bush is more erect than that of Kerman and it may be better for direct heading. It could also suit closer row spacing and be better for the Darling Downs than the Kerman variety.

Results from the Actopan x Sanilac cross have been erratic. Although bush habit, rust resistance, and seed size are satisfactory, the plant is less drought tolerant than the Californian Small White x Sanilac material. Yields are therefore variable, especially in a poor growing season.

This limitation could be overcome by irrigation. Trials in the Inglewood, Warwick, Toowoomba and Biloela areas have indicated that this material is more adaptable than the Kerman-Burnia-Gallaroy type and further trials are being planned in these areas.

The pods of the Sanilac x Actopan material have a tendency to shatter when being harvested. The seed also appears to be brittle and more care is needed during handling to prevent cracking.

The occurrence of a new race of rust in navy bean crops has further complicated the varietal situation. The two new varieties, Gallaroy in particular, are already showing rust in increasing severity. Because of this rust problem, it has been proposed to release the Actopan-Sanilac cross material, some of which is still resistant to the local rust strains.

Seed increase of selections 45 and 46 has progressed to a stage where larger scale field trials and canning assessments can be made.

A new virus disease recently detected in several navy bean crops may also influence the selection of suitable varieties. This virus, known as peanut mottle virus, was first detected in peanuts in 1966 and has subsequently become widely distributed in peanut crops as a result of transmission by aphids and in infected seed.

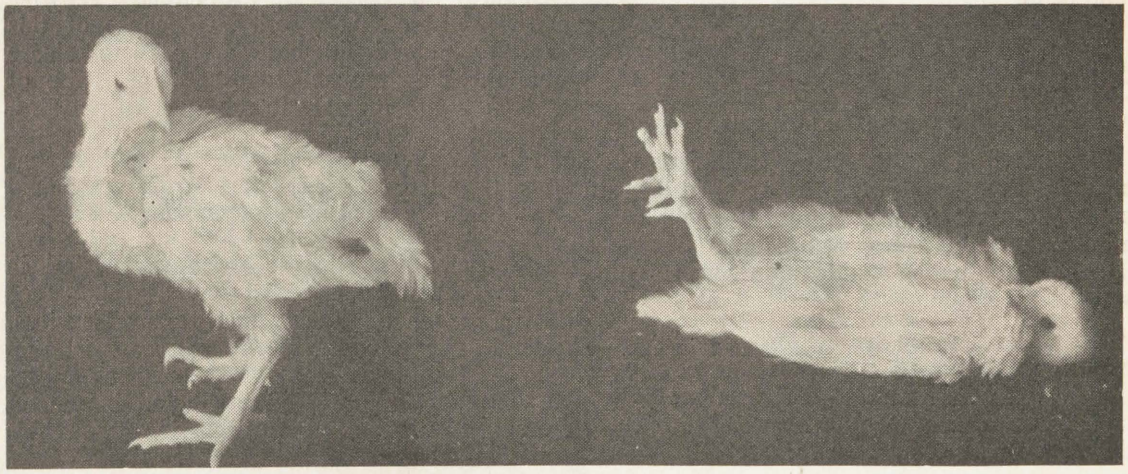
The reaction of navy bean varieties is variable, ranging from leaf mottling with little apparent effect on plant growth in Kerman and Gallaroy to severe leaf yellowing, stunting of plant growth, and necrosis of leaf veins, stems and pods in selection 46.

A decrease in yield of some lines because of peanut mottle virus is suspected from results of the 1971-72 variety trials but reliable data on yield effects are not yet available.

New breeding work is being initiated to pass on the rust resistance of the Actopan-Sanilac cross material to Kerman and Gallaroy. This work is being carried out by Mr. H. M. Groszmann, Assistant Director of Horticulture.

An increase in bush height of the Kerman and Gallaroy varieties is being attempted by crossing these varieties with strong-stemmed French bean types. This work has completed the second generation and the possibility of achieving this aim should be known after the 1972-73 season. The release of larger seed types and coloured seed types is also a possibility.

[To Be Concluded]



It is easy to see why the term "Crazy Chick Disease" was coined to describe vitamin E deficiency. Note the characteristic outstretched legs also. These birds are 22 days old. The bird on the left is healthy.

Vitamin E In Poultry Nutrition

by G. D. STEWART,
Poultry Husbandry Officer.

VITAMIN E deficiency causes encephalomalacia, exudative diathesis, and muscular dystrophy in poultry, enlarged hocks and dystrophy of the gizzard muscle in turkeys, and muscular dystrophy in ducks.

It is also required for normal embryonic development in poultry, turkeys, and probably ducks.

Vitamin E has been termed the fertility vitamin as prolonged deficiency causes testicular degeneration and lack of fertility in male birds.

Vitamin E belongs to the group of chemical substances known as the tocopherols.

Natural Sources

The tocopherols occur naturally in a wide range of plants and seeds. There is, however, little evidence of the availability of vitamin E in feedstuffs to livestock. The richest sources of vitamin E are vegetable oils, unmilled cereals and eggs.

VITAMIN E (ALPHA TOCOPHEROL) CONTENT OF SOME FEEDSTUFFS

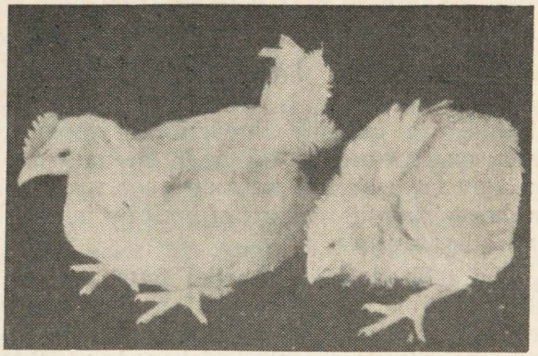
	I.U.*/lb.	I.U./Kg
Barley	16	35
Maize	10	22
Fish meal	4	9
Meatmeal	0·45	1
Oats	9	20
Rice polishings	42	92
Wheat germ meal	60	132
Wheat	5	11
Soybean	23	51
Maize, soybean, peanut oils	132	290
Sunflower oil	160	352
Safflower oil	230	506

* I.U. = International Units.

Functions of Vitamin E

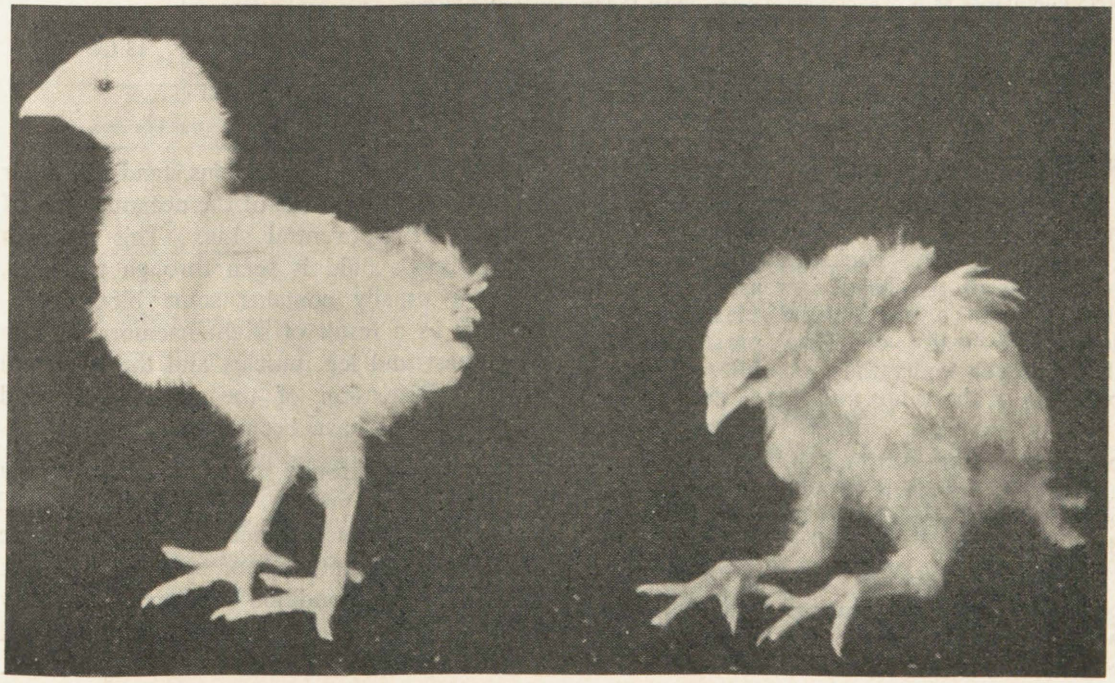
Vitamin E has an extremely wide range of biological functions, being implicated in enzyme systems and acting as a physiological antioxidant and a synergist.

There is evidence that vitamin E is concerned in the metabolism of nucleic acid in the synthesis of the blood plasma protein of the chick. It also has a stimulating action on the production of hormones of the pituitary and adrenal glands. The absorption and storage of vitamin A and the carotenoids associated with pigmentation is improved.



Vitamin A deficiency. Note the ruffled appearance of the feathers and poorer growth of the vitamin A deficient bird on the right. The bird on the left is healthy. Both are 36 days old.

Note the unthrifty appearance of the vitamin E deficient chick. This bird was photographed as it was falling over backwards. The bird on the left is healthy. Both are 22 days old.



Alpha tocopherol is a strong antioxidant protecting substances sensitive to oxidation during storage, in food troughs and in the digestive tract. It is the only antioxidant absorbed in quantity through the intestinal walls, and is stored in organs in the body and in body fat, where it plays an important role in maintaining the stability of body fat in fowls and other animals.

The utilization of essential fatty acids is also improved. Some research workers say it is doubtful whether vitamin E is actually an essential vitamin for the chicken, but rather acts as a general antioxidant and that its function can be performed equally well by other synthetic, chemically-similar substances.

One text lists the following seven suggested functions of vitamin E. These are:

1. As a biological antioxidant.
2. In normal tissue respiration.
3. In normal phosphorylation reactions.
4. In metabolism of nucleic acids.
5. In synthesis of ascorbic acid.
6. In synthesis of ubiquinones.
7. In sulphur amino acid metabolism.

Vitamin E in Feeds

Research workers state that it is meaningless to quote an absolute daily requirement for vitamin E for any animal. This is because the need at any particular time depends so markedly on other factors. These include: previous dietary history, tissue storage of tocopherol, dietary stresses, environmental stresses, stress induced by bacterial or vital disease or by drugs used and needed to control disease, and, finally, occasional stresses of forced activity, rapid growth, and egg laying. Any of these activities may increase the tocopherol requirement.

RECOMMENDED PRACTICAL ADDITIONAL LEVELS FOR VITAMIN E

Ration Energy Level	Starter Rations	Grower Rations	Layer Rations	Breeder Rations
1400 kilocalories M.E.*/lb.	6 I.U.†/lb.	4 I.U./lb.	..	..
1350 kilocalories M.E./lb.	..	..	2 I.U./lb.	6 I.U./lb.
3075 kilocalories M.E./kg	13 I.U./kg	9 I.U./kg	..	..
2975 kilocalories M.E./kg	..	..	4 I.U./kg	13 I.U./kg

* M.E. = Metabolizable Energy. † I.U. = International Units.

Symptoms of Deficiency

FOR YOUNG BIRDS. Encephalomalacia is a nervous derangement characterized by ataxia (unsteady gait), backward or downward retractions of the head, increasing incordination, a rapid contraction and relaxation of the legs, and finally complete prostration and death. Even under these conditions, complete paralysis of the wings and legs is not observed.

The condition usually manifests itself between the fifteenth and thirtieth days of life, although it has been known to occur as early as the seventh day and as late as the fifty-sixth day.

Exudative diathesis is characterized by oedema of the subcutaneous tissues associated with abnormal permeability of the capillary walls.

In severe cases, the chickens stand with their legs wide apart because of the accumulation of fluid under the ventral skin. This greenish blue, viscous fluid is seen through the skin, since it usually contains some blood components as a result of slight haemorrhages in the breast and leg muscles and the intestinal walls. Distension of the pericardium and sudden deaths have been noted.

Muscular dystrophy seems to occur initially in the breast muscle. When vitamin E deficiency is accompanied by a methionine deficiency, symptoms occur at about 4 weeks of age. This condition is characterized by light coloured streaks of easily-distinguished affected bundles of muscle fibres in the breast.

A similar dystrophy occurs in ducks but manifests itself as a general condition throughout all the skeletal muscles of the body.

FOR MATURE BIRDS. No outward symptoms occur over prolonged deficiency periods but hatchability is reduced markedly.

Embryos from deficient hens may die as early as the fourth day of incubation.

For males, testicular degeneration is the main effect of a deficiency in vitamin E.

Encephalomalacia may or may not respond to treatment with vitamin E depending on the extent of the damage to the cerebellum.

Other Factors

Ataxia in chicks can be caused by both vitamin A and vitamin E deficiency and, since these deficiencies can occur together, it is important that confusion should be avoided.

The main differences are shown in Table 1.

TABLE 1

COMPARISON OF DEFICIENCY SYMPTOMS OF VITAMINS E AND A

Symptoms and Post Mortem Findings	Encephalomalacia	Vitamin A deficiency
Ataxia	More vigorous convulsive movements; violent strugglings readily introduced by touching	Very wobbly gait, stooping; ruffled feathers, occasional nervous twitching not unlike that of encephalomyelitis (epidemic tremors)
Brain Changes	Necrotic areas on cerebellum	No changes in brain
Vitamin A Level in Liver	Normal	Absence of vitamin A
Kidney and Ureters	Normal	Deposits of urates

Confusion may also arise between encephalomalacia and encephalomyelitis. See Table 2.

TABLE 2

COMPARISON OF SYMPTOMS OF ENCEPHALOMALACIA AND ENCEPHALOMYELITIS

Symptoms and Post Mortem Findings	Encephalomalacia	Encephalomyelitis (Epidemic Tremor)
Ataxia	In early stages chicks show a swaying walk and display "drunken" legs, usually stiffly thrust out (chick lying on side)	Chick totters as if its body is too heavy for its legs and squats. Chick rests on breast and hocks
Tremor	A slow tremor may be seen	Tremor very fine
Brain Changes	Necrotic areas in cerebellum	No changes

Selenium

Selenium protects chicks against exudative diathesis, and is 200 times more effective than vitamin E in preventing this disorder. Exudative diathesis may therefore be looked on as selenium deficiency. A minimum level of 0·1 p.p.m. selenium has been suggested for practical diets to prevent exudative diathesis.

Vitamin E Inhibitors

1. PEROXIDISING POLYUNSATURATED OILS. Oils such as cod liver oil, corn (maize) oil, soybean oil, sunflower seed oil, linseed oil, all increase the vitamin E requirements. This is especially true if the oils are allowed to undergo oxidative rancidity in the diet or are in the process of peroxidation when consumed by the animal.

If they are undergoing active oxidation rancidity at the time of consumption, they not only destroy vitamin E in the feed, but also apparently cause the destruction of body stores of vitamin E in the feed. This leads to encephalomalacia in growing chicks and poor hatchability in breeding stock.

These effects can be overcome by addition of vitamin E and an effective antioxidant.

2. PELLETING. Destruction of both vitamin E and vitamin A may occur if the diet does not contain sufficient antioxidant to prevent the accelerated oxidation of these vitamins under the conditions of high temperature and moisture.

3. FLOUR BLEACHING AGENTS. Both nitrogen trichloride and chlorine dioxide at concentrations usually used to bleach flour will destroy most of the tocopherols in flour. According to one researcher, baking destroyed 47% of the remaining tocopherols in treated flour.

Effects of Nutritional Stress

Overseas investigations have shown that some particular brands of feed have been associated with outbreaks of encephalomalacia. This suggests some other factor or factors being involved as there appeared to be no deficiency of tocopherols in the particular feed.

It has been suggested that damaged grain, because of poor harvesting conditions, may be a contributing factor in outbreaks of encephalomalacia.

In Australia, it is not so much the amount of vitamin E present in the feed but the relationship between the level of alpha tocopherol and the dietary stress due to the presence of oils.

Incompletely balanced proteins, particularly those containing low levels of methionine and cystine, may also be a stress factor.

Temperature Stress

Field cases tend to occur mainly in warmer weather. This could also be tied up with rancidity problems in feed.

Sex Incidence

Experimentally-induced encephalomalacia shows that the incidence in males was about twice as high as females.

P. D. Ranby and A. H. Outridge (1954) showed that, on one farm, 1,200 cockerels had encephalomalacia and losses exceeding 4% were incurred while 1,200 sister chickens on a separate part of the farm and on the same food were free from trouble.

It appears that perhaps growth rate differences for males and females could be a factor or else there are feeding stresses being placed on the males because of their need for a higher density diet than females of the same age. More research would be needed on these ideas.

Breed Incidence

Heavy breeds appear more susceptible than the light breeds, but there is a lot of confusion here.

Family Incidence

In a field case reported by Ranby and Outridge (1954) a high incidence occurred in two out of eight sire families. Of the progeny, 23% of one male's offspring were affected as were 12% of the progeny of a second male, but only one or two cases occurred in the remaining sire families.

It appears that vitamin E should be supplied in the diet at a minimum level of 8 I.U. per lb. depending on the amount of and types of oils present in the diet, the state of the grain both during growth and at harvest time, the prevailing environmental conditions, and whether or not the grain-producing areas are selenium deficient. The apparent sex incidence needs a lot closer observation on the physiological changes in the birds and their corresponding dietary needs.

