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The Tasmanian

Journal of Agriculture

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Editorial

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PHYSICAL WELFARE

FOR many years knowledge relating to the feeding and welfare of farm animals was far in advance of the same branch of science as applied to human beings. The feeding of farm livestock had been reduced to an exact science long before man gave serious thought to applying the same principles to himself. Even to-day it is not uncommon to meet farmers who devote much thought and attention to the efficient and economical feeding of their live-stock, but who give little or no consideration to the suitability of their own food or that of their families. It has taken a long time to appreciate that the human body, in structure and function, is essentially the same as that of the lower animals.

Sir Truby King, whose pioneer researches on infant feeding and child welfare now form the basis of juvenile welfare work in all civilised countries, first became interested in nutritional problems affecting calves on the institution's farm when he was medical superintendent at Seacliff Mental Hospital in New Zealand. He found available a wealth of information on animal nutrition, and the success which attended his efforts in applying this knowledge to the farm livestock induced him to give consideration to the application of the same principles to the young of the human race.

The success which attended his efforts is too well known to require detailed elaboration, but it resulted in a rapid reduction in the rate of infant mortality. This represented only part of the achievement—the part which could be determined by reference to statistics. A more far-reaching result has been the improved health and better physical development of large numbers of children who, although they might have survived, would not have reached the standard of health and vigour to which they have attained.

The modern methods of infant feeding and care owe their origin to the foundation work of stockowners and agricultural scientists,

and it is consequently ironical to find that town dwellers and not the rural population have, up to the present, derived most benefit from it. This is due to the fact that in cities the necessary educational work has been more easily conducted while the relative isolation of country families has handicapped the spread of knowledge relating to the new methods. It is hoped that the articles published in this Journal from the pen of Sister Green, of the Launceston Baby Health Association, will do something to restore the balance, and will assist to bring before country people information the application of which must result in the development of a healthier and consequently happier race.

It is also hoped that the gardening notes which are now being printed in each issue of this publication will likewise prove of considerable value and will result in the establishment of more and better home gardens. Every farm homestead and every farm cottage should have its garden, but, unfortunately, in country districts good vegetable gardens are not as common as they should be.

The part played by vegetables in maintaining the health of both children and adults is generally recognised, but in spite of this it is obvious that many families must be inadequately supplied with fresh, green vegetables. In many instances this is due to the fact that pressure of other work prevents the farmer from devoting time to the cultivation of vegetables for household use, but it is questionable if the saving of such time is in the interests of anybody. "Health Before Wealth" is still a good guiding principle, and the little time required for attention to a garden will seldom be a deciding factor in the success or otherwise of a farming enterprise. In the long run an unsuitable diet, lacking sufficient garden products, is likely to lower efficiency through first lowering the physical stamina of the farmer and his family, so that saving time which should be devoted to the home garden is likely to prove a false economy.

Nor should the flower garden be overlooked. The home environment plays a big part in the life of the family and the outlook and conduct of its members. Sordid surroundings must have a tendency to lead to a sordid outlook, while pleasant and neat surroundings are always inspiring. A garden frequently makes the difference between a home and a place of residence.

Financial success, although of importance, is not the only consideration in connection with rural life. Of fundamental importance is the physical well-being of those engaged in primary production. The higher the standard of health and physical fitness, the sounder is the foundation on which to build an agricultural industry.

THE INFLUENCE OF PACKING, CASE LINING AND TRANSPORT ON BRUISING IN APPLES

By P. H. THOMAS, Chief Horticulturist, and T. D. RAPHAEL, M.A., Dip. Hort., Horticulturist

FOLLOWING suggestions made by the Agent-General in the report on the 1931-32 apple season, it was decided to carry out a series of experiments in regard to bruising of apples.

It was thought that the prevalence of bruising in Tasmanian fruit might be attributed to one or all of the following causes:—

1. Unsuitable packing methods.
2. Lack of adequate case lining materials.
3. Transport and handling prior to shipment.

The simplest scheme which could be evolved to investigate these factors was as follows:—

Three shipments of 40 cases each were packed and forwarded overseas. Twenty cases in each shipment were transported by road to Hobart Wharves for export and 20 cases were conveyed by river steamer. On arrival at the wharves 10 cases from the road consignments and 10 cases from the river steamer consignments were retained for a week and subsequently examined by Departmental officers, full particulars in regard to bruising, etc., being noted. The remainder were despatched overseas for examination and report by the Agent-General.

Half the packed cases were lined with woodwool top and bottom only, whilst the remainder were packed and lined top, bottom and sides with corrugated cardboard strips. The different packs were allocated as indicated below, identification letters being branded on the various cases—

Retained at Hobart

AX—Strawboard packs sent by river steamer	5 cases
AY—Strawboard packs sent by road transport	5 cases
BX—Woodwool packs sent by river steamer	5 cases
BY—Woodwool packs sent by road transport	5 cases

Sent Overseas

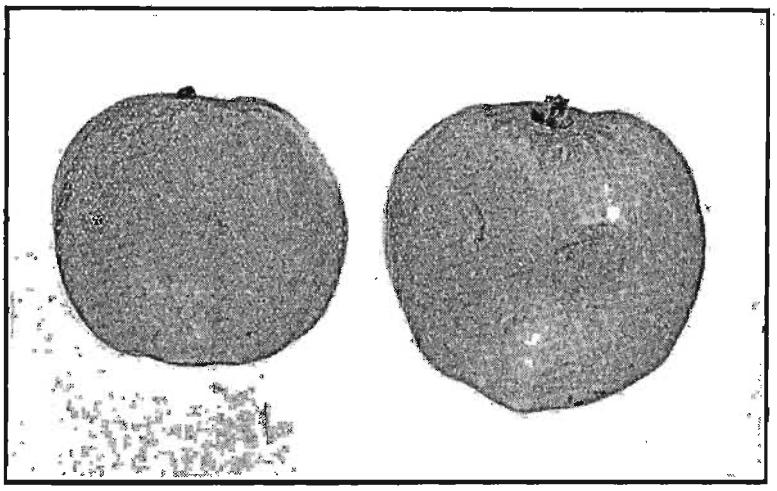
AX—Strawboard packs sent by river steamer	5 cases
AY—Strawboard packs sent by road transport	5 cases
BX—Woodwool packs sent by river steamer	5 cases
BY—Woodwool packs sent by road transport	5 cases
Total Number of Cases in Shipment	40

The following ships were utilised for the experimental consignments:—

1. "Orsova"—end of March—2½in. Duke of Clarence apples.
2. "Oronsay"—end of April—2½in. Jonathan apples.
3. "Cathay"—early June—2½in. Sturmer Pippin apples.

All the experimental cases were packed by one of the Packing Instructors. Great care was taken to ensure that all fruits were free from any visible bruises and that the cases themselves were uniform in size.

In the actual examination of the fruit, cases were opened at the top, sides, or both top and sides, and several layers removed. No really bad bruising was discovered, and it was found sufficient to divide the apples into three groups—"moderately bruised," "slightly bruised" and "unbruised." In addition to this arbitrary selection a note was taken of "case bruising"—that is, injury caused to the fruit by contact with any of the six walls of the case.



APPLES ILLUSTRATING "SLIGHT" AND "VERY SLIGHT" BRUISING

General Bruising

Results obtained from the Hobart wharf examinations and the overseas examinations are summarised in the following table:—

TABLE 1

Shipment	Wharf	AX			AY			BX			BY		
		Medium	Slight	Free	Medium	Slight	Free	Medium	Slight	Free	Medium	Slight	Free
		%	%	%	%	%	%	%	%	%	%	%	%
Orsova	Hobart	0	37	63	0	38	62	2	58	40	0	36	64
	London	14	17	69	7	37	56	8	39	53	12	36	52
Oronsay	Hobart	4	32	64	3	22	75	4	45	51	2	28	70
	London	0	67	33	0	30	70	0	70	30	0	79	21
Cathay	Hobart	5	50	45	2	41	57	10	47	43	8	55	37
	London	0	94	6	0	86	14	0	92	8	0	82	18
Summary	Hobart	3	40	57	2	35	63	6	50	44	4	42	54
	London	2	66	32	3	45	52	1	70	29	6	59	35
	Hobart & London	3	53	44	2	40	58	3	60	37	5	50	45

AX—Steamer transport, Strawboard lined. BX—Steamer transport, Woodwool
AY—Road transport, Strawboard lined. BY—Road transport, Woodwool

It will be apparent from Table 1 that, though the examinations in England and Tasmania do not correspond very closely, nevertheless, over the three shipments cases lined with corrugated cardboard contained much less bruised fruit than those only padded top and bottom with woodwool.

As regards the method of transport to the Hobart wharves, provided the cases are properly packed, there appears to be little to choose between boat and lorry.

Case Bruising

The records kept in regard to bruises directly attributable to the fruit coming in contact with the sides of the case clearly indicate the advantages of using corrugated cardboard lining.

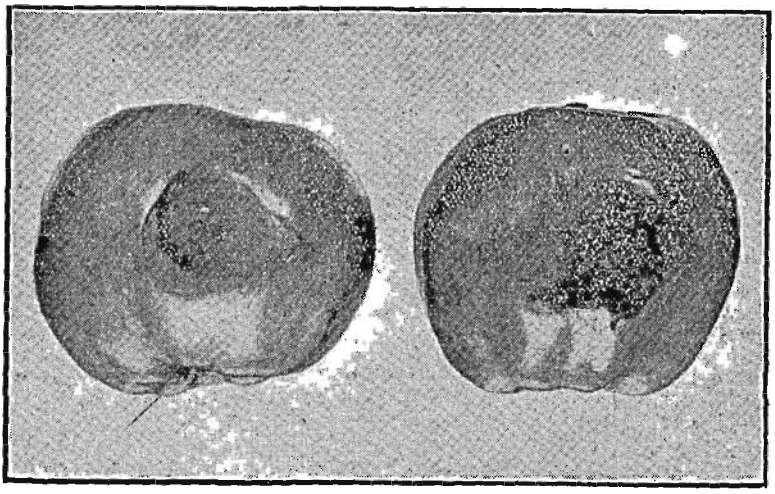
Reference to Table 2 will show that more than twice as much case bruising was present in the unlined series of cases.

TABLE 2

Shipment	Wharf	AX	AY	BX	BY
		%	%	%	%
Orsova	Hobart ...	6	6	21	12
	London ...	17	13	20	24
Oronsay	Hobart ...	4	4	12	8
	London ...	13	5	80	50
Cathay	Hobart ...	6	7	19	17
	London ...	57	48	71	23*
Summary	Hobart ...	9	9	39	23
	London ...	24	17	38	30
	Hobart & London ...	16	13	38	26

*Much bruising caused by case warping and short linings.

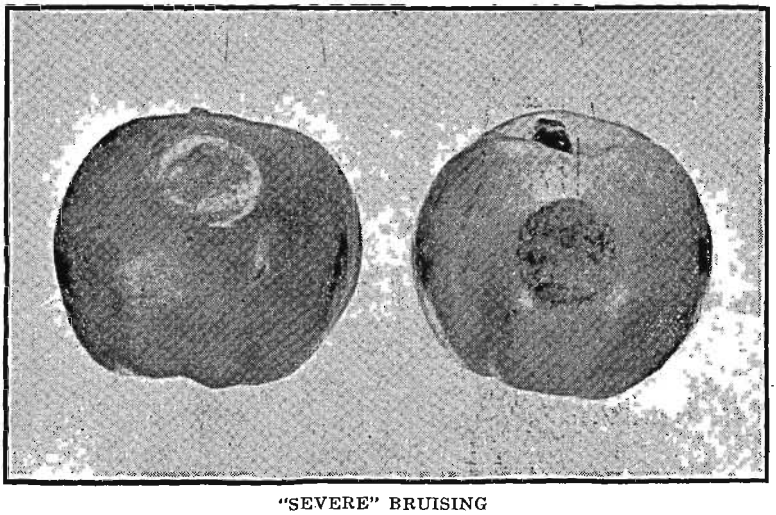
The large margin in favour of corrugated cardboard lining might have been even greater had not some of the pieces been cut rather short and normal case bruising taken place on the exposed apples. Another point of great importance is the quality of the material used. It was found that a somewhat inferior grade had been selected for some of the experiments, many of the corrugations having broken down during transport, thereby affording but little protection to the fruit during subsequent handlings.



Left: SPECIMEN OF "CASE" BRUISED FRUIT
Right: SPECIMEN OF PACKING BRUISE
Both in the "Moderate" category.

Packing Bruises

Although packing was performed carefully and fruit sized as closely as possible, in a number of instances packing bruises were fairly prevalent. A study of the packs adopted showed that where even very slight irregularity in case size or in the size and form of the fruit itself necessitated a further two apples per layer, packing



"SEVERE" BRUISING

bruises were considerably increased. It is considered that in the hardwood case more bruising damage is annually caused by excessively tight packing than to any other factor. A few examples bearing on this point might be referred to here (ref. Table 1)—

1. In the "Oronsay" shipment the apparent superiority of BY—70 per cent. unbruised fruit over BX—51 per cent. may be entirely attributed to the slacker pack adopted in the BY fruit.
2. In the "Oronsay" shipment a similar case to that mentioned above is also instanced by the better out-turn of unbruised fruit in AY—75 per cent. as compared with AX, 64 per cent.
3. In the "Cathay" shipment the slight advantage of BX (43 per cent.) over BY (37 per cent.) is largely accounted for by the tight packs adopted in three of the five cases in the former section.

This season it was not found possible to test out more than one type of case, but the results obtained seem conclusive enough to extend the same principles, with certain minor modifications, to the Canadian type of case made of hardwood and to the ordinary soft-wood case. With suitable lining material and a fairly firm pack, there seems no reason that bruising of any commercial importance should be experienced in consignments that receive the normal handling they are subjected to during transport and loading

DEVELOPMENT OF SUPERIOR SEED LINES

By R. H. BEVIN, Dip. C.A.C., B.Agr., Chief Agronomist

THE Editorial of the November, 1933, issue of the Journal dealt with the importance of pure seed in agriculture. The following extract from the editorial can well be quoted again:

"Where plant improvement work has been undertaken, the resultant increases in yield seldom amount to less than 7 per cent., while much greater increases often approaching 100 per cent. have been obtained. The economic importance of such increases will be realised when they are considered in relation to the agricultural and pastoral production of the State."

It is now universally recognised that the work of plant improvement for the production of superior seed lines lies outside the province of individual farmers and has come to be regarded as a State responsibility. The function of the Agronomy Division in the Department is to tackle the question in regard to those crops whose economic importance in Tasmania is such as to merit special attention.

Potatoes

For some years the potato crop has been subjected to examination and selection work. The result is that 56 tons of elite Brownell seed were released in 1933 to approved growers for bulking up to commercial quantities. This coming season and in subsequent years the supply of such seed will be available to high country growers, and from them seed potatoes will pass on to the commercial growers of potatoes for export on the Coast, where the superior seed will in time replace the nondescript lines generally planted. A record of this work appears in the August, 1933, Journal.

Pasture Plants

The improvement of our cereal and pasture plants was held in abeyance pending the establishment of a developmental farm which originally formed part of the scheme for the re-organisation of the Department. However, in 1932 a commencement was made in tackling the Perennial Ryegrass position. This activity followed along three lines—(1) The encouragement of the growing of the superior pasture type now known generally as Hawkes Bay or New Zealand Certified Ryegrass. (2) The investigation into the possible sources of old pasture ryegrass in Tasmania, and the exploiting of such sources commercially. (3) The selection of individual plants of superior type from a great number of samples from all parts of Tasmania, and also selection within the lines of New Zealand Certified Ryegrass.

The results of the above programme to date are:—Firstly, the successful launching of the Certified Ryegrass Scheme for Tasmania. Secondly, the determination of the fact that there are no very extensive areas offering economic scope for the production of

Tasmanian mother seed. Thirdly, the planting out of 10,000 plants of Tasmanian and New Zealand (Mother Seed) plants on which selection work is now being done.

From this beginning a start has now been made on two other pasture plants—Cockfoot and Subterranean Clover.

Thanks to the valued assistance, first, of Major H. J. Dumaresq who placed the Perth area at our disposal, and secondly, of Mr P. B. Grubb, who has given us the land at Strathroy, we have been able to make a modest commencement in our programme, which in addition to the aforementioned plants, includes further cereals—wheat, oats, barley, and also blue and grey peas.

FIELD DAY AT STRATHROY PLOTS

Cereals

Wheat-growing in Tasmania should be normally a profitable activity on mixed farms. For over sixty years now, the variety Bræmar Velvet has maintained its popularity because of its apparent suitability for the production of a highly desirable biscuit flour. It has therefore been selected as the first variety to claim our attention from the point of view of improvement for purity, type, yield and disease resistance. A number of crops were inspected in 1932-33 season, and one—that of Mr. C. F. Hall, Hagley—was found to contain a much lower percentage of impurities than any others seen, and in addition was free from covered smut. Only a trace of loose smut was discernible. From this crop two acres were rogued to remove as far as possible any heads other than Bræmar. The produce from the area was threshed separately, the machine being thoroughly cleaned out beforehand. This year, from the rogued seed 12 acres have been sown for us by Messrs. Boyes Bros. at Clarendon, while Mr. Hall has a further 10 acres. These crops, which still contain a trace of impurities, are being rogued, and as a result a limited amount of reasonably pure Bræmar Velvet seed should be available for next year's sowing.

encouraging as with wheat, as it appears that barley as an impurity is general throughout the State. However, two small areas of oats, grown for us by Major Dumaresq and by Messrs. Boyes Bros., have been heavily rogued this season, and the oats should be of a high purity from which a start may be made next season. Plant selection is being done at Strathroy, where nine plots of commercial Algerians were sown and from these some hundreds of plants have been selected for such qualities as tillering, heading, size of grain, etc. From these the individual selection will commence.

The barley crop is being subjected to examination in the same way as with wheat. A number of introductions have been made, and these are growing at Strathroy for comparison of head type and quality with our standard, Beaven's Plumage Archer, which has proved so suitable for our conditions generally, both in regard to yield and quality. An attempt will be made as time goes on to select a barley of rapid growth habit consistent with yield and malting quality—such a type would prove of the greatest value in those later districts where the sowing of the crop has often to be delayed owing to the seasonal conditions, and as a result the opportunity of harvesting an "A" grade sample is somewhat remote.

SELECTIONS OF RYEGRASS

For many years the pea crop has been of major importance throughout Tasmania, but until recently little has been done to study the question of seed in relation to yield and quality. Selected seed imported from England two years ago has shown signs of being superior to a commercial line grown alongside under exactly similar conditions. The difference being markedly apparent—probably 50 per cent. increase in the selected seed at least—it indicated

that work of selection within our grey and blue pea lines would probably yield a handsome return. This work has consequently been set in train, an area being set aside at Strathroy for the purpose.

There is no doubt, when one considers the experience of other States of the Commonwealth and also of other countries of the world, that a comprehensive effort to place the quality of all our farm seeds on a higher plane is a necessary step in our agricultural work. The interest which farmers are taking in the matter was well exemplified in their attendance in such numbers at the field day held at Stathroy on December 9th, 1933. Despite the limited area on which we have to work, it was evident that the plots aroused the keenest interest. The nucleus has been established from which work on a wider scale can readily be developed when the opportunity for expansion presents itself.

Acknowledgments

The writer would like to acknowledge here the great assistance which has been given by Major Dumaresq, Mr. P. B. Grubb, Messrs. Boyes Bros., and Mr. C. F. Hall, on whose properties work is being carried on.

DISEASES OF ADULT BEES

By H. M. NICHOLLS, Microbiologist

IT has long been known that brood diseases of bees occurred in this State, but very little attention has ever been given to the diseases of adult bees, even if it was recognised that such existed. Some investigations recently made by the writer into the causes of the dying-off of bees on a large scale in several apiaries have revealed that there are two dangerous diseases of adult bees operating actively in Tasmania. Attention was first called to the matter when a number of dead bees were received from an apiary in the Deloraine district last year. These had been sent, in the first instance, to the Government Analyst, as it was believed that the bees had been poisoned, but as no trace of any poison could be found they were sent to the Department of Agriculture for microscopic examination. It was found that the bees had died from the attacks of two diseases, both of which are known in other parts of the world. One of these diseases is *Nosema apis,* which does not appear to have been previously recorded from Tasmania, and the other is caused by the very common and widespread fungus *Trichoderma lignorum.*

Nosema apis, or microsporidiosis, is practically world-wide in its distribution, as it has been described from Great Britain, Denmark, Canada, America, Australia, Italy, Switzerland and Germany, and there is no doubt that it occurs in other countries where its presence has not yet been discovered or yet acknowledged. It is extensively spread in Tasmania, having been received during the last twelve months from widely separated parts of the State.

The organism which causes this disease is extremely minute, and consists of a single cell. It belongs to the group of unicellular organisms known as the Microsporidia. This group is not known to produce disease in human beings, but is extremely fatal to insects of many different kinds. A closely related group causes fatal diseases in fish. Where it originated, and when and where it first became parasitic on bees, does not appear to be known.

Nosema apis has three stages in its life-history. The first is the amœboid stage known as the "planont," as it is able to move about from place to place in search of a suitable cell to penetrate into the stomach of the bee. When it has effected an entrance it passes into the "meront" stage, in which it feeds and grows considerably, finally breaking up into a greater or lesser number of minute and very resistant spores. The spore, or third stage, is the means by which the disease is perpetuated and spread. All the stages of the parasite are passed in the chyle-stomach of the bee, and this is the main seat of the disease, though the spores may sometimes be found in enormous numbers in the small intestine.

The fungus diseases of bees have, within the last decade, been the subject of close study in Europe and America, where it has been found that various species of *Aspergillus* and some related

organisms were present together in the chyle-stomach. The walls of the stomach were always riddled by the fungus threads and reduced to such a state of disintegration that it was never possible to make satisfactory dissections. In many cases the outer coating of muscular fibres of the chyle-stomach was detached from the underlying cells by the mass of fungus threads.

The spores of *T. lignorum* are extremely small, averaging about three microns in diameter—smaller, really, than some of the bacteria—so that they could be readily swallowed by bees with drinking water or food. The fungus is extremely common as a saprophyte in all sorts of situations. It was first identified by the writer as *T. viride* (Pers), but subsequent investigation showed that this was a synonym of *T. lignorum* (Tode), and it was considered desirable to refer to the organism by the name under which it has been described in Europe. The fungus grew with great luxuriance in Czapek's solution agar and soon crowded out everything else. In its method of growth and the colouration of the colonies, it bore a strong resemblance to *Penicillium italicum*, one of the common blue-moulds.

[H. M. Nicholls, photo.

GROWTH OF *TRICHODERMA LIGNORUM* ON CZAPEK'S SOLUTION AGAR. (Natural size).