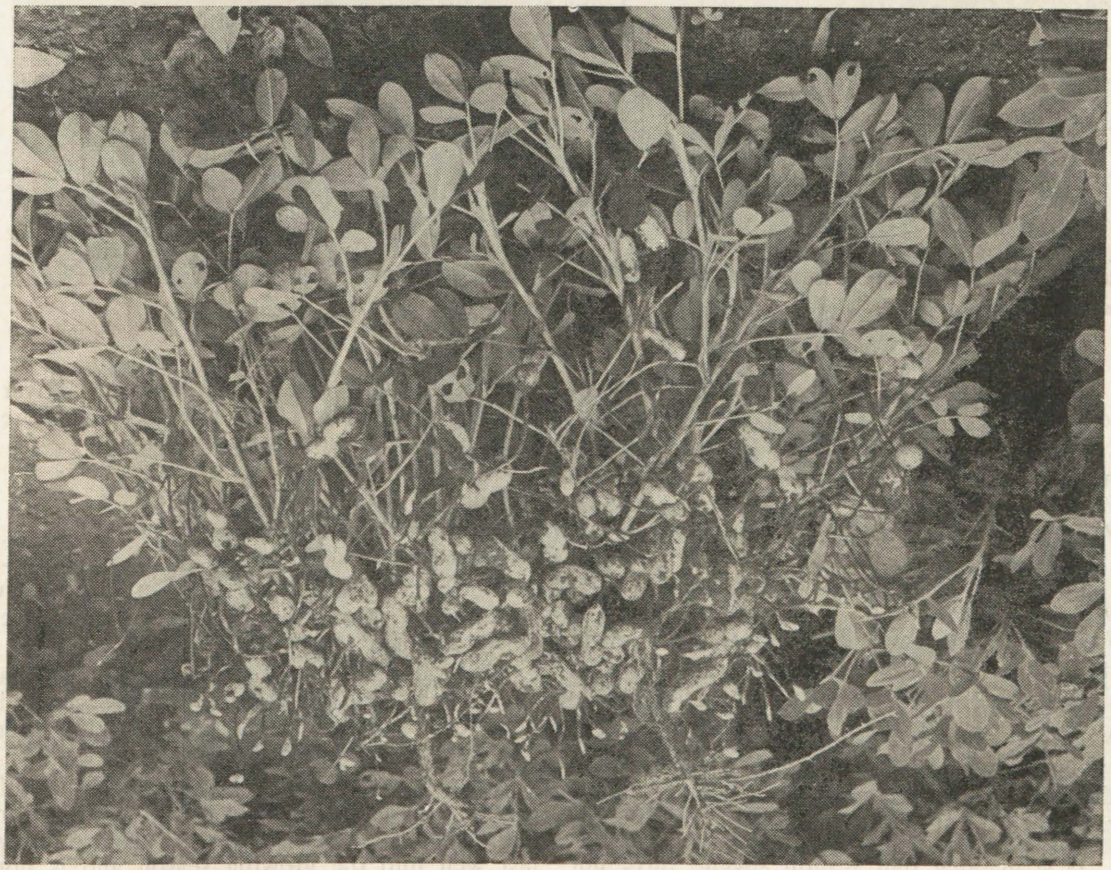
Peanut Growing–2

J. H. SAINT-SMITH, Agronomist; G. J. P. McCARTHY, Plant Pathologist; J. E. RAWSON and S. LANGFORD, Agronomist; and R. C. COLBRAN, Plant Pathologist.

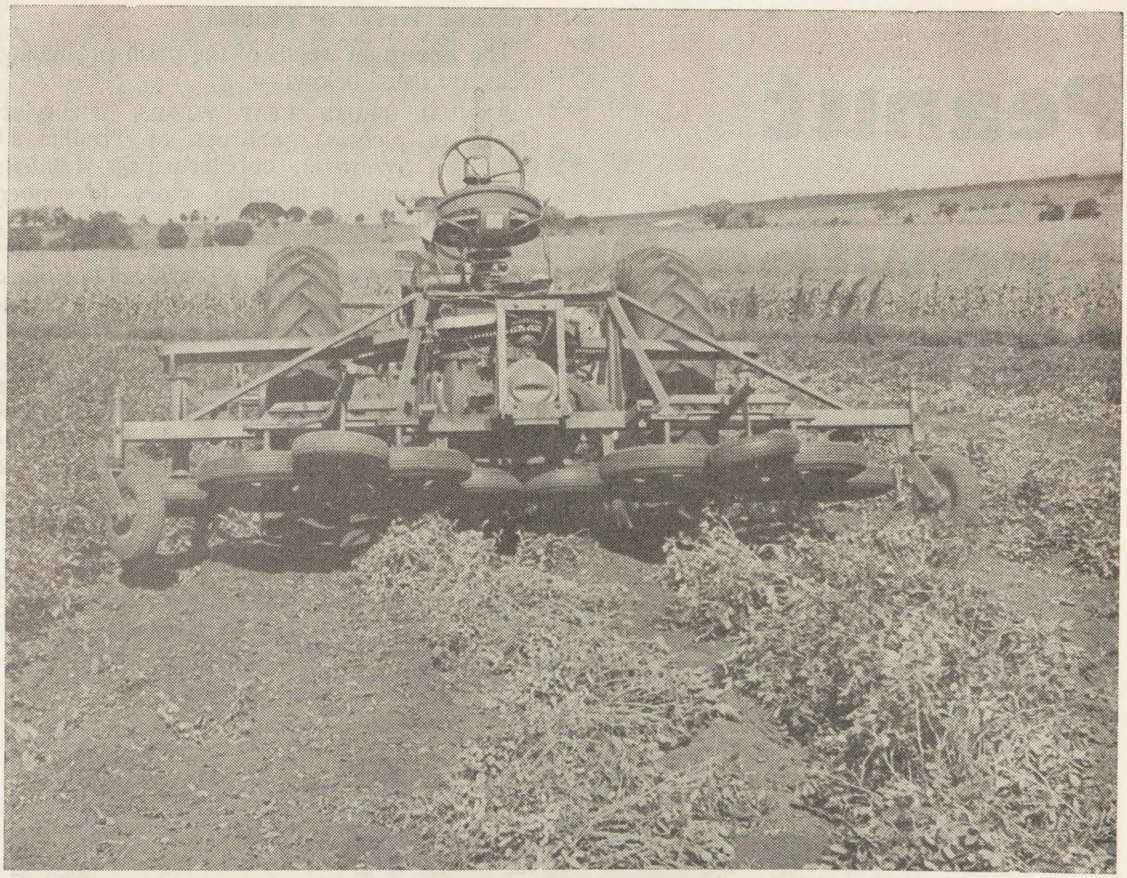
Common Weeds of Peanuts

The important weeds of the main producing areas are listed below:—

ANNUAL BROAD LEAF WEEDS. Bell-vine (*Ipomoea plebeia*), caltrops or "bullhead" (*Tribulus terrestris*), cobbler's pegs (*Bidens pilosa*), common morning glory (*Ipomoea purpurea*), common sida (*Sida rhombifolia*), fat hen (*Chenopodium album*), Noogoora burr (*Xanthium pungens*), pigweed (*Portulaca oleracea*), potato-weed or "chickweed" (*Galinsoga parviflora*), red shank (*Amaranthus* sp.), spiny emex or "bullhead" (*Emex australis*), stinking Roger (*Tagetes minuta*), thornapples or "stramonium" (*Datura* spp.), wild gooseberry (*Physalis minima*), star burr (*Acanthospurnam hispidum*), wild hops (*Nicandra physalodes*), Gambia pea (*Crotalaria goreensis*).



A Virginia Bunch peanut upturned to show peg and pod formation and distribution.



A "Pre-Ben", four-row peanut puller.

ANNUAL GRASSES. South Queensland. Awnless barnyard grass (*Echinochloa colonum*), crowsfoot grass (*Eleusine indica*), Mossman River grass "Mossman burr" (*Cenchrus echinatus*), summer grass (*Digitaria adscendens*), urochloa grass (*Urochloa panicoides*).

PERENNIAL WEEDS. Blue heliotrope (*Heliotropium amplexicaule*), couch grass (*Cynodon dactylon*), nut grass (*Cyperus* spp.), African star grass (*Cynodon plectostachyum*).

Weed distribution is by no means uniform. Many of the broad-leaf weeds require the fertile conditions of the better class scrub soils. On the poorer forest soils, the weed population may consist entirely of grasses.

It is possible that several species have not yet spread to all areas to which they would be adapted. Spiny emex and Mossman River grass (or Mossman burr) have become more widespread during recent years.

Herbicides for Peanuts

1. RESIDUAL HERBICIDES. (i) Trifluralin. (N N-dipropyl-2,6-dinitro-4-trifluoro-methylaniline). Marketed as "Treflan E.C.", an emulsifiable concentrate containing 4 lb. active constituent per gallon.

Trifluralin is sprayed on the soil surface a few days or a few weeks before planting and incorporated into the soil immediately using disc or tine implements.

Recommended dosage rates are 1 pint of product per acre for sandy soils, 1¼ pints for loams and 1½ pints for clays. Control may last well into the growing season and is not affected by wet weather or cultivations.

Trifluralin controls pigweed, red shank, caltrops and all the annual grasses listed above. Most large-seeded broad-leaf weeds including bell-vine, common morning glory and Noogoora burr are resistant.

The cultivations required for trifluralin incorporation can have a pulverizing effect on the soil. This is undesirable on sloping lands subject to erosion.

The cost of material to treat an acre of sandy soil (1 pint per acre) is approximately $4.50.

(ii) 2,4-D (2, 4-dichlorophenoxyacetic acid) as the amine salt. This chemical is available as water-soluble liquid formulations normally containing 5 lb. acid equivalent per gallon.

When used as residual herbicide, 2,4-D is sprayed on the soil surface as soon as possible after planting. The most convenient method is to carry the spraying equipment on the planting unit. In this way, it is possible to economise in chemical (and water) by spraying in "bands" 18 in. wide over the planted rows.

The recommended dosage is 2 lb. acid equivalent per acre of sprayed ground (3·2 pints of 50% product per acre). When spraying in 18-in. bands, the amount of material required is 1 lb. acid equivalent per acre of crop (1·6 pints of 50% product).

Residual treatment with 2,4-D controls most broad-leaf weeds of peanuts (Noogoora burr is a notable exception) and all the common annual grasses except Mossman River grass (or Mossman burr). The effect is fairly short-lived, normally about 4 weeks only. Under most conditions, peanuts tolerate the treatment well, but heavy rain after planting can result in crop damage.

Material costs $1.40 per acre for spraying the whole surface.

A bulk thresher unloading into a bulk handling truck.

2. SELECTIVE FOLIAR HERBICIDES. (i) MCPB (4- (4-chloro-2-methylphenoxy) butyric acid) as the sodium salt. This is marketed as "M and B Tropotox", a water soluble liquid containing 4 lb. acid equivalent per gallon.

MCPB is sprayed on growing crops to control certain broad-leaf weeds including bell-vine, cobbler's pegs, common morning glory, Noogoora burr, pigweed, potato-weed, red-shank and stinking Roger. Spiny emex and thornapples are not adequately controlled and the related herbicide 2,4-DB is preferred for these weeds. (See later).

The dosage is ½ lb. a.e. per acre (1 pint of product per acre) for seedlings and 1 lb. a.e. per acre (1 quart) for older weeds. The peanut plants usually show symptoms of spray damage. These symptoms eventually disappear, but some reduction in yield is possible.

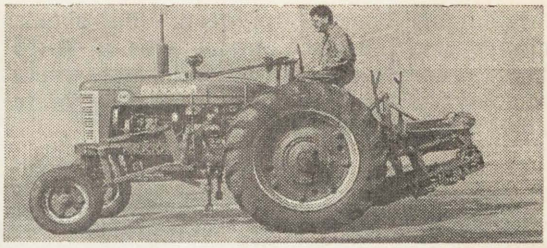
Treatment with MCPB at ½ lb. a.e. per acre (1 pint) costs about $1.20 per acre for material.

(ii) 2,4-DB (4- (2,4-dichlorophenoxy) butyric acid), marketed as "ICI Bexone 2,4-DB Weedkiller" (potassium salt) and as "Embutox 40" (potassium and sodium salts). Both are water-soluble liquids containing 4 lb. acid equivalent per gallon.

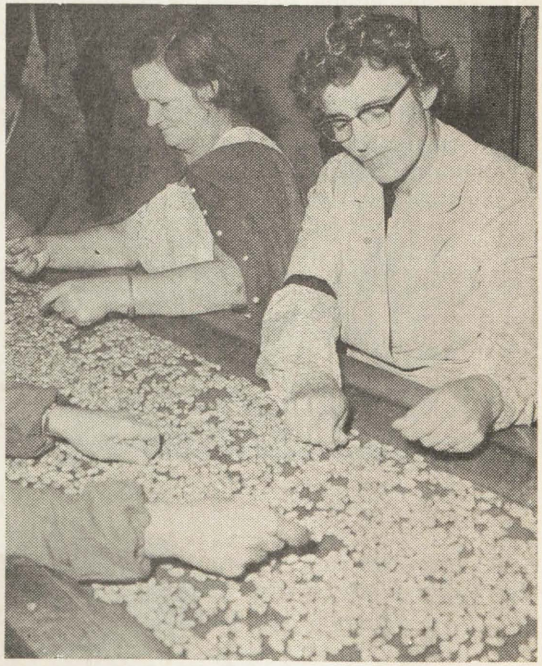
2,4-DB controls spiny emex and thornapples as well as all the weeds controlled by MCPB. It should be used instead of MCPB where these two species are present. Dosages are as for MCPB. One pint of 2,4-DB costs about $1.40.

(iii) 2,4-D as the amine salt. (See above for formulation details).

2,4-D at 1 to 2 oz. a.e. per acre (1 gal. to 40 to 80 acres) will control bell-vine and morning glory. There is usually slight visible damage to the peanut plants, similar to the effect of MCPB. Dosages higher than 2 oz. can cause severe yield reduction.



A "Cornish" peanut cutter-puller. Note the stump-jump attachments for the cutter bars.



Peanut kernels being hand sorted at the Peanut Marketing Board's plant at Kingaroy.

No other broad-leaf weeds are controlled by this treatment.

The material costs only a few cents per acre.

Other herbicides are under investigation for use in peanuts. Growers should consult local advisory staff for recent recommendations.

Harvesting

Probably no part of peanut growing calls for more knowledge, skill, care and attention than harvesting. It is safe to say that more farmers lose more money through incorrect harvesting methods than in any other part of the entire operation of peanut growing.

It is only by taking delivery of high quality peanuts that the Peanut Marketing Board is able to give high returns. Moreover, it must be realized that the security and expansion of the peanut industry are best safeguarded if uniform grades of high quality kernels and nuts in shell can be offered for sale with a minimum of handling costs.

The grower receives his best incentive to contribute to quality if the price he receives for his crop is a true one relative to the price received by other growers for their crops. At present, many growers receive incentive payment in one way or another for high quality crops.

Although all aspects of peanut culture are involved in producing a high quality crop, one which must be investigated by all growers is artificial drying.

WHEN TO HARVEST. Peanut plants flower over a long period with the result that, at harvesting time, some pods will be over-mature, some will be mature and some immature.

Peanuts should be cut and pulled when the greatest number of nuts show darkened veins on the inside of the shell The time of maturity cannot be set as any fixed time from planting. Maturity is influenced by the date of planting and by soil and weather conditions during crop growth.

It is usual for a number of bursts of pegging to occur during a season. It is necessary, therefore, to pull a number of plants in a particular block and open the nuts on these plants to determine when to harvest.

The general tendency among growers is to pull peanuts too soon. More nuts may be harvested by early pulling but less weight will be obtained by early harvesting. The quality of the kernels will also be lower because immature nuts yield shrivelled kernels which are suitable only for use as oil.

If pulling is delayed too long, loss of nuts may occur through rotting of pegs and sprouting of the kernels, particularly in the Spanish variety.

Over-mature nuts are very susceptible to damage by rain and moulds, both before and after pulling. A high percentage of very immature nuts presents problems in drying and increases the percentage of shrivelled nuts.

CUTTING AND PULLING. Nowadays, the removal of peanuts from the soil is practically all done with machinery. Two or four-row mid-mounted cutter bars are passed under the nut clusters of peanut plants to cut the tap roots and loosen soil around the plants. The cutters are followed by rear-mounted pullers that compress the tops and raise the plants at the same time. Two or four rows of plants are pulled and laid in continuous rows.

The usual practice is to allow the plants to wilt but not dry out and then to combine two or four original plant rows into one windrow. This operation is carried out with a side delivery rake but it is essential for the rake setting to be accurate and that the implement be used very carefully so that the pods are not removed from the plants.

Instead of raking, some growers prefer to stand the plants upside down by hand to allow them to sun-dry. This method, though relatively costly, reduces damage if rain falls before threshing. On the other hand, it can lower the quality in hot weather. A compact, dense windrow increases drying time and weather risk.

Cutting when the soil is too moist weakens the pegs and excessive soil can adhere to the pods lengthening curing time in the field and increasing the weather risk.

Fluffers may be used to remove some excess soil and lossen the windrows. These lift the plants gently, shake them and put them back on the soil. They may be used only before

plants become dry and brittle, for otherwise pegs will be broken and nuts lost.

Damage to pods by tractor wheels and in other ways during cutting, pulling, and raking must be avoided or deterioration of the kernels will be more serious and rapid. Better quality pods in the ends of the rows near headlands are obtained by handling and raking the plants so that the windrows have an even density throughout the field and the bushes are not heaped on the ends of rows. A common solution to this problem is to run one or two windrows parallel to the headlands, and this enables threshers to operate.

CURING. Experienced growers take full advantage of the fine weather for pulling, curing, and threshing their crops. They allow the windrowed peanuts to dry for 2 to 5 days before threshing and bulk handling.

The moisture content of the pods is usually high and can be about 20%. At this level, threshing must be followed immediately by artificial drying.

The grower who has no artificial drying equipment must leave his crop in windrows for 7 to 14 days or longer. Occasionally the moisture content will fall below 12% (wet basis by Steinlite electronic moisture tester or below approximately 11% by forced air oven at 130 deg. C. for 3 hours) and the crop can be safely threshed and bulk handled or bagged.

More frequently the grower has to thresh and bag his crop at a higher moisture content and allow drying to continue in the bags. His operations are frequently delayed by rain and high humidity and peanuts bagged at about 15% moisture will often dry slowly. Some growers have bagged peanuts in the field during rainy weather and serious spoiling and down grading have resulted.

THRESHING, HANDLING AND DRYING. Given dry weather, windrows of peanut plants are threshed within a few days. No definite time from pulling to threshing can be set because drying depends on weather conditions and the availability of artificial drying equipment.

If the weather is wet after pulling, it may be necessary to lift the edges of the windrows to reduce mould damage. Turning the rows mechanically at this stage will cause the loss of nuts from the plants.

Threshing is done with pick-up peanut threshers which either deliver into bulk bins or into bags. Trash is either spread by the machines or is dumped in heaps for later baling and use as stock food.

Peanut threshers can cause considerable damage to peanut pods. Threshing damage should be kept to a minimum by correctly setting and operating the machines.

If the crop is threshed when the moisture content of the pods is above 12%, artificial drying of bulk-handled pods is necessary. This must be begun immediately if the moisture content is high. Bagged lots harvested when the moisture content of the pods is above 12% may be artificially dried or be open-stacked to dry.

In wet weather, handling and drying bagged pods requires considerable labour and storage space as the bagged pods should not be allowed to be wet by rain. The advantages of artificial drying to protect quality are obvious under conditions of wet weather.

The usual method of artificial drying is to pass a large volume of air through either stacks of bags or through the nuts in bins. The temperature of the drying air is raised slightly above atmospheric temperature by drawing it over the power plant used to drive a large air-circulating fan or by using electric heaters or L.P. gas burners.

Artificially dried peanuts usually have a brighter, more attractive pod appearance than sun-dried nuts. In any bulk handling equipment for peanuts, it is necessary to use either gravity or elevators for moving the nuts. Augers are quite unsuitable for moving bulk peanuts and air blast movement may damage the kernels even if the pods are not broken.

Controlled drying of peanuts should assist greatly in reducing excessive mould damage after harvest.

A full discussion of the various methods of peanut drying is beyond the scope of this article. Peanut growers considering installing crop dryers are referred to a publication entitled "A Crop Drying Guide for the Queensland Peanut Grower" by A. Baikaloff. This publication, price $1, is available from the Peanut Marketing Board, Kingaroy.

[TO BE CONCLUDED]

Dawson Gum Control

by P. V. BACK, Botany Branch.

MANY of the brigalow scrubs being developed in Queensland contain Dawson gum also known locally as blackbutt.

On many occasions regrowth of this tree has become a problem in developed brigalow country.

Trials on the Brigalow Research Station, near Theodore, have shown that regrowth of Dawson gum or blackbutt (*Eucalyptus cambageana*) can be controlled with chemicals.

Growth Forms

Two main growth forms of this plant can become a problem after clearing: saplings and multi-stemmed regrowth.

A typical burnt out brigalow-Dawson gum scrub. Note the dense understorey of brigalow suckers and Dawson gum regrowth (plate 1).

SAPLINGS. These are single-stemmed plants (see plate 2). They are usually seedlings that come up when mature trees are left standing after the scrub is pulled. The standing trees shed seed into the seedbed formed by burning the trash. This results in the appearance of Dawson gum seedlings.

Seedling regeneration can be avoided if all of the trees are knocked down during the pulling operation. When no mature trees are left standing, then no seed can be shed on the area and the little extra expense at this stage can save the great expense of a full reclamation programme later.

MULTI-STEMMED REGROWTH. As the name implies, this type of regrowth has a number of stems sprouting from broken or burnt-off stumps (see plate 3). This is the commonest form of Dawson gum regrowth and nearly always occurs when burnt out brigalow-Dawson gum country is pulled. Before it is cleared, this burnt out scrub contains many mature trees and saplings of Dawson gum and when pulled these break off and later shoot from the remaining butt (see plate 1).

Multi-stemmed regrowth is usually unavoidable at the pulling stage and provision for its control should be made when planning a development programme.

EXPERIMENTAL WORK

Separate trials were conducted on methods for controlling the two different forms of regrowth.

Dawson gum saplings suitable for injection (plate 2).

Multi-stemmed regrowth of Dawson gum suitable for basal bark spraying or cut stump spraying treatment (plate 3).

Saplings

For single-stemmed plants with a diameter exceeding 2 in. at waist height, stem injection was the technique chosen. The chemicals were injected at two different heights.

Plants in one group were cut at waist height with a small axe and the chemical injected with an automatic vaccination syringe. The others were injected at the base with an automatic spear-type tree injector. In all treatments, cuts were made every 4 in. (centre to centre) all the way round the saplings.

Separate groups of saplings were treated in a dry winter, dry spring and a wet summer.

Three different preparations were used: picloram plus 2,4,5-T amine (Tordon 105), picloram plus 2,4-D amine (Tordon 50D) and 2,4,5-T amine alone. All were mixed with water. Two series of treatments were carried out at each height and at each season, using two different dilution rates and two different volumes per cut. The volumes per cut were adjusted so that the amount of active constituent per cut was kept constant for each particular chemical. Details are given in Table 1.

RESULTS. Best results were obtained with the picloram plus 2,4,5-T amine preparation (Tordon 105) (plate 4). With this preparation, there appeared to be little difference in kill between the waist high and basal injections or between the 1% and 2% concentrations (picloram equivalent).

TABLE 1

Sapling Injection

Chemical	Rate (acid equivalent)	Injection Height	Volume per cut	Percentage Kill		
				Winter	Spring	Summer
Tordon 105*: picloram + 2, 4, 5–T amine	1%	waist	2 cc	90	95	100
	4%	base		90	95	95
Tordon 105*: picloram + 2, 4, 5–T amine	2%	waist	1 cc	95	95	100
	8%	base		90	100	100
Tordon 50D*: picloram + 2, 4–D amine	1%	waist	2 cc	85	90	95
	4%	base		65	80	95
Tordon 50D*: picloram + 2, 4–D amine	2%	waist	1 cc	80	90	100
	8%	base		75	95	90
2, 4, 5–T amine	5%	waist	4 cc	65	60	65
		base		65	70	40
2, 4, 5–T amine	10%	waist	2 cc	55	65	70
		base		60	75	40

All preparations were mixed in water.

* In the text, only the rate of picloram equivalent is cited. It should be noted that each of these preparations contains four times as much 2, 4, 5—T or 2, 4—D as it does picloram.

TABLE 2

Basal Bark Spraying of Multi-Stemmed Regrowth

Chemical	Rate (acid equivalent)	Percentage Kill				
		Dry Autumn	Wet Winter	Dry Spring	Dry Autumn	Wet Summer
Tordon 255*: picloram + 2, 4, 5–T ester	0·5%	73	100	55	70	94
	2·0%					
Tordon 255*: picloram + 2, 4, 5–T ester	0·2%	26	89	26	57	97
	0·8%					
Tordon 255*: picloram + 2, 4, 5–T ester	0·1%	39	83	9	20	87
	0·4%					
2, 4, 5–T ester	5·0%	58	90	59	52	87
2, 4, 5–T ester	2·0%	34	82	24	40	72
2, 4, 5–T ester	1·0%	12	50	20	7	65

Diesel distillate was the carrier for all the preparations.

* In the text, only the rate of picloram equivalent is cited. It should be noted that each of these preparations contains four times as much 2, 4, 5—T or 2, 4, D as it does picloram.

A dead sapling 18 months after injection treatment of 1 cc per cut at waist height using Tordon 105 made up at the strength of 1 part of Tordon 105 to 1½ parts of water (plate 4).

It was found, however, that there was less spillage of chemical when the lower volume (1cc per cut) and higher concentration were used. At higher volumes (2 cc per cut) more care was needed to stop some of the mixture from dribbling out of the small cuts.

The time of treatment had only a slight effect on the kill. Marginally better results were obtained in the wetter summer period. This indicates that, with this preparation, sapling injections could be carried out all the year round except under severe drought conditions.

COSTS. Using 1 cc per cut of the stronger mixture (1 part Tordon 105 plus 1½ parts of water) and with an average of four cuts per sapling, the cost of chemical per sapling is 0·65c. One hundred saplings can be treated by one man in 1 hour.

One hundred saplings per acre represents a moderate density of regrowth and the total cost of treating them would be about $1.90, made up as follows:—

Chemical	$0.65
Labour at $1.25 per hour ..	$1.25
Total	$1.90

The cost and rate of work will vary considerably according to density and size of the saplings.

Multi-stemmed Regrowth

Conventional methods of frill ringing and injection are impracticable for treating regrowth of this type. Two other techniques were used: basal bark spraying and cut stump spraying.

BASAL BARK SPRAYING. Using a knapsack sprayer, the bark of each stem was wetted thoroughly from ground level up to a height of 12 to 15 in. Care was taken to ensure that all the stems, even the small horizontal ones at the base, were well wetted. Most plants had three to four stems averaging 2 in. in diameter and 2 to 3 fl. oz. of spray were needed to treat a group of stems of this size.

Treatments were applied at various times throughout the year in an effort to determine whether there was any seasonal influence on effectiveness.

Chemicals used, rates, seasons of application, and results are shown in Table 2.

RESULTS. Picloram plus 2,4,5-T ester (Tordon 255) in diesel distillate at a concentration equivalent to 0·5% picloram gave the best results (see Table 2). However, under conditions of high soil moisture, there was little difference between the 0·5% and 0·2% rates of picloram equivalent.

This suggests that basal bark spraying of multi-stemmed Dawson gum regrowth at the lower concentration would be an economic proposition if undertaken when the soil was moist (plate 5).

COSTS. For treating 1 acre of moderately dense regrowth carrying about 100 multi-stemmed plants, about 1½ gal. of spray will be needed. Using the weaker mixture (4·8 fl. oz.

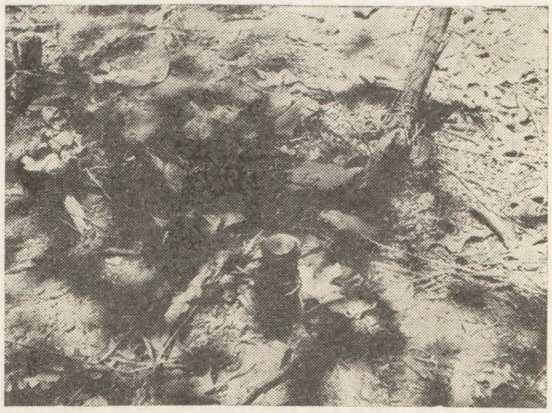
Multi-stemmed regrowth 18 months after basal bark spraying with Tordon 255 at 4.8 fl. oz. to 1½ gal. of distillate (plate 5).

of Tordon 255 to 1½ gal. of distillate) and assuming that one man will treat 1 acre an hour, the total cost will be $2.69 per acre, made up as follows:

Tordon 255	$1.11
Diesel distillate	$0.33
Labour at $1.25 per hour ..	$1.25
Total	$2.69

This cost will vary with the density of the regrowth but should be fairly constant per 100 plants.

CUT STUMP SPRAYING. With this technique, the stems were cut off as close to ground level as possible and the stumps and any small uncut stems were sprayed thoroughly with a



Multi-stemmed regrowth 18 months after cut stump spraying with Tordon 105 at 3·2 fl. oz. per gallon of water (plate 6).

hand-operated knapsack sprayer. In the trial, the plants were cut off with a motorized brush-cutter, but an axe or chain saw could also be used.

Most of the plants treated had three to four stems averaging 2 in. in diameter and about 1 fl. oz. of spray was needed to treat each plant.

The chemicals used, rates of application and results of treatments at different times during the year are shown in Table 3.

RESULTS. Best results were obtained with the picloram plus 2,4,5-T amine mixture (Tordon 105) in water at a rate equivalent to 0·2% picloram (see Table 3).

TABLE 3

CUT STUMP SPRAYING OF MULTI-STEMMED REGROWTH

Chemical	Rate (acid equivalent)	Carrier Wet	Percentage Kill			
			Wet Winter	Dry Spring	Dry Autumn	Wet Summer
Tordon 105*: picloram + 2, 4, 5–T amine	0·2% / 0·8%	water	93	45	66	100
Tordon 105*: picloram + 2, 4, 5–T amine	0·1% / 0·4%	water	88	23	34	91
Tordon 255*: picloram + 2, 4, 5–T ester	0·1% / 0·4%	distillate	93	56	66	95
2, 4, 5–T amine	2·0%	water	57	25	32	73
2, 4, 5–T amine	1·0%	water	56	32	29	43
2, 4, 5–T ester	1·0%	distillate	67	48	23	73

* In the text, only the rate of picloram equivalent is cited. It should be noted that each of these preparations contains four times as much 2, 4, 5—T or 2, 4—D as it does picloram.

Under conditions of high soil moisture, the weaker mixture of Tordon 105 (0·1% picloram equivalent) in water and of Tordon 255 in diesel distillate also gave good results (plate 6). As with basal bark spraying, timing appeared to have an important effect on results with cut stump spraying.

COSTS. Two men are needed to cut the plants and spray the stumps. They should be able to treat 1 acre of moderately dense regrowth (100 plants per acre) in an hour. An average of 1 fl. oz. of spray mixture is required per plant, so 5 pints of spray would be enough to treat about an acre.

Under good conditions (moist soil), the most economical chemical and rate to use would be Tordon 105 mixed with water at the rate of 3·2 fl. oz. per gallon. With this mixture, the total cost of treating 100 plants per acre would be about $2.76, made up as follows:—

Tordon 105	$0.26
Labour at $1.25 per man per hour	$2.50
Total	$2.76

If Tordon 255 were used at the lower rate, the total cost would be increased to $2.90, allowing an extra 14c for diesel distillate instead of water.

If conditions were less favourable and it was necessary to use a higher concentration (6·4 fl. oz. of Tordon 105 or 3·2 fl. oz. Tordon 255 per gallon of mixture), these costs would rise to $2.98 and $3.32 respectively.

The cost per acre will vary with the density of regrowth but cost per 100 plants should remain the same unless the suckers are either very sparse or very dense.

Burning

Treated areas should not be burnt for at least 18 months after treatment as earlier burning may reduce effectiveness. This could present a problem with cut stump spraying as there is likely to be a lot of dry material on the ground and the fire hazard may become severe.

Application

Accuracy of application is very important. With sapling injections, the cuts should be no more than 4 in. apart (centre to centre) but should not overlap. A narrow-bladed axe or injector tool should be used and the chemical put into the cut immediately.

With basal bark spraying, it is necessary to wet right round the stems and to make sure that any small stems at ground level are also wetted. Spray should be applied to the stems until run-off is observed.

The best way to do this is to start from ground level and run the nozzle up the stem. By the time a height of 12 to 15 in. is reached it will be noted that some of the spray is running back down the stem. This is sufficient wetting.

Thorough wetting is also necessary in cut stump treatment. If a chain saw is used to cut down the plants, it is likely to leave a thin film of oil on the stump. This does not matter if Tordon 255 in diesel distillate is used but if Tordon 105 in water is being used it is advisable to add a non-ionic wetting agent to the mixture.

Provided application is accurate and thorough, and seasonal conditions are suitable, these techniques provide a reliable means of killing regrowth of Dawson gum.

Cattle T.B. Campaign Not Quarantine

THE tuberculosis in cattle eradication programme was not truly a quarantine programme, said the Director of Animal Industry in the Department of Primary Industries (Mr. A. L. Clay).

In the gazetted areas of the State, he said, tuberculosis testing was compulsory and cattle that reacted to the test were required to be destroyed. If sold, they must be sold for slaughter direct. The same applied to those areas outside the gazetted areas, except that testing was not yet compulsory.

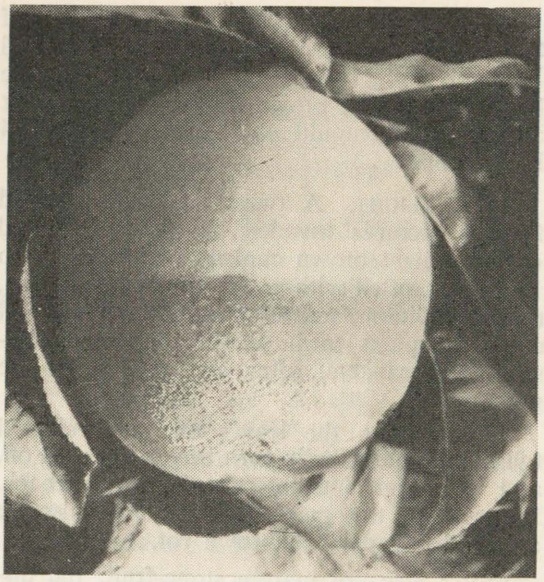
However, store cattle from known infected properties in the western and Gulf areas could not now be allowed to travel to uninfected properties without hindering the progress of the programme, unless the cattle were first tested.

Possibly it was this comparatively new situation that had led some people to refer to the eradication programme as a quarantine programme.

It was unavoidable that owners of infected cattle would meet some interference in what normally was the free movement of their cattle.

Improved Brown Rot Control In Stone-fruit

by J. B. HEATON, Plant Pathologist.



Peach brown rot. Note the grey-brown masses of spores.

BROWN ROT caused by the fungus *Sclerotinia fructicola* (Wint.) Rehm is the most serious disease of stone-fruits in the Granite Belt around Stanthorpe.

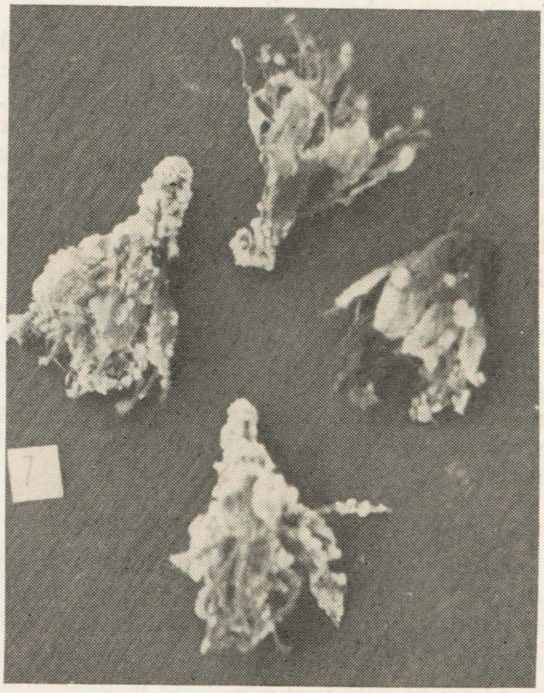
Humid wet weather in early spring and later in summer from December onwards may lead to severe brown rot epidemics in ripening fruit on the tree. Further severe post-harvest losses occur at fresh fruit markets.