Several fungi grew from the contents of the stomachs of bees, including *T. lignorum, Mucor mucedo, Aspergillus herbariorum, Mystrosporium sp.* (identical with the Mystrosporium that grows on

dead apple-leaves), *Penicillium glaucum* and *Fusarium sp.* This latter appears to be identical with the common *F. oxysporum* that is found on potatoes. The only fungus that grew consistently from pieces of the stomach wall of dead bees was *T. lignorum.*

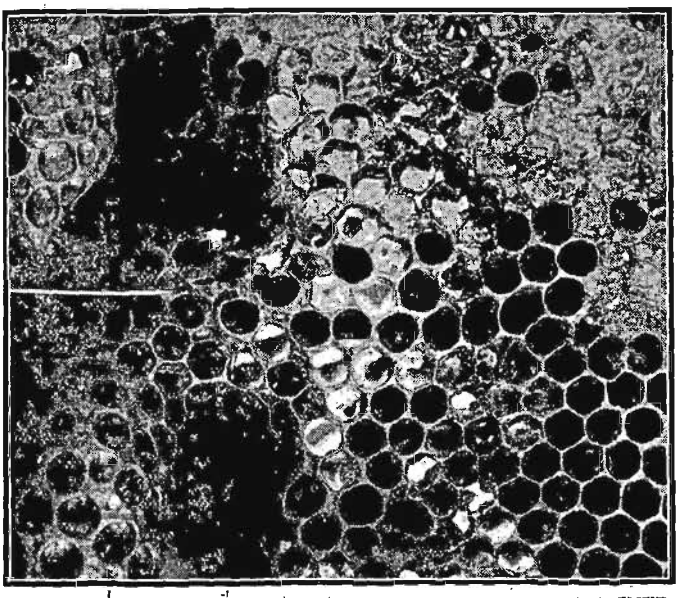
T. lignorum appears to possess great powers of resistance to adverse influences. Some of the first lot of dead bees received, which had been kept in the office in a dried-up state for over twelve months, were crushed in sterilised water and a few drops used to inoculate some tubes of Czapek's solution agar, with the result that a dense growth of *T. lignorum* appeared in a day or two. The fungus, it is stated in Cook's "Australian Fungi," has an ascigerous stage named *Hypocrea rufa.* It has several times been found in the cells of the comb from diseased hives, and it is possible that it is collected in the first instance by the foraging bees and inoculated into the cells, where it acts as a reservoir of infection for the whole hive.

There do not appear to be any definite symptoms associated either with the fungus disease or *Nosema apis,* except that the colonies dwindle away and finally disappear, and the only way to recognise either of them is by microscopic examination. No growth appears on dead bees when kept in the incubator on sterilised blotting paper under cultural conditions.

When colonies begin to get weak without any apparent cause these diseases should be looked for. Though *Nosema apis,* has been extensively studied in many countries no specific remedy has yet been found for it, though it has been shown that a great deal can be done to prevent its appearance or mitigate its virulence when it does appear.

One of the main sources of infection appears to be the drinking water of the bees, and this is especially dangerous in showery weather, as the bees invariably drink at the puddles which form about the hives, instead of going farther afield. Short intervals of sunshine tempt the bees to take flights from the hives for the purpose of discharging the contents of the intestines, and as the fæces of infected bees are always full of the spores of *Nosema apis,* the consequence is that all the surface water in the neighbourhood of an apiary where the disease exists becomes charged with infective material. The best thing to do is to keep the bees well supplied with pure drinking water, which should be placed in a situation where the sun's rays can reach it for the longest possible period. The vessels containing the water supply should be covered with a board or something to protect them from the risk of contamination by the fæces of flying bees. It is stated that the spores of *Nosema apis,* suspended in water, are killed by direct sunlight in from 37 to 51 hours.

Bees sometimes suffer from *Nosema apis* in a slight form, and appear to harbour the spores of the organism without suffering any ill effects from their presence, and thus act as carriers. It is quite probable that the disease is spread to new countries by carriers of this kind, especially amongst the worker bees that accompany new queens sent from other countries.



TRICHODERMA LIGNORUM IN CELLS OF OLD AND BLACKENED COMB. (Natural size). [H. M. Nicholls, photo.

Other means of checking the disease that have been recommended are to char the interior of all infected hives with a blow lamp and leave them unoccupied with several weeks; to collect and burn all old combs, quilts, and dead bees, and to turn over all the soil in the neighbourhood of the hives, sprinkle it with paraffin and cover with quicklime. These measures should also have considerable effect on the fungus disease, as it is quite probable that the minute spores are swallowed with drinking water. The hives should therefore be placed in a dry and well-drained situation. The combs should be regularly inspected and any showing signs of fungus growths in the cells should be immediately melted down. The frames should not be used again unless thoroughly disinfected with boiling water or some fungicide such as sulphate of copper. It is quite obvious that no preventive measures can be taken unless modern hives are used, and the presence of these diseases in the State is a very strong argument in favour of the total abolition of the old-fashioned box hive.

The following notes on the resistance of *Nosema apis* to destructive agencies have been compiled by G. F. White, an American investigator:

The spores of *Nosema apis*, suspended in water, are destroyed by heating to a temperature of 136° F. for ten minutes; suspended in honey, they are destroyed in the same time at about 138° F. The spores drying at room temperature and outdoor temperature (about 60° F.) remain virulent for about two months. In a refrigerator they remain virulent for seven-and-a-half months. Suspended in water, they are destroyed by the rays of the sun in from 37 to 51 hours. They remain virulent in honey for from two to four months, and in the bodies of dead bees lying on the soil for from 44 to 71 days. A one per cent. aqueous solution of carbolic acid destroys them in ten minutes.

THE BLUE FLEA-BEETLE

By H. M. NICHOLLS, Microbiologist

SOME complaints have been received by the Department of Agriculture recently as to injury to strawberries and garden plants by small black grubs which devour the leaves and, in the case of fruit-bearing plants, the fruit also. Specimens forwarded to the Department have proved to be in all cases the larvæ of the blue flea-beetle *Haltica pagana,* which has long been a trouble to the strawberry growers of Tasmania.

Haltica pagana belongs to the family *Chrysomelidae,* all the members of which are leaf eaters. This family includes some of the most serious insect pests known, the notorious Colorado potato-beetle being a typical example. In Tasmania there are only two Chrysomelid beetles that have earned notoriety as enemies of the horticulturist, and these are the flea-beetle already mentioned and the little silvery beetle *Monolepta subsuturalis.* This latter attacks apple trees as a rule and is seldom found on cultivated trees or plants of any other kind, with the occasional exception of raspberries. It was at one time a very common pest in orchards, where it did a great deal of damage by eating holes in the fruit, but it is now seldom heard of. This is due very largely to the extended use of arsenate of lead as a spray and to the clearing away of native bush from the vicinity of orchards.

Haltica pagana belongs to the sub-family Halticinæ of Chrysomelidæ. This sub-family includes small species which have the hind femora thickened and adapted for jumping. Flea-beetles are very common pests in Europe and America, there being quite a number of them which are destructive to garden plants, particularly those of the vegetable garden; but in Tasmania *Haltica pagana* is practically the only one that is a trouble to the gardener. It is a small, deep blue coloured beetle about a quarter of an inch in length. Its larvæ are black, grub-like creatures which may reach a length of half-an-inch and are of the typical Chrysomelid larval form. Damage is done by both beetles and grubs, but the latter are the more voracious. Both beetles and grubs attack the burr plant known as the "buzzy" *(Acaena sanguisorbae)* to such an extent as to sometimes clear it right out on large areas, and if it confined itself to this *Haltica pagana* would deserve to be regarded as a very beneficial insect. The writer has seen, on the North-West Coast, several places in which the buzzies have been nearly eaten right out and the few remaining plants have been literally covered with the little brilliant blue beetles. The "buzzy" plant is a native of New Zealand, and suggestions were made at one time that *Haltica pagana* should be imported and liberated there to form a natural control for it; but the liking of the beetle for strawberries and other garden plants of economic value led to the abandonment of the idea.

When the beetles or grubs are attacking garden plants that are not likely to be used for food for human beings or animals, they can be got rid of by spraying with arsenate of lead, at the strength usually used for the codlin moth. On strawberries the pest generally makes its appearance about the time that the fruit is well formed and beginning to ripen, when it is, of course, impossible to use arsenate of lead. An excellent substitute for this spray, however, may be found in the infusion of hellebore, which may be used with safety up to a day or two before the fruit is picked. One ounce of hellebore, steeped for an hour in one gallon of water, forms a very effective spray.

There is a large number of Chrysomelid beetles in Tasmania, but most of them feed on various species of eucalyptus or wattle and seldom or never change their feeding habits. No members of the family are regarded as wholly beneficial, though *Haltica pagana* sometimes does good work in destroying the "buzzy" plant.

SURFACE INTRODUCTION OF SUBTERRANEAN CLOVER ON RUN COUNTRY

By R. A. SHERWIN, B.Sc. (Agric.), Dip. C.A.C.,
Acting District Agricultural Organiser

DURING the last six years it has been conclusively proved that Subterranean Clover will thrive on most classes of soil and under most climatic conditions common to Tasmania. Further, when once established, its prolific growth so enhances the carrying capacity that it becomes only a matter of time and finance before large areas of pastoral country are sown down.

One of the greatest handicaps in establishment of large areas of "Sub" has been the amount of capital necessary for the purpose. In the past, the general practice has been to lay down the clover with a cover crop of oats, and though this method gives good results, in a comparatively short time it has the disadvantages of being costly and of allowing only a limited area to be sown in one season.

Trials conducted over the last three years have shown that Subterranean Clover can, with suitable management, be established in native pastures by surface cultivation. This allows not only a big reduction in per acre cost of establishment, but also permits the treatment of more extensive areas on a property in any one season. Clover introduced by this method takes longer to form a close cover than when sown with a crop, but this is more than counterbalanced by the advantages mentioned above and by the fact that the grazing of the native pasture is not lost for a long period, as is the case when the plough is used for the purpose of establishment. Further, the response of the native grasses to top-dressing and surface cultivation is such that heavier stocking is possible before the Subterranean Clover is present in sufficient quantity to have any influence.

As mentioned before, some type of surface cultivation is necessary to ensure that the seed has a chance of being covered and hence germinating. For this purpose, different implements are suitable under varying conditions. The disc (single or tandem), the stiff-tyne cultivator with narrow points, and the penetrating type of grassland harrow all do good work on soil suiting them. One stroke will usually give a sufficiently good seed bed. Where there is a large amount of roughage or tussocks it may be necessary to burn, but if the implement used is able to do good work in spite of the roughage, it is better left as it affords valuable cover for the plants in their first winter.

Early sowing, if possible before the middle of March, is important. Later sowings frequently result in poor germination and injury of young plants in the winter. Three to four pounds of seed per acre is sufficient. This can be broadcast with the superphosphate at the rate of a hundredweight per acre before or after the

soil is cultivated. If sown before cultivating, the seed has a greater chance of being covered.

Topdressing should be carried out in the second and following years. If, however, the cover is very thin after the first year it may be desirable to allow the clover to spread before applying any more manure, but generally the use of superphosphate will be justified by the increased growth of native grasses and clovers, and at the same time it will hasten the thickening of the Subterranean Clover sward.

Grazing Management

During the first year the grazing management is of particular importance. Clover is being asked to establish itself under difficult conditions, and so it should be checked as little as possible. Stock should be kept off the area until the plants have become well rooted, and then only light stocking is advisable. Again in October stock should be removed from the area to secure a good runner development, and hence a good setting of seed.

The aim should be to secure a high-producing pasture which will pay for itself in the shortest time. This can be managed only by early sowing and manuring and the adoption of a lenient grazing policy.

The grazing management outlined may seem difficult to achieve if large areas are to be treated. However, with runs which are normally closed up in the autumn and winter for use at lambing time the matter is relatively simple. Where only a part of a run is being treated it is important that the area is not too small, for under such circumstances the stock are inclined to punish the treated area too heavily, and consequently retard the establishment.

The Economic Aspect

It is difficult to arrive at a true estimate of the costs and returns likely to arise from this class of work. Seasonal conditions, soil fertility, management and prices all influence the results. However, it is possible to give an indication of what may be expected in this direction.

During the first year the cost of establishing the clover should not exceed 15/- per acre. This figure covers the seed and manure, the cost of applying these, and of cultivation. In the following years there will be the charge for topdressing (6/6 per acre) and for supplying the extra sheep necessary for the area. Additional fencing may be a further charge.

In considering the returns, one can depend that with average results the treated area will carry at least one extra sheep in its third year and at least two extra in its fourth. Then there are such factors as the improved health and greater wool yield of the stock, higher lambing percentages, and possibly of selling off cull sheep fat instead of as stores.

Normal results should see all expenditure recovered at the end of four years and ensure a substantial profit for the following years and, as well, a much improved property.

THE CULTIVATION OF LUCERNE

By D. H. MALCOLM, R.D.A., District Agricultural Organiser

LUCERNE is perhaps the oldest cultivated forage crop in the temperate regions of the world, and we find due appreciation of it from the earliest times. It appears to have been brought from Media by the Greeks during their Persian wars, towards 470 B.C. The genus Medicago to which lucerne belongs derives its name from this fact. The culture of lucerne spread to Italy and Spain in the days of the Roman Empire, but was not known in England until about 1650. Since that date it has spread to almost every corner of the world and has proved particularly valuable in various parts of Australia and New Zealand.

In Tasmania, although certain individual farmers in various localities have grown lucerne over a period of years, the crop has never become generally popular. It must be realised, of course, that as far as lucerne is concerned there are certain climatic and other factors limiting the extent to which this crop may profitably be utilised. Lucerne is a summer-growing plant, and as in Tasmania our summers are of short duration the maximum returns cannot be expected. Then again, in the high rainfall areas of the North, perennial clovers—such as Red Clover and Alsyke—will be found to give a higher average return over a yearly period, while in addition clover pastures are easier to manage and to make into hay.

Nevertheless, in the drier areas of the State there is a definite, if limited, space for lucerne in our forage crop programme. Particularly is this so in the case of the grazier who requires succulent forage to top off his fats in the early summer, or the dairyman who has a constant milk supply to maintain during the dry season of the year.

There are some fifteen types of lucerne grouped under the classification of *Medicago sativa,* but of these we need concern ourselves with but two types, viz., the common or ordinary lucerne and sand or variegated lucerne, of which latter the variety named Grimm is a selection. Grimm Lucerne is noted for its ability to withstand severe frost and cold, but does not produce a large bulk of forage.

Ordinary lucerne is the usual cultivated type, and of this many strains are available, such as Hunter River, Bacchus Marsh, Turkestan, Peruvian, Provence, Arabian, etc. Several of these strains have been tried out in Tasmania at various times, and although no detailed experimental work has been conducted, the indications are that the Australian strains are to be preferred.

Climate and Soil Requirements

Lucerne is a very deep-rooted crop, and for this reason needs a permeable soil. The most suitable soils are alluvial river flats or limestone soils well drained. Black sand over a firm subsoil is good. Stiff clays, or soils sour and deficient in lime are unsuitable.

Drainage is of paramount importance, for, although in the dormant period in winter, lucerne may stand a week's waterlogging without ill effect, it will not stand being covered with water for more than a couple of days during the growing season. Similarly, where the water table remains within four feet of the surface lucerne will not thrive. Continued cold is deleterious, as is wet weather, and it accounts for the only moderate success of lucerne in districts where the rainfall exceeds 30 inches.

The Seed Bed and Time to Sow

Under favourable conditions a field of lucerne should remain profitable for six to seven years. The life of the lucerne paddock and the yields it will produce will depend very largely upon the thorough preparation of the seed bed. Freedom from weeds is essential, and this can be achieved only by fallowing and working the land some months in advance. At seeding time the seed beds should be fine, firm and compact from top to bottom, only the surface inch being in a loose condition.

Seeding may be carried out in either autumn or spring, although where it can be conveniently managed the late spring sowings are to be preferred, as the young plants will have a chance to get well established before the autumn frosts set in.

Sowing with Cereal

This practice has been followed to a large extent in certain areas on the mainland, and seems worth a trial in Tasmania where the lucerne is to be used solely as a grazing crop. The usual method is to sow a cereal crop for hay and then broadcast five to six pounds of lucerne seed per acre and roll in. Sown in this fashion, the lucerne is well sheltered in its early stages and shows up strongly by hay harvest. After the hay is removed the lucerne should be left to harden off and get a firm grip of the ground before being fed, and it is best not to feed before April. In succeeding years it may be grazed when convenient.

Seed per Acre, and Method of Sowing

The amount of seed varies from three to four up to 15 pounds per acre. With a crop of this kind it does not pay to be economical of seed as bare patches will result in weed invasion. Weeds will soon ruin the stand. For irrigated pastures 10 to 15 lbs. per acre is recommended, and for non-irrigated lands eight to 10 pounds. The seed may be broadcast or drilled as desired. A good plan is to mix the seed with the superphosphate and sow through the manure run of the drill. If this practice is adopted care should be taken to sow the seed immediately it is mixed. The feed tubes should be removed from the discs and allowed to hang loose. Cover the seed lightly with roller or brush harrows.

The young plants are rather delicate, the first season being mostly confined to root development. For this reason it is inadvisable to graze in the first year. The field, however, should be mown in order to check weed growth.

Manuring

Lucerne, like the clovers, responds to lime, and on most soils from one to one-and-a-half tons of lime could profitably be worked into the soil during the preparation of the seed bed. At seeding, 2 cwt. superphosphate should be applied, and this dressing should be applied again as a top-dressing each spring. In addition to manuring, surface cultivation is necessary each year, and should be carried out during the winter months. For light soils the special "lucerne tickler" points fitted to the ordinary cultivator are quite satisfactory, but for heavier soils a stroke with the disc harrows followed by the tripod harrows is to be preferred. This surface cultivation will do much to keep down weed growth, and by bruising the crowns of the lucerne plants will stimulate them to a more vigorous growth.

Utilisation of Crop

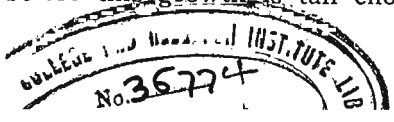
(a) Pasture.—Its succulent character and cooling effect on the animal's system make lucerne one of the best grazing crops, while in addition it is a quick fattener. Even where lucerne is grown for hay it is usual to graze the last growth, but care must be taken that sufficient leafage is left to protect the crowns of the plants from frost.

Where lucerne is grazed, care should be taken that the crowns are not damaged through too close grazing. It should be noted, also, that lucerne will not stand constant nibbling. When the paddocks are to be grazed divide them into small areas and stock heavily so that the field will be fed off rapidly.

(b) Cut and Fed.—By using lucerne as a soiling crop there is less waste then when grazed, and there is also less danger of damage to the stand from unskilful management. Then again, by this method the danger of bloat in cattle is practically eliminated.

The area should be large enough to be cut over in four to six weeks; thus, by the time the last of the plot is being cut, that cut first will again be ready. Cut lucerne just as it is coming into bloom, and if the growth is vigorous it is desirable to let it lie and wilt for a few hours before feeding to stock. Many farmers make the mistake of allowing the crop to become too mature before cutting. Certainly, if it is left until full bloom is reached a heavier cut is obtained, but the resultant forage is far less digestible and nutritious. Moreover, by cutting late the number of cuts obtained in a season will almost certainly be reduced.

(c) Lucerne Hay.—This is one of the most valuable stock foods if made with the requisite care and skill. The remarks in the foregoing paragraph regarding the time to cut for green forage may also be applied to cutting for hay, but, in addition, attention should be paid to the new growth at the crown of the plant. This new growth appears just as the crop is coming into flower, and the mower should be used before this growth is tall enough to be damaged in cutting.



It should be remembered that the leaves of lucerne hay are as high in feeding value as wheat bran, and it therefore behoves every farmer to see that, by careful handling, as little leaf as possible is lost during hay-making.

Lucerne hay is also very easily spoilt by rain, and care should be taken to cart as soon as the crop is ready. In dry, hot weather hay-making is simple and quick. The crop is mown and left for a day. The following day it is raked into windrows; two or three days later thrown into cocks. When no moisture can be squeezed out of the stems it is ready for stacking. If the hay is to be baled straight from the field the straws should be dry enough to break if a bunch is twisted in the hands.

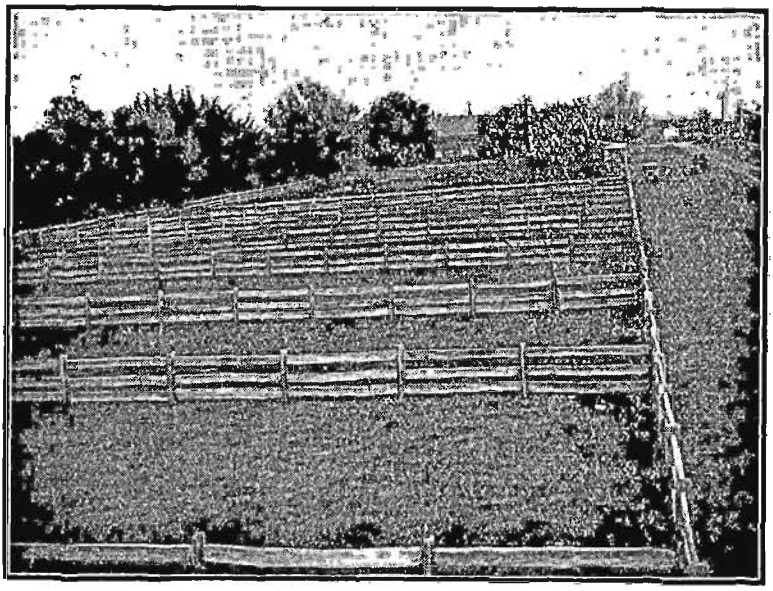
Irrigation

The land is best irrigated a week or so before seeding, and not after the seed is sown. The crust formed by the watering is broken by the seeding operations and the seed gets a quick start. The secret of successful irrigation once the stand is established is to see that the ground is always moist enough to keep the crop growing vigorously. If the soil conditions fluctuate between saturation and dryness, good results cannot be expected. Moreover, if the ground is allowed to dry out when the crop is growing it will be checked and immediately begin to flower. A watering at this stage will not encourage further growth, but instead the new shoots will come away from the crowns.

Normally, four to five inches of water should be applied at each flooding, but care must be taken to see that the water does not lie in any depressions in the field. In a normal season one watering between the first and second cuts should be sufficient, followed by two waterings between each of the succeeding cuts. In a dry season such as the present, an October watering may be desirable in order to saturate the subsoil and encourage growth. In any case, it should be remembered that, as lucerne is a deep-rooted plant, to merely moisten the surface with water will not produce the desired results.

A Young Farmers' Club may be conveniently divided into two sections—junior and senior. While boys and girls are at school they become used to holding meetings as junior members under the guidance of their teacher. After leaving school they can conduct their own meetings as senior members.

The large number of activities in which a Young Farmers' Club engages fall into two natural groups—agricultural and livestock.