In recent years, the disease has been particularly severe in apricots, peaches and nectarines. It occurs occasionally in plums, but infrequently in cherries and rarely in pome fruit.

The Disease

The symptoms of the disease are blossom blight, twig blight and fruit rot. Of these symptoms, fruit rot is the most striking and occurs in mature fruit. The other symptoms occur only after wet weather during flowering.

BLOSSOM BLIGHT. Infected flowers turn brown, wilt and the petals wrap around the centre of the flower. Gum may exude at the flower stalk.



Infected peach flowers after 24 hours in a sealed plastic bag. Note the clumps of spores.

An orchardist may confirm the presence of the disease by moistening some discoloured blossoms and placing them in a sealed plastic bag or jar. If the brown rot fungus is present a grey-brown mould will develop within 24 hours (plate 2).

TWIG BLIGHT. A twig that bears infected flowers becomes invaded by the fungus and develops light brown cankers or lesions, ½ to 1 in. long, often with gum. Under favourable, moist conditions, masses of grey-brown to buff coloured spores form on these infected blossoms and cankers, often at the edge of the gum.

Subsequently, the leaves on such infected twigs and laterals wilt, turn brown and fall off, and the twigs and laterals develop dieback. In apricots, the green fruitlets may also be attacked and develop brown rot.

FRUIT ROT. In mature stone-fruit, the disease is first noticed as a small, round, brown spot ⅛ to ¼ in. in diameter on and beneath the fruit surface. If the atmosphere is moist, such a spot will enlarge rapidly within 24 to 48 hours causing a firm, brown rot which involves the whole fruit.

The fruit surface remains entire and darkens. Grey-brown to buff tufts of the causal fungus grow out from the fruit surface, producing clumps of spores, which may appear arranged regularly in a series of concentric rings about the infection point. Further development of the spores results in the fruit being covered in a grey-brown, talcum-powder-like mass of spores (plate 1).

When fruit is affected in this way, wind, rain and insects such as the dried fruit beetles (*Carpophilus* sp.) may readily spread these spores throughout an orchard, leading to further infection particularly if any recent scratches or wounds are present on the fruit surface.

The Disease Cycle

Diseased fruit, if allowed to remain in an orchard either on trees or the ground, shrivel to hard bodies known as "mummies" which survive the winter.

In spring with rain and warm temperatures, the fungus becomes active again in these mummies, and also in diseased fruit stalks and twigs from the previous season. Spores are produced which contaminate the newly emerging blossoms. If these blossoms then become wet for more than 10 hours, infection occurs, blossom blight develops and twig blight may follow.

Even when conditions do not favour the development of blossom blight and subsequent twig blight, early infections of the fruit may be established before shuck fall. In either case these early fruit infections remain latent and develop only with the onset of fruit maturity.

Disease Survey and Blossom Blight

Following reports of blossom blight of stone-fruit at Stanthorpe in the spring of 1968, regular district surveys have since been made by officers of the Department of Primary Industries.

In 1969 and 1971 during warm, wet weather in September, this symptom was detected in most stone-fruit localities in the Granite Belt. The blossom on peach, nectarine, apricot and almond trees was variously affected. Laboratory tests have shown the blossom blight fungus to be very infective and able to cause brown rot of fruit.

As a direct result of this survey, when rain fell throughout the Granite Belt during the blossoming period from September 13 to 15, 1971, a warning to orchardists of the need to apply fungicides was issued by radio and television.

Current Research

Since 1969, because new fungicides have appeared, emphasis has been placed on investigating chemical control of brown rot. As a result of these investigations, new recommendations have appeared in district spray schedules since 1970.

Better control of brown rot is now possible and many orchardists may benefit from using one of the new fungicides such as benomyl*. However, a place remains for the long recommended fungicides such as captan, captafol and thiram.

*benomyl is available as Benlate (Registered Trade Name).

Whatever fungicide is used, however, complete cover spraying at the correct stage of blossom and fruit development is essential if good control of the disease is to be obtained. In the department's investigations, fungicidal sprays were applied at 200 to 250 p.s.i., at a rate of 1 gal. per tree during blossoming and 2 to 3 gal. per tree during the pre-harvest period.

CONTROL MEASURES

1. Orchard Hygiene

For successful brown rot control, good hygiene measures in the orchard during and between growing seasons, and during harvest and packing are as essential as the application of suitably timed orchard sprays.

Good hygiene in the orchard involves pruning out and destroying by burning or burying all diseased twigs and mummies. Removing mummies from the trees by shaking is not sufficient because the diseased fruit stalks that remain attached to the trees act as a source of infection.

Before and during harvest, rotten fruit which has fallen to the ground should be removed and destroyed or ploughed into the soil. At harvest, pickers should handle fruit carefully to avoid damage. They should also avoid touching rotten fruit remaining on the trees. Regular cleaning in the packing shed, using household disinfectants containing bleach, and regular collections and burial of waste fruit are also necessary.

2. Fungicides For Blossom Blight Control

In peaches, captan 0·1%, lime sulphur 1% and benomyl 0·025% give excellent control. One spray of benomyl at full bloom or one spray of lime sulphur at late full bloom is necessary. With captan, however, two sprays are necessary, one at early blossom and the other at full bloom.

In apricots, benomyl at 0·0125% applied at full bloom should give good control.

3. Fungicides For Brown Rot Control

In peaches and nectarines, benomyl 0·025% and captan 0·1% give good control. Captan will also give some control of soft rot *Rhizopus stolonifer* whereas benomyl is ineffective. In recent tests another fungicide dichloran** appears very promising for control of soft rot.

In apricots, benomyl 0·0125%, captafol 0·1% and thiram 0·12% give good control of brown rot. In recent tests, Daconil† also appeared very promising.

CONTROL SCHEDULE

Time	Peach and Nectarine	Apricot
Pruning season	Prune out infected twigs, fruit stalks and mummies soon after harvest. Collect, burn or bury	
Bloom	Benomyl 0·025% at full bloom OR captan 0·1% OR captafol 0·1% at early and full bloom OR lime sulphur 1% at late full bloom	benomyl 0·0125% at full bloom
28 and 14 days before harvest ..	benomyl 0·025%, OR captan 0·1%, OR captafol 0·1%	benomyl 0·0125%, OR captafol 0·1% OR thiram 0·12%
Near harvest 1–3 days	(i) Collect and destroy fallen rotten fruit from orchard (ii) captan 0·1%	(ii) benomyl 0·0125%
Post-harvest	If rain prevents application of near-harvest recommendations then dip fruit in benomyl 0·025% and dry before cool storing or packing	

Rates of fungicide product per 100 gal. of spray are as follows:—benomyl (50% W.P.) at 0·0125% and 0·025% are 4 and 8 oz. respectively; captan (83% W.P.) at 0·1% is 1¼ lb.; captafol (80% W.P.) at 0·1% is 1¼ lb.; lime sulphur (20% active ingredient at 1% is 5 gal.; and thiram (80% W.P.) at 0·12% is 1½ lb.

** dichloran is available as Allisan (Registered Trade Name)

† Registered Trade Name

Tuberculosis-Free Cattle Herds (As at October 20, 1972)

ANGUS

Crothers, H. J., "Mooreenbah", Dirranbandi
Mayne, W. H. C. & Sons, "Gibraltar", Texas
McKelvie, Mrs. M. R., Boonara, Condamine

A.I.S.

Cox, T. L. & L. M. J., Seafield Farm, Wallumbilla
Crookey, J., Arolla A.I.S. Stud, Fairview, Allora
Davis, W. D., "Wamba", Chinchilla
Embrey, R. J. & D. M., Lanefield Rd., Rosewood
Evans, E. G., Lauraven A.I.S. Stud, Maleny
Fowler, K. J. & B. D., Kenstan A.I.S. Stud, M.S. 195 Pittsworth
Franz, E. L. and E. L., "Amabar" A.I.S. Stud, Amamoor, via Gympie
Heading, C. A., "Wilga Plains", Maleny
Henry, Mrs. K. & Sons, "Tara", P.O. Box 4, Cambooya
H. M. State Prison Farm, Numinbah
Klein Bros., Kapleton A.I.S. Stud, Ma Ma Creek, via Grantham
Lawley, E. D. & Sons, Arley A.I.S. Stud, Maleny
Littleton, H. V. D. S. & N. A., "Wongalea", Bowenville
Marquardt, C. R. & J. L., "Cedar Valley", Wondai
Martin, J. P. & R. J., Kentville, via Forest Hill
McShane, Est. A. H., Handford Rd., Zillmere
Middleton, C. W., Airton Vale, Cambooya
Mitchell and Mulcahy, Rosenthal
Neale, D. G., "Groveley", Greenmount
O'Sullivan, P. W., "Navleigh", M.S. 371, Greenmount
Phillips, J. & Sons, "Sunny View" A.I.S. Stud, Kingaroy
Pagel, E. E., and Hayes, E. M., Trafalgar Stud, Tarampa, via Lowood
Queensland Agricultural College, Lawes
Ross, W. & Co., M.S. 23, Rosewood
Sanderson, W. H., "Sunlit Farm", Mulgildie
Schelbach, N. N. & Co., Allanview Stud, Warwick
Schloss, C. J., "Shady Glen", Rocky Creek, Yarraman
Scott, W. & A. G., "Walena" A.I.S. Stud, Blackbutt
Siebenhausen, J. & S. C., "Meniton", M.S. 195, Pittsworth
Sullivan, A. M., Crystal Springs, Pittsworth
Sullivan, F. B., "Fermanagh", Pittsworth
Sullivan, M. C., "Valera", Pittsworth
Thompson, W. H., "Alfa Vale", Nanango
Vohland, A. R., Bevallan, Stoneleigh, M.S. 150, Pittsworth
Voight, E. M., Fernvale
Weier, L. G., Prairie Plain A.I.S. Stud, M.S. 765, Allora
Wieland, A. W. & T. G., "Milhaven", M.S. 786, Boonah

AYRSHIRE

Goddard, B., Inverell, Mt. Tyson, via Oakey
Mathie, J. E. & M. D., "Ainslie", Maleny
Ross, E. D. & Co., "Ardrossan", Crediton, Mackay
Scott, J. N. & Son, "Auchen Eden", Camp Mountain
Smith, E. J., "Hillcrest", Borallon
Zerner, G. F. H., "Pineville", Pie Creek, Gympie

BRAFORD

Bowden, W. H., "Brendale", South Pine Road, Strathpine
Thompson, M. A. K., "Glen Kyle", Buderim

FRIESIAN

Behrendorff, E. C. & N. G., Inavale Friesian Stud, M.S. 786, Boonah
Chamberlain, C. H., Sherwood, Rocks Road, Gympie
Evans, P. J., M.S. 28, Dragon St., Warwick
Goodwin, A. T. & P. M., Winabee Stud, Killarney
Guppy, N. J. & H. M., Bli Bli Road, Nambour
Hickey, K. A. & M. R., Bunya
Lobley, N. E., "Neloby", Mumford Rd., Narangba
McWilliam, A. A., "Oatlands", Wight's Mtn Rd., Samford
Martin, R. J. and E. L., Kentville, via Forest Hill
Morrison, E. J. & Son, Cedar Creek, via Closeburn
Norgaard, M. J. & B. F., Yarrabine Friesian Stud, Yarraman
Panzram, J. & K., Blenheim, via Laidley
Pomerenke, P., Kentville, via Forest Hill
Queensland Agricultural College, Lawes
Robert-Thompson & Co., R. D. and A. M., M.S. 411, Beaudesert
Staines, R. V., Bowhill Rd., Oxley South
Stumer, A. O., Brigalow, Boonah
Vonhoff, A. R. & D. G., M.S. 918, Toowoomba

GUERNSEY

Dionysius, R. L. & L., Warana Stud, M.S. 1796, Proston
Dippel, J., Thornton, via Laidley
Erbacher, J. P. & M. M., "Leafmore", Hodgsonvale
Gibson, A. & D., Mooloo, via Gympie
Holmes, C. D. (owner Holmes, L. L.), "Springview", Yarraman
Hopper, G. T. & H. W., Elendean Guernsey Stud, Maleny
Scott, Cecil & C. A., "Coralgrae", Din Din Rd., Nanango
Smith, Mrs. E. P., Remleigh Guernsey Stud, Imbil
Wilson, R. A. and M. R., "Okeden", Proston

HEREFORD

Hill, W. W. & P. C., "Mathalla", Dirranbandi

JERSEY

Conochie, I. S., Brookland Jersey Stud, M.S. 461, Kalbar
Forsyth, D. E., Kobarnie Stud, Mulgildie, Q., 4629
Gotke, B. B., "Reynold Valley Stud", Charlwood, Kalbar
Harley, G. W. & P., "Hopewell", East Nanango
Herbener, K. E., P.O. Box 172, Monto
H. M. Prison Farm, Capricornia Stud, P.M.B. 11, Rockhampton
H. M. State Farm, Palen Creek
Hodgens, G. & J. F., "Bunyeris", Peachester
Lau, J. F., "Rossallen", Goombungee, Toowoomba
Mahaffey, H. W. & V. N., "Coombooran", via Gympie
McCarthy, J. S., "Glen Erin", Greenmount, Toowoomba
McDonald, R. G., "Buffelvale", M.S. 807, Mundubbera
Newton, J. C. & A., Merryvale, Upper Caboolture
Paulger, S. & S. M., "Adavale", Kenilworth
Perkins, M. J. & E. M., Byee Jersey Stud, M.S. 692, Sth. Nanango
Porter, F. & Sons, Westwood Stud, Conondale
Postle, R. S. & G. C., "Yarallaside", Pittsworth
Queensland Agricultural College, Lawes
Redgen, H. M. & N. F., Bonbrae, Maleny
Scott, P. E., "Kiaora", Manumbar Rd., Nanango
Semgreen, A. L., "Tecoma", Coolabunia
Snare, A. E. & Son, Laidley Park Stud, Laidley, 4341
Spressor, O. W., Carnation Jersey Stud, Mt. Walker Rd., Rosewood
Thompson, J. R. H. & R. V. A., "Dewrang", Natural Bridge, Nerang
Todd, J. R., Aberfoyle, Laravale, via Beaudesert
Vohland, A. R., Bevallan, Stoneleigh, M.S. 150, Pittsworth
Wadley, D., "Nindethana", Moggill
Waite, H. M., M.S. 182, Laidley
Westbrook Training Centre, Westbrook

MURRAY GREY

Beresford, J. P. & P. J., Copenhagen Bend, Maryborough

POLL HEREFORD

Anderson, J. H. & Sons, "Inverary", Yandilla
Christensen, B. L. & M. O., "Elavesor", Rosevale
Nee Nee Pastoral Co., Dirranbandi, 4392
Stiller, N. L., "Vine Veil", Guluguba

POLL SHORTHORN

Leonard, W. & Sons, "Welltown", Goondiwindi
Pointon, R. B. & S. C., "Wywurri", M.S. 780, Kingaroy

BRAHMAN

Queensland Agricultural College, Lawes

SANTA GERTRUDIS

Barbara Plains Grazing Co., Barbara Plains, Wyandra
Central Estates, "Comet Downs", Comet

SHORTHORN

Pointon, R. B. & S. C., "Wywurri", M. S. 780, Kingaroy

DROUGHTMASTER

Ferguson, G. A. E. & H. R., "Charraboon", Toogoolawah
University of Queensland Veterinary School, St. Lucia

RED POLL

Goodyear, A. R. J., "Hillfields", Upper Brookfield Rd., Brookfield

Blood Scours In Pigs

by L. P. DADSWELL, Veterinary Officer.

BLOOD SCOURS, the common name for swine dysentery, is one of several diseases in which there are scours containing blood.

Some of the other diseases are chronic salmonellosis, *Escherichia coli,* enteritis and coccidiosis.

Cause

The exact cause of swine dysentery is not known. It is thought that undefined damage and infection by one type of bacteria (spirochaetes) is followed by infection with another type of bacteria (*Vibrio coli*).

Spread

Faeces from infected pigs is the source of infection. Other pigs contract the disease by eating food or drinking water contaminated with infected faecal material. Up to 100% of the pigs may be affected with swine dysentery.

Spread from one piggery to another occurs by introducing infected pigs or by the mechanical transfer of faeces. This occurs commonly on boots and from trucks transporting pigs. Congregating large numbers of store pigs at saleyards favours the spread of swine dysentery.

Signs

Usually the weaner to porker group is affected, but swine dysentery may occur in pigs of all ages. The pigs' temperatures may rise to 104 deg. F. early in the disease but, with the onset of scouring, temperatures fall and become subnormal in the late stages.

The scour is watery and passed in a continuous stream without straining. The colour of the scour varies from grey to brown to black with or without flecks of blood and mucus. Sometimes it is free blood.

The hindquarters of the pigs become soiled and wet with faeces and the flanks often appear hollow. Affected animals may be depressed, but many continue to eat throughout the course of the disease.

Up to 60% of affected pigs may die in the initial outbreak in a piggery. Deaths usually occur within 2 to 4 days of the onset of scouring.

Scouring may last for a few days or for several weeks. A small percentage of pigs become wasters and are permanently stunted after signs of the disease disappear.

Control

Once swine dysentery has appeared in a piggery, the best method of eradicating it is to sell all the pigs for slaughter, disinfect all housing, spell the piggery for 6 months and then restock from a piggery in which swine dysentery has not occurred.

In choosing pigs for restocking, one must remember that some pigs which have gone through an outbreak remain carriers. These carriers appear healthy and thus may introduce the disease into a non-infected herd.

When depopulating of a piggery is not possible, one is forced to live with the disease.

The incidence of swine dysentery can be reduced by:—

1. Isolating affected pigs.
2. Minimizing the mechanical transfer of infected faeces by such practices as feeding affected pigs last and disinfecting footwear.
3. Cleaning the premises regularly.
4. Protecting waterbowls and feeding areas so that the water and feed cannot be contaminated with faeces.
5. Providing solid walls between groups of pigs.
6. Reducing pig numbers as crowding favours transmission.
7. Treating the drinking water or feed with suitable drugs is usually effective in reducing the spread and severity of the disease. However, it is not advisable to rely solely on drugs but to use them in combination with methods of good hygiene. Water or feed may be medicated with certain arsenic preparations (for example, organic arsenicals or sodium arsanilate in the water) or tylosin.