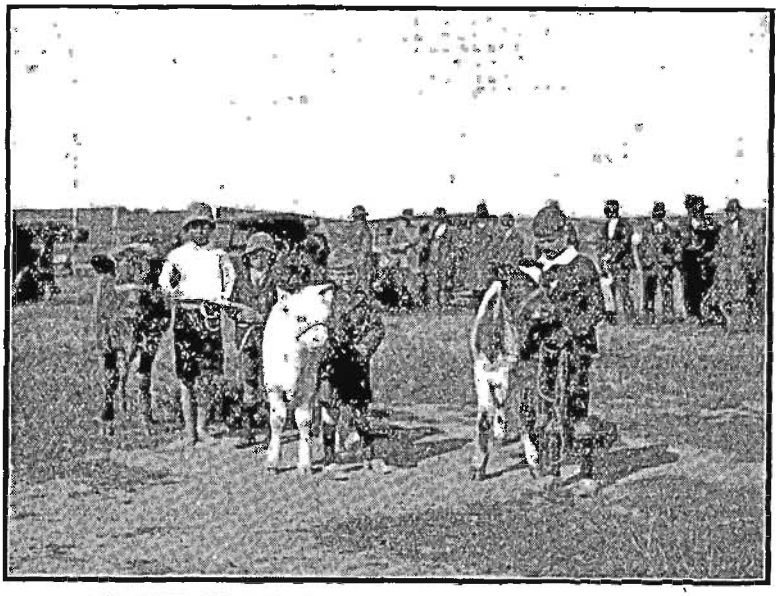


PASTURE PLOTS AT THE SHEFFIELD STATE SCHOOL

The agricultural section makes a study of the crops of the district. Plots of different varieties of cereals, pulses, root crops or pastures may be grown at the school. Different systems of crop rotation and manuring may be tried and careful records kept. A balance sheet may be drawn up, giving the cost of seed, manure, sowing and harvesting, and the return as grazing, hay or grain. If the plots are situated at the school, competitions can be arranged for the best kept records. If boys cultivate a plot at home, they can exhibit samples of produce at a field day meeting. An individual plot for each member is often favoured for horticultural work.

Livestock clubs are formed by those members who are able to secure a calf, lamb or pig, or some poultry or bees. The members of these clubs rear their stock at home according to their own opinion as to the most suitable method. At meetings they get experienced men or experts to lecture to them on animal husbandry. Records may be kept of the cost of feeding and grazing. A field day is usually held at which the members display their stock and prizes are awarded to the most successful exhibitor. It is usually desirable to hold field days before the local show, so that a team

can be selected to represent the club in competition with other clubs in the district. If the pupils are able to keep their calves into the second year, they can be fattened or brought into milk. The club can then install a Babcock testing machine, and each member can learn testing and recording. A member may sell his or her stock at the end of the year and purchase better bred young stock next year. In this way some members have become possessed of young pure-bred stock while at school. On leaving school, senior members may be able to go in for breeding. They may use a pure-bred sire to improve a grade herd, while in some cases they may be able to build up a pure-bred line of stock.

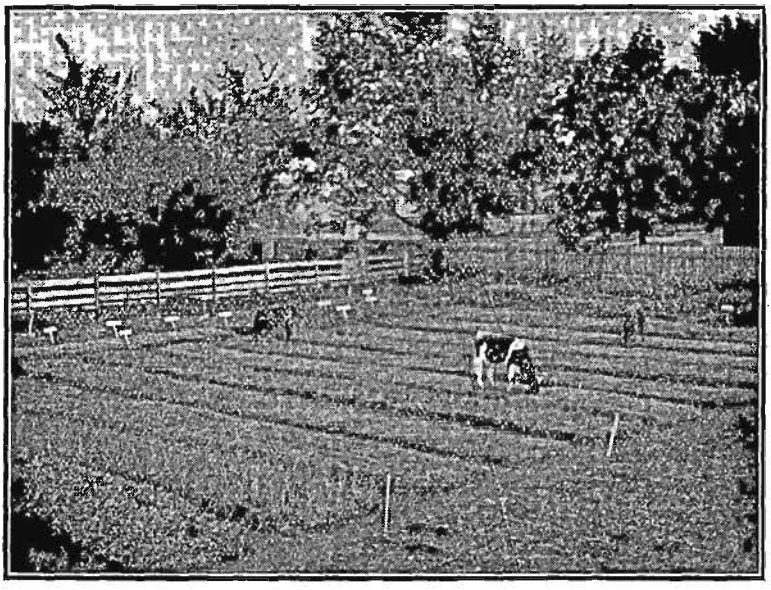


MEMBERS OF THE CALF CLUB, WESLEY VALE SCHOOL

Pasture improvement clubs are also being formed. A pasture club really comes between the two main types, and can often be run in conjunction with either. It is partly agricultural—for it requires the cultivation of the soil and the sowing of seed—and partly livestock—for, to get good results, the pasture plots should be grazed. For those who are interested in livestock, but cannot undertake the keeping of an animal at home, a pasture club is of great interest. The growing of nourishing feed is a very important part of livestock management. Members of a pasture club can keep records of the mixtures of grass and clovers sown, the effect of manures, and amount of meadow hay cut, or the number of stock carried at different times of the year.

Where there is insufficient land for an agricultural club, or where livestock are difficult to keep, horticultural clubs are often formed. Here the boys grow vegetables, and the girls flowers. A show of these is held, at which prizes are given for the best exhibits.

Whether members of a Young Farmers' Club are able to make immediate cash profit out of club work or not, there are other and more important advantages. Boys learn to feed and to care for stock; they learn to know good livestock when they see it; they see the difference in the use of feed on ordinary stock and on well-



PLOTS AT THE SHEFFIELD STATE SCHOOL

bred stock. Similar lessons are learnt in the growing of crops and pastures—the effect of manure and tillage on selected seed and on ordinary seed. Senior members are often able to have the use of land; they get used to the business of purchasing stock and fodder seed and manure; they learn something of the relationship between these commodities, and to handle them to the best of their ability.

It is well known that children often at an early age show a keen interest in a particular line of work. The Young Farmers' Club movement offers an outlet for the energies of the country boy and girl along the lines of his or her natural bent.

BREEDING FOR PRODUCTION

By J. T. ARMSTRONG, B.Sc. (Agr.), Chief Dairy Officer

ALTHOUGH during the last few years far more attention than formerly has been paid to the advantages to be gained by the use of a pure-bred bull from a high-producing strain to head the dairy herd, yet the proportion of such sires in use is not nearly as high as it might be, it is evident that far too many dairymen are satisfied to calve their herds down to a nondescript type of bull.

That the movement toward the more general use of pure bred for production sires is gaining ground is instanced by the number of sales of such bulls which are now being effected as compared to five or six years ago; but, despite the publicity which has been given to the improvement which can be effected in a herd by the use of a good sire, far too many farmers are evidently still insensible to these benefits and at the first sign of depression were content to carry on with the inferior type of bull. This is evident from the fact that as soon as the price of butterfat fell the demand for good bulls began to decline. Much of this decline may be due to the fact that prospective buyers had not the money necessary, but it is felt that if more dairymen were fully alive to the possibilities of improving their herds by the use of a high-class sire, the purchase price could have been raised in some manner.

The decline in values for dairy produce has forced all dairymen to realise that if they wish to continue in the industry they must reduce the cost of production, either by effecting some saving in working costs or by increasing yields without greatly increasing overhead expenses.

The majority of farmers have made an effort to increase production by making better provision for feeding the herd, and in most instances success has been achieved; but such an improvement is going only part way since it does not take into consideration the possibility of breeding heifers whose capacity for production will be greater than that of their dams.

The capability to produce heavy yields of either milk or butterfat is a hereditary factor, and as such is handed down to the progeny by the ancestors contained in the animal's pedigree. In this respect the herd sire exercises a very important influence since the production factors he carries in his inheritance are passed on to every calf he sires, and in most instances that will be to every calf in the herd, whereas the factors contributed by each cow in the herd are limited to her own calf.

The factors in the inheritance on which production depends are just as definite as the factors which control breed type, but they may be limited to a considerable extent by faulty conformation or weakness in constitution.

It is known by everyone that if a pure-bred Jersey bull is mated to a pure-bred Jersey cow the resultant calf will be a pure-bred Jersey and show Jersey type. Similarly, modern research work has shown that production capacity can be passed on to the progeny in just the same way.

If a bull could be obtained which was pure-bred for high production—that is, one which carried in his inheritance no factors for low production—and this bull was mated to a cow which also carried no factors for low production, the resultant heifer would be a heavy producer, since she could carry only factors for high production.

Conversely, if a bull was pure-bred for low production and carried in his inheritance no factors for high production, was mated to a cow of the same type, all the heifer calves would be unprofitable as producers.

Unfortunately, until comparatively recently, there were no available means of identifying and separating out strains or blood lines which were more or less pure for high production, or those which were bearers of nearly all the factors for low production, and as a result the various blood lines are more or less mixed, and great difficulty would be experienced in attempting to isolate strains which did not carry factors for low production.

All that can be said at present is that certain blood lines will, as a general rule, produce profitable cows; but even in the best strains low producers not infrequently crop up. As a rule, the various breeds, while being pure-bred so far as breed type is concerned, are certainly of very mixed inheritance so far as production is concerned.

In breeding a Jersey-Ayrshire cow to a Jersey-Ayshire bull, the resultant calves may show several different types; some may be apparently pure Jersey, some may approximate very closely to the Ayrshire type, and some will obviously be crossbred, some showing a predominance of Ayrshire and some of Jersey type.

Similarly, in breeding for production from stock which are very mixed so far as production factors are concerned, the same phenomena are experienced. The heifer calves may be good producers, they may be very low producers, or they may be just about average.

Reverting again to breeding to type, if a pure-bred Jersey bull is mated to a Jersey-Ayrshire cow, some calves will be absolutely indistinguishable from Jerseys, the majority will conform to Jersey type, and fewer will show the characteristics of the Ayrshire breed. By mating these heifers in turn to pure-bred Jersey bull, more of the heifers will show Jersey features, and in a very few generations the Ayrshire blood will have been bred out and all calves will be indistinguishable from pure-bred Jerseys.

Similarly with breeding for production, if a bull from a high-producing strain—i.e., one who carries in his inheritance practically no factors except those for high production—is mated to a cow whose production factors are either low or mixed, it follows that the resultant progeny will carry more of the factors for high production, and the possibility of unprofitable stock being produced becomes very much smaller. Then, if these heifers are mated in turn to a good sire the proportion of the blood of the low-producing ancestor will be almost bred out and there will be present very few of the factors making for low production.

In practice this theory is modified to a certain extent by conformation and constitution, and since it is obvious that if the

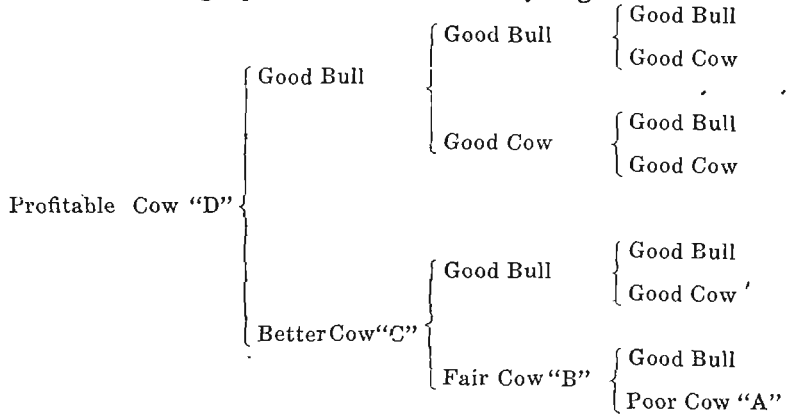
parents carry in their inheritance factors tending to cause badly-shaped udders, smallness in barrel, weakness in heart girth, or other visible constitutional faults, it naturally follows that these must, to a greater or lesser extent, influence productivity and exercise a depressing influence on the factors inherited in respect to production. These faults, however, are generally obvious and can easily be guarded against, and no dairyman should consider mating with his herd any bull which is definitely faulty in any important characters.

The factors for production, however, are unfortunately not visible to the eye and may only be detected by giving strict attention to the test records of the ancestors on the animal's pedigree, and in this respect the Pure-Bred Herd Recording Scheme is of inestimable value to dairy farmers, since from a study of the records obtained under this scheme a prospective purchaser is able to gain an idea of the production history behind the bull he is considering purchasing.

Our records, unfortunately, do not go as far back, nor are they as extensive as one might wish, but each year fuller information is being obtained. Yet, limited as they are, they are still sufficient to enable a fairly definite opinion to be expressed as to the probable inheritance of the majority of bulls being offered for sale.

It is hoped, with the steady development of the Herd-Testing Scheme, that a time will come when, from a study of records of production, it will be possible to forecast with some sort of certainty the probable yield of a bull's heifers before they actually come into production.

This is the ideal aimed at, but this objective has not by any means been reached, and the best which can be done at present is to study carefully what data is available and to discard any bulls who carry in their immediate ancestry animals which proved to be unprofitable and select herd sires only from strains on which heavy production is a feature. Then, by continuing on with sires drawn from the same blood line, it may be hoped that in each generation a greater proportion of the factors tending to low production will be eliminated until eventually a herd is obtained in which the average production is uniformly high.



The cow "A" shown in the diagram may carry in her inheritance

many of the factors leading to low production, but mated to a pure-bred bull whose inheritance for production is sound, she will, in most instances, give a calf whose record will be an improvement on her own. The heifer will obtain half her inheritance from the dam and half from the sire, and on an average she will carry only half the factors for low production which the dam carried. This heifer "B," mated in turn to a good sire, will produce a heifer calf "C," who carries the factors from two grade ancestors, but in addition the factors from four good pure-bred ancestors. She inherits only a quarter of the factors which cow "A" carried. Then "C," calving to a good bull, gives a heifer who carries in her inheritance only one-eighth of the original factors of cow "A," and these will be dominated by the factors from the other eleven pure-bred animals in her pedigree.

From such breeding the cow "D," properly cared for, should be a profitable dairy cow in comparison with the original female ancestor "A," provided that the sires selected in the different generations were from good strains.

If, however, any of these bulls carried many of the factors for low production, it is possible that such factors might combine with similar factors from the grade cow to which he was mated, and the resultant heifer would be disappointing.

It is therefore most essential, when a new herd sire is being selected, that not only must strict attention be paid to his ancestry to ensure that he is pure-bred so far as breed type is concerned, but even stricter attention should be paid to the records of production of the ancestors in his immediate pedigree.

Even where such a practice has been carefully and conscientiously followed, many dairymen have found that they have not achieved the results aimed at, but such disappointments will certainly be in the minority when compared with results obtained by breeders who have not paid the same attention to the production history behind the bull selected as the herd sire.

It is practically impossible to assess the value in a herd of a bull who is pure-bred, or nearly so, for high production, whereas the possession of a bull whose pedigree contains many ancestors of doubtful productive capacity may prove absolutely calamitous, and it will take generations of careful selective breeding to eliminate his injurious influence from the herd. One further point might be stressed, and that is, in interpreting records of production the care given to the herd in question when the records were being compiled should receive every consideration.

There are some stud owners who give their stock all the attention necessary to ensure that every cow is yielding to her utmost capacity, and there are others whose herds are given rather scant attention. It may be possible that a bull from the latter class of owner may achieve better results than a bull from the former class, even though the record of his dam may not have been as high as in the case of the other bull. In such cases it is because the dam inherited the capacity to produce and passed this on to her calves, but her own production was limited by insufficient feeding and attention. This factor must always be considered when interpreting any records.

VETERINARY RESEARCH AND THE BACTERIOLOGICAL LABORATORY

WHAT THEY MEAN TO THE STOCKOWNER

By W. E. CHAMBERLIN, M.V.Sc., Veterinary Pathologist

IT has long been recognised that the treatment of sick and injured animals falls within the scope of the veterinarian's activities. Valuable as these efforts have been in the past, the main trend along which modern medicine, both human and veterinary, is now developing is that of disease prevention. With this new development has come a fuller knowledge of disease and its cause, and this has been made possible largely owing to the perfecting of the microscope and, with such perfection, the discovery of a new world of organisms commonly called germs which must be magnified hundreds of times in order to be seen by the human eye.

One frequently hears the statement that more diseases exist at the present time than ever before. Is it not rather the case, however, that ailments which were previously linked under the one name are now recognised in the laboratory as separate?

Tasmania, in line with the other States, has a well-equipped veterinary bacteriological laboratory in which diagnostic and a small amount of research work is undertaken. At the present time activities in research are limited, largely owing to the lack of an experimental station of the type existing in New South Wales, and also in Victoria and Queensland. In these States adequate facilities are available for the keeping and handling of stock. In South Africa thousands of pounds are spent annually on the upkeep of a veterinary research station, and in New South Wales nearly two hundred acres of land, and well equipped buildings, have been set aside for the express purpose of veterinary research.

In view of the facilities already available in Australia for investigational work, why, then, does the need arise for a research station in Tasmania? Is not veterinary research a luxury which can be afforded by larger and wealthier countries only?

In answering these questions, it may be advisable to consider at some length that which veterinary research might accomplish in this State.

Tasmania has problems closely allied with those of the other parts of Australia. They are not identical, however, and treatment effective in one place is frequently of little value in another. The position may be clearly understood if germ life is likened to plant life, in which many strains of the one species exist. Just as varieties of apples thriving in Tasmania might fail in other parts of Australia, so certain varieties of Mastitis germs may be prevalent here and yet practically unknown on the mainland. So with many forms of disease organisms, and as a result vaccines which are highly effective in another State may be of little value in Tasmania.

Perhaps one of the most striking examples of a common problem is that of deficiency disease. A considerable amount of attention has already been paid to this subject in parts in Australia. In Tasmania at the present time exist belts of country which are either naturally deficient in, or have been depleted of, certain of the mineral constituents essential for animal nutrition. Stock-raising is still attempted in some of these areas, which are probably among the most deficient pasture lands in the world. Complicating the position in Tasmania is the fact that not only is there variation in the degree of deficiency, but also in type.

Based on experiments already conducted in other States, licks of various types have been prepared and placed on the Tasmanian market. Although eagerly sought after by the enterprising stock-owner, they have in many instances not only failed to satisfy local requirements, but have constituted a definite source of loss. Only by investigation into these local requirements can correct mineral supplements be ascertained.

The effect of deficiency disease on sheep and cattle alone must be responsible for an annual loss of thousands of pounds to breeders in this State. Not only may this loss be attributed to general lack of condition and stunted growth, but also to poor wool yield. Again, many of the more serious ailments of livestock have their origin in mineral deficiency, and localities are now to be found in which stock-breeding has become practically impossible, or is carried on only with extreme difficulty.

Another aspect of the problem arises from pasture improvement. Many of the so-called toxæmias of cattle and sheep can now be traced to the new conditions of intensive grazing. How much of the trouble could have been averted if veterinary research had proceeded hand-in-hand with the creation of this artificial mode of living?

Another disease which is now widespread in Tasmania, and which is responsible for heavy loss, is contagious abortion of cattle. With facilities for carrying out the necessary work, this disease could be controlled and probably ultimately eradicated.

Further avenues along which investigational work could be of the highest value are—

(a) Cattle.—Tuberculosis, and its eradication from the dairy herds of this State. Mastitis and its control. Sterility Vaginitis.

(b) Sheep.—Intestinal Parasites and Lungworm. Entra-toxæmia and Preparturient Paralysis.

(c) Pigs.—Contagious Pneumonia, Necrotic Enteritis, and Tuberculosis.

(d) Poultry.—Fowl Pox, Bacillary White Diarrhœa, Coccidiosis and Parasites.

(e) White Spot and other contagious diseases.

(f) Plants.—Survey of the poisonous plants.

The earmarking of a small proportion of the amount of annual

loss sustained by stockowners in this State would provide a well-equipped Veterinary Research Station and Laboratory. Surely, an investment of this nature, which would pay such good dividends in the control and alleviation of disease, must appeal to the man on the land who, through no fault of his own, is sustaining heavy losses.

To illustrate the comprehensive nature of the work carried on in the laboratory at the present time, a few examples may be given.

Assume that *(a)* a sheepowner suddenly loses a number of his best animals, which have hitherto appeared healthy and have been on apparently good feed. The sheep owner examines one but fails to detect any abnormality. He does the rational thing in calling in the service of a veterinarian. On post-mortem the cause of death is diagnosed as an obscure toxæmia. The veterinarian decides to take specimens and to forward them to the laboratory. In the laboratory the material is examined under the microscope and subjected to a series of tests. The condition is subsequently diagnosed as "entero-toxæmia" and the sheepowner advised accordingly. Preventative measures are then suggested in order to minimise further losses.

(b) A dairy farmer is suffering loss by reason of the fact that a number of his cows are failing to get in calf. The cows may be sterile, either permanently or temporarily. The veterinarian is called in, and he sees that this sterility may be due to one of several causes. He takes samples of blood from a number of the affected animals and sends the blood to the laboratory to be tested for contagious abortion. In the laboratory the sera and blood clots are separated and the tests set up. After twenty-four hours the readings are taken, following which the stockowner is advised as to whether contagious abortion exists in his herd. If the test has been positive, steps may be taken to eradicate the disease.

(c) A farmer finds that one of his valuable draught mares is falling away in condition and will not respond to the usual farm remedies. A veterinarian diagnoses the trouble as "ulceration of the bowel." Material is forwarded to the laboratory, where investigational work is carried out in order to discover the primary cause of the ulceration. If the investigations are successful, curative or preventive measures may be possible in the future.

(d) A poultry farmer suffers heavy mortality of unknown origin and submits material to the veterinary laboratory. By examination, and perhaps investigational work, the cause of the trouble is ascertained and steps are then indicated for preventing or minimising further losses.

(e) A fish-breeder loses fish owing to the presence of an obscure disease in his aquarium. Specimens are sent to the laboratory. Here it is discovered that the fish are affected with a contagious disease which, if unchecked, would probably destroy the majority of the fish in the aquarium and possibly spread to an adjacent pond or stream. Prompt eradication of the trouble, therefore, might be

the means of preventing the introduction into our lakes and streams of some highly contagious disease which, when once established, would seriously threaten the fisheries of the State.

It will be seen, from the examples given, that the services of the veterinary laboratory are at the disposal of those concerned in the welfare of animal life in this State. In order, however, to derive the greatest benefit from this service, the closest co-operation must exist between the stockowner and the laboratory.

Many of the diseases common to stock may be transmitted to man, often with fatal results. The utmost care must therefore be exercised, in collecting and forwarding specimens, to ensure not only the safety of the sender, but that of the officials and others through whose hands the specimens must pass before reaching the laboratory.

Again, careless handling often destroys the value of a specimen. A small piece of a diseased organ well preserved (in five per cent. formalin or in spirit) is always preferable to a whole organ unpreserved and decomposing. When forwarding bowel or stomach contents, formalin may be added unless a toxæmia (enterotoxæmia, pulpy kidney, etc.) is suspected. Smears of pus are often of diagnostic value and are best made on thin pieces of glass. Blood collected for laboratory test (contagious abortion) should be kept away from direct sunlight and forwarded with as little delay as possible. Lastly, as material for bacteriological work must be taken prior to or immediately following death, it is always preferable to forward a live animal or to notify the laboratory while live material is still available.

The veterinary laboratory has a very definite place to fill in the control and elimination of disease. Of necessity, problems continually arise. Some are elucidated quickly, but others for the moment remain unsolved. It is in tackling these latter problems that the utmost co-operation between the stockowner and the veterinarian is desirable. The veterinary laboratory should then become a storehouse of information on the more elusive stock troubles and, as such, fulfil its place in the scheme for control, and ultimate eradication, of disease.

THE GARDEN

By H. A. TURNER, Horticulturist

February and March are usually dry months and special attention is necessary to all growing vegetable in the way of hoeing and regular watering, where the latter is possible.

Winter maturing crops of cabbage, cauliflower, broccoli, celery and leek should now be established, and success with these depends, to a great extent, on good cultural treatment and pest control during the next two months.

Tomatoes will be ripening freely and if the fruit is inclined to be small, water can be used more freely than is advisable in the earlier stages of growth. Any of the tree type of tomatoes that have been grown on stakes will repay attention to hoeing and watering at the present stage by continuing to fruit until the cold weather sets in.

To get the best results from such vegetables as runner beans and cucumbers, the crop should be picked regularly as it matures. This, together with mulching or watering, will greatly prolong the cropping period and increase returns.

When the celery crop is almost full-grown, blanching should be commenced. From the time of earthing up it takes five or six weeks for the stalks to become white. First of all, clear the bed of weeds and remove all dead leaves and suckers or side shoots. Celery sometimes makes a lot of these. Then tie the bunches with wet raffia or strips of cloth and draw fine soil up around the plant. Do not earth up completely in one operation. Better results may be expected if the process is a gradual one.

Cabbage, Broccoli and Cauliflower.—Seed of the early or spring maturing varieties should now be sown. Water the plants regularly during the time they are in the seed bed and keep them free from aphis. Have a well manured and thoroughly cultivated piece of land ready for setting out the plants as soon as they are ready.

Turnips.—Although not very generally grown as an autumn crop, garden turnips will do well if sown in March or early April. Seed should be sown in fertile soil, but no fresh manure should be added or too rank top growth will probably be the result. The white varieties, such as White Stone and Early Milan, come to maturity quickly. Table swedes require the same treatment and will stand throughout the winter. They are improved by frost.

Onions.—For the spring crop, seed of early varieties should be sown in April either in rows or in the seed bed and transplanted when ready. Onions are not difficult to grow, but during the last few years many gardeners have lost almost their entire crop as the result of a disease commonly known as "white rot." It also attacks garlic, and sometimes shallot and leek. The first sign of the disease above ground is a yellowing and wilting of the foliage. An examination of the bulbs will show that the

roots have been more or less destroyed. The disease spreads quickly around the onion in the form of a white, fluffy, mossy growth which eventually enters the bulb, causing it gradually to dry up.

The fungus responsible for the trouble is introduced principally by the transplantation of slightly diseased seedlings, or by the resting stage of the fungus being transported from place to place in the soil adhering to seedling plants. Once established in an onion bed it may easily be spread over the whole garden if fragments of diseased plants are left laying about, or it can be carried from place to place on tools or implements and may remain active in the ground for five or six years.

When a crop becomes infected there is no cure and the best thing to do is to use or dispose of the sound onions and burn those that are diseased. White rot can be prevented, and the first consideration is to secure disease-free plants. To do this it is necessary that seed be sown in soil that is free from the disease. Virgin soil is best, but if that is not to be had, select soil for the seed bed in which onions have not been grown. In this way healthy plants are obtained, and if these in turn are planted on land that is new to the crop the disease will be avoided. In a small garden, soil on which onions have not previously been grown will perhaps not be available. In that case the next best thing is to set the plants in the soil that has had the longest rest from the crop.

A home garden is hardly complete if it does not include some of the more permanent or perennial vegetables such as asparagus and rhubarb. Small fruits are also a valuable addition.

Enough asparagus may be grown for the average family in quite a small space. A plot twelve feet square is sufficient if well treated. Success depends very largely on the proper preparation of the ground before planting. As a well prepared bed of asparagus will produce profitably for many years it is worth going to some trouble to establish the bed properly in the first place and also to have it in a position where it will not interfere with other gardening operations.

Asparagus beds that have been returning good crops for thirty years, or even more, are not uncommon. A deep, sandy loam is the best, but any soil that will grow a good crop of potatoes will do. The beds should be narrow—say, about six feet wide—so that tramping is avoided. Asparagus roots deeply and should be planted only in soil that has been broken up and manured to a depth of eighteen inches, while cultivation to a depth of two feet is better.

To grow a small bed for home use, choose a well-drained position and remove the soil to a depth of eighteen inches at least. Loosen up the subsoil in the bottom of the trench and mix with it a good layer of stable or cow manure, and, if available, a layer of broken bones is well worth while. Then fill in the trench with alternate layers of rich soil and stable manure. If the soil is turfy, so much the better; but if not, mix a sprinkling of bonedust with it.

Turf should not be used near the surface, or it may become troublesome as a weed. Some gardeners believe in having the surface of the bed, when completed, below the level of the surrounding ground. The reason for this is that the continual re-growth of the crowns and the necessary mulching will soon raise the bed above original ground level.

The plants are set eighteen inches apart, so that a bed six feet wide will take three rows. If they are lined each way it will facilitate later weeding and cultivation.

The plants are not difficult to grow from seed, but where only a few are required it pays to get them from a nurseryman. Although older plants are sometimes used, one or two-year-old plants are better and should be planted in July. Set the plants five or six inches deep, spread the roots carefully, cover with fine soil and add a thin mulch of old stable manure.

After planting, very little work is necessary to keep the bed in order. Deep digging will damage the rooting system, so light forking and careful weeding is all that can be done in the way of cultivation. Kainit is favoured as an annual topdressing, but if this is not available a sprinkling of sulphate of potash should be forked in in the autumn. A light dressing of sulphate of ammonia in the early spring will also be beneficial and should be put on before mulching. A good mulch is essential, the best being four or five inches of old stable manure, which is valuable as a fertiliser and also to keep the ground moist during summer.

For the first two seasons the plants will produce only weak shoots, and so that the plants may gain strength these should not be cut. The third season some of the shoots may be used, but only during a short season—say, three weeks. Subsequently, the season may be extended to about two months, after which the shoots must be allowed to mature so that the plants may build up for the following year. In early autumn, when the asparagus tops turn yellow they should be cut off at ground level or slightly below. Berry-bearing tops are sometimes cut a little earlier to prevent the fall of berries. This, no doubt, saves a lot of weeding.

CHILD WELFARE

NATURAL FEEDING OF BABY

By OLIVE M. GREEN, Sister-in-Charge, Baby Health Clinic, Launceston

IT is because baby needs the very best food available for perfect growth and development that we stress the need for the natural feeding. No intelligent parent wishes to follow a method merely because it is written down in black and white, even on good authority. The parent likes to understand why these things are done, and to be able to explain intelligently to those who criticise. Here, then, are many good reasons why baby should be naturally fed.

Mother's milk is made for the baby, so it is his birthright and a food that will produce an "A1" fitness. It is an easily assimilated food, quite free from germs, because the milk is drawn straight from the mother to the baby. One has only to think of the stages cows' milk has to go through before it eventually reaches the baby to realise the importance of this consideration.

Mothers ought not to be misled or deceived by the pictures of babies made overfat and overheavy when reared on patent baby foods and unsuitable mixtures. Nothing is easier than to overfeed and overfatten a baby by such means. Such children are seriously handicapped for life, as they lack the normal well-balanced proportionate development of muscle, bones, teeth and internal organs, which only breast-feeding can establish in perfection, during the first six months or more after birth. No food has yet been discovered that will take the place of mother's milk absolutely. There is always something lacking.

We see that the natural food produces the best baby—that is, a well-developed child who will be a joy and comfort in the home, and not a fretful, weak, sickly child who is a constant worry to his parents. He will be equipped with better teeth because he has had to work for his food, thus ensuring natural exercise for his mouth and jaws. He will not be allowed to idly lie whilst the milk dribbles into his mouth through a small-holed teat. Good food makes good blood, which in turn produces better brains and nerves.

Natural feeding helps the mother and gives her better health. The blood used in nourishing the child before birth is diverted to the breasts, and the stimulus given by the suction of the baby aids in this process. The pelvic organs react more readily and there is much less chance for the mother to suffer from displacements, which often occur at this time.

Statistics show us the low infant mortality in child life among the breast-feds, as only one breast-fed to every five bottle-fed babies dies.

Think, too, of the saving in time and money. Mother's milk costs nothing and is readily prepared for the babe.

Having convinced ourselves that breast feeding is the best for mother and baby, let me add a few simple suggestions for the mother's general health and a few points in the method of feeding baby.

The nursing mother, above all, needs freedom from undue worries and anxieties. If the mother could realise the tremendous importance of the first few months of baby's life, and for his sake put aside the worries and minor irritations of life, many cases of early and unnecessary weaning could be avoided. At first she should take up her household duties gradually, but exercise is essential to good health. Fresh air and sunshine, and sufficient rest and sleep, are needed. Her bowels must act daily and strong purgatives be avoided. Abundance of water is absolutely necessary, as water helps to make milk. Cows' milk may be given as a food, but must not take the place of water. The mother should drink a glass of water immediately before feeding her baby, as this helps the flow of milk.

The diet should be simple, but nourishing and laxative. Take three wholesome meals daily with plenty of fruit, vegetables and wholemeal bread. Apples and oranges are good fruits, and the vegetables should include lettuce, tomatoes, spinach, celery and other greens. Avoid pastry, pork, pickles, vinegar, rich foods, coffee, alcohol, and heavy meat-eating. Meat should be taken once a day only; but eggs, cheese, beans and other meat substitutes are allowable. Dates, figs, raisins, and all dried fruits are good.

When the mother is feeding her baby she should choose a comfortable easy chair or lounge, with cushion and footstool, and so make the nursing time a rest time for herself. There must be absolute quietness during feeding, as talking and noise interfere with the flow of the milk and baby's attention is detracted from his task. The nipples must be swabbed with boiled water before and after feeding, and thoroughly dried to prevent any cracking.

Feed baby regularly—every four hours for preference—giving not longer than 20 minutes' suction. Reverse the order of the breasts each feeding, but give both breasts every time—either 10 minutes from each, or 15 minutes from the first and five minutes from the second breast. Some babies get all they require in a much less time. The best feeding times are 6 a.m., 10 a.m., 2 p.m., 6 p.m. and 10 p.m., and let baby sleep from 10 p.m. to 6 a.m. Babies fed from birth only five times in the day sleep more soundly, tend to suck more vigorously, and run less risk of overfeeding. Once during and immediately after feeding, bring baby's wind up. After feeding, he must be put down in his cradle, without any jolting, jigging, or unnecessary handling or stimulation.

It is unnecessary and harmful to give night feeds, as these encourage broken rest and sleep, as well as indigestion. Do not form in baby at the dawn of life any avoidable habit which may be injurious afterwards. "Peace at any price" is surely a very poor policy. A drink of warm, boiled water may be given; see that baby is warm, dry and comfortable, turn him on his other side, and he will soon learn that the night time is sleep time. This ensures an undisturbed night's rest to the mother and establishes the baby in its proper rhythm from the start, saving him from the period of irritability, disturbed rest and slackening of growth incidental to the breaking of a bad habit a few months later. Happy is the baby who sleeps all night from the dawn of existence—who never loses this priceless gift—never becomes a victim of insomnia.

BUREAU SECTION

AGRICULTURAL BUREAU OF TASMANIA

WHERE ARE WE GOING?

By THE CHIEF EXECUTIVE OFFICER

FOR years now the Bureau has been stressing the necessity for organisation. Our plea to "Organise, Organise!" has been made so frequently that it may be taken by some as the cry of "Wolf, Wolf!"—and, just as in the fable, the wolf eventually came—so is the state of our primary producers inevitably drifting to the breaking point.

Money has to be found from somewhere to pay rent, interest, insurance, taxes, and keep fences and implements in order; to say nothing of the little personal necessities of the family. With such low returns for butter, fruit, potatoes, eggs and other things, it is hard to know just where it is all going to end.

To be prepared is the finest armour of defence. Can we as producers say that WE are prepared?

The Bureau organisation may well be looked upon as the primary producers' first line of defence. Can we say that the line is as strong as it should be? Are our reserves ready to support those who are shouldering the responsibilities?

Our future depends largely on the speed and intelligence with which we act. Producers properly organised can, and will, bring to bear their individual as well as group initiative on their problems.

Let us decide NOW, and not further delay, what we ought to do for ourselves and what the State ought to do for us — then see that it is done.

Conditions are changing so rapidly that they can only be met by prompt planning to provide some quick and effective solution. Instead of wondering where we are going, is it not time that we asked ourselves: "Here we are, what are we going to do about it?"

It is the responsibility of every man on the land to at least become a member of the Bureau organisation. There must be the will to do it, and action must be spontaneous to get the best results.

Adversity may be expected to bring to the front either the best or the worst in a community. We can solve our difficulties by getting together and making careful plans—and fearlessly carrying them out. Or we can side-step the issue until such time as the position becomes so desperate that reform is attempted by force rather than by reason.

One is almost afraid to contemplate the future of producers unless they have a strong organisation to protect them.

We should heed men of constructive ideas rather than follow those who are noted more for making a noise than for their understanding of our problems.

A PAGE FOR THE COOK

Supplied by A. C. IRVINE, Mistress Domestic Science,
Education Department, Tasmania

BANANA CHARTREUSE

4 nice bananas
2 pint packet jelly crystals
¾ pint milk
2 ozs. sugar
½ gill sherry
1 gill cream
Vanilla
½ oz. gelatine
Pinch salt

METHOD.—(1) Make jelly by pouring 1½ pints of boiling water over the crystals, then add sherry and stir well; (2) pour some of the jelly into a plain mould 1 inch deep and let set; (3) put a pattern of sliced bananas round the edge of the jelly and very gently pour a little jelly on top of bananas to set them; (4) when set, stand a smaller mould on top of jelly and fill it with water; (5) pour the rest of the jelly round the small mould and let set; (6) cut up gelatine and soak half-an-hour in the milk, then dissolve slowly, and cool; (7) add vanilla, salt, sugar and whipped cream; (8) remove small mould by pouring out the cold water and wiping round inside with a hot cloth; (9) pour in the cream mixture and let set, then turn out on to pretty dish. This is called double moulding.

GEMS

½ lb. flour
½ teaspoon salt
1 oz. butter
6 drops essence
½ teaspoon soda
1 teaspoon cream tartar
1½ ozs. sugar
1 egg
1½ gills milk

METHOD.—(1) Get oven and gem irons very hot; (2) sift flour etc.; (3) cream butter and sugar, and add the beaten egg, and mix well; (4) add milk and essence, then flour, and drop in spoonfuls into very hot, greased gem irons, and bake 10 minutes; (5) serve hot or cold (buttered.)

PRUNE AND ROLLED OAT PLUM PUDDING

1½ cups stoned, soaked prunes
1 cup milk
½ cup wholemeal
1 cup dry rolled oats
3 tablespoons melted butter
3 tablespoons honey
1 egg
1 teaspoon carb. soda
½ teaspoon salt
½ teaspoon almond essence, or any other flavouring (if liked)

METHOD.—Mix honey and butter, and add to the dry ingredients, except carb. soda; dissolve that in the milk slightly warmed. Add eggs, then prunes. You may add nuts. Stir well, steam 2 hours. Serve with cream, custard or lemon sauce.

ROLLED OAT BISCUITS

2 cups rolled oats
1 cup brown sugar
¼ cup wholemeal
½ cup melted butter mixed with 2 tablespoons hot water in which 1 small teaspoon of carb. soda has been dissolved

METHOD.—Mix dry ingredients and then add butter and water. Drop in spoonfuls on greased tins (spaced far apart) and cook slowly. Leave to cool for 1 minute before removing from tins.

RISSOLES

4 ozs. cooked meat
1 slice onion
Salt and pepper to taste
1 oz. flour
1 egg
¼ teaspoon mixed herbs
1 gill stock or gravy
2 ozs. mashed potatoes
Breadcrumbs

METHOD.—(1) Mince meat and onion and mix with the stock, salt, pepper, herbs, and potatoes and flour. (2) Stir all over fire till boiling and then cool on a plate. (3) Form into little balls and dip them into

seasoned flour, beaten egg and breadcrumbs and wet-fry. (4) Drain on kitchen paper and serve with sprigs of parsley.

APPLE CHARLOTTE

6 apples
2 ozs. butter
2 ozs. sugar
Nutmeg
Stale bread
½ gill water

METHOD.—(1) Cut bread into very thin slices and melt the butter. (2) Dip some of the bread into the butter and line a pie-dish. (3) Peel and cut up apples and put in with sugar, nutmeg and water. (4) Cover with more bread, dipped in butter, and bake for 1 hour in a moderate oven with the water.

PINEAPPLE JELLY CAKE

1 round sponge cake
2 pint packets jelly crystals
1 tin pineapples
Pinch salt
Water
Whipped cream, flavoured and sweetened
2 tablespoons sherry

METHOD.—(1) Split cake in half. (2) Cut up pineapple very small and put between the cake. (3) Stand cake in a tin a little larger than the cake. (4) Take liquid from the pineapples and enough water to make 1½ pints and put this on to boil, then strain over jelly crystals and stir well. (5) Add sherry and salt, and pour this carefully round cake till cake is covered. (6) Let set, then turn out and cut into squares and decorate with the cream.

FRUIT JELLY

1 pint packet jelly crystals
2 passion fruit
2 oranges
2 bananas
2 ozs. sugar
2 peaches or any other fruit
2 apricots or any other fruit
3 slices canned pineapple

METHOD.—(1) Make jelly with 1 pint boiling liquid, either water, fruit juice, or both mixed, and pour over the crystals and mix well. (2) Add all the fruit and sugar and let set in a fancy mould. (3) Turn out when set, and serve with whipped cream.

CHEESE STRAWS

4 ozs. scraps puff pastry
3 ozs. cheese (grated)
Salt and cayenne

METHOD.—(1) Roll out 4 ozs. of pastry left over from puff pastry and spread with the grated cheese. (2) Sprinkle a little salt and cayenne on top. (3) Fold carefully in three and roll out. (4) Roll out again twice. (5) Cut into rings and straws and bake till a pale brown. (6) Serve the straws in the rings.

PIKELETS

4 ozs. flour
¼ teaspoon salt
Nutmeg
5 tablespoons milk
2 ozs. sugar
¼ teaspoon soda
½ teaspoon cream of tartar
½ oz. melted butter
1 egg

METHOD.—(1) Sift flour, etc. (2) Beat egg and sugar, and add melted butter and milk. (3) Stir in flour and nutmeg and drop in spoonfuls on to a hot, greased pan or girdle. (4) Turn when brown, and eat cold—buttered.

VICTORIA SANDWICH
(Foundation Recipe)

4 ozs. flour
¼ teaspoon salt
¼ teaspoon soda
½ teaspoon cream of tartar
3 eggs
4 ozs. sugar
1 oz. butter
2 tablespoons milk
Essence

METHOD.—(1) Get oven and tins ready. (2) Sift flour, etc. (3) Beat eggs and sugar till they are thick and creamy. (4) Mix in the flour. (5) Put butter and milk on to boil, and when boiling stir into the mixture. (6) Add essence and pour into the well-greased tins, and cook slowly for 12 minutes. (7) Put any filling liked and stick two together, and ice top.

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Editorial

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AGRICULTURAL EDUCATION

THE complexity of the problems associated with modern methods of production and the disposal of products calls for detailed knowledge and specialised training. This has been recognised to a far greater extent in secondary than in primary industries. The result is apparent in the provision of a number of educational institutions which are concerned mainly with the training of the youth of the State for secondary industries and business pursuits while the claims of our more important primary industry have been almost entirely ignored. The balance would best be restored, not by reducing the existing educational facilities, but by supplementing them with others devoted specially to agricultural education.

In times of economic stress there is always a tendency to regard education as a luxury and to treat it accordingly. It is significant that this tendency is most apparent in backward communities and among the most uncultured individuals. Thinking men appreciate that a progressively higher educational standard is a vital necessity in a civilisation which is becoming increasingly more complex. In a democracy or self-governing community a high standard of education is doubly desirable. It was once said of a certain well-known and very facile English politician that he could survive anything but national education. The quip has a wider application.

It is desirable to distinguish between general or cultural education and specialised or technical training. In this article we are not particularly concerned with the former except to emphasise its indispensibility as a preparation for the latter. The years devoted to higher education are specially valuable, as it is then that the critical faculty and the power of logical reasoning are developed. Education will not turn a born fool into a wise man, but it is capable of developing the latent qualities in the great mass of mankind.

In connection with specialised training in this State we find that high schools and technical schools are catering principally for

those who propose to enter business or secondary industries. In addition, there are several colleges devoted exclusively to business training, and in the University we possess an institution which, as well as providing for higher cultural education, provides courses in Engineering, Law, and other vocations.

Agricultural Education is confined to one or two secondary schools which have the subject of Agricultural Science on their curricula and which devote a few hours a week to the subject. The term is also applied to certain work which is carried on in State primary schools, but such activities would be more aptly, if less ambitiously, described under the title of Nature Study. It is obviously not possible for children of primary school age to deal effectively with the science or the art of Agriculture. Nature Study is useful as part of a well-balanced cultural educational programme, and it is desirable to take advantage of rural surroundings to provide a study project; but such elementary work, no matter how valuable it may be, should not be confused with a real agricultural training.

There is another aspect of the subject which is worthy of attention. It relates to the diversified nature of the farmers' undertakings. The great majority of urban workers and executives confine their activities to a narrow field. The city manual workers, the business men, and those engaged in the professions, are required to be skilled only in one small section of the field of human industry. On the other hand, the farmer finds it necessary to engage in a wide range of activities. He must be skilled in many and varied manual tasks; he conducts a business, and his calling requires him to be something of a practical botanist, geologist, chemist, engineer, geneticist and veterinarian. In addition, his problems are complicated by the fact that he is confronted with a constantly-changing set of physical conditions due to the vagaries of the weather and the movement of the seasons—factors which make unceasing demands upon his ingenuity and adaptability but which have little influence upon the tasks of most city workers. That many farmers fail to attain a high standard of efficiency in their calling is not surprising in view of the multiplicity and the complexity of the tasks associated with modern agriculture. Under the circumstances, what is more remarkable is that agriculture manages to be conducted as efficiently as it is.

When due consideration is given to the involved nature of the farmers' tasks and to the dearth of training facilities, it is apparent that Agriculture is the Cinderella among industries. Existing facilities for agricultural education are by no means proportional to the place occupied by the industry in our national economy.

MANURES AND MANURIAL PRACTICE

By R. A. SHERWIN, B.Agr.Sc., Acting District Agricultural Organiser

No. 1: INTRODUCTION

THIS article is the first of a series which will be published to give the farmer a more intimate knowledge of the various aspects of fertilisers and the principles underlying manurial practice. As far as possible, technical terms will be avoided in order that the layman may have no difficulty in following the text.

The word "manure" is derived from the same source as the word "manual," and originally it meant "to work by hand," but during the last three centuries its meaning has changed considerably. It became the name for all the processes and materials, such as cultivation, the growing of leguminous crops and the addition of animal excrement, which helps to improve the soil; later, it was confined to those substances which were added to improve the soil and which included marl, chalk, animal remains and farmyard manure; to-day, its meaning is limited to the substances which supply plant foods to the soil directly, so that lime, chalk and marl are no longer considered as manures, for their function is mainly to improve the physical and mechanical condition of the soil and not to supply plant foods. However, lime will be considered along with the manures on account of the importance of its association and reaction with them in the soil.