Importance

One of the main economic effects of swine dysentery is the considerably depressed growth rates in pigs affected. The cost of drugs to treat and control dysentery is also considerable. Furthermore, drugs may be required for some years to prevent a major outbreak of the disease.

Prevention

Swine dysentery can be kept out of a piggery by:—

1. Discouraging visitors to the piggery.
2. Ensuring that visitors or workmen do not introduce infection mechanically. (Adopt procedures such as insisting on clean footwear and disallowing trucks carrying pigs or empty trucks containing pig faeces on your piggery).
3. Introducing pigs only when necessary and then only direct from known herds in which there has never been swine dysentery.
4. Quarantining any introduced pigs for 2 to 3 weeks before they are run with the herd.

Egg Losses Through Breakages

POULTRY farmers are losing as much as 10% of their eggs through breakages.

Assuming a 25c a dozen return to the producer, this can mean an annual loss of $375 in a flock of 1,000 layers.

Breakage is a definite and costly problem. Much of it results from carelessness and improperly adjusted equipment. Proper attention to details in producing and marketing eggs is important if egg breakage is to be reduced.

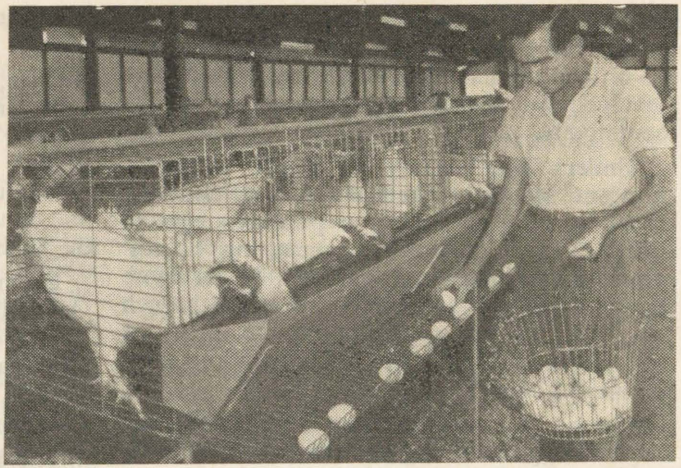
Experiments at the Department's Animal Husbandry Research Farm at Rocklea determined where the breakages occurred. Eggs were candled each day for 7 days from the nine random sample entrants as soon as the eggs were gathered. They were kept in the cool room and sent to the Egg Marketing Board on the seventh day.

At the research farm fewer than 1% cracks were found. When candled at the Egg Board, 2·4% cracks were evident, indicating that packing, transporting and processing had resulted in 1·4% cracks. It should be noted, however, that after storage in a cool room sometimes apparently "sound shelled" eggs showed further cracks on recandling.

—K. D. PUGH, Poultry Section.

Egg Marketing In Queensland

by B. A. BERGE, Marketing Officer



SINCE the 1940s there has been a complete transformation of the egg industry in Australia from one which was ancilliary to a large extent to other primary industries such as dairying and grain growing to a specialized autonomous industry.

Eggs are produced in all parts of Australia, with commercial production being geared to meeting Australian requirements and, until recent years, remunerative export markets. Nowadays, as a result of increased egg production in countries which were formerly large importers, export prices are low and market opportunities are very limited.

Production

More than 85% of total Queensland production is produced in the south-eastern corner of the State. Other areas of less importance are centred on Rockhampton, Townsville, Cairns and the Atherton Tableland.

A comparison of recorded commercial production in Queensland with that of other States, from 1960-61 to 1970-71, is given in Table 1. An appreciable volume of eggs is produced by a large number of small flocks outside statutory marketing control.

Table 3 shows the disposal of Australian eggs by type of product and by market.

Uses

Most eggs produced and sold on the domestic market are sold as egg in shell for use in the home and for the restaurant trade. Eggs that are pulped are pasteurized and sold as chilled or frozen pulp. Egg pulp is also freeze dried for sale as dried whole egg, or dried yolks or albumen.

Egg pulp is used by bakers and pastry cooks and as an ingredient in foodstuffs such as custard powders and cake mixtures, and also for certain pharmaceutical and industrial purposes.

Table 2 shows Australian per capita consumption of eggs as eggs in shell and as egg products from 1964-65 to 1968-69. The figures relate to all egg production whether Board-controlled or not.

Marketing

Marketing of eggs in the various States is conducted by statutory marketing boards. In Queensland, there are two boards, The Egg Marketing Board having jurisdiction in south-eastern Queensland and The Central Queensland Egg Marketing Board in a defined area in central Queensland. Eggs produced outside these areas are not subject to board control.

In addition, an Australian Egg Board set up under Commonwealth legislation acts as an export authority for the State Egg Boards. There is also a Council of Egg Marketing

Authorities of Australia. The functions of these last two bodies are largely of a co-ordinating nature. They are not directly involved in the physical handling of the commodity.

Under "The Primary Producers' Organisation and Marketing Acts, 1926 to 1966," any grower in Queensland who produces eggs in one or other of the egg marketing boards' areas, and whose flock numbers 50 or more birds, is obliged to market his eggs through the egg marketing board for the area, or sell under a Certificate of Exemption from the board concerned.

It was in south-eastern Queensland that the first egg marketing board in the Commonwealth was set up in 1923. At the request of growers in central Queensland a separate board, called The Central Queensland Egg Marketing Board, was set up in January 1947.

Grade Standards

In Queensland, quality and grade standards for eggs are laid down by regulation made under "The Poultry Industry Acts 1946 to 1965".

QUALITY. Under the above Act, standards for first quality eggs relate not only to cleanliness, shape and general appearance of eggs, but also to aspects not detectable by the consumer before purchase, such as bloodspots and the air cell.

Second quality eggs must conform to standards which are not significantly lower than those for first quality eggs. Second quality eggs can be sold for human consumption provided that the contents of the eggs are incorporated with other ingredients to produce a commercial product, such as in a manufactured product or in the baking or pastrycook trade.

GRADES. Grading of eggs relates solely to weight. Eggs marketed in prescribed areas of Queensland must be marked according to the grade standard. The stamp borne by the egg shows, in the upper half of the stamp, the identification mark of the particular grade and, in the lower half of the stamp, the identification symbol of the producer. Regulations also provide for the marking of second quality and chilled eggs.

Exempted Growers

The boards are authorized to exempt growers, in certain cases, from the operations of the marketing acts, thereby enabling such growers to sell the commodity direct to consumers and retailers and, at the same time, rationalizing distribution. Exempted growers are required to pay certain charges raised by the board.

Exemption certificates issued by the South Queensland Board now exceed 300 and sales by these exempted growers exceed 5 million dozen a year.

Co-ordinating Committee

The Egg Marketing Board and The Central Queensland Egg Marketing Board formed the Queensland Egg Boards' Co-ordinating Committee in 1948. The committee co-ordinates sales in all areas outside the area of jurisdiction of the boards. The plan includes the export surplus of the two boards.

Australian Egg Board

The Australian Egg Board was established originally in 1948 under the Commonwealth Egg Export Control Act. Its aim was to control the marketing of exports and to act as agent of the Commonwealth Government in administering the inter-Governmental bulk contracts with the United Kingdom.

In 1954, following the discontinuance of bulk buying by the U.K. Government and the reversion to selling in the U.K. on an open market, the Egg Export Control Act was amended to provide for the A.E.B. to operate export pools in respect to those State boards which desired to do so, but leaving any State board free, if it preferred, to market independently.

During recent years, all State Egg Boards have marketed, through the A.E.B. pools, all eggs in shell and frozen whole eggs exported. The A.E.B. purchases the eggs from the State Boards, the latter packing, processing and shipping on behalf of the A.E.B.

For several years following the termination of bulk purchases by the U.K. Government, sales of Australian frozen whole eggs were made in bulk to a group of importers in the U.K. on the basis of firm prices each year for

the total export pack. Contracts have not been negotiated since 1957-58, and since then all frozen whole egg shipped on behalf of the A.E.B. to the U.K., and elsewhere, has been sold to individual buyers at various prices.

Hen Levy

The Council of Egg Marketing Authorities of Australia was set up in 1962, and comprises all members of the State egg marketing boards. One of its earliest tasks was to develop a plan for stabilization of the industry in Australia. C.E.M.A.A. also is concerned with research projects which it recommends to the Minister for Primary Industry.

From July 1, 1965, the Commonwealth Government, at the request of the Council of Egg Marketing Authorities of Australia, introduced a levy on egg-producing flocks. The levy is authorized by Commonwealth legislation which is contained in three Acts of Parliament: The Poultry Industry Levy Act, The Poultry Industry Levy Collection Acts, and The Poultry Industry Assistance Act.

These Acts together embody a scheme which gives the Australian egg industry an opportunity to achieve a reasonable degree of stability. The scheme is, in effect, an extension of the States' egg marketing arrangements, to a single Australian marketing plan. Within the framework of the scheme, the State egg marketing boards remain autonomous and perform their normal functions of marketing the eggs placed under their control.

The boards also act in concert to ensure that the scheme operates with equity for the benefit of the whole of the poultry industry throughout Australia. This co-ordination and liaison is achieved through the C.E.M.A.A.

The legislation provides for a levy on hens, 6 months old and over (excluding the first 20 hens of any flock), which are kept for commercial purposes. Levy is payable fortnightly, producers being required to furnish a return each fortnight of the number of hens kept by them. The maximum levy prescribed in the legislation is $1 per hen per annum and the levy is payable by producers in all States.

Under an arrangement with the various State Governments, the Egg Marketing Boards in the various States have been appointed by the Commonwealth as agents of the Commonwealth Government for the collection of the levy and administration of the Acts.

The Egg Marketing Board is the agent for the whole of the State of Queensland. The proceeds of the levy are applied towards meeting losses experienced by the State egg marketing boards in the disposal on non-profitable export markets of production which is surplus to domestic market requirements.

The levy on hens is thus intended to replace equalization or pool levies imposed by State boards for the purpose of meeting losses on exports. Previously, these losses were borne entirely by those producers who marketed their eggs through the boards. As the levy is payable by all commercial producers, whether they dispose of their eggs through the boards or not, all producers meet their share of the losses on the exports of surplus production.

Other Organizations

The Egg Marketing Board Suppliers' Organization which is constituted under The Primary Producers Organisation and Marketing Acts, was established in 1958. The organization comprises Local Associations, five District Councils (one for each board electoral district), and a General Council. At June 30, 1970, there were 12 Local Associations functioning.

Members of The Egg Marketing Board are "ex officio" members of the District Councils for their respective districts, and of the Central Council. Every person who owns or keeps 50 or more domesticated fowls within the board's territory is entitled to membership.

The organization is financed by a levy on eggs marketed through the board.

The Federal Council of Poultry Farmers' Association is a voluntary growers' organization representative of the various poultry farmers' associations in Australia. All States are represented, Queensland by delegates from the Egg Marketing Board Suppliers' Central Council.

The Federal Council is concerned with the welfare and advancement of the poultry industry of Australia generally and speaks for the industry on all matters with the exception of egg marketing.

TABLE 1

AUSTRALIA: RECORDED COMMERCIAL EGG PRODUCTION BY STATES

'000 doz.

Season	New South Wales	Queensland	Victoria	South Australia	Western Australia	Australia
1960–61	62,160	10,810	28,215	10,491	7,333	119,009
1961–62	61,657	10,176	29,939	11,387	7,558	120,717
1962–63	54,609	11,290	26,794	9,918	7,796	110,406
1963–64	56,713	12,459	24,992	8,731	8,331	111,226
1964–65	62,918	14,182	28,016	9,354	9,621	124,090
1965–66	65,240	17,207	29,925	11,218	9,295	132,885
1966–67	68,043	20,695	34,100	13,176	9,810	145,823
1967–68	74,682	21,668	38,231	15,813	11,583	161,976
1968–69	76,062	21,026	41,147	15,692	11,491	165,419
1969–70	82,021	23,846	47,613	16,655	12,716	182,850
1970–71	89,568	25,295	53,728	19,652	14,500	202,743

Source: Australian Egg Board

TABLE 2

AUSTRALIA: ESTIMATED PER CAPITA CONSUMPTION OF EGGS AND EGG PRODUCTS (IN TERMS OF EGGS IN SHELL)

lb.

Commodity	1964–65	1965–66	1966–67	1967–68	1968–69
Eggs in shell	25·2	25·6	25·7	25·7	25·7
Egg pulp	1·8	1·7	1·6	2·0	2·2
Egg powder	·2	·1	·2	·1	·1
Total eggs and egg products	27·1	27·5	27·5	27·9	28·0
Equivalent No. of eggs	217	220	220	223	224

Note: Inconsistency in additions is caused by rounding.
Source: Commonwealth Statistician.

TABLE 3

AUSTRALIA: ALLOCATION OF CONTROLLED PRODUCTION OF EGGS FOR CONSUMPTION IN AUSTRALIA AND FOR EXPORT

'000 doz.

Year	Packed for Australian Consumption	Packed or Processed for Overseas Consumption				Annual Production
	Shell, Liquid and Dried	Shell	Pulp	Dried	Total	
1965–66 ..	115,755	4,122	11,995	1,013	17,130	132,885
1966–67 ..	125,514	4,394	15,416	499	20,309	145,823
1967–68 ..	129,520	6,014	25,794	647	32,456	161,976
1968–69 ..	133,479	6,453	25,398	89	31,940	165,419
1969–70 ..	142,057	4,148	36,291	353	40,793	182,850

Source: Australian Egg Board

Returns From Intensive Piggeries--2

by B. S. ALCOCK, Agricultural Economist.

CHANGES IN ALL FACTORS

The section Variation in Returns—Changes in All Factors is now examined.

In the previous section, changes in only one factor at a time were examined, with all other factors held constant. In this section, changes in several factors are allowed for. These are divided into:—

1. Price factors: bacon price, feed cost
2. Management factors: pigs/sow/year, feed conversion, average daily gain.

The distinction is made because the producer would tend to have more control over the management than the price factors. Note, however, that both types of factors contain controllable and non-controllable elements.

Three efficiency ratios have been calculated for selected values of these various factors. The ratios are gross return per sow (Table 2), feed cost per sow (Table 3), and margin over feed cost per sow (Table 4).

The assumptions used in calculating the tables are as set out in the section dealing with establishment cost and cash requirements and that on Costs and Returns for the 55-sow piggery. However, the margins would be applicable over a fairly large range of intensive piggery sizes (greater than 40 sows).

Gross Returns per Sow

In the gross returns, no allowance has been made for sow deaths or replacements, that is, the gross returns are for the number of bacon pigs stated less 1% deaths and condemnations. This implies that cull sow receipts compensate for sow deaths and replacements.

TABLE 2

GROSS RETURN FOR SOW AT SELECTED VALUES OF VARIOUS FACTORS

Prime Bacon Price c/lb.		22	25	28
Pigs/Sow/Year	Average Daily Gain lb.	$/sow	$/sow	$/sow
14	1·00	328	374	419
	1·25	387	441	496
16	1·00	375	427	479
	1·25	443	504	566
18	1·00	421	480	539
	1·25	498	568	637

NOTES:—1. Grading: 90% prime, 10% first. 2. Price of first grade 5c less than prime. 3. D.W./pig is 110 lb. if average daily gain is 1·00 lb. and 130 lb. if average daily gain is 1·25 lb. 4. 1% deaths and condemnations.

Feed Cost per Sow

Feed cost per sow at selected values of various factors are set out in Table 3.

TABLE 3

FEED COST PER SOW AT SELECTED VALUES OF VARIOUS FACTORS

Feed cost c/lb.			3·25	2·75	2·25
Pigs/Sow/Year	Feed Conversion Ratio	Average Daily Gain lb.	$/sow	$/sow	$/sow
14	4·0	1·00	329	284	238
		1·25	380	327	274
	3·5	1·00	304	262	221
		1·25	348	300	252
	3·0	1·00	278	241	203
		1·25	317	273	230
16	4·0	1·00	363	313	263
		1·25	422	363	304
	3·5	1·00	334	289	243
		1·25	385	332	278
	3·0	1·00	305	264	223
		1·25	349	301	253
18	4·0	1·00	397	343	288
		1·25	463	398	334
	3·5	1·00	364	315	266
		1·25	422	364	305
	3·0	1·00	332	287	243
		1·25	381	329	277

NOTES:—1. Creep feed: 60 lb./pig at 4c/lb. 2. Average weight at 8 to 9 weeks: 40 lb./pig. 3. Growing period: 16 weeks (sell at 25 weeks). 4. Sow feed: 2,500 lb./sow. 5. Boar and gilt feed 329 lb./sow.

Margin over Feed Cost per Sow

Figures from Table 2 and Table 3 have been used to calculate Table 4. Set out in the notes accompanying Table 4 are the values that must be subtracted from the margin over feed cost to obtain the cash surplus and the return to management.

Use of the Tables

These tables demonstrate the sensitivity of the pig enterprise to changes in the various factors. They may also be used for a rough evaluation of an individual case. For example:—

Bacon price = 25 c/lb. prime
Feed cost = 2·25 c/lb.
14 pigs/sow/year
Feed conversion = 3·5
Average Daily Gain = 1·25 lb.
80-sow piggery
Establishment Cost = $700 per sow
Total cash requirements = $760 per sow (including grain purchases for first 6 months of second year).

Costs and Returns	Per Sow $	Per 80 sows $
Gross Return (Table 2)	441	35,280
Feed Cost (Table 3)	252	20,160
Margin over feed cost (Table 4)	189	15,120
Other Cash Costs	77	6,160
Cash Surplus	112	8,960

Return to Management

From Margin over feed cost, deduct:—

(i)	$65
(ii) 10 c x $700 ..	$70
(iii) 4 c x $760 ..	$30
Total	$165

Return to management = $189–$165
= $24 per sow
= $1,920 for 80 sows.

This is positive, so the piggery should be profitable over 10 years. It would be more profitable over 15 years.