Manuring is by no means a recent innovation, for in the literature of the Roman civilisation there is mention of the value assigned to animal droppings and to the effect of legumes, e.g., peas, beans, etc., on the succeeding crop; but it was not until the seventeenth century that any considerable advance in manuring was made in Britain. This advance saw the extended use of chalk, marl and burnt clay as soil improvers and the application of animal refuse, which included hoof shavings, wool, skin, fish, bones, etc. 1840 saw the commencement of the age of discovery of artificial manures. It started with the discovery of a phosphate bed in England and continued with the finding of the Chile nitrates, guano, rock phosphate and Stassfurt salt deposits. It developed with the manufacture of various manures, direct or as by-products of other industries, and lastly the manufacture of nitrogenous manures from air.

No understanding of the action of manures could be established until a study had been made of the soil, the plant and the air, and their relationship to each other. This study commenced late in the eighteenth century and has developed with increasing intensity until the present time, but our knowledge is yet far from complete. One of the first problems was to discover the secrets of plant growth, what were the food materials required and how were they assimilated. At that time the science of chemistry was in its infancy; the composition of air and water was unknown, so it is not surprising that very little progress was made with the prob-

lems relating to the plant and the soil. Various theories were advanced to explain plant nutrition, but many of them were wide of the mark; for instance, assertions were made that only water was necessary, and in another case that the soil required no manure, for if the ground was kept stirred the air would provide all the fertiliser that was required.

Once it was possible to make an analysis of the composition of plants their constituent elements could be determined, and it was found that relatively few substances were present. In plants, water is the main ingredient, while in the remaining portion, which is termed the "dry matter," more than half is carbon. This substance is obtained by the leaves from the carbon dioxide gas in the air. In the presence of sunlight the green leaves have the power of combining the carbon dioxide with water to form sugars and starch from which the carbon compounds of the plant are manufactured. The remainder of the essential plant foods are obtained from the soil and include nitrogen, phosphorus, potassium, calcium, sulphur, sodium, magnesium, chlorine and iron. Of these, the only ones of any importance in a study of manures are the first four, i.e., nitrogen, phosphorus (phosphate), potassium (potash), and calcium (lime), for they are the only ones likely to be deficient in the soil. In nearly every case there is much more of these substances present than the plant requires, but usually only a small quantity is in a form which the plant can utilise. All the other plant foods are required in small quantities which are seldom deficient, so their supplies do not need to be augmented by the application of manures containing them.

Each of the substances mentioned exists in the soil in combination with one or more other substances, and the compounds so formed are to some extent soluble in the soil moisture. The insoluble portion is of no use to the plant, for solid particles cannot pass into the root to be used as food. The plant can utilise only the dissolved part, which is absorbed by a process termed osmosis. This process hinges on the fact that the membranes or walls of the feeding cells of the root allow dissolved materials to pass through into the root. A balance of the strength of the solution is maintained between the interior of the feeding cells and the outside. When some substance—for instance, phosphate—is taken out of the feeding cell to be incorporated in the structure of the plant, the concentration of phosphate inside the cell falls below that of the soil moisture, phosphate moves from the outside through the cell wall into the cell sap, which is the name given to the solution inside the feeding cell. When each solution is of the same strength no more movement takes place until the balance is again upset. Each material in solution acts independently to maintain its own balance; the action of one substance is not affected by the presence of other compounds in the same solution. Many substances other than those essential to plant growth are present in the soil solution, and consequently find their way into the feeding cells. Only occasionally, some of these non-essentials are found when the plant is analysed, so that apparently the root has selective power in its feeding. This is explained by the fact that the plant takes from the cell sap only the materials required in its

structure and the balance of the unnecessary materials is not disturbed so that no more is absorbed from the soil.

Not only compounds, but also water passes through the cell walls and upsets the balance maintained between the two solutions. Where water is drawn from the feeding cells into the plant the strength of the solution in the former rises immediately, and to bring it back to the strength of the soil solution water passes into the plant. If, for some reason, the soil solution outside the root becomes stronger, water is immediately drawn from the root to restore the balance, and where an appreciable quantity is withdrawn these cells may collapse or wilt. In some cases the wilting is sufficiently extensive to cause the death of the plant. Heavy dressings of soluble fertilisers frequently upset the balance so much that extensive wilting will occur, and where the plants are young many may be killed. Such an action is termed "burning," and is referred to in another article in this issue dealing with the effect of superphosphate on the germination of turnip seed.

Earlier in this article reference was made to the fact that, in almost all soils, there is an abundant supply of the essential plant foods. Some authorities estimate the supply to be sufficient for more than a hundred cereal crops. However, only a small percentage of this supply is soluble in the soil moisture and hence of any use to the plant. This is named the "available" plant food and is quickly exhausted when the land is cropped continuously. The "unavailable" food becomes available slowly, but in many instances the rate of removal of one or more of the essential elements of plant food greatly exceeds the rate of its replacement, and consequently a deficiency occurs. Hence, the addition of a manure containing a quantity of the substance which is lacking will restore optimum conditions for plant growth—as fas as it is affected by food supplies—and in many cases will result in a very striking improvement. In other instances the soil may contain, in an available form, all the food a crop will require, yet the addition of a fertiliser may stimulate growth to the extent of producing an increased yield which will make manuring payable. An example of this is seen in the results obtained from manuring with superphosphate on soil which already contains sufficient available phosphate. One of the effects of an abundant supply of phosphate is to hasten and increase root development, giving the plant a greater feeding range which allows it to grow quicker and withstand dry conditions better than plants which have not received the stimulus.

The study of the nutrition of plants and of the chemistry of the soil has been accompanied by elaborate experimental and observational work in the field. This phase of investigational work has been, without doubt, of great value, for it has linked the practical man with the scentific one to their mutual advantage. The practical man has tested the theories of science and the scientist has explained the observation of practice, both to the advancement of manurial practice. Although early experiments showed that certain manures then available could be profitably used, it was a long time before the farmer could be convinced of the wisdom of using these fertilisers. Chemical manuring was an entirely new avenue opened to the farmer, and to secure its adoption the farmer had to

be educated. The early manures were believed by many to be plant poisons which might improve production for a short time but ultimately they must cause the land to deteriorate. Experience alone has been able to show that certain manures, if applied annually for a period of years, have a detrimental effect on later crops, but it has also disclosed the correct method of utilising these manures to secure their advantages and avoid their disadvantages. Consequently time, experimental evidence and education have convinced the farmer of the soundness of the practice, and to-day the inclusion of a manuring programme in farming is universal.

For some time it was thought that chemical analysis would yield definite information of the quantity of plant nutrients in the soil, and thus indicate the manures which could be used profitably. The first of these it will do accurately, but as yet soil analysis is no guide to manuring. If we want to use it for this purpose we must have a knowledge of the quantity of "available" plant food in the soil, and so far no means have been discovered to differentiate between the "available" and the "unavailable" food. To-day a large amount of soil analysis is being done, and it is hoped that by classifying soils into types according to their analysis, situation and behaviour to different treatments, the soil chemist will be able to recommend suitable manurial treatment for all classes of soils. However, little help can be expected from this source for many years, as much has to be accomplished to finalise the work.

Summary

In brief, the main points are:—

(1) The food of the plant consists of a small number of substances, some of which are obtained from the air while the remainder are supplied by the soil.

(2) These latter are taken into the plant only when they are dissolved in the soil mixture; food in this state is termed "available."

(3) The total supply of food in the soil is sufficient for many crops, but the bulk is unavailable as it exists as a solid and is not soluble.

(4) These solids dissolve slowly and thus maintain a supply of available nutrients. Where the rate of renewal is slower than the rate at which the plant exhausts the supply a deficiency occurs.

(5) Deficiencies are in nearly all cases confined to one or more of the following:—Phosphate, nitrogen, potash and lime.

(6) Manures are substances containing in a concentrated form one or more of these four essentials and are utilised to remedy deficiencies.

(7) Normal plant growth is dependent upon the presence of a sufficient supply of all the essential foods. An excess of one food will not compensate for the deficiency of another.

EXPERIMENTS IN THE TRANSPORT OF FRESH BERRY FRUITS TO MAINLAND MARKETS

By T. D. RAPHAEL, M.A., Dip. Hort., Horticulturist

EXPERIMENTS were conducted last season in the transport of fresh berry fruits to the Sydney markets. The fruits selected, strawberries and raspberries, are both extensively planted in this State, and if an economic trade could be built up to Sydney and perhaps other mainland ports this should provide a useful outlet for any surplus production.

Unfortunately, only a limited amount of cool storage is available aboard the interstate vessels trading direct from Hobart, and only a very small proportion of this is run at temperatures which would be suitable for soft fruits. Under these conditions a possible solution appeared to be some type of returnable ice chest standardised in size and constructed in such a manner that it could be stored as ordinary deck cargo. Additional advantages accruing from such a container would be that with the replenishment of the ice in the tank fruit could be held or transported inland at low temperatures until sold to the consuming public.

Case Construction

Preliminary laboratory trials were conducted on a small scale using airtight insulated cases of different types; several of these had to be discarded either on account of weight, bulk, or unsatisfactory insulating properties. It was intended that the fruit for these cases should be first pre-cooled down to a temperature of about 35 degrees.

The unsuitability of the more cumbersome and complicated types was soon revealed, and with the necessary reduction of insulation the need for small ice tanks became evident. Accordingly, several types of ice tanks were constructed, the proportion of ice to the fruit being varied from about 1 to 3 to 1 to 6. From observations made a ratio of 1 to 4 would appear to be most suitable, though in the actual shipments the minimum of ice stated (1 to 6) produced reasonably good results; the quantity and compactness of the pre-cooled mass of fruit have, of course, a considerable bearing on this point.

Cases Selected for Shipment

Two cases were eventually selected for experimental shipments, one with internal measurements 15½" x 15½" x 14" high, with a capacity of 24 punnets (1 lb. each, 5" x 5" x 3"), and the other built on more commercial lines with internal dimensions 24" x 20" x 19" and having a capacity of 80 punnets. Each of these contains a central ice tank which divides the cases into two compartments of equal size. Tanks placed in this position were found to be more convenient and efficient than when affixed to the lid. Illustrations of the cases, together with complete descriptive matter, are given in Figures I. to III.

Fruit Selected for Shipment

In order to try and simplify the experiments as much as possible, both strawberries and raspberries were tried in each shipment —in the first (13/1/34) 12 punnets of each fruit, and in the second (20/1/34) 50 punnets of strawberries and 30 punnets of raspberries. Good strains of Ettersburg "tree" strawberry were used, and a fairly good type of Red Antwerp raspberry was obtained. Owing to the short season and lateness at which the fruit shipments were started, experiments were of necessity confined to these varieties and no opportunity was given for trying such large, high quality raspberries as Lloyd George or strawberries of the Royal Sovereign type.

To reduce the time between picking and shipping, fruit was gathered on Friday afternoon and transferred to cool store almost immediately, being finally placed aboard the "Zealandia" for Sydney on Saturday morning. This procedure was adopted as far as possible

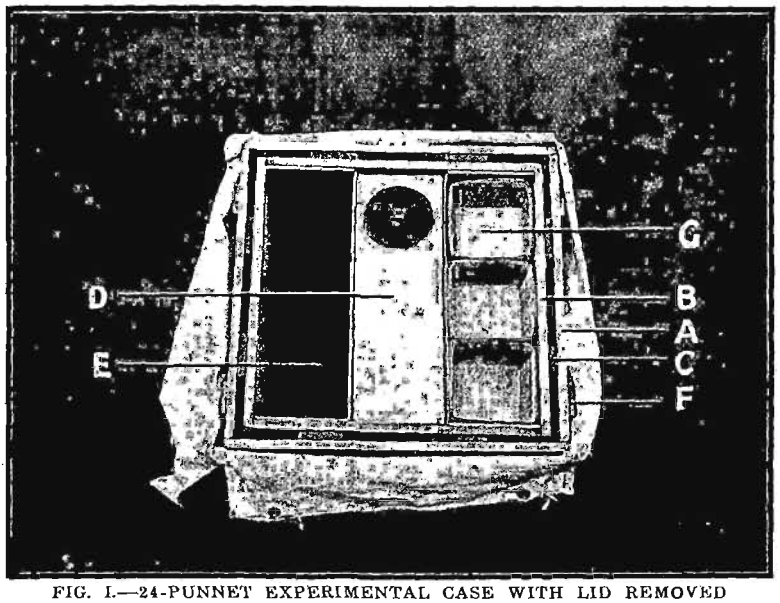


FIG. I.—24-PUNNET EXPERIMENTAL CASE WITH LID REMOVED

External measurements, 18½" x 18½" x 15¾" high

Inside measurements, 15½" x 15½" x 14"

A—Outer case of ½" pine. B—Inner case. C—Insulating strips forming air jacket. D—Ice tank (15½" x 13½" x 5") with slatted ply-board screens on either side. E—Bottom punnet dividing-slat resting on felt lining. F—Strengthening side batons. The overlapping lip of the lid rests on these when the case is closed down for export. G—Top row of punnets.

with both shipments, though on the second occasion picking commenced on Friday morning and the "Zealandia" did not leave Hobart until Saturday evening, which actually necessitated an extra 18 hours storage.

The strawberries selected were of average maturity, perfectly sound and free from bruised or broken skin, and in all cases had the stalk attached. It was considered that by observing such points the danger of fungal rots or wilting would be reduced to a minimum.

When selecting the raspberries, careful attention was paid to maturity, and firm fruits which were just turning to deep red in colour were eventually chosen as the most suitable. A few punnets of firm but dark red berries and several definitely light red colour were included for experimental purposes. These all arrived at Sydney in good order, but the former rapidly collapsed on exposure to the high temperatures, and the latter wilted to some extent and were of poor flavour. Strawberries picked slightly under-ripe were particularly poor in flavour on arrival at their destination.

Pre-Cooling

Previous work on the cold storage of berry fruits has shown that temperatures approaching 32 degrees are not altogether satisfactory if it is intended that the fruit should be eventually marketed fresh in the ordinary way. Accordingly, a temperature ranging from 35 to 40 degrees was aimed at in the pre-cooling chamber. In the second shipment raspberries were pre-cooled at two temperatures—33 degrees and 38 degrees; on examination in Sydney those punnets pre-cooled to 38 degrees opened up favourably and in subsequent storage appeared to justify the employment of the higher temperature.

No experiments were made to ascertain the optimum duration of the pre-cooling period, 15 to 16 hours being used throughout the tests. In the first shipment fruit was packed straight into the case and the whole placed in the cool chamber, intact. Owing to the dimension of the second case used, this was not possible, the fruit being packed in the case after pre-cooling. This latter system has several advantages. Not only is the fruit cooled more rapidly, but the punnets may be topped up prior to shipping, or, alternatively, may be heaped up prior to pre-cooling to ensure full punnets after settling and shrinkage have taken place at the lower temperature.

The possibility of pre-cooling the fruit by means of the ice tank alone was investigated during the trials. In carrying out this system it is necessary to pack the fruit in the case after picking, fill the ice tank and leave the whole with the lid removed for a few hours; then close down overnight. Prior to shipping next morning the ice tank is emptied, refilled with fresh ice and the box lid secured in the usual way. When such a system is adopted the ratio of ice to fruit should not be less than 1 to 3 for best results. Large ice blocks may be cheaply obtained and should prove reasonably satisfactory where the grower intends to pre-cool and ice the fruit in his own packing shed.

Packing

In the present experiments the cases used were constructed to take the 1lb. punnets or "chips" in which berry fruits are universally marketed. Much more elaborate designs could be constructed for similar returnable cases employing the sliding, shallow trays for first-class dessert fruit, and growers might easily improve along these lines should the markets eventually demand such. Both lined and unlined punnets were tried for both strawberries and raspberries.

The cases illustrated show the system of packing. Ply-wood slats separate the rows of punnets, the cross-pieces giving about

⅜" clearance between each row to allow for a slight bulge of fruit in the punnets. The cross-pieces are spaced so as to rest on the transverse sides of the punnets. The placing of the dividing slats might be rendered more secure by vertical grooving of the sides of the inner case.

The bottom of the inner case is lined with detachable thick felt which serves the double purpose of insulation and shock absorber. A possible third use might be an absorption medium for any excessive moisture caused by the sweating of the fruit, though in the present experiments this was practically negligible and with good management should not occur. The bottom slat is placed on this felt before packing the first row of punnets, and a further slat is

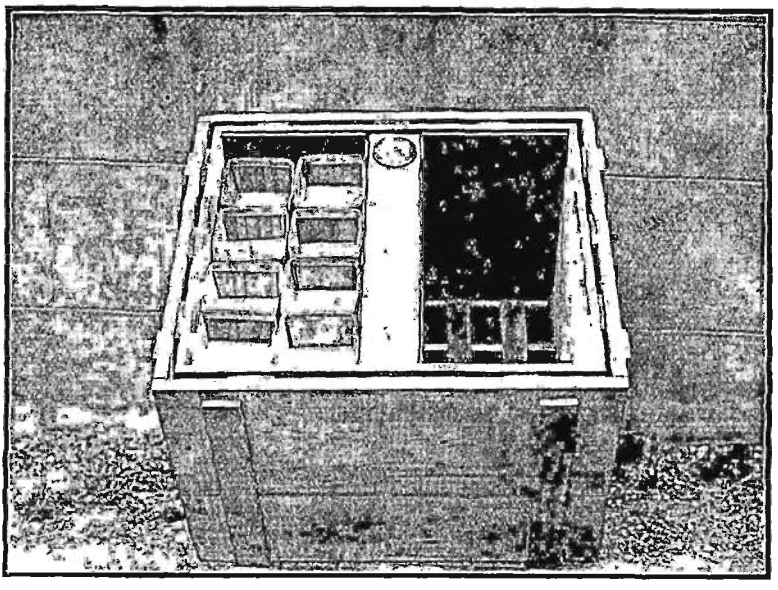


FIG. II.—80-PUNNET TRIAL COMMERCIAL CASE

External measurements, 28" x 24" x 21" high
Inside measurements, 24" x 20" x 19"

This case contains 5 layers of 8 punnets each on either side of the central ice tank. Strengthening side batons are placed as before, whilst corner irons and a single horizontal 1" iron strip are also advisable.

placed over the top row of punnets for protective purposes. Between the top slat and the lid a small roll of corrugated cardboard will serve to keep all the punnets in place should the need arise through careless handling. The lids used were close fitting and detachable, being held firmly down by straps; a successful type of hinged lid could, doubtless, be devised for this purpose and would facilitate handling. In the larger cases handles were fitted to the sides, but it was eventually found that a small cross-piece of 1" board was sufficient for ordinary handling, carrying being most easily performed by holding at the bottom corners. The packed cases were finally enclosed in canvas covers; these served several purposes—

(1) Additional insulation and protection against the sun;

(2) Protection against possible wash or damp deck;
(3) Cleanliness, labelling and handling.

A wool-pack was used with the large case, and though making the container less attractive in appearance, served other purposes admirably. To ensure that the cases would be placed the right way up a label was affixed to this effect.

General Results and Observations

Both consignments of fruit arrived in good order at Sydney and were very favourably commented upon by the trade generally.

The first consignment had a particularly favourable passage throughout; not only was the fruit gathered dry and taken from a bed which had been thoroughly picked over two days previously, but less than 18 hours elapsed between gathering and despatch from Hobart. The shade temperature on arrival in Sydney was only 80° Fahr.

As a contrast to this, much of the fruit in the second case was picked wet and taken from a bed which had not been picked over for four days. In addition, a period of 30 hours elapsed between picking and despatch, and the external temperature on arrival in Sydney was over 100° Fahr. The severity of this test is even greater when the low ratio of ice to fruit in the large case is taken into account.

Some fruit from both consignments was held for a few days in Sydney, but moulds did not occur extensively within a reasonable interval allowable for distribution and sale.

Paper-lined punnets were found advantageous in the first consignment, but amongst the berries which were harvested wet the paper appeared to encourage the development of moulds.

It was noticeable that raspberries showed signs of distress before the strawberries, when retained for a further period on arrival.

Financial Considerations

The construction of such complicated types of case naturally leads to the question of cost. The price of the original 80-punnet container constructed at the joinery factory amounted to £3/15/- and the ice tank cost a further 17/-, making a total of £4/12/-. As many growers, however, are sufficiently adept at carpentry to construct such cases themselves, provided suitable pine and plyboard timber is available, this price might easily be halved. Working, therefore, on the fairly conservative estimate of £2/10/-, the initial overhead charge per pound of fruit carried would be approximately 7½d. However, as the cases are returned it might be possible, in a season lasting from December to February, to use a single case at least six or seven times, reducing the overhead charge in the first season to about one penny per lb. A grower who intended to ship regularly each week would require two such cases, though if disposal were rapid it would be possible to ship from Hobart on Saturday and have the empty returned from Sydney the following Wednesday.

Transport charges are more difficult to assess; as a guide, however, freight to Sydney and return freight on the empty case might

be reasonably placed at 5/-; whilst Marine Board charges and wharfage rates in Sydney would probably amount to a further 2/6 per case.

In addition to these charges there will be depreciation and local cartage. No figure can be given for the latter as it will largely depend on the distance of the exporter from wharves, the presence or otherwise of regular transport services, and whether the grower can provide his own transport. The estimated costs on a single 80lb. container would approximate 1½d. per pound of fruit carried.

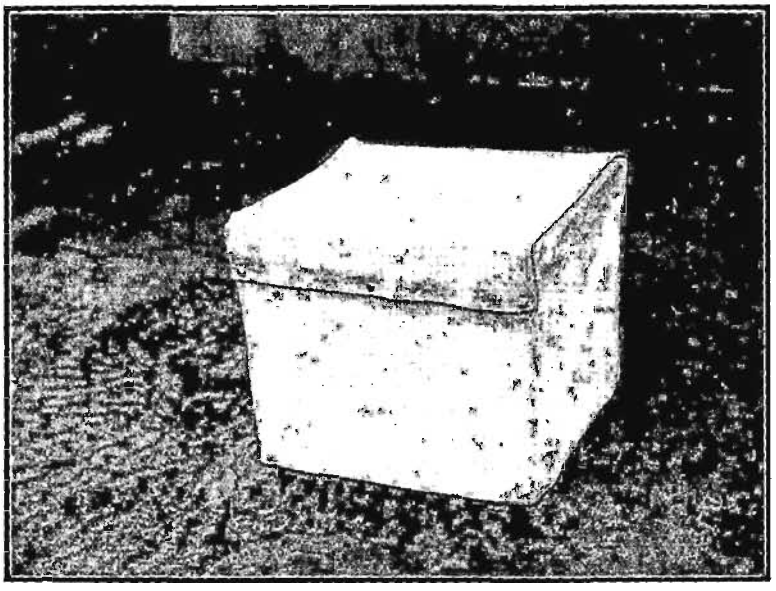


FIG. III.—CASE PACKED AND READY FOR SHIPMENT
Secure roping or strapping is essential.

The prices realised for the fruit will, of course, depend largely on the market; but from experiences in the past experiments, no difficulty should be encountered in obtaining from 12/- to 15/- per dozen for good strawberries. The present demand for raspberries in the fresh state does not appear to be great, but could doubtless be stimulated by publicity and other means should the occasion arise.

Thanks are tendered to Mr. H. W. Piesse for his advise and assistance in the construction of the cases, to Mr. F. S. Hanton for his co-operation in the handling and pre-cooling of the fruit, also to the Chief Officer of the "Zealandia."

Summary and Conclusions

From the experiments carried out and described above, there would appear to be little difficulty in landing commercial quantities of fresh, sound Tasmanian raspberries and strawberries at Sydney and perhaps other Northern markets, provided that—

(1) Reasonably airtight, insulated cases of a type similar to those described, are employed, the ratio of ice to fruit being not less than 1 to 5;

(2) Only perfectly sound, dry fruit, picked at the recommended stage of maturity is used;

(3) Picking is carried out as shortly before shipment as possible;

(4) Thorough pre-cooling to 35° Fahr. is carried out shortly after picking.

On arrival at their destination, quick distribution to the consumer will ensure the most satisfactory results, though if the fruit is left in the container and the ice tank is refilled, little immediate loss is likely to be experienced under normal conditions.

From observations made in Sydney and the general handling of those cases tested, it would seem that an intermediate sized case holding 48 punnets would be the most generally satisfactory for the trade. Measurements would be as follow:—

External, 28½" x 18½" x 15¾"
Internal, 25½" x 15½" x 14"

This case is actually an enlarged type of the small experimental container (Fig. I.) having 24 punnets on either side of the central ice tank instead of only 12, and will combine ease of handling with an increased ice ratio to that existing in the 80-punnet case (Fig. II.) already tried.

MORTALITY IN SHEEP, ASSOCIATED WITH POISONING BY PIMPERNEL (ANAGALLIS ARVENSIS)

THE Department of Agriculture directs the attention of stockowners to the fact that a number of deaths have occurred in sheep through grazing on fallow land infested with the above weed. The attention of stockowners is drawn to the danger generally of grazing sheep on fallow where certain types of weeds predominate and where there is no grass or cereals to balance up the ration.

It appears that certain weeds, of which the pimpernel is one, if taken in large quantities have a serious effect on the stock, and the practice of turning sheep from the bush to fallow where this weed exists is fraught with danger.

The Department has at least three records of heavy mortality occurring as a result of sheep feeding on this weed, and sheepowners should guard against the possibility of trouble by preventing sheep gaining access to the paddocks where the weed grows in profusion and by cultivating the paddocks on which it grows.

Pimpernel *(Anagallis arvensis)* belongs to the order Primulaceæ and is a common weed of gardens, waste places and fallow ground. It is a neat, much branched annual plant which grows along the ground; the branches are from six inches to a foot long and the leaves are placed opposite to each other and are attached close to the stem. The plant has a small, star-shaped flower of a bright or pale pink colour. The seed capsule is globular and about the size of a peppercorn.

The sheep which graze heavily on this weed are affected with staggers, constipation, succeeded by blood-stained diarrhœa, and a severe inflammation of the stomach and intestines. If this inflammation is far advanced treatment is of little avail, but in the early stages the sheep may be given a purgative followed by a powder consisting of chalk (½ oz.), catechu (30 grains), powdered opium (20 grains), given in gruel two or three times a day.

Chief Veterinary Officer

COMMON FARM WEEDS: THEIR CHARACTER AND CONTROL

By R. H. BEVIN, Dip. C.A.C., B.Agr., Chief Agronomist

APART from some old cropping areas, farm lands are free from bad weeds, and on properties where some of these exist measures for eradication or control, if promptly taken, can effectively limit the damage and economic loss resulting from their presence in the soil. In many cases failure to identify weeds in the early stages of infection leads to serious trouble later on. The old adage, "One year's seeding means nine years' weeding," is very true of the majority of the troublesome weeds.

In this and succeeding articles the weeds most common to Tasmania will be dealt with. All those mentioned are undesirable members of our farm plant population, but not all are necessarily "noxious," while under certain systems of management and control their capacity for creating trouble is severely limited.

Section 1: Cruciferous Weeds

This section deals with weeds belonging to the cabbage family of plants. Its best-known members are Wild Turnip (Charlock), Wild Radish, Mustard and Hoary Cress (White Weed).

WILD TURNIP, or CHARLOCK *(Brassica sinapistrum)*, is well known for the bright yellow colour which it imparts to our fields in late spring and early summer. It is an annual weed with a strong tap root and stems which grow from 18 inches to three feet in height. The leaves resemble those of the ordinary white or garden turnip, being broad, dark green, and roughened by the presence of hairs on the surface. The bright yellow flowers are from half to three-quarters of an inch in diameter, and consist of four petals in the shape of a cross, a feature characteristic of all the cruciferous family of plants. The seed, which is small, black and hard, somewhat like that of turnip, sets in long, narrow "pods" which, when quite ripe or during threshing, split and liberate their contents.

The persistent vitality of the seed in the soil is the greatest obstacle to the control of Wild Turnip, and although in some cases pulling can be employed where the weed is not too firmly established, in old infected land it flourishes strongly, making heavy demands on the plant food and moisture supply of the soil, and thereby lowering the yield of the cultivated crop with which it is competing. Wild Turnip seed has been known to live in the ground for over 50 years, and hence fallowing for eradication is impracticable.

Where heavy infestation of land occurs the presence of Wild Turnip is best controlled by adopting a system of farming such that when a grain crop has to be grown the land will be in the best possible heart to enable the crop to withstand the weed growth. This means the growing of fed-off crops and the laying down of the

land to pasture for a number of years, a practice which under present prices for farm produce is likely to prove most profitable in any case.

Spraying of Charlock has been experimented with in Tasmania, but the cost of the treatment and lack of equipment on the farm has discouraged an expansion of the practice. Copper Sulphate (Bluestone), 16 lbs., with water 50 gallons, will spray an acre and effectively control the weed without any ill-effects on cereal crops. Sulphate of Ammonia has been used also, it being contended that it is even more efficacious than Bluestone, as the nitrogenous fertiliser stimulates the crop after application.

WILD RADISH *(Raphanus raphanistrum)* occurs in much the same way as does Charlock. Its flowers, however, are white in colour, while the seed pods are much thicker, longer, and are jointed between the seeds. They break into sections at threshing time and form a troublesome impurity in wheat and oats owing to difficulty in removing them by dressing machinery. Like Charlock, it is an annual, but there is no simple control treatment. Land heavily infested should, as mentioned before, be laid down to pasture and not used for grain unless it is absolutely essential.

HOARY CRESS, or WHITE WEED *(Lepidium draba)*, has, fortunately, not become widespread in Tasmania. It is perennial, with strong, creeping roots. The plant grows one foot to 18 inches high, with strong stems branching near the top; the leaves are whitish green and the flowers are white, small, and in clusters at the end of the stems. The seed pods are heart-shaped, thick-walled, and persist in the soil for considerable periods.

Control of White Weed is extremely difficult owing to the "twitch-like" habit of its root, and although exhaustive summer fallowing will considerably weaken the stand it is rarely possible under our climatic conditions totally to eradicate it, especially as viable seeds are also present in the soil. Where it is very thick the best way to make use of the land is by laying it down with permanent pasture. In such an association stock will keep the weed down and prevent it from seeding.

PEPPER CRESS *(Lepidium campestre)* is a common impurity in grass and clover seeds, and seems to be increasing. The lower leaves form a rosette from which rises a single stem branched near the top. The flowers are very small and white, arranged one above the other at the terminal end of the stem. The seed pods, on short stems, are small in colour with a marked cleft along the axis and projecting wings on the edges. The actual seeds are reddish-yellow in colour.

Cultivation through the summer so that the seeds are allowed to strike and are then killed by working gives an adequate check to this weed, which reproduces only from seed.

HEDGE MUSTARD, or WIRY JACK *(Sisybrium officinale)*, is an annual weed somewhat resembling Charlock but differing in that the flowers are much smaller, being only about a quarter of an inch in diameter. The whole plant gives the impression of being much more wiry and straggling than is Charlock or Radish. It rarely occurs as thickly as do the latter, but should it do so control measures would be similar to those mentioned previously.

THE RABBIT

By T. PHILP, L.V.Sc., Chief Inspector of Stock

THE transference of an animal or plant to a new country generally means that the new inhabitant either fails to acclimatise itself and dies out or else finds its new environment suitable to its requirements and it flourishes. In some instances it manifests a prolificacy undreamt of in its old haunts and becomes a pest.

The history of Australia contains many instances of this in plant and animal life, but the most outstanding example is that of the wild rabbit. It is impossible to calculate the cost of the rabbit to Australia, but one has only to think of the thousands of miles of wire fencing, the expenditure on poisons, traps, fumigants, labour, and other methods of protection against rabbits to realise the many millions of pounds which this animal has cost the country. The deterioration in livestock of all kinds, the reduction in carrying capacity of rabbit-infested pastures and the destruction of trees and crops represent an annual toll of an incalculable amount. Unfortunately, the animal has a commercial and a food value which tends in many instances to the perpetuation of a system of rabbit farming.

One would have thought that long before this the stockowner himself would have realised that he cannot farm both rabbits and sheep, as there can be no question of the relative value of each industry. Five rabbits are said to represent one sheep, and the rabbit "knows his oats"; he is a discriminate feeder and likes and selects the best; he is particularly fond of clovers and will travel long distances to improved pastures.

There is little need to dwell on this phase of the subject, as it is all too well known and the necessity for rabbit destruction is becoming increasingly recognised, and it can be said that better results are being obtained at the present time and more systematic and effective work on rabbit destruction is being carried out than at any previous period. Adequate powers exist under the Rabbits Destruction Act, and the majority of municipalities are co-operating with the Department to the fullest. All that is necessary is further Departmental assistance to supervise and organise the work of rabbit destruction and to stimulate and assist those municipalities which are lagging behind in the work.

It is not definitely known when the rabbit was first introduced into Australia, but the return of livestock issued by Governor Phillip from Port Jackson in 1788 included rabbits.

The famous clipper "Lightning" is reported to have arrived in Hobson's Bay on 25th December, 1859, with four hares, 66 partridges and 24 wild rabbits consigned to Mr. Thomas Austin, of Barwon Park, near Geelong. These rabbits were greatly sought after and were sold at £1 each. One landowner is reported to have constructed hutches and artificial burrows on his estate. An employee caught killing a rabbit was instantly dismissed and a gamekeeper was appointed especially to protect the animals. It

is recorded that six years after Mr. Austin had imported the rabbits he had killed off on his estate 20,000 and estimated that 10,000 remained.

A Victorian paper in 1863 published a laudatory article on some enterprising gentleman who fenced in 200 acres and started a rabbit farm. Shortly afterwards the fence was destroyed by fire and the rabbits subsequently spread over the whole district. It was not so long after these events that it was found necessary to enact special legislation in all States to deal with the rabbit pest.

It is recorded that rabbits were numerous on Rabbit Island, near Queenscliff, in the early forties, and from there they were obtained to feed the aborigines at Flinders Island, and also to feed the whalers and sealers. No doubt at about this time they were introduced into Tasmania as a supposedly desirable acquisition.

Much could be written about the early history of the rabbit in Australia, but the purpose of the writer is to give some information regarding methods of destruction, particularly by the use of poison, which has proved to be the most reliable method of rabbit destruction.

There are many methods of rabbit destruction, and it is not possible to standardise these—what suits one district will not suit another—and in recommending methods and a particular poison so much has to be taken into consideration. Type of feed, nature of the country, climate, rainfall, distribution and nature of natural cover, and many other factors all have to be considered in making recommendations, and investigation by a competent authority is essential for the best results. Where possible, destruction of cover should be part of an organised rabbit campaign.

Trapping is one of the oldest and commonest methods of rabbit destruction, but as it is a business and the trapper works for the skins and carcases when it pays him to do so, trapping will not eliminate rabbits.

While the fencing of individual properties with rabbit-proof fencing is an effective way of controlling the rabbit, infinite care must be taken in the construction of the fence and in its maintenance lest all the expense goes for nothing. If this applies to individual properties, how much more so does it apply to the great boundary fences designed to keep back the rabbit. Mainland States have constructed thousands of miles of boundary fences, but all to no purpose.

In a country like Tasmania, many parts of which are rough, heavily timbered, rocky, and subject to floods and washaways, district boundary fences would not long remain rabbit-proof, and the experiment would probably be even more disastrous than in mainland States.

It would appear, therefore, that the most effective way of lessening the rabbit menace would be by organised poisoning campaigns, which should be concerted and complete insofar as the particular district is concerned, adopting the best methods for the area.

The use of fumigants in rabbit destruction plays a very important part in suitable country, but owing to the broken nature of the Island this method has rather a limited application here. However,

where it can be used it is cheap and most effective. The materials chiefly used are calcium cyanide and carbon bisulphide, which evolve poisonous gases. These substances are sold under various proprietary names and full particulars for use are given with the package.

Cheap supplies of poisons are an essential if the best results are to be obtained, and as many enquiries have been received asking for the different methods of preparing poisoned baits the following particulars, gleaned from various sources, are set out.

Particular care should be taken in the handling and storage of poisons. Strychnine should not be kept in bottle on shelves in houses, stables or sheds. The bottles of strychnine should be placed in tins with well-fitting lids, with plenty of padding so that the bottles will not be broken if the tin is knocked down. Mortality in stock has been traced to poisons which have contaminated food supplies due to want of care in storage.

Apples and Strychnine

Cut up the apples into baits about half-an-inch to five-eighths of an inch square. Dust with 1 oz. of strychnine, powdered, to 10 or 12 lbs. of apples with, say, a large pepper castor. Any sugar in the proportion of about 1 lb. to 15 or 20 lbs. of apples dusted on the baits has been found a great additional attraction. This applies when the fruit is a little on the sour side. If the apples are sweet no sugar is necessary. Lay in a furrow from six inches to three feet apart, according to the infested state of the place. The advisability of "free feeding" several times beforehand where above poison is to be used cannot be too strongly recommended—in fact, it is practically essential to success. The baits in free feeding should be exactly the same as those which are poisoned, and should be laid in the same way. If the baits free from poison are well taken, success is absolutely certain. The rabbit comes to the furrow eager and unsuspicious and falls an easy victim.

As indicated, the poisoned baits should be placed from about six inches to three feet apart, and a pound of apples will make about 250 to 300 baits; therefore, an ounce of strychnine should suffice for 2,500 to 3,000 baits. The necessary length of the furrow required can thus easily be determined in connection with what a place may require.

In places where there are only a small number of rabbits, it is not a bad plan to peel the apples that are used in the actual poisoning (not necessarily with the "free" baits). This is making assurance doubly sure, as every side of the bait will absorb the poison.

In cases where the furrow cannot be readily made, good work can be done by laying the poison on scratches, similar to those made when trapping. When poison is taken, the furrows should be replenished until the rabbits cease to take it. It is hard to err on the side of liberality, but very easy to do the opposite. It is far better to have some poison left in the furrows than to have a few rabbits left for future breeding.

This method has come to stay. Splendid results are being obtained throughout the State wherever the above directions are properly followed. The great points in favour of apple poisoning are—

(1) It is good all the year round, no matter how plentiful the grass may be.

(2) It is cheap and simple.

(3) The rabbits are found dead near the furrows.

(4) The value of the skins will, in nearly all cases, more than recoup the cost of the work.

(5) If the poisoned baits are put down last thing at night and looked at early in the following morning, there is little danger to stock or bird life. Under any circumstances, if the baits are laid right in the furrows, stock are not likely to get at them.

(6) Young rabbits will take it as freely as old ones.

When apples cannot be obtained, turnips or carrots may be substituted.

Preparation of Phosphorus Baits

Phosphorus and Pollard

(1) Take phosphorus, 1 stick (one-seventh of a pound); bisulphide of carbon, 2 tablespoonsful; sugar (white), 2½ lbs., or molasses, 1½ pints; water (clean rain), 1½ gallons; pollard, a sufficiency.

Half-fill a pickle bottle with water and add carbon bisulphide. Break the phosphorus under water and place it in the bottle, making sure that it is completely covered with water. Allow it to stand for at least 24 hours.

Heat the 1½ gallons of water to a temperature that can be comfortably borne by the hand, put it in the mixing trough and dissolve the sugar and molasses. Then strain in the contents of the pickle bottle, allowing it to pass through flannel into water. (Immediately on completion of this operation throw the strainer on to a bare piece of ground, as it will take fire). Then add pollard until the dough is the right consistency for the particular variety of cart to be used. During the mixing, from 10 to 15 drops of oil of rodium, aniseed or cinnamon may be added. The mixing may safely be done with the hands. The dough should be distributed before becoming sour. Extreme cleanliness should be observed throughout.

(2) Nearly fill a glass jar with water (a pickle bottle would answer). Cut a stick of phosphorus into about five pieces (in cutting phosphorus, it must be covered with water in a shallow dish, otherwise, if left out of water it immediately takes fire), put the cut phosphorus into the glass jar containing the water, and pour into same two tablespoons of bisulphide of carbon and the phosphorus will be dissolved in a very short time. Dissolve the sugar in about four quarts of hot water and mix it thoroughly with the balance of the cold water, after which pour in the dissolved

phosphorus, stirring it with a stick; then gradually add the mixed pollard and bran, stirring all the time until it becomes of the consistency of a thick dough so that it will not stick to the fingers, and when in this condition it can be kneaded up without fear of burning the person mixing it.

Great care should be taken in the keeping and handling of phosphorus, and a few hints may be serviceable to put those who have not used it on their guard against possible accident or loss of property by its ignition.

Always keep the phosphorus under water when out of use, and do not store it in the dwelling or other outhouse if you value your safety. It should always be kept in a small detached shed with an earthen floor—a shed in which could be kept the other bait-making material and equipment. Dig a hole in the ground and thus lessen the risk of the tub or oil drum which contains the phosphorus being upset. Be mindful of the necessity for keeping it well under water, as, should it be exposed to the air (the water having dried off), in a very short time it will ignite. It is advisable to keep this shed or depot locked and secure against entry by children or others unacquainted with poisons.

Always keep a bucket of water by when handling phosphorus. One can with safety take a stick of phosphorus and break it under water with the naked hands, and put it into the pickle bottle to dissolve, providing there is no delay in the operation and that the hands are washed afterwards. Phosphorus will keep for an indefinite period while under water, and retain its poisonous qualities. but as soon as it becomes dry it burns right away; hence the necessity for extreme care in handling it.

Strychnine and Jam

Although this combination has been in use for probably 45 years, only recently has it come into any prominence. Jam is a medium of which the rabbits are very fond. It can be made from almost any fruit—apples, quinces, or if these are not procurable, even from pumpkin or pie melon. To prepare the jam, chop the fruit (skin, seeds and all) into pieces half-an-inch square and boil with half their weight of sugar until a thick jam is obtained. Care must be taken to keep it constantly stirred while boiling, as rabbits will not touch it if burned. When the jam is made, add strychnine at the rate of 1 oz. to 25 lbs. of jam, and mix thoroughly. The strychnine may be either dissolved in acid or simply powdered fine. Arsenic may be used instead of strychnine—it is cheaper, but the results are not so good.

The method of laying the jam is to turn up a sod and place a piece of jam the size of a pigeon's egg on it. Six or eight lumps, 10 or 12 yards apart, should be put down in patches near the buck heaps, 100 yards between patches. The jam should be laid on chips or small pieces or bark, so that what is not used can be lifted and relaid. Sheep, cattle and horses will not touch jam, according to Bruce.

Here is another method which has been used successfully in Western Australia and reported in the Journal of Agriculture of that State.

Take 8 lbs. of jam (any kind) and ½ oz. of powdered strychnine; mix well and lay on small pieces of bark or wood in a ploughed furrow. In this connection the use of the prepared jams on sale by manufacturing firms is recommended in view of the fact that smaller quantities go a longer way, and because of the cheapness and certainty of the manufactured article.

In country where ants are plentiful it is expedient to put the jam down as late in the evening as possible, as this insect readily finds it and is objectionable to the rabbit.

—P. G. Stead's Report, N.S.W.

Phosphorised Wheat or Oats

½ gallon flour paste
2 ozs. phosphorus
¾ kerosene tin of oats or wheat.

Dissolve phosphorus in bisulphide of carbon, mix and pour phosphorus paste over oats or wheat, again mixing thoroughly, making sure all oats are covered with the paste.

DISTRIBUTION OF CERTIFIED BROWNELL SEED POTATOES

THE First Harvest Certified Brownell Seed Potatoes grown under high country conditions from seed distributed by the Department of Agriculture last year will be available to all farmers this season. Care has been taken that the crops from which the seed is produced were grown under conditions of suitable isolation and altitude and under the supervision of Departmental Field Officers, who have inspected all crops in the field and advised rogueing where necessary in order to eliminate weak or backward plants. In order to distinguish this seed from any other lines each bag will carry the seal of the Department and a label descriptive of the contents.

For the information of farmers who desire to obtain First Harvest Brownell Seed this year, the following is a list of growers whose crops have been certified:—

Biggins, J., Yolla	Lillico, Elliot, Wilmot
Butler, Alan, Sheffield	McGinty, J., Ridgley
Chamberlain, J., Preston	Murfet, A. W., Paradise
Clarke, L. J., Natone	Page, G. S., Upper Burnie
Day, Chas., Sheffield	Rothwell, H., Somerset
Day, G. M., Sheffield	Rothwell, W. E., Henrietta
Hilder, J. R., Burnie	Stitz, C., Hampshire
Jacobs, F., Needles	Taylor, G. P., Ulverstone
Lawson, E., Upper Natone	Thomas and Parsons, Thirlstane

In each case the postal address is that accompanying the name.

Price to be Paid for Seed

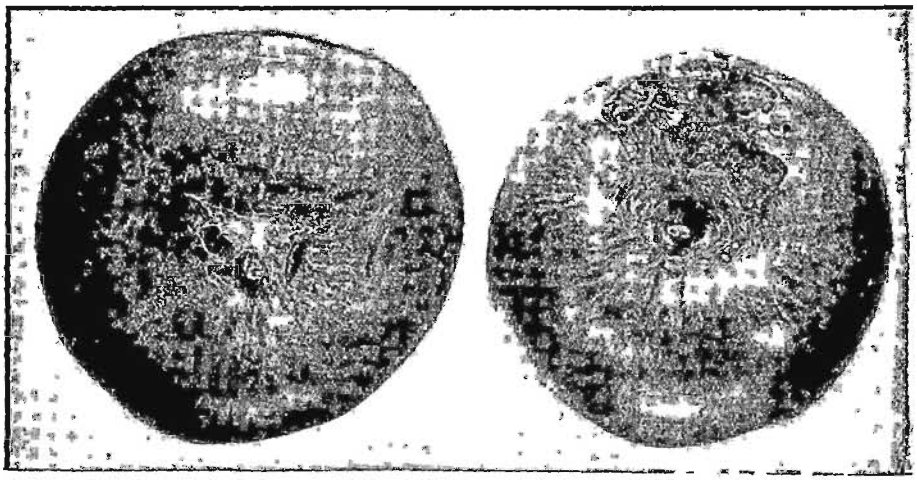
One of the conditions under which the Departmental seed was accepted for growing is that seed shall be sold at a price not greater than 25/- per ton over market rates. This should allow a fair margin of profit to the grower and avoid any complaints that farmers in possession of elite seed are unduly exploiting the market.

Chief Agronomist

THE LIGHT BROWN APPLE MOTH

By H. M. NICHOLLS, Microbiologist

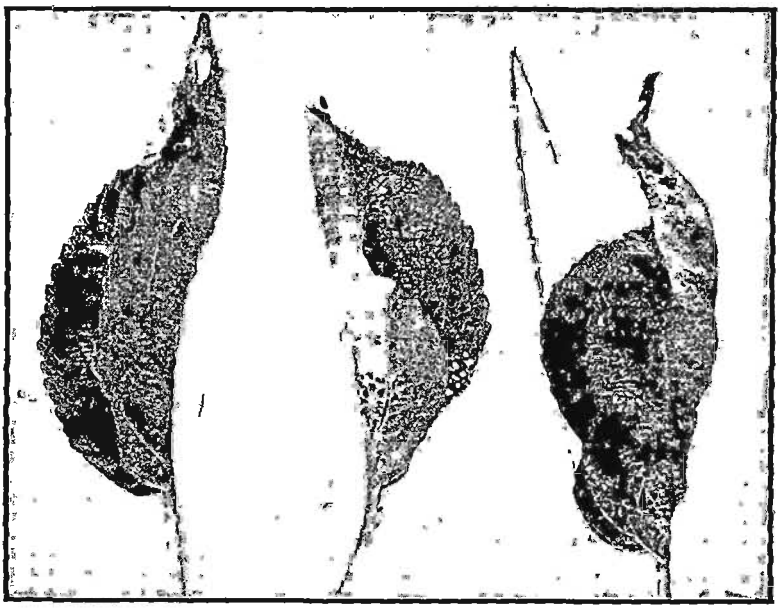
THE Light Brown Apple Moth *(Tortrix postvittana)* has been known to the orchardists of Tasmania ever since fruit trees were first planted here. For many years it was regarded as a minor pest, as it did only a small amount of damage to apples and other fruits, but for some unexplained reason it has increased to such an extent during the last five or six years that it has now become in many parts of the State the most serious insect pest that the fruit-grower has to contend with. It was formerly known as *Cacaecia postvittana,* but it has now been removed to the genus Tortrix, as the labial palpi extend straight forward instead of curving upward as is the case in the former genus. It belongs to the family Tortricidæ, which is found in all parts of the world where temperate conditions prevail. The moths of this family are popularly known as "leaf-rollers" or bell-moths," as the caterpillars always live in concealment, either in leaves rolled up and spun together with web, or in stems, roots or seed-vessels, and the adults, when sitting



APPLES INJURED BY CATERPILLARS OF *TORTRIX POSTVITTANA.*
On the right-hand one an empty pupa-case, from which a moth has emerged, may be seen. (Natural size).

at rest with the wings closed, have a bell-shaped outline. The caterpillars are nearly always of a greenish colour and spindle-shaped—that is to say, they are slightly thicker in the middle of their bodies than at the ends. They are generally slender, with a few scattered hairs on each of the segments, and have the usual number of legs and prolegs. Tortricid caterpillars can be recognised by their peculiar habit of rapidly wriggling backwards with

snake-like, sinuous movements when touched. In the United States there are about a dozen members of this family which are important enemies of the fruitgrower, and in England there are six; but in Tasmania, fortunately, there is only one. *Tortrix postvittana* is a native insect and is found in all the Australian States with the exception of Western Australia. It has been introduced to New Zealand, where it now outnumbers the native species, *Tortrix excessana,* and its control has become a serious problem. It has also been introduced to the Hawaiian Islands, and specimens have occasionally been found in England—no doubt introduced with Australian fruit—but it does not appear to have yet established itself there.



LEAVES ROLLED UP BY THE CATERPILLARS OF *TORTRIX POSTVITTANA* (*Natural* size).

The Light Brown Apple Moth causes injury in the orchard by gnawing holes in the fruit and rolling up and eating the leaves. The injury caused to the leaves is not very important, but apples which have been attacked are always quite unsaleable and of very little use for any purpose. The caterpillars do not burrow into the fruit as those of the Codlin Moth do, but generally stick a leaf to an apple with web and feed in the shelter thus formed. They prefer the stalk end of the apple to any other part, but sometimes they attack the eye end or the side, and the patches they eat out are usually extensive. They very rarely attack the apple before it is half-grown and the main injury is done by the caterpillars of the second summer generation. These make their appearance during January and February. The caterpillars, which range up to about

three-quarters of an inch in length and are of a dirty green colour, are omnivorous feeders and are found on many different kinds of trees, shrubs and smaller plants. They have been recorded in Tasmania as attacking the apple, pear, plum, apricot, peach, gooseberry, strawberry, tomato, potato, cabbage, chrysanthemum, rose, mignonette and boronia, besides many native plants.

The moths are slightly larger than the well-known Codlin Moth and are of a pale brownish-yellow colour, interspersed with irregular darker markings, but both size and markings may vary considerably. The females are larger than the males. The latter can be distinguished by the fact that the apical half of the forewing is of a darker shade of brown than the basal half, and there is a peculiar folding over of the costal margin near where the forewing is attached to the thorax. The females often have a dark spot on the hind margin of the forewing about one-third of its length from the attachment of the wing, but this does not occur in all specimens. The hindwings of both sexes are much lighter in colour than the forewings. The moths are most numerous during February and March, but specimens may be found practically all the year round. Not infrequently stored fruit is attacked, and one caterpillar, if it gets into a case of apples, will sometimes disfigure half a dozen of them.

The eggs are laid in masses of about 100 and take a fortnight to hatch. In Tasmania the caterpillars feed and grow for about 50 days, and the pupal stage lasts about 21 days, so that the whole life-cycle of the insect, from egg to egg, occupies about 12 to 13 weeks. When about to pupate the caterpillars spin a flimsy cocoon in a rolled-up leaf or under a leaf stuck to an apple. Breeding is practically continuous throughout the year. When the leaves of orchard trees have fallen the moths migrate to practically any kind of tree or plant that remains green through the winter and lay their eggs on them, and the caterpillars feed and grow until spring once more arrives and orchard trees come out in leaf, when the resulting moths once more migrate to the fruit trees and lay their eggs. The insect has thus no winter stage passed in the orchard, and reinfestation takes place every year from moths that have bred outside. Shelter belts of evergreen trees are prolific sources of trouble, as they provide very convenient breeding grounds for the pest. In New Zealand it is reported that even pine trees are extensively used as winter breeding grounds.

It is the absence of any winter stage passed in the orchard that makes this pest such a difficult one to deal with. As the caterpillars are present on the trees only when the latter are in full leaf it is obvious that strong sprays cannot be used against them, and their habit of rolling up leaves and sticking leaves to the fruit, and living in the shelters thus formed, protects them to a considerable degree from the action of sprays of any kind. Up to the present the most successful remedy has been arsenate of lead,

applied with the greatest force that the pump is capable of, so as to force the poison into the shelters, but this has not been generally successful. In the great majority of cases the caterpillars choose the endmost leaf of a shoot to roll up and live in, and one Tasmanian orchardist has been struck with the idea of cutting off and burning all the end shoots of his trees during the month of February. By this means large numbers of the caterpillars have been destroyed and the method is reported to have been quite successful, though it entailed a great deal of labour.

There have been many speculations as to why this pest, which formerly did much less damage, has suddenly increased to such injurious proportions, and the true explanation seems to be a climatic one. *Tortrix postvittana,* under ordinary conditions, is parasitised to such an extent that the great majority of the larvæ and pupæ are destroyed before they reach the moth stage. The writer has bred two species of Tachinid flies, two species of Ichneumon, one Braconid and one Bethylid from the caterpillars and pupæ. The Bethylid, *Goniozus antipodum,* is probably the most numerous of all the parasites that attack this pest. During the last five or six years Tasmania has had a succession of wet and cold summers, and there is little doubt that these unfavourable climatic conditions have had the effect of checking the activity of these beneficial insects, thus allowing the pest to rapidly multiply. Hymenopterous parasites in particular are very sensitive to weather conditions and are never so active in wet and cold as they are in warm and dry weather. There have been periods in the past when the Light Brown Apple Moth has unaccountably increased in numbers, and it will probably be found, if meterological records are examined, that these outbreaks coincide with cold and stormy summers. A contributing factor is the clearing away of the native bush and the planting of evergreen trees as shelter belts. Being deprived of its natural food, which it formerly found in native trees and shrubs, the insect has acquired a taste for introduced trees, and has thus formed extensive breeding grounds in the immediate neighbourhood of fruitgrowing areas. Even under unfavourable conditions, however, the parasites continue their beneficial work, for of some pupæ kept in the writer's office last year, 38 per cent. proved to be parasitised. It is probable that the dense smoke from the recent bushfires, which deluged the principal fruitgrowing districts of the State, will have a still more detrimental effect on the parasites than the cold and wet summers have had, and it may be some years before they resume their normal activities.

Some experiments were recently tried to see if the moths could be captured at light traps. A strong acetylene lamp placed over a large, tin funnel which led into a deep glass jar, was used for the purpose. Some cotton wool, moistened with carbon tetrachloride, was placed in the bottom, with some fine wire gauze on wooden supports over it to keep the insects from contact with the chemical. In a trial made in November last it was found that the moths were

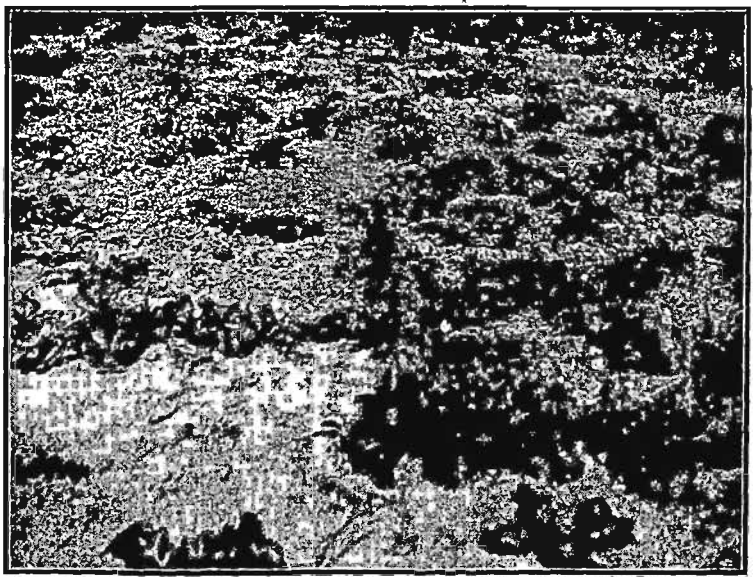
readily attracted and caught, practically every one that came within range of the lamp eventually finding its way into the lethal chamber, but at this time they were few in number. In later experiments, tried after the bush-fires had covered the whole country with smoke, no moths — or, in fact, insects of any kind — made their appearance, everything capable of flying seeming to have been driven away. In the orchard in which the experiments were tried there were numerous rolled-up leaves with living caterpillars in them, but no moths of any kind showed themselves. An examination of the moths caught in the first trial showed that both males and females were attracted and that some of the latter had not yet laid their eggs. This gives reason to hope that a useful method of controlling this pest may be found in light-traps. These could be made very cheaply by suspending any kind of bright light over a dish of water with a little kerosene floating on it. The moths fly for only about three hours after dusk, so that it would not be necessary to keep the lights going all night. Some success has been achieved in the past in catching the moths by means of lures, those used for the Codlin Moth often catching large numbers of the Light Brown Apple Moth as well.

THE EFFECT OF PHOSPHATES ON THE GERMINATION OF TURNIP SEED

By R. A. SHERWIN, B.Agr.Sc., Acting District Agricultural Organiser

THAT Superphosphate, when applied at the rate of 1 cwt. or more per acre, frequently has a detrimental effect on the germination of some small seeds, and in particular the turnip seed, has been recognised in Canterbury (N.Z.) for a number of years, and to eliminate this injury Basic Superphosphate has been substituted for Superphosphate. Two simple trials conducted in the North Midlands district this summer indicate that the same conditions concerning the germination of turnips apply here.

The two trials mentioned were conducted on land which had come under the plough for the first time to be prepared for turnips. In each case the bulk of the area was manured with a hundredweight per acre of Superphosphate with which the seed was mixed, while the remainder of the areas—two acres—received two hundredweight of Basic Superphosphate per acre. The Basic Super was formed by mixing equal quantities of Super and Ground Limestone; details of the mixing are given later.



EFFECT OF BASIC SUPER ON TURNIPS

Basic Super on right, Super on left

The first trial, which was started in October, showed only a small difference in the germination in favour of the Basic Phosphate. The second trial, laid down in the last week of December, gave, on a conservative estimate, a 20 per cent. improvement in the

strike on the Basic Phosphate area. The most noticeable feature in this trial was the even germination over the whole area manured with the Basic Phosphate, while on the portion receiving Super the strike was very patchy. What might be justifiably regarded as a confirmation of these results was seen in a 20-acre paddock of turnips which had been manured with Basic Phosphate at the rate of 1 cwt. per acre—the strike over the whole area was remarkably even and the plants were, if anything, too thick.

The action of Superphosphate on the germinating seed is of interest. The phosphate in Superphosphate is readily soluble in the soil moisture and forms a comparatively strong solution which is in close contact with the young plants. When this solution is above a certain strength, which frequently happens when 1 cwt. or upwards of Super is applied per acre, what is commonly called "burning" will destroy the young plants. On the other hand, Basic Phosphate is only slowly soluble in the soil moisture, so that although the young plants receive the benefit of the manure, the strength of the soil solution is kept down and there is no injury to the young plants.

Basic Phosphate ready for sowing is available in Tasmania, or the farmer can mix it for himself. Where the latter course in followed equal quantities of Superphosphate and Ground Limestone should be placed on a floor and well mixed. The mass should be left in a heap until it sets, when the lumps are broken up ready for bagging and sowing.

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WHAT IS ECONOMY?

"WE have warped the word 'economy' in our English language into a meaning which it has no business whatever to bear. In our use of it, it constantly signifies merely sparing or saving; economy of money means saving money; economy of time, sparing time, and so on. But this is a wholly barbarous use of the word—barbarous in a double sense, for it is not English, and it is bad Greek.

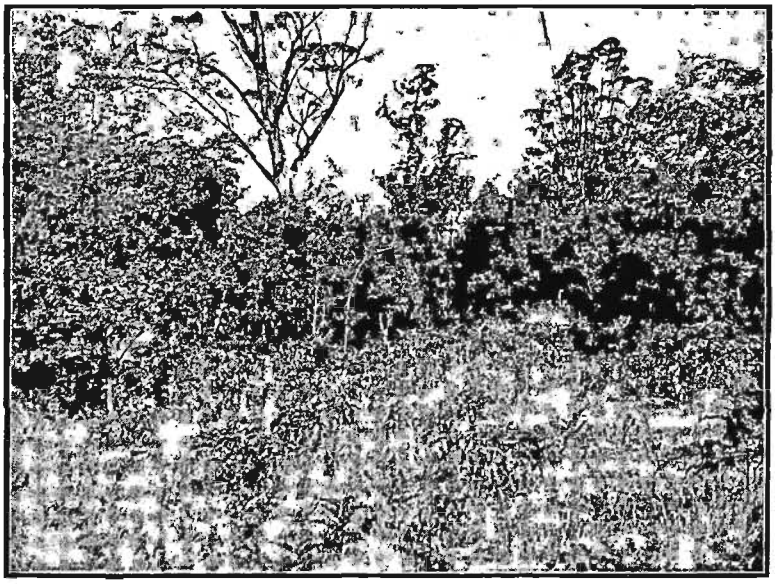
Economy no more means saving money than it means spending money. It means the administration of a house; its stewardship; spending or saving—that is, whether money or time, or anything else—to the best possible advantage. In the simplest and clearest definition of it, economy, whether public or private, means the wise management of labour; and it means this mainly in three senses namely: First, applying your labour rationally; secondly, preserving its produce carefully; lastly, distributing its produce carefully."

Ruskin

POISONING OF WATTLE

By R. H. BEVIN, Dip. C.A.C., B.Agr., Chief Agronomist

IN the "Journal" of May, 1931, a preliminary note appeared referring to the experimental work on wattle poisoning which was carried out on the property of Mr. L. P. Gillham, Bracknell. After three years the results have shown that cutting of wattle scrub and treating as described was most effective when applied during the month of April. Mr. Gillham has dealt with 40 acres, the mortality inflicted being over 90 per cent. The remaining 10 per cent. was disposed of in one day.

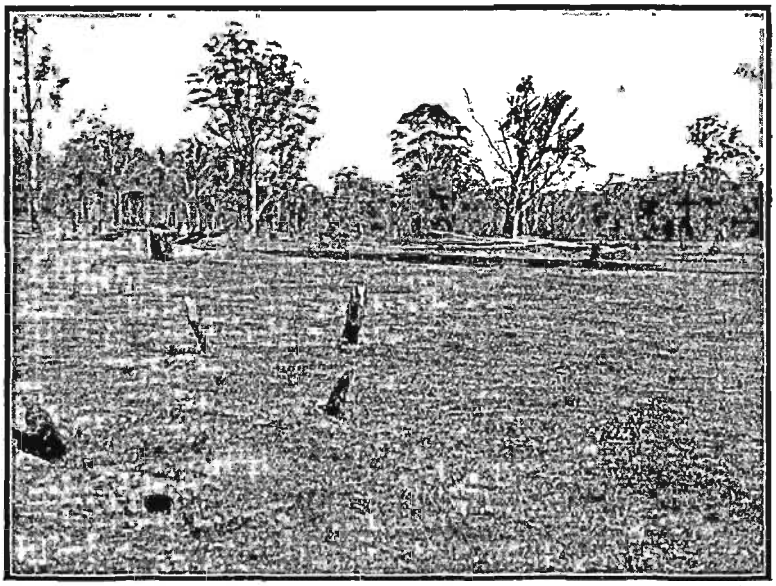


COUNTRY BEFORE TREATMENT

The work of clearing the 40 acres took one man 30 days. The cost of the whole job, including material, was not more than £14, or approximately 7/- per acre. The material itself was inexpensive, costing 3/- for the whole area.

The poison used was Sodium Arsenite, which is readily prepared by boiling washing soda 1 lb., white arsenic 1 lb., and 1 gall. of water for half-an-hour. When boiling is finished 3 gallons of water are added to bring the solution to the required strength.

The method of application is by use of a swab prepared by tying sacking around a stick. The wattle is cut close to the ground and the stump-cut surface is immediately dabbed with poison. One gallon of the preparation will do at least 10 acres in average wattle scrub.



TWO YEARS AFTER TREATMENT

WHEAT ENGORGEMENT IN HORSES

By THE CHIEF VETERINARY OFFICER

FROM time to time the serviecs of the veterinary officers are requisitioned to advise on the treatment of horses which have gorged themselves by gaining access to bags of wheat. This produces a very serious condition and has led to the death of a number of valuable draught horses. Most cases arise through carelessness or want of knowledge of the danger. Wheat engorgement may be followed by colic, which may end fatally, or by laminitis or founder, which may permanently cripple the animal.

The diagnosis of the trouble is generally made easy by the fact that the horse is found eating the wheat or there is direct evidence of its having done so.

The gravity of the trouble is dependent on the amount of wheat consumed, the working of the animal soon after it has gorged itself, and the individual susceptibility of the animal to digestive troubles. The symptoms vary from sluggishness at work, loss of appetite and dull pain, to acute pain, when the animal throws itself violently on the ground, and the more pronounced the symptoms the more serious the condition.

Most cases assume the severe form, when the symptoms set in suddenly. The animal becomes restless, looks round at its flank, paws the ground and shows ordinary symptoms of colic. Soon the pain becomes more acute, the abdomen may swell and the membranes of the eye assume a yellow colour, and the animal may break out into a sweat. In bad cases the animal may throw itself violently down and sit up on its haunches.

The animal may sometimes belch gas or eject some food. This is often a fatal sign, showing that the stomach is greatly distended and liable to rupture. In the ordinary way the horse cannot vomit owing to the structure of the stomach. When vomiting occurs the pains suddenly cease, the animal's expression becomes haggard, and it trembles, becomes cold, and death soon ends its sufferings.

Experiment has shown that the acid secretions of the stomach plus the wheat elaborate a poison. This poison can be counteracted by giving an alkaline substance, and for this purpose baking soda or soda bicarbonate is best and should be given in doses of four ounces in a quart of water. It is generally considered that to allow water to wheat-engorged horses was not good practice as it was said to swell the wheat; but the gastric juices in the stomach will cause the wheat to swell without any added water, and the water which is drunk does not remain in the stomach, but the greater portion passes to the cæcum or water gut.

Water dilutes the poison and washes some of the wheat out of the stomach, which is the most dangerous place for it to lodge; therefore, water should be given ad lib. Violent purgatives are dangerous and liable to nauseate the animal, and salts are preferable to aloes or oil. Three-quarters of a pound of Epsom Salts

with half an ounce of ginger may be given in a pint of water. If pain is severe and continuous, 2 ozs. of Chloral Hydrate with ¼ lb. of sugar and a pint of water may be given. This eases pain and checks fermentation.

The animal should not be permitted to roll and knock itself about. Copious enemas of warm water should be given. If the animal recovers it should not be put to work for some days, and its food should be of a laxative nature. In all cases, where possible, a qualified veterinary surgeon should be called in as a veterinarian has at his command hypodermic drugs and instruments which would be dangerous in the hands of the uninitiated.

A frequent sequel to wheat engorgement is laminitis or founder. This in itself is a very serious condition and needs skilful treatment. Under the best of conditions and treatment it frequently leaves the horse crippled and with deformed feet. This disease will form the subject of an article in a subsequent "Journal."

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SUSPECTED POISONOUS PLANTS

FROM time to time mortality occurs in stock, and the cause, owing to lack of facilities for veterinary investigation or other reasons, is sometimes not determined.

There is reason to suspect that in some cases death is due to the feeding on poisonous plants, and as no survey of these has been made for Tasmania the Veterinary Division are desirous of collecting all the specimens and data possible. Stockowners are asked to report all suspected cases and to forward specimens of plants to the Veterinary Laboratory, Launceston, for identification.

Plants should be collected in as fresh a condition as possible, and the following instructions should be observed:—

(1) Specimens to be collected in duplicate.

(2) Whole specimens to be obtained. If too large, send a portion of stem with leaves and flowers attached.

(3) Specimens to be kept moist by wrapping end of stem or root with wet cotton wool and lightly sprinkling with water, or by wrapping whole specimens in damp paper.

(4) Specimens to be forwarded in a box or tin as soon after collection as possible.

(5) The following information should accompany each specimen:—

(a) Herb, shrub, bush, or tree.
(b) Approximate height.
(c) Colour of flower.
(d) Nature of soil (clay, sand, etc.)
(e) Locality.

Chief Veterinary Officer

GRADE HERD RECORDING, 1932-33

By J. T. ARMSTRONG, B.Sc. (Agric.), Chief Dairy Officer

ON the following page is a summary of the records of the Grade Herd Recording Scheme for the year 1932-33.