Note that this example is profitable despite low production (14 pigs per sow). This is so because of cheaper feed and lower establishment cost.

TABLE 4

MARGIN OVER FEED COST PER SOW FOR SELECTED VALUES OF VARIOUS PRICE AND MANAGEMENT FACTORS

MANAGEMENT FACTORS			PRICE FACTORS								
Prime Bacon Price c/lb.			22			25			28		
Feed Cost: c/lb.			3·25	2·75	2·25	3·25	2·75	2·25	3·25	2·75	2·25
Pigs/Sow/Year	Feed Conversion Ratio	Average Daily Gain lb./day	$/sow	$/sow	$/sow	$/sow	$/sow	$/sow	$/sow	$/sow	$/sow
14	4·0	1·00	−1	44	90	45	90	136	90	135	181
		1·25	7	60	113	61	114	167	116	169	222
	3·5	1·00	24	66	107	70	112	153	115	157	198
		1·25	39	87	135	93	141	189	148	196	244
	3·0	1·00	50	87	125	96	133	171	141	178	216
		1·25	70	114	157	124	168	211	179	223	266
16	4·0	1·00	12	62	112	64	114	164	116	166	216
		1·25	21	80	139	82	141	200	144	203	262
	3·5	1·00	41	86	132	93	138	184	145	190	236
		1·25	58	111	165	119	172	226	181	234	288
	3·0	1·00	70	111	152	122	163	204	174	215	256
		1·25	94	142	190	155	203	251	217	265	313
18	4·0	1·00	24	78	133	83	137	192	142	196	251
		1·25	35	100	164	105	170	234	174	239	303
	3·5	1·00	57	106	155	116	165	214	175	224	273
		1·25	76	134	193	146	204	263	215	273	332
	3·0	1·00	89	134	178	148	193	237	207	252	296
		1·25	117	169	221	187	239	291	256	308	360

NOTES:—1. To obtain Cash Surplus/Sow. (a) If labour not a cash cost: subtract $22/sow from margin over feed costs to cover only boar replacement cost, animal health, heat, repairs and maintenance and sundry cash costs. (b) If labour is a cash cost: subtract $77/sow from margin over feed cost to cover all cash costs other than feed.

2. To obtain Return to Management per sow, subtract the following items from margin over feed cost per sow:—(a) $65 per sow as an allowance for cash costs ($77) less an adjustment for value of pigs on hand at end of 10 year period ($12). (b) 10c for every $1 establishment cost per sow (that is, excluding any grain for second year). (c) 4c for every $1 total cash requirements per sow. Note that this method assumes that labour cost is $3,000 per 55 sows (or $55 per sow). In addition, for ease of calculation, an 8% interest charge has been used.

3. If Return to Management is positive, the piggery has a good chance of being profitable over 10 years.

CONCLUSION

This article has attempted to provide a method to assess profitability of a planned piggery and to discuss the factors affecting profitability.

The particular set of assumptions used in the example led to low estimates for returns, that is, it was not a good investment. In other situations, a piggery may be an excellent investment.

The example does assume a reasonably high standard of management, and it would be unwise to budget on more than 16 pigs per sow, or a better conversion than 3·5, or higher growth rate than 1·25 lb. a day. Similarly, it would be unwise to plan on a higher price than 25c per lb., despite current prices.

Thus, the best opportunities for improving the estimated profitablity of the piggery in the example lie in lower establishment costs and cheaper feed. These avenues, of course, should not be pursued to the detriment of management.

Bigger Sunflower Plantings Likely

HIGHER world prices may lead to bigger sunflower plantings in Queensland this summer.

The price is expected to be more than the $110 a ton less freight charges paid last season. This makes sunflowers an attractive short-term crop.

Given a favourable season, the area sown to sunflowers could be more than 200,000 acres. Last season, an estimated 150,000 acres were sown and, in the previous season, 49,000 acres.

Besides this, much land, prepared for winter grain crops but unplanted through lack of rain, is expected to be sown to sunflowers for a quick cash return.

Although from late September to early November is the preferred planting time, the season may be extended well into January. Late planted crops have sufficient time to mature, but are subject to a greater risk from rust damage in wet summers. However, a lower oil content can be expected in late-planted crops.

Sunfola varieties, with some Polestar, are the main varieties grown. Polestar is grown as a birdseed variety and has a lower oil content than the Sunfola varieties which are used by the oilseed industry.

—C. A. SCHRODER, Agriculture Branch.

Bad Year For Pangola Grass

by J. K. TEITZEL, Agrostologist, B. A. FRANZMANN, Entomologist, R. A. BROADLEY, Nematologist, and W. PONT, Senior Pathologist.

CLIMATICALLY, 1971 was an exceptional year on the wet tropical coast. A very wet summer was followed by a very dry, winter-spring.

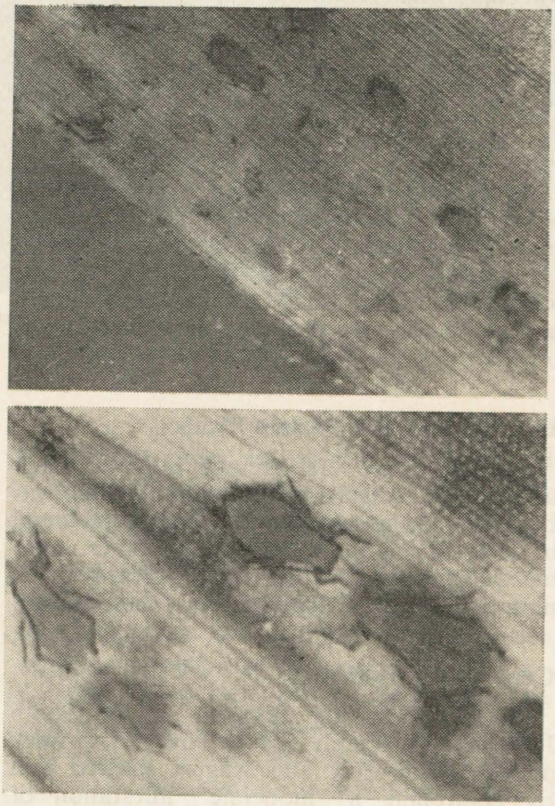
Plant growth in pangola grass pastures (*Digitaria decumbens*) was limited by lack of sunlight during the wet season and by lack of water during the dry season. This meant that the pastures were subjected to considerable pressure by grazing animals. Furthermore, these conditions were favourable for the build up of a variety of pests and diseases which attacked the pangola grass.

Aphids

Aphid populations, identified as *Schizaphis* sp. of the *graminum* group, have been observed in isolated pangola grass pastures for a number of years. However, during April of 1971, some pastures were found where aphid numbers had built up to plague proportions.

Subsequently, large populations were observed in pangola pastures throughout the wet tropical coast (the coastal strip between Ingham and Cooktown). The damage caused was variable but was devastating when high aphid numbers were associated with heavy grazing.

Nevertheless at least one newly planted pangola pasture was virtually wiped out by the aphids without being grazed.



Photographs through a microscope of aphids on a leaf of pangola grass.

Outbreaks in the coastal strip continued until the end of August. The subsequent decline in aphid numbers in infested paddocks appeared to be caused mainly by the feeding of predacious ladybirds (Coccinellidae).

Though the insect had virtually disappeared, its effect was still apparent at the end of November especially in pastures which were badly damaged. Many were slow to recover from the attack and were of little value for grazing. Because of subsequent weed infestation, some may have to be replanted.

Symptoms Of Aphid Damage

The most obvious symptom of aphid damage was a yellowish and partially dead leaf tip. The yellowing, followed by death, moved progressively down the leaf blade to the base, and resulted in the death of the whole leaf. Leaves exhibiting the typical symptoms usually carried a large number of aphids (up to 40) concentrated towards the tip.

When most of the leaves were damaged, the whole plant died. Long lengths of dead runners were common in ungrazed pastures. Grazed pastures soon became overgrazed and long runners either dead or alive were virtually absent. In only one pasture aphids were found on the roots and crown of the plants.

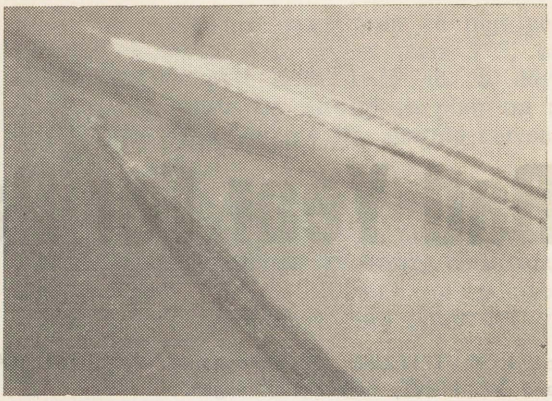
Damage To Other Pasture Plants

Since aphids were present in such large numbers on pangola grass, a careful watch was kept on other pasture plants. They were found in isolated instances on several other commercial grasses in the area. However, in almost all cases, damage was insignificant.

Control Of Aphids

Some preliminary research at the South Johnstone Research Station over a 5-week period during July and August showed that by controlling a "moderate" infestation of aphids with insecticides, the growth of pangola was about 40% greater than in uncontrolled areas.

A range of insecticides has since been tested for aphid control and from this work the recommendation is dimethoate at 4 oz. active constituent per acre. After spraying with dimethoate, animals must be withheld from the pasture for at least 1 day.



An aphid damaged leaf (top) compared with a healthy leaf (bottom).

The economics of the use of this control measure are unknown at this stage. In any situation of aphid infestation, many factors must be carefully considered before the application of a spray, because aphid populations are subject to many natural controlling factors, not the least of which are the predacious ladybirds.

Diseases

Damage from disease added to the problems caused by aphid infestation in pangola grass pastures. Rust (*Puccinia oahuensis*) was prevalent and its harmful effects were very noticeable late in 1971, particularly where dry weather or overgrazing had retarded growth in pastures recovering from aphid attack.

Other diseases that contributed to unthriftiness in pangola pastures in most coastal areas were a leaf spot caused by a fungus (*Piricularia grisea*) and a virus infection known as striate mosaic.

Nematodes

In the course of the studies, root and soil samples were collected from under pangola grass plants in unhealthy areas. Populations of the meadow or root lesion nematode (*Pratylenchus brachyurus* and *Pratylenchus coffeae*) were found to be high. Such populations would contribute to the state of decline.

Ungrazed pangola grass showing damage by aphids 9 months previously.

In the preliminary work at South Johnstone, nematode populations were recorded. These remained largely unchanged where a growth response was achieved through the use of aphicides. This indicates a minor role of nematodes in causing the decline; their precise effects were masked by the heavy aphid build-up.

The Future

Because 1971 was such an exceptional year, the poor performance of pangola grass must be treated with a degree of caution. This grass has several desirable attributes not possessed by other pasture grasses. However, the current commercial trend towards planting pangola gass over an entire property should be reconsidered in the light of the 1971 experience.

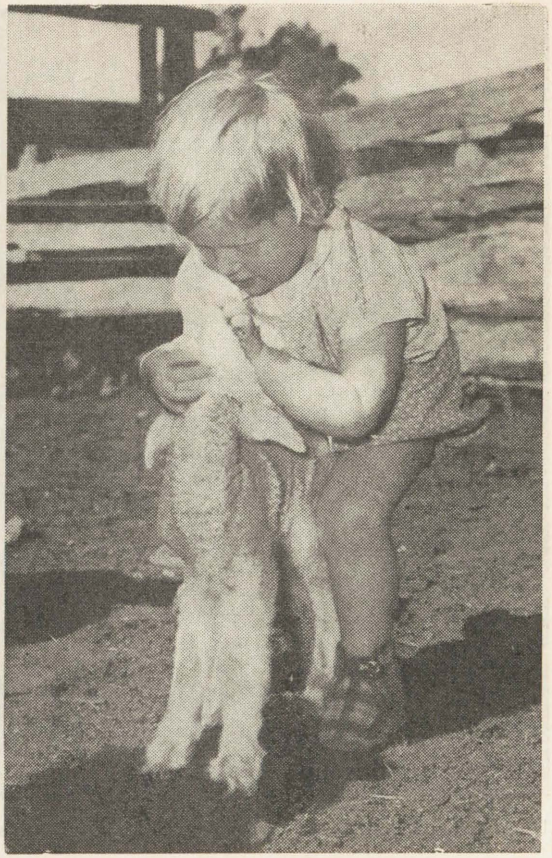
Many other highly productive grasses and grass-legume combinations are available for commercial use. The suitablity of these varies according to different types of country. Consequently, apart from giving some protection against possible devastation of any one species by a pest or disease, it makes sense from a production viewpoint to plant several different types of pasture in the various paddocks of each property.

Information on pasture species suitable for the wet tropical coast is available from any local Adviser in Agriculture.

Pet Sheep Need Proper Care

by MARY ROSE and W. E. M. ROTHWELL, Sheep and Wool Branch.

AN increasing number of suburban homes, kindergartens and institutions are keeping sheep either as pets and projects for children or simply as lawn mowers to help in the irksome task of keeping the grass down.



A lamb makes an appealing pet for children.

Before acquiring a sheep, prospective owners should consider some points very seriously:—

- Will the area where you will keep your sheep provide it with sufficient feed, and if not are you prepared to spend some time and money in providing it with some extra feed?
- Do you have sound fences that will keep your sheep safely inside? Can you provide a dog-proof pen to protect it from worry and harm caused by straying dogs?
- Do you realize your sheep is susceptible to both worms and fly-strike and that you will need to provide some protection and treatment for these troubles?
- Your sheep will require shearing at least once a year and crutching as well?

Obtaining a Lamb

Unless you are personally acquainted with a sheep breeder, the easiest method of obtaining a lamb is to consult a stock agent who may be able to get one from the saleyards.

Problems of the Orphan Lamb

Often a very young lamb that has not suckled its mother may die despite attempts to rear it on cow's milk. This can be a very traumatic experience which can generally be avoided by a little care and knowledge.

It is likely that the death of the lamb is accelerated because it has not received the first milk from its mother. Colostrum is the milk secreted during the first 48 hours after lambing. It contains nutritious and protective

Ewes with lambs on a sheep property.

elements which fulfil the needs of the newborn lamb for the first few days of its life and also prepare its body so that it can deal with normal milk.

Colostrum contains 20% more protein and a little more fat than normal milk. It is normally rich in vitamins A and D, provided the ewe is not deficient. It acts as a natural purgative for the young animal, clearing from its intestines the accumulated faecal matter known as meconium, which is often of a dry, putty-like nature.

In addition to this, the young lamb obtains its first supply of antibodies from the colostrum and this protects it against various bacteria and viruses by imparting to the lamb a passive immunity against the diseases caused by these organisms. Scouring is a common problem in young lambs deprived of first milk and it is probably because the antibodies normally protect them against bacteria causing this complaint.

Preparing Artificial Colostrum

An artificial colostrum can be prepared quite simply using the following recipe:—

26 oz. of warm cow's milk
1 beaten egg
1 small teaspoon cod liver oil (or castor oil)
1 dessertspoon of sugar.

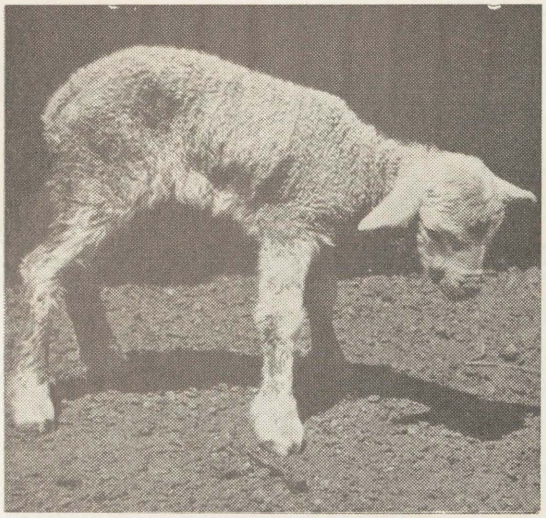
The dose rate is up to 6 oz. per feed of the mixture four times a day for the first two days.

First Two Days

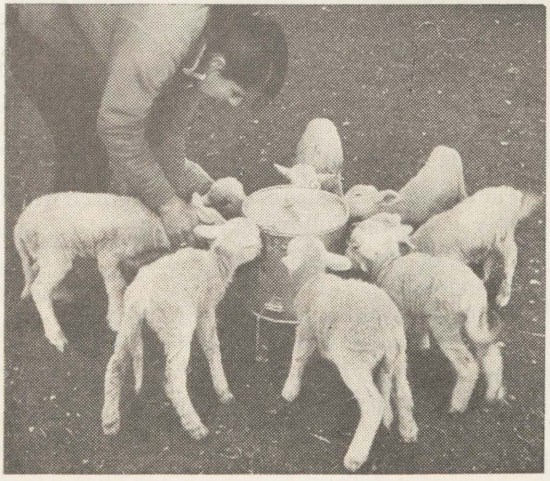
Early care of the orphan lamb will mainly be keeping it warm and assisting it with feeding.

Place the lamb in a warm, draught-free place and cover it with an old blanket.

Its first feed of the colostrum mixture should be given straight away. Warm the mixture and encourage the lamb to feed by dipping a finger in the mixture and allowing the lamb to suck. Later the lamb can be fed using a rubber teat and baby's bottle.



A sickly little lamb may be saved by care and knowledge.



Training young lambs to suck a rubber teat. This is a proprietary unit which allows many lambs to be fed simultaneously by one person.

Feeding Requirements

Following the 2 days' feeding with the artificial colostrum, the lamb can be bottle-fed with warmed cow's milk.

Ewe's milk is stronger than cow's milk. It contains twice as much fat, equal sugar, and about twice as much protein. However, it is not really necessary to supplement it. If you wish to bring cow's milk more nearly to the nutritional standard of ewe's milk, add 1¼ oz. of whole cream dried milk powder to every pint of cow's milk.

A good schedule to follow with the milk feeds would be: up to 4 oz. every 3 hours, starting the first feed at 6 a.m. with the last feed at 9 p.m. As soon as possible train the lamb to drink its milk from a bowl. You can do this by first immersing your hand in the milk right up to the knuckles and then placing a finger in the lamb's mouth. It will then draw up the milk along your finger. After a few lessons you can withdraw the finger as the lamb will learn to draw up the milk without this aid.

At 2 weeks, feed three or four times a day, giving up to 8 oz. of milk per feed or 1½ pints per lamb per day.

At the same time, you can start the lamb on solids. A suitable starter would be:

Bran	2 parts
Pollard	2 parts
Buttermilk powder	1 part

These ingredients can be obtained from any produce merchant.

Make up these as a warm porridge with milk, gradually increasing the solid and decreasing the milk until the lamb learns to eat the mixture as a not-too-liquid mash. This will reduce the amount of milk your lamb requires.

It is necessary to keep all your feeding utensils clean and protected from flies as young animals are especially susceptible to disease.

The Growing Lamb

FEEDING AND SHELTER. Within 6 weeks or so of the birth the lamb will start eating grass and herbage and so feeding of milk and mash can be greatly reduced.

Clean, cool water should be provided from about 3 weeks. Shade and shelter from the weather should be available. Lack of shade can lead to a form of sunburn or photosensitivity sometimes so severe that lambs and

sheep die. Shelter from rain is important as sheep may die from cold and exposure in inclement weather.

Sheep will eat some tall grass but prefer short grass. It is important to realize that a big body of grass does not mean that there is sufficient feed for a sheep. Grasses that grow quickly may become rank and unpalatable to sheep. The sheep is much more selective than the goat and many weeds and coarse plants are unattractive as feed.

Sheep are more particular about their feed than is generally realized and do better when allowed to roam about and select their diet. If you are able to do this, make sure any gardens and shrubs are excluded from the grazing area as these will prove most attractive to sheep—a most unwelcome attraction for garden-lovers.

If sheep are to be tethered, they should be moved to a fresh area at least every few days, even though there appears to be plenty of feed available.

PROVIDING ADEQUATE FEED. It is only by observing your sheep's feeding habits that you will recognize that the feed is inadequate. A contented sheep will spend some time during the day lying down and chewing its cud. A hungry sheep on the other hand will eat constantly and become thinner and less healthy. Hungry sheep may pull leaves and even bark off trees and shrubs.

Since a large number of the grasses and plants in Queensland are summer growing, late winter and spring are likely to be critical periods for your sheep's feed.

If you see that your sheep is not getting enough to eat and you wish to keep it, you will need to provide it with an adequate diet. The safest and simplest feed would be lucerne hay. About 1 lb. per day should be sufficient but if there is little other feed available up to 2 lb. of hay may be needed.

Feeding grains (such as wheat, maize and sorghum) to sheep that are unaccustomed to a grain diet can be extremely dangerous. Before doing so you would be wise to seek some advice on how to feed grain to sheep.

Poison Plants

Poison plants are another serious danger to sheep grazing in suburban areas. Among the common garden plants and weeds there are a large number of potentially poisonous ones. *Euphorbia* spp. such as naked lady and poinsettia, green cestrum (*Cestrum parqui*), angel's trumpet (*Datura* spp.), delphiniums and larkspurs, oleander, castor oil plant (*Ricinus communis*), elder (*Sambucus* spp.), Brazilian nightshade (*Solanum seaforthianum*), arum lily (*Zantedeschia aethiopica*) are a few of the well known ones.

Husbandry

Before your lamb is 6 weeks old it should have its tail docked. This simple operation assists in keeping the breech area clean.

If your lamb is a male, it should be castrated at the same time. Male sheep become aggressive and can be dangerous so it is wise to carry out this operation before the lamb is 6 weeks old. Your local veterinary surgeon will carry out both these operations for you.

Worms

Because of the high incidence of summer rainfall in coastal Queensland, there is a constant threat of worm infestation, particularly stomach worms during summer and autumn.

All these species of worms have a somewhat similar life cycle, and are generally specific to one animal species or group of related animal species. This means that worms found in sheep or goats are not usually found in cattle or dogs. Moreover, sheep worms are not likely to be passed on directly to children or adults.

Worm larvae are eaten with the grass and lodge in the stomach of the sheep. After about 16 days here they develop into male and female worms. The female worms lay massive numbers of eggs which are passed out with the droppings. These eggs usually hatch out within a few days if the weather is warm and humid. As larvae, they attach themselves to grass stems ready to be eaten with the grass.

Because of the large number of eggs laid within the sheep by these worms, pasture rapidly becomes contaminated—another reason for changing the grazing area as often as practicable.

To control sheep worms, sheep must be drenched with a suitable drench as often as is indicated by the weather conditions. As many as four or more drenches could be required during the spring and summer. Suitable drenches are available from produce agents and some chemists.

Blowflies

All sheep are subject to blowfly strike. The chances of strike usually increase as the fleece gets longer, particularly during prolonged wet weather or periods of high humidity.

The blowfly lays eggs on wet or dirty portions of the sheep, particularly on the breech of ewes and under the belly of male sheep.

These eggs hatch into small, white maggots in a very short time, and work down on to the skin of the sheep. They are sometimes difficult to see, until the strike becomes well established. They cause intense irritation in a small area or spread rapidly over a large area if wool moisture is available. Toxins released by these maggots can eventually kill the sheep.

Usually the sheep will be observed to become restless and stamp the hind legs, or even rub the hind quarters against a post or fence. Often a sheep will lie down and chew the wool on the affected area.

To treat affected sheep, the wool from the struck area should be removed with a pair of sharp sheep shears or even a large pair of scissors. The area can then be wetted with a solution of "Dettol" or similar disinfectant. If one of the organo-phosphorus types of dressing (such as diazinon) is available this can be used. In fact, this is what is used by the sheepmen to treat sheep.

Shearing

Shearing is usually done at intervals of 12 months, and can present a problem in a city, as few people are available to undertake the shearing of one or two sheep. The Sheep and Wool Branch of the Department of Primary Industries may be able to suggest where a shearer could be contacted.

It is a good idea to shear your sheep at the end of the winter or in the spring thus ensuring that the sheep has little wool on during the wet months.

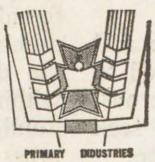
Dogs

Perhaps the greatest deterrent to keeping sheep in the suburbs is the problem of dogs. A strong, sound fence may deter some dogs but a dog-proof fence would need to be about 6 ft. high and secured at the bottom to prevent dogs coming under.

Dogs are a real menace either singly or in packs as they chase and attack sheep and can cause them severe injury which, if not fatal, may make it necessary to have the sheep destroyed.

Provided there is some supervision during the daytime a sheep will probably be safe enough, but at night some protection will be necessary. At night, household dogs that are not tied up or confined tend to roam the streets and may gather in packs. These are a real threat to an unprotected sheep. Even quite small dogs are capable of inflicting serious damage to a sheep.

The sheep may be shut in a shed or any area which is dog-proof. A cage-type pen of wire netting with a roof to protect the sheep from the weather may be constructed. Remember that if the pen is not completely enclosed, the sides will need to be at least 6 ft. high.



Crusting Hampers Seedling Emergence At Inglewood

J. L. GUNTON and J. C. KERR, Agriculture Branch.

GOOD germination and emergence are essential in successfully establishing high yielding field crops and pastures.

In the Inglewood Shire, many of the cultivated alluvial soils form a heavy crust after rain or irrigation, resulting in poor emergence. Replanting is not always possible because the time of planting is often critical for establishment and high yields.

To test the effectiveness of possible methods and techniques for reducing this problem, trials were conducted at the Inglewood Field Station of the Department of Primary Industries during 1968 and 1969.

Navy beans, wheat and linseed were used as indicator crops in these trials. On crusted soils, a marked reduction in emergence was recorded with these crops. The broad-leaf type plants were most seriously affected when compared with the grass type plants.

The Soil

The problem of surface crusting is worst on the silty clay loams of the older alluvial terraces and levees. Many of these soils have been over-worked and organic matter reserves are low. They have a high, fine-silt and sand content and a relatively low clay content.

Because of their poor structure, these soils slake or "melt" as they are wetted, and the soil particles run together to form a non-aggregated layer which forms a strong crust as it dries.

The degree of crust development is associated with the rainfall intensity at any one time and the amount of total rain received. Severe crusting can even result from high intensity falls of less than 50 points.

This plot was planted by the roller method mentioned in the accompanying article. The crust was formed by following rain. Traces of the roller track can be seen running from bottom to top.

A typical example of the crusting that forms on Inglewood soils after heavy rain.

On the other hand a severe crust can also result from low intensity falls of fairly long duration. The crust formed in this case is usually thicker. Depending on the duration of the rain period, this crusting is often the most difficult to control by mechanical means, because the soil remains too wet to cultivate during the critical pre-germination period.

Techniques Investigated

Several mechanical methods to control the crust problem were investigated. These at best provided some short term control.

VEE-SHAPED ROLLER. This principle involved using two sets of vee-shaped rollers in tandem. The front set compressed the soil below the seed position. The seed was placed in the resultant furrow and the following set of rollers was used to cover the seed. A fine seedbed was necessary for the success of this technique.

HIGHER PLANTING RATES. This method involved heavier seeding rates to reduce the energy required per plant for lifting the crust.

PLANTING DEPTH. Various planting depths were used to determine the effect of the time of emergence on the crust. Results showed that shallower planting was an advantage. However, reducing planting depth for summer crops could entail depletion of moisture around the germinating seed. Hence this principle has practical limitations.

TRASH COVER. In this treatment, a trash cover was used to reduce the amount of damage from raindrop splash on the soil

surface. Results showed little benefit when the amount of rain was sufficient to saturate the top 2 to 3 in. of soil. Planting and subsequent positioning of the trash layer would be a practical problem.

SOIL AMELIORANTS. Some slight improvement was found with the addition of high rates of ameliorants such as gypsum and lime. Results, however, were still poor and it is doubtful whether the cost of these products could be justified commercially.

The relatively poor results could be associated with the low clay content which indicates that these soils have a low exchange capacity. Activity of these ameliorants is low when due to the low clay content availability of sites for cation exchange is poor.

MECHANICAL TILLAGE. Harrowing the ground to break the surface crust following rain has been a district practice. Results are frequently successful.

The main problem with this technique is the difficulty of timing the operation as the soil is often too wet to carry machinery at the critical emergence period. Rotary cultivators have proved to be more efficient than the diamond harrows for this operation.

MAINTAINING A WET CRUST. This method entails flushing the soil surface with small amounts of water until the seedlings begin to emerge. Although this practice is effective in some areas, it does not appear to have any practical application for these soils. A wet crust was found to reduce further germination of some crops in the trial.

Long-term Control

From observations and the limited trial data, it is felt that the most suitable method of reducing the crust problem in the Inglewood area is to improve the stability and aggregation characteristics of the soil by increasing the organic matter content.

A management plan which includes the use of a pasture phase in a rotation and the return of crop stubble during a crop phase is, on present knowledge, the most effective means of reducing this problem.

Conclusions that can be made from the trials are:—

- No method gave outstanding improvement
- The vee-shaped rollers were the most effective mechanical method tested
- Rolling cultivators are useful in overcoming the crust once it has developed
- Stability of soil aggregates through increased organic matter incorporation should provide the most satisfactory long-term solution.

Brucellosis-Tested Swine Herds (As at October 20, 1972)

BERKSHIRE

Bishop, N. H., Three Moon, via Monto
Clarke, E. J. & Son, "Kaloon Stud", Boonah
Cochrane, S., "Stanroy", Felton
Cook, F. R. J., Astonvilla, Middle Creek, via Pomona
Crawley, R. H., Rockthorpe, Linthorpe
Dalby Hospital Board, Jubilee Farm, Dalby
H. M. State Farm, Numinbah
H. M. State Farm, Palen Creek
Handley, Est. J. L., "Meadow Vale", Lockyer
Handley, G. R., "Locklyn" Stud, Lockyer
Hutton, G. J. & Sons, "Grajea" Stud, M.S. 182, Laidley
Kimber, E. R., Tarella, M.S. 805, Mundubbera
Ludwig, A. L., "Beau View" Stud, Cryna, via Beaudesert
Neuendorf, W., M.S. 794, Kalbar
Queensland Agricultural College, Lawes
Research Station, Hermitage
Rosenblatt, G., "Rosevilla", Biloela
Traves, G., "Wynwood" Stud, Oakey
Westbrook Training Centre, Westbrook
Whitley, L. D., Yarrol, via Monto

LARGE WHITE

Ashwell, J. & B., "Green Hill", M.S. 465, via Cambooya
Ballon, E. E. & E., Maclaglan
Barrier Reef Islands Pty. Ltd., Hayman Island
Barron Bros., "Chiltern Hill", Cooyar
Batterham, P. & N., Raby Park, Inglewood
Beutel, G. R. and Son, Brookdale Stud, M.S. 786, Boonah
Bishop, N. H., "Three Moon", via Monto
Briskey, R. G. and M. J., Wallingford, Pittsworth
Brosnan, D. J., "Bettafield", Mt. Murchison, via Biloela
Cauley, J. R., M.S. 918, Toowoomba
Cauley, T. P., M.S. Jondaryan 444, Rosalie
Clegg, J. A. & M. A., "Karoma" Stud, Mundubbera
Coleman, C. J., Merriland Stud, Britannia Station, Charters Towers
Cook, F. R. J., Astonvilla, Middle Creek, via Pomona
Corney, Messrs. F. D. and E. C. W., Pagel, Tara
Cotter, N. J., "Olaroy", Goomeri
Craig, K. F., "Echoes", Bancroft, via Monto
Dean, G. F. & A. M., Home Creek, Wooroolin
Department of Aboriginal and Island Affairs, Cherbourg
Diete, E., Ingoldsby, 4343
Duncan, C. P., "Colley", Flagstone Creek, Helidon
Duncan, J. A. & B. L., Ma Ma Creek
Dunlop Meats Pty. Ltd., Coondulla, Robertson Pk., Murray Upper
Eagle, D. R. & J. A., "Walugra", 134 Hogg St., Toowoomba
Evans, P. J., M.S. 28, Dragon St., South, Warwick, and Rosehill
Fisher, J. & L., Lyndhurst, Jimbour
Fletcher, L., "Par-en-eri" Stud, M.S. 806, Mundubbera
Forster, I. S. & D. E., 112 Drayton Rd., Toowoomba
Fowler, K. J. & B. D., "Kenstan", M.S. 195, Pittsworth
Fowler, K. P., Northelea Stud Farm, 156 Hogg st., P.S. 1436, T'wba
Franke, K. H. and B., "Delvue" Stud, Cawdor
Freeman, W. A., "Trevlac", Rosewood
French, A., "Wilston Park", Pittsworth
Gibson, H. R., "Thistleton", Wootha Rd., Maleny
Gosdon, T. C. & E. A., "Naumai", Dalby
Graham, T., Dunleigh, Highfields
Grayson, D. G., Wodalla, Killarney
H. M. State Farm, Numinbah
Head, G. A., M.S. 825, Ipswich
Hinchcliffe, D. F. & R. K., "Oakview", Milman, 4702
Hockings, J. & M., "Quambi", Kumbarilla
Hodgens, J. F., "Bunyeris", Peachester
Hudson, R. F. & V. D., "Rondel", Hogg St., Wilsonton, Toowoomba
Hutton, G. J. & Sons, "Grajea" Stud, Laidley
Jones, K. B. & I. R., "Cefn" Stud, Clifton
Kahler, J. & S., "Karajoy", East Nanango
Kajewski, C. & D. I., "Glenroy", Glencoe, via Toowoomba
Kanowski, A., "Exton", Pechey
Kimber, E. R., "Tarella", M.S. 805, Mundubbera
Kruger, V. F. & B. L., "Greyhurst", Goombungee
Kuhl, V. and C. A., "The Mounts", M.S. 222, Oakey
Lee, G. J., M.S. 444, Jondaryan
Le Gros, W., "Elourea Stud", Marburg
Little, R. S., P. M. & G. W., "Glengarry", Jimbour
Maranoa Stud Piggery, Mitchell
Marsden, M., "Fernflat" Canaga
Marsh Pastoral Co., Brymaroo
Mathieson, K. N., "Iderway", Gayndah
Mengel, N. D., Douglas Park, M.S. 223, Nobby
Player, G. W., Square Top, via Kaimkillenbun
Postle, R. S., G. C. & Son, "Yarallaside" Stud, Pittsworth

LARGE WHITE—continued

Powell, R. S., "Kybong", Gympie
Purcel, J., "Scoria", Thangool
Queensland Agricultural College, Lawes
Quilter, P. R., Paga Paga Piggeries, Postman's Ridge
Radel, V. V., "Braedella" Stud, Coalstoun Lakes
Reiser, G., Brisbane St., Beaudesert
Research Station, Biloela
Ridge, I. D. & B. M., Jay Dee, Pine Creek, Canungra
Rosenblatt, G., "Rosevilla", Biloela
Ruge, A. F. & V. M., "Alvir" Stud, Biggenden
Ruge, G. H. & I. E., "Al-Lester" Stud, Woowoonga, Biggenden
Salvation Army Training Farm, Riverview
Sharp, D. W. & L. J., "Arolla", Lavelle, Q., 4357
Shears, B. A., Old Bay Rd., Burpengary
Smith, R. & I. E., Lupton Rd., Beaudesert, 4285
Smyth, R., Barambah Rd., Goomeri
Thomas, F. & Sons, "Rosevale", Laravale
Vandenberg, J. J., Tamborine
Ward, R. J., "The Plateau", Mulgildie
Willet, L. J., "Wongalea", Irvingdale
Williams, W. L. & M. E., "Jindabyne", Miles
Withcott Stud Piggery, Rowbotham St., Toowoomba
Wolfenden, C. B. & J., Rossmoya
Young, W., Jnr., Kybong, via Gympie

TAMWORTH

Kanowski, S. E., Pinelands, via Crows Nest

WESSEX SADDLEBACK

Douglas, Mrs. W. S. & Son, "Greylight" Stud, Goombungee
Jurgensen, R. H. and R. R., Kildare. M.S. 1065, Boonah
Smith, C. R. & Son, "Belton Park", Goombungee