Whilst it is interesting and encouraging to note that the average yield per cow is 21.7 lbs. of butterfat in excess of last year's average and is the highest yet recorded under the scheme, it is very disappointing to find that since the 1927-28 season the number of herds under test has only increased by 53, as will be seen from the following table.

Year	No. of Herds	No. of Cows	Av. Milk Production (lbs.)	Av. Test %	Av. B'fat (lbs.)
1927-28	249	6,635	4,038	4.06	164.0
1928-29	400	8,671	4,482	4.29	191.5
1929-30	448	7,577	4,620	4.32	199.8
1930-31	361	6,280	4,159	4.44	184.9
1931-32	258	5,630	4,184	4.33	181.5
1932-33	302	6,398	4,612	4.40	203.19

From these figures it will be seen that, despite the additional interest which has been taken in dairying during the last few years few farmers have realised the value of herd recording. It is estimated that in the northern portions of the State there are at least 3,000 dairy farmers, and of this number only 302, or ten per cent., have become members of the Grade Herd Recording Scheme.

The greatest number of herds tested in any one year was in the 1929-30 season—the peak season so far as prices for dairy produce were concerned, and a falling off in the number of herds entered was recorded in the following season when prices for butterfat commenced to decline. The big decrease in the number of herds submitted for test in the year 1931-32 was attributable to a large extent to the fact that just at the commencement of the season the Commonwealth Government decided that a subsidy for Herd Recording could no longer be paid to the various States, and in order to obtain sufficient funds to carry on the scheme the State Government felt it necessary to increase the cow entry fee to 3/- per cow. Fortunately, however, the Rural Credits Department of the Commonwealth Bank came to the aid of the Government and made it possible for testing to be continued without any increase in fees being necessary.

The decision of the Bank was, however, received late in the season, and many herds had then been in milk for so long that the owners decided not to submit them for testing for that season.

GRADE HERD RECORDING, 1932-33

Name of Unit	No. of Herds	No. of Cows	COWS COMPLETING 180 DAYS OR MORE						COWS NOT TESTED 180 DAYS					TOTAL	Cows not Included in Herd Avge.
			No.	Milk, lbs.	B'fat, lbs.	Av. Milk	Av. B'fat	181 or over	151 to 180	121 to 150	91 to 120	61 to 90	Under 60		
Kentish	17	283	223	1,226,347	56,608.9	5,499.3	253.85	186	15	27	21	16	18	283	60
Ridgley	28	396	372	2,009,133	90,548.4	5,400.8	243.40	289	30	51	13	4	9	396	24
South Leven ...	23	312	307	1,512,170	73,263.9	4,925.6	238.64	211	52	23	18	3	—	312	5
Deloraine	25	570	483	2,410,704	107,627.5	4,991.1	222.83	436	54	25	21	14	20	570	87
Circular Head	21	447	408	1,995,175	89,754.7	4,890.1	219.98	379	29	14	9	9	7	447	39
King. Is. No. 1	12	641	422	2,303,260	95,748.4	5,210.9	216.62	501	38	25	20	21	36	641	199
Marrawah	25	477	411	1,925,520	83,712.8	4,684.9	203.68	351	38	11	5	5	1	477	66
King Is. No. 2	12	806	584	2,943,170	118,828.3	5,039.6	203.47	692	58	27	8	12	9	806	222
Table Cape	26	505	493	2,131,058	98,814.6	4,322.6	200.43	321	98	55	14	7	10	505	12
Winnaleah-Scottsdale ...	30	482	472	1,860,929	88,991.1	3,942.6	188.54	298	90	60	16	6	2	482	10
Forest	25	301	279	1,191,343	51,951.6	4,270.0	186.20	246	24	8	8	4	11	301	22
Wilmot	20	259	244	960,558	41,876.4	3,936.7	171.62	125	43	38	31	3	4	259	15
Ringarooma ...	13	375	375	1,492,460	61,206.7	3,979.8	163.21	100	174	53	38	4	6	375	—
Flinders Island	25	544	530	1,973,344	83,642.1	3,723.2	157.81	193	86	105	84	35	27	544	14
	302	6,398	5,623	25,935,171	1,142,575.4	——	——	4,328	829	522	306	143	160	6,398	775

Average Milk: 4,612.3 lbs. Average Test: 4.405% Average Butterfat: 203.19 lbs.

The slump in prices followed, and when the 1932-33 season opened many dairymen decided that they could not afford to submit their herds at even the moderate fees being charged.

It is quite realised that with the prices ruling for dairy produce the majority of dairy farmers are producing at a loss, and consequently have little or no money to spare, but the policy of carrying on dairying from year to year with no system of checking the returns of the various members of the herd is courting disaster.

In prosperous times, with butterfat at a high figure, a dairy farmer could show satisfactory returns even if the herd was not forced to yield to its maximum capacity, and even if one or two individual members of the herd were not economical producers; but in times such as these dairymen are finding it extremely difficult to make ends meet and no farmer can afford to carry "boarder cows."

The advantages to be obtained from herd recording have been stressed so often that it would hardly seem necessary to repeat them, but a study of the figures showing the small percentage of the herds under test out of the total number being milked leaves one doubt whether dairy farmers generally are fully alive not only to those advantages but to the absolute necessity of having some definite check on the productivity of the herd as a whole and on the various individual members.

The objects of recording are—

1. To provide a check on the efficiency or otherwise of the farmer's feeding programme.
2. To determine whether, if suitably fed, each cow in the herd is able to give an economic return and to provide a means whereby the unprofitable or "boarder cow" may be detected.
3. To provide the herd owner with a definite measure by means of which he may assess the value of the herd sire by giving figures which will enable him to compare the yield of the heifers with that of their dams.

Referring back to the first object of recording, that of gauging the efficiency of the feeding policy, a study of test records for various months of the year; during good seasons and unfavourable seasons; and the returns of some herds with others, a very definite impression is gathered that the yield of the average cow in Tasmania is limited by the ration she receives. It is a moot point if, generally, dairy farms in the State are not overstocked for the amount of feed available and whether it might not be more economical for many farmers to carry fewer cows and thereby make an increased ration available for each cow.

It is realised that this is a debatable question, but it is one to which, in the writer's opinion, all dairymen should give serious consideration, particularly in view of the unsatisfactory state of the butter market.

Records would seem to indicate that in a great many instances the same gross return could be received from a smaller herd if

every member of the herd received a sufficient and proper ration. To decrease the size of the herd would in some measure decrease costs of production and give the herd owner a better opportunity of carrying on in spite of the low prices.

Referring back to the second object, it is well known and generally accepted that the capacity of a cow to produce is limited by her breeding, and if she comes from a strain of low producers no amount of feeding will make her an economical dairy cow.

In a mixed herd, unless it be a herd which has been carefully culled, there are always one or more cows which do not pay for their keep, and they are carried by the better cows. This means that some of the returns from the more productive cows which should constitute the farmer's profit are utilised to carry the "boarder" or unproductive cows. This type of cow cannot always be detected by a study of type, but is shown up for what she is under a recording scheme.

Referring to the third reason, that of assessing the value of the herd sire; the heifers' ability to produce is handed down half from each parent and therefore every heifer calf will receive from her sire half her inherited tendencies for production and for this reason it is most essential that the herd sire comes from a productive strain since his blood is carried by every heifer in the herd. Unfortunately, however, the real worth of a bull is not known until his heifers come into production, and if under comparable conditions of feeding and care the heifer yields are in excess of their dams' on an age corrected basis the choice of the herd sire has been a happy one, but if on the other hand the heifers' yields are below those of their dams the sooner the sire is replaced the better.

Without recording, no comparison between daughter-dam yields is possible and the owner has no definite means of assessing the worth of the sire.

Considering these three factors it is difficult to understand the argument advanced that the expense of recording is not justified at present when prices are low. It is at times such as these that no farmer can afford to dispense with testing.

Taking last season's average production of 200 lbs. of butterfat per cow at an average price of 9d. per lb., it will be seen that the gross return from the sale of butterfat is £7/10/- per annum, whereas in some herds the average production was 350 lbs. of butterfat and the gross return was £13/2/6 per cow, a difference of £5/12/6 per cow.

In order to build up a herd average from 200 to 350 lbs. some system of recording is essential since the feeding policy must be checked, all low producers must be culled and heifers must be bred which will be more productive than their dams. The herd recording fee is not an extravagence; it is an essential charge on the farm, and with the present bleak outlook so far as prices are concerned no farmer can afford to keep more cows than he can economically feed, nor can he afford to keep cows whose yield falls below the standard he considers reasonable.

FERTILISERS FOR GARDEN USE

By H. A. TURNER, Horticulturist

ENQUIRIES have recently been coming to hand from amateur gardeners concerning the quantities and kinds of artificial fertilisers that should be used on small plots.

Owing to the variation in soils it is impossible to lay down a hard and fast rule for manuring. The quantities given below will suit the average garden, but by close observation the individual gardener will very likely find that the soil in his garden will give better results to some variation of the suggested mixture.

It is generally understood that the elements, or plant foods, supplied in manures are three. They are phosphates, potash and nitrogen, and the functions of the three may be briefly stated as follows:—

Phosphates have a pronounced influence in imparting general vigour, especially in the early, or seedling, stages of plant growth and in the development of flowers and seeds.

Potash plays a considerable part in the formation of plant sugars and starches; it also strengthens and adds substance in leaf development.

Nitrogen stimulates the growth and development of leaf and stem.

Phosphates are usually supplied in the form of superphosphate, bone dust, or blood and bone. Potash can be used as sulphate of potash, muriate of potash, or kainit. Nitrogen is generally applied as sulphate of ammonia, nitrate of soda, dried blood, or blood and bone.

It will be noticed that blood and bone contains both phosphates and nitrogen, so also does bone dust, but the nitrogenous content of the latter is usually small.

A manure that contains all three of the plant foods is known as a complete manure. For instance, a mixture consisting of two parts of superphosphate, two parts sulphate of ammonia and one part of muriate of potash is used considerably at the present time and is known as a 2-2-1 mixture. This is a complete manure, and after an application, provided the soil was otherwise in good condition, a gardener would be justified in expecting good results.

It may be quite possible, however, for a soil to be well supplied with one or more of the elements in the above mixture, or, on the other hand, it might be particularly deficient in one or more of them. If such happens to be the case, the gardener will find from experience that by decreasing the amount of one element or omitting it altogether the crop returns do not suffer, All Tasmanian soils appear to be deficient in phosphates, and it is safe to assume that all crops will benefit by its use.

Soils that are well supplied with organic material may require little or no nitrogen. Over-supplies of this element result in rank

growth and a reduced return of the root, seed, or fruit crop. Plants grown for their leaves or stalks, such as lettuce, celery or rhubarb, respond to heavier dressings.

Potash is usually deficient in light and sandy soils, Root crops like beet, carrots, onions, and also peas and beans, are particularly susceptible to a shortage of potash.

Considering the relatively large amount of produce that is taken off a small garden in one season, heavy manuring is advisable. An annual dressing of a complete manure at the rate of ten or twelve hundredweights per acre is not too much.

To apply at any desired rate on small garden beds it is only necessary to remember that one ounce of manure to the square yard, or two pounds to the square rod, is near enough to the rate of three hundred-weights per acre.

Liquid manure is often used to hurry along various garden crops. It is most effective if applied soon after watering, say the following day, and should be used only in a dilute form at intervals of about a month.

One ounce each of superphosphate and sulphate of ammonia, and half an ounce of sulphate of potash, stirred into four gallons of water makes a good complete solution sufficient for three square yards. It should be kept stirred so that any residue not dissolved may also be applied. Care should be taken to prevent liquid manures coming into contact with the foliage of plants.

Good stable manure is probably the best as well as the safest of all manures, whether natural or artificial. It contains a little of all the plant foods, but, compared with artificial fertiliser, these are in a dilute form. For this reason well-decayed stable manure will not burn or injure plants even when used in large quantities. If the soil is poor 16 or 18 pounds to the square yard is not excessive, while if the soil is in good heart half that quantity may be sufficient. Until fermented and partially decayed, it is not a good substance for plants. Stable manure has advantages over artificial fertilisers in that it is lasting, and being bulky and organic in nature, adds humus so improving the condition of almost any soil to which it is applied.

Poultry manure is one of the richest of the natural manures and is generally considered to be somewhere about four times as rich in plant foods as stable manure. It is very suitable for top-dressings to almost all growing crops. Onions in particular benefit from an application sprinkled over the surface of the bed.

An excellent organic liquid manure may be made by putting two or three shovelsful into about 30 gallons of water and allowing it to stand for two or three days before using.

THE GARDEN

By H. A. TURNER, Horticulturist

CABBAGES for spring use will in many cases be already planted but where they are not the plants should be put in without delay. Nearly all the early varieties are small and do not require a great deal of ground space. The rows need not be more than eighteen inches apart, with the plants, say, fifteen inches in the rows. A soil that drains readily is best for this and all crops that have to stand through the winter months. Wet soil being cold will delay growth. A heavy application of stable manure is inadvisable at this time of year as it holds water like a sponge and keeps the soil cold. A dressing of about three ounces of Superphosphate and an ounce of Sulphate of Ammonia per square yard will be beneficial. After the plants have started to grow half an ounce of Sulphate of Ammonia per square yard at intervals of a month or six weeks will hurry them along.

PEAS for an early crop may still be sown in a sunny position. On heavy wet soils where it is difficult to keep the weeds in check early peas are a doubtful proposition but on the lighter soils that drain readily good results may be expected from a sowing made at the present time. Use some of the dwarf, early maturing varieties.

May is a good time to sow BROAD BEANS. When sown too early the spring frosts destroy the first blossoms and the plants then become "leggy." They are not particular in regard to soil, but should be allowed plenty of room. Two feet between rows and six inches between plants is not too much.

Every advantage should be taken of dry weather to carry out cultivation among growing plants. Weeds continue to grow during winter months and neglect at the present time will result in garden plants being smothered.

June is not a suitable month for seed sowing except perhaps in a few particularly well sheltered and warm localities. A few potato onions and shallots may be planted.

Towards the end of July, provided the soil is dry enough, further sowings of peas should be made. CARROT seed should also be sown. Although it is too early for the main crop any of the short-horn varieties sown at this time and kept weeded should be ready for use by the end of October. The longer main-crop varieties are best sown towards the end of August, the same applies to PARSNIPS.

If LETTUCE plants are available, put a few out and they will mature rapidly as the spring advances. If plants are not obtainable, sow seed. In the early part of the season lettuce do better if the plants are raised in a seed bed and then transplanted. For later crops sow thinly in the permanent rows.

vigorous shoots will be produced by the plant each year. After pruning these should be divided and woven on to the wires or supported on the fence, as the case may be. In weaving on to the trellis the canes should be kept separate as far as is possible. This will allow for a greater fruiting surface than would be the case if the canes were twisted together rope fashion.

There is little pruning to be done to the loganberry except cutting out the old canes as soon as they have finished cropping. Cut these off close to the crowns so that no stubs are left. When the old canes have been removed the new shoots which will have done most of their growing on the ground should be trained on to the support. About eight or ten strong young canes are enough for each plant, if more have been produced it is best to cut the weaker ones. The stronger canes may be anything from ten to fifteen feet in length and when these have been placed in position it is advisable to cut a foot or more off the terminal. Occasionally when growth is strong, laterals are sent out along the canes, these should be cut back to five or six buds.

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STUD STOCK IMPORTATIONS SINCE 1/11/1933

Account G. Green, Antill Ponds—1 Dorset Horn Ram.

Account W. R. Bennett, St. Leonards—15 Merino Rams.

Account L. D. Burbury, York Plains—6 Merino Rams.

Account D. O. Meredith, Plenty—4 Red Poll Cows and Calves; 2 Red Poll Heifers.

CHILD WELFARE

THE ARTIFICIAL FEEDING OF BABY

By OLIVE M. GREEN, Sister-in-Charge, Baby Health Clinic, Launceston

BEFORE describing artificial feeding and food components, let it be definitely understood that no system of bottle feeding can ever give to either mother or child the advantages which both derive from suckling. Human milk cannot be made outside the human body, and "Nothing can ever replace the heart and milk of the mother"—*(French Proverb)*. We can approach the mother's milk in composition by carefully modifying the milk of some mammal, but the imitation cannot be made identical with the original and must always be inferior to it, and the best feeding bottle is a troublesome, unclean, clumsy contrivance compared with the living breast.

Every infant who cannot be suckled in the natural way is entitled to receive properly modified milk. Cow's milk merely diluted with water and sweetened with cane sugar is far from an ideal food for babies. Pure cow's milk undiluted is still more unsuitable, and patent foods or unmodified sweetened condensed milk are even more unsatisfactory. Babies may seem to flourish temporarily on such foods, but, though fat, they tend to become flabby, susceptible to chest troubles, bronchitis, colds, etc., and the child is fortunate if he escapes serious diarrhœa and rickets.

Humanised milk is the best substitute for mother's milk. It consists of cow's milk modified to resemble mother's milk in the proportions of water and the three essential foodstuffs—sugar, fat and protein. These recipes, prepared by scientists and now almost universally used in the artificial feeding of infants, are simple in preparation and economical in use.

Select the milk for baby, carefully choosing a clean dairy. The milk from a herd of cows is more reliable as regards equality of composition than the milk of a single cow. Jersey milk should be avoided as the fat globules are very coarse and the fat percentage very high, so that it tends to disagree with young babies. All the utensils must be kept scrupulously clean and covered. Follow the recipe carefully.

For making up the daily supply of humanised milk the following will be required: A jug; half-pint measure, marked in ounces; tablespoon, teaspoon and knife on a clean plate; karilac; boiled water; and a saucepan of boiling water for scalding utensils.

The recipe for mixing 30 ozs. of humanised milk is as follows:—

Fresh milk, 13 ozs.
Karilac, 1 oz. (2 level tablespoons)
Boiled water, 17 ozs.
Kariol, 6 level teaspoons.

(Kariol and Karilac are procurable from all chemists).

To make the milk mixture, stir the milk thoroughly and measure into a clean, scalded jug. Dissolve the Karilac (a dextrorised

sugar of milk) in the boiling water and mix all together. Bring the mixture quickly to the boil in a clean saucepan kept for this purpose, and boil for a minute or two. It is necessary to stir the mixture all the time after it has become fairly warm to prevent a skin forming on the milk, then strain through a piece of scalded butter muslin into a scalded jug. Cool rapidly by standing the jug (covered) in a stream of tap water flowing across the sink, or better still, in ice-cooled water. The milk can also be cooled by placing the jug in a basin of frequently changed water, stirring the milk from time to time until it has become merely warm. Keep in an ice-chest or in a cool, outside, airy safe, standing the jug in a dish of cold water and covering with damp butter muslin. The muslin is kept moist by drawing up moisture from the water in the deep soup plate or dish into which it dips. Keep the safe away from any drains, rubbish heaps, or garbage of any kind. In the country the mother may be able to stand the milk in a cool stream under trees, and if it is essential to keep milk indoors choose a draughty, airy place for it.

Kariol, or Plunket Emulsion, is a very fine permanent emulsion of specially selected fats and oils for use when the baby has to be artificially fed, the object being to arrive at a standard emulsion for modifying cows' milk simply, safely, and without waste of time. The emulsifying is done without any oxidation of vitamins and the homœogenised butterfat is freed from the indigestible, volatile, fatty acids of cows' milk cream. No preservatives of any kind are used, and no drugs, and Kariol is a good bone and teeth builder. Two tablespoons of this cream are equal to about three tablespoons of ordinary, medium, thick, bought cream. Kariol can be given by teaspoon immediately before each feed, or, as in the recipe given above, it may be mixed with the milk mixture and given through the bottle. Start with a quarter level teaspoon in the 24 hours and increase by quarter teaspoons every second day up to the total amount required—usually about five or six teaspoons daily. The total daily amount of Kariol should be measured out carefully into a small cup or jar, and this amount should be finished in the 24 hours. Use ordinary standard-sized household spoons for measuring, as medical tea and tablespoons are considerably smaller than domestic spoons, and should only be used if expressly specified.

Fruit Juice

Every bottle-fed baby must have some fresh, uncooked fruit or vegetable juice daily to supply the necessary vitamins. Start with a few drops in warm boiled water and increase the quantity as baby gets older. Orange, tomato, carrot or grape juice may be used.

Feed baby every four hours (five times daily), the best feeding times being 6 a.m., 10 a.m., 2 p.m., 6 p.m. and 10 p.m., and not at night. Hold the baby in your arms and the bottle in position during feeding. Use a small-holed teat and apply tension to the bottle so that baby has to suck vigorously for his food and thus obtain active exercise for his mouth and jaws. The bottle of milk mixture, previously heated to 100° Fahr., should be covered with a small

flannel bag and the milk re-heated again half-way through the meal. This can be done by standing the bottle in a basin of hot water. Do not let baby take less than 10 minutes or longer than 20 minutes to drink his food. Once during and again immediately after feeding, get baby's wind up.

Wash the bottles each time after use, first in cold water, then in warm water, soap and soda. Brush well with a brush kept for the purpose, rinse, then bake or boil. Afterwards cover lightly with a piece of muslin to keep out the flies and dirt. Remember always that the feeding bottle must be simple and easily cleaned, and the teat should be readily turned inside out. Avoid boat-shaped bottles as these require two rubber endings and the ordinary straight bottle is more readily cleansed and more easily heated.

The teats should be rinsed first in cold water, then dip the finger in dry salt and scour the inside and outside of the teat thoroughly, rinse, then scald. Stand the teat on a saucer to drain and cover with a cup to keep dark. Light and water perish rubber.

TABLE FOR ARTIFICIAL FEEDING

Age of Baby	Ozs. Humanised Milk Daily	Total Fluid at Each Feeding	Feeding Times
1 month	20 ozs.	5 ozs.	6 a.m., 10 a.m. 2 p.m., 6 p.m., 10 p.m.
2 months	27½ ozs.	5½ ozs.	do.
3 months	30 ozs.	6 ozs.	do.
4 months	32½ ozs.	6½ ozs.	do.
5 months	35 ozs.	7 ozs.	do.
6 months	37½ ozs.	7½ ozs.	do.
7 and 8 months	40 ozs.	8 ozs.	do.

At 9 months begin semi-solid foods, and feed four times daily.

ANSWERS TO ENQUIRIES

Enquiry: My cows suffer from cracked and chapped teats. What is the best treatment?

Answer: Wash the teats with an antiseptic solution, then dry them with cotton wool and apply zinc ointment daily.

Veterinary Division

Enquiry: Several of my sheep have become blind. The eyes are swollen and inflamed, and discharge pus. What treatment is advisable?

Answer: The animals are apparently affected with Infectious Ophthalmia, a condition due to infection. Affected animals should be isolated, preferably in a shady place, and each day about 6 drops of one of the following lotions should be placed in the eye after washing them with a boracic lotion—

(a) Saturated solution of boracic acid in which 20 drops of spirits of camphor are mixed with each four ounces of the solution;

(b) Zinc sulphate, grains 9; distilled water, ounces 10.

Veterinary Division

Enquiry: In what way is Westernwolths Ryegrass superior to Italian Ryegrass