LANDRACE

Ashwell, J. & B., "Green Hill", M.S. 465, Cambooya
Ballon, E. E. & E. Maclaglan
Barrier Reef Islands Pty. Ltd., Hayman Island
Batterham, P. & N., Raby Park, Inglewood
Bertolotti, F. E. J. & N. I., "Mascotte", Wallumbilla
Bishop, N. H., Three Moons, via Monto
Brosnan, D. J., "Bettafield", Mt. Murchison, via Biloela
Cauley, J. R., M S. 918, Toowoomba
Cauley, T. P., M.S. Jondaryan 444, Rosalie
Clegg, J. A. & M. A., "Karoma" Stud, Mundubbera
Coleman, C. J., Merriland Stud, Britannia Station, Charters Towers
Cook, F. R. J., Astonvilla, Middle Creek, via Pomona
Crowle, N. & D., Cooranga North, 4408
Dean, G. F. & A. M., Home Creek, Wooroolin
Diete, E., Ingolsby, 4343
Dowling, A. M. & C. M., "The Anchor", Wutul, via Toowoomba
Dunlop Meats Pty. Ltd., Coondulla, Robertson Pk., Murray Upper
Fisher, J. & L., Lyndhurst, Jimbour
Fletcher, L., "Par-en-eri" Stud, M.S. 806, Mundubbera
Forster, I. S. & D. E., 112 Drayton Rd., Toowoomba
Fowler, K. J. & B. D., "Kenstan", M.S. 195, Pittsworth
Fowler, K. P., "Northlea", Hogg Street, Wilsonton, Toowoomba
Fowler, N. E. P. & M. P., Kingaroy
Gosdon, T. C. & E. A., "Naumai", Dalby
Graham, T., Dunleigh, Highfields, 4352
Grayson, D. G., "Wodalla", Killarney
Hinchcliffe, D. F. & R. K., "Oakview", Milman, via Rockhampton
Hockings, J. & M., "Quambi", Kumbarilla
Hudson, R. F. & V. D., "Rondel", Hogg St., Wilsonton, Toowoomba
Jones, K. B. & I. R., "Cefn" Stud, Clifton
Kajewski, C. & D. I., "Glenroy", Glencoe, via Toowoomba
Little, R. S., P. M. & G. W., "Glengarry", Jimbour
Maranoa Stud Piggery, Mitchell
Marsden, M., "Fernflat", Canaga
Marsh Pastoral Co., Brymaroo
Nielsen, L. R., "Sunny Hill", Ascot, via Greenmount
Peters, L. A., "Moonlight", Bongeen
Powell, R. S., "Kybong", Gympie
Purcell, J., "Scoria", Thangool
Ridge, I. D. & B. M., Jay Dee, Pine Creek, Canungra
Rosenblatt, G., "Rosevilla", Biloela
Ruge, A. F. & V. M., "Alvir", Biggenden
Sharp, D. W. & L. J., "Arolla", Lavelle, Q., 4357
Smith, E. J., "Avrvale" Stud, Borallon, via Ipswich
Smith, R. & I. E., Lupton Rd., Beaudesert, 4285
Trout, L. B. and L. J., "Caminda", Crawford, Kingaroy
Vandenberg, J. J., Tamborine
Willet, L. J., "Wongalea", Irvingdale

Anne Cook's farm home

Natural and Processed Cheese

IT'S not really difficult to understand the difference between natural and processed cheese.

Natural cheese is one that continues to mature until it is eaten. It has an inbuilt fermentation process that causes subtle flavour changes as time passes.

The maturing period is a very important factor. Some cheese is best consumed while young. Others need a little age to reach their characteristic ripeness.

In Cheddar cheese, for example, a young Cheddar is termed mild. Leave it for 3 to 6 months and it will become a semi-matured Cheddar. Another 3 to 6 months sees it ripen into a sharp, tangy mature Cheddar much sought after for its full flavour.

Processed cheese is cheese in which the maturing process has been arrested at a given point by heating. Both flavour and texture remain constant almost indefinitely. It does not even require refrigeration.

Processed cheese has great appeal to children because of its mild flavour. But it is also much used because it slices easily and comes in a variety of packs and sizes to suit every housewife. It is useful for cooking, and in sandwiches and savouries.

—Australian Dairy Produce Board.

Home Hints

IF you cannot resist saving the pretty paper gifts are often wrapped in, you'll know how difficult it is to remove the sticky tape without ruining the paper itself. By running a warm iron carefully over the tape two or three times, you should be able to peel it off without damaging the paper, which can then be used again.

A pad of blotting paper impregnated with disinfectant will keep the dustbin fresh if it is taped inside the lid.

Left-over scones can become light and fluffy dumplings, if placed on top of a simmering stew for five minutes before serving.

To make cut glass and crystal really gleam, wipe over with a cloth moistened with methylated spirits.

When putting away one season's clothes, before taking out the new, remove all stains and wash or clean all garments. This way your clothes will remain spruce much longer, for dirt rots clothes. While fresh stains may be easy to remove, they'll always be stubborn when left a while.

Don't thrown empty jam or fruit tins in the rubbish bin, but pack them with small items that are to be thrown away, such as peelings. Saves space and keeps the bin clean.

A handy hint when defrosting the refrigerator. Freeze the cans for the picnic cooler, then put the frozen food in the cooler. The ice-cream stays frozen. The milk and butter can also be put in the cooler and remain quite cold.

Cheese won't crumble as you cut it if you first dip your cheese knife in hot water.

Attach a key ring to the pull tab on the zip fastener on a small child's garment. It's so much easier for little fingers to pull on and off.

If your laminate-topped benches or cupboards become stained with tea or cooking spillings, wipe over with cloth or sponge to which a first-class liquid bleach has been added. Wash off in the usual way and all stains will have disappeared.

Before going on long car trips, slip a piece of plastic foam into an old pillow-case, and use it as a cushion. It's much softer than most car seats, and will prevent children's bare legs from sticking to the seat cover.

Check the Fly Invasion

FLIES kill more people than wars. The fight against this enemy of health is long and frustrating, but it must not stop.

Flies are the most unwelcomed, yet the most common, house guests. They aren't particular where or what they eat and they may begin a meal on a manure heap and they drop into your kitchen for dessert. Microscopic germs cling to the fly's legs making it possible for him to contaminate everything he touches.

To breed, flies must find a deposit of filth or decaying matter. Manure heaps, or unclean fowlyards, open garbage bins and unsealed lavatory pansteads are ideal breeding and feeding grounds for this dangerous menace.

The best way to destroy flies is to prevent them from breeding. Keep a tight-fitting lid on garbage bins. Keep lavatory and yard tidy. Try to avoid the excess use of manure on gardens. Clean grease traps as often as possible.

Don't feed flies by leaving food around uncovered. Keep lids on sugar, milk, and especially meats. Promptly dispose of your pet's uneaten food. Make your home fly-proof with screens on doors and windows.

The use of insecticides can be highly effective indoors. Your chemist may be able to recommend a brand. Don't forget to read the instructions on the container and abide by them.

If, despite your best efforts, you are still unable to control flies in or around your home, contact your local health inspector. He will be glad to help with your problem, and will appreciate your co-operation in helping to stamp out this menace.

—Queensland Health Education Council.

★ ★

Corns and Bunions

CORNS and bunions can play "the very devil" with a person's feet. No wonder some people will go to extraordinary lengths to rid themselves of persistent, nagging corns. But many totally forget the damage they can do to their feet while they're busy "treating" their corns.

A corn is produced by the skin thickening and becoming hard, usually on the toes, although corns can and do develop on the sides of and even underneath the feet. When corns occur between the toes they are moist and sodden and are called "soft" corns. The corn actually grows "upside-down"—its eye or tip is inward. Bunions are a type of arthritis of the joints of the big toes as well as being a thickened skin condition.

Ill-fitting shoes that cramp and deform the feet are the major cause. Walking incorrectly, putting one's weight more on one side of the foot than on the other, can also create these conditions. The pressure of tight shoes creates friction and because of this irritation the skin grows more rapidly and becomes changed by the pressure into a type of horn. Uneven soles of shoes are responsible for corns underneath the feet.

The best way to prevent corns and bunions is to wear roomy, well-made and properly shaped footwear. Proper hygiene is important to general foot health, too. The feet should be washed and dried thoroughly every day.

Home remedies and magic cures for corns and bunions should be avoided. In nine cases out of 10, the sufferer treating himself may end up worse off than when he started. Attempt self-treatment only if you're thoroughly capable of doing it and of doing it well.

Mostly, it's unwise for people to operate on their own corns. Often corns are situated in awkward spots. Using a razor blade to cut or shave corns can be dangerous for there is always the risk of cutting too deeply. This opens the door for possible infection and much extra pain.

Medication and cutting can relieve the pain of corns but these are best left to the reliable chiropodist or other qualified person. Young corns may respond to corn plasters, oils and lotions but the older, more deep-seated ones are less likely to respond.

With bunions, it's essential to go to the doctor for treatment.

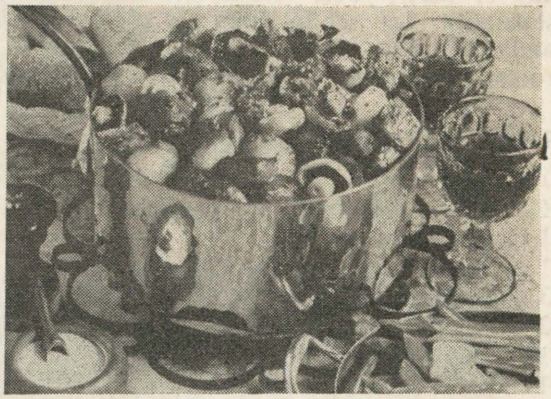
—Queensland Health Education Council.

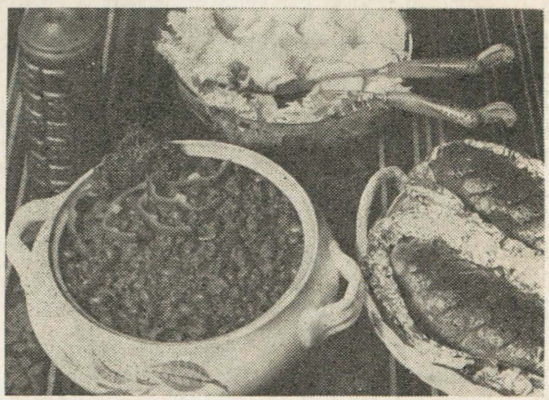
Meat Dishes For Christmas

THE Festive Season will soon be with us, the time for sharing our homes and our tables with friends. Consider making the main dish at your dinner party a red meat dish.

These recipes have been designed so that they are equally suitable for a sit-down or buffet dinner party. Serve the Bourguignon or Daube with small boiled potatoes, and other vegetables for a sit-down dinner. But, for a buffet dinner, serve any of these dishes with boiled rice or noodles, a tossed green salad and crusty garlic bread.

Because of the work involved in giving a party, thought to preparation the day before has been foremost in presenting these recipes. The flavour of all these dishes improves if prepared a day or two beforehand.





TOP. *Boeuf Bourguignon, a traditional French beef dish for festive dinner parties.*

LOWER. *Chilli Con Carne. Mexican cooking can make a big hit for a buffet at Christmas.*

Boeuf Bourguignon

4 lb. chuck, blade or round steak
¼ lb. bacon or salt pork, diced
1 large onion, chopped
3 medium sized carrots, diced
2 cloves garlic, crushed
3 tablespoons butter
2 tablespoons flour
½ cup beef stock (or use stock cube and water)
1½ cups burgundy
2 teaspoons salt
Freshly ground black pepper
1 teaspoon sugar
Bouquet garni (sprig thyme, 1 bay leaf, 2 sprigs each celery leaves and parsley)
20 small, white onions
½ lb. button mushrooms
Chopped parsley.

Trim excess fat from beef and cut into inch cubes. Place diced bacon or salt pork in a heated pan and fry until browned and crisp. Place in base of casserole dish. Add some of the butter to pan and brown meat in three or four lots, removing meat to casserole after browning. Saute large chopped onion, garlic and carrots in remaining butter, cooking until onion is soft. Stir in flour and cook for 1 minute. Pour in stock and burgundy, stirring constantly until mixture thickens and bubbles. Pour over meat; add salt, pepper, sugar and bouquet garni to casserole, cover and cook in a moderately slow oven, 325°F., for 2 hours. Sauté whole onions in butter until lightly coloured and add to casserole. Cover and cook for 45 minutes. Add button mushrooms, also sautéed in butter, and cook Bourguignon for further 15 minutes. Remove bouquet garni,

skim fat from surface and sprinkle with chopped parsley before serving. Serves eight to 10.

For preparation day before party. Cook casserole for 2 hours and refrigerate. On day of party, saute onions and mushrooms separately. Lift set fat from top of casserole and add onions. Cook for 1 hour, add mushrooms and complete cooking.

Daube of Lamb or Daube A'gneau

1 4 lb. leg of lamb (or 2 shoulders of lamb)
½ lb. bacon rashers plus extra bacon rinds
1 carrot, chopped
1 onion, chopped
3 cloves garlic, crushed
2 tablespoons olive oil
1½ cups red wine
1 bay leaf, crumbled
1 teaspoon dried thyme
1 teaspoon dried marjoram
2 tablespoons chopped parsley
2 teaspoons salt
Freshly ground black pepper
1 onion and 1 carrot, chopped
2 tablespoons butter
2 tablespoons flour
½ cup water
1 beef stock tablet
2 tablespoons tomato paste.

Have butcher remove bones from lamb. Trim off excess fat and dice into inch cubes. Remove rind from bacon and dice. Blanch rinds and bacon pieces by boiling in 1 inch of water for 5 minutes. Drain, keep rinds and half of bacon pieces for later use, add remaining pieces to lamb cubes in a glass or earthenware bowl. Add first chopped carrot and onion, garlic, oil, wine, bay leaf, thyme, marjoram, parsley and seasonings. Mix well and cover. Leave in refrigerator for 4 hours or overnight.

To cook Daube. Fry reserved bacon pieces until crisp and place in base of casserole dish. Add second chopped onion and carrot to pan with butter and cook over low heat until onion is soft. Stir in flour and cook for 1 minute. Add strained marinade, stirring constantly until mixture boils and thickens. Stir in water, stock tablet and tomato paste. Place marinated lamb mixture into casserole and pour over the thickened sauce mixture. Add bouquet garni and cover meat with reserved bacon rinds. Cover casserole tightly and cook in a moderately slow oven, 325 deg. F., for 2 hours or until meat is tender. Remove bouquet garni and bacon rinds. Skim off fat and check seasoning. Serve sprinkled with chopped parsley. Serves eight.

For preparation the day before party. Marinate meat in the morning, cook during afternoon. Refrigerate when cooked, leaving casserole as it is. On the day of the party, lift off set fat with bacon rinds and remove bouquet garni. Cover and heat in a moderately slow oven for 30 to 45 minutes.

Chilli Con Carne

2 tablespoons butter
2 large onions, chopped
2 cloves garlic, crushed
3 lb. coarse minced beef
1 green capsicum, chopped
1 x 15 oz. can tomatoes, chopped
3 tablespoons tomato paste
1 cup water
2 to 3 tablespoons chilli powder
2 teaspoons salt
Freshly ground black pepper
1 teaspoon sugar
2 x 10 oz. cans red kidney beans

Sauté onion and garlic in butter until soft. Increase heat and add minced beef. Cook, stirring often, until meat is browned. Add capsicum and reduce heat. Add chopped tomatoes and liquid from can, tomato paste, water, chilli powder, salt, pepper and sugar. Cover and simmer gently for 45 minutes. Add drained kidney beans and simmer for further 15 minutes. Garnish casserole with capsicum strips and parsley before serving. Serves eight to 10.

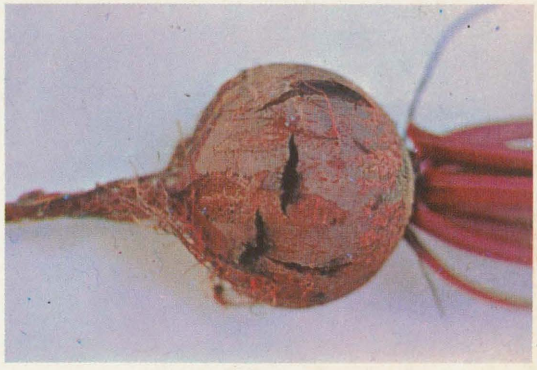
For preparation day before party. Cook dish entirely, place in a casserole dish, cover and refrigerate. Heat in oven, 300 deg. F., for 30 to 45 minutes just before required.

The standard 8 oz. measuring cup and level standard spoon measures are used in recipes. The recipes have all been kitchen-tested by Tess Mallos, food consultant to the Australian Meat Board.

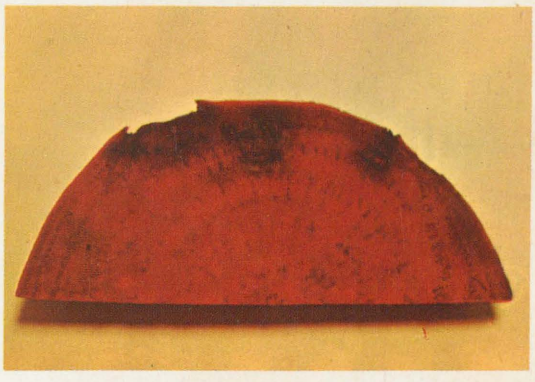
S. G. Reid, Government Printer, Brisbane

LIFT YOUR PER-ACRE OUTPUT THROUGH THE DEPARTMENT OF PRIMARY INDUSTRIES

More Vegetable Disorders



BEETROOT. Boron deficiency. External root cracking is a prominent symptom. Multiple topping is sometimes present also.



BEETROOT. Boron deficiency. Internal blackening in the root, most commonly close to the surface.

BEANS. Boron deficiency. The leaves have a pinched appearance. The growing point or flower initials may die. Multiple shooting may then occur. Pod set is generally poor.

BEANS. Acid soil injury. Leaves puckered. Yellowing of the area between the veins of the leaf. Check pH at time of land preparation. By a suitable application of lime, establish a soil pH of 5·5 to 6·5 before planting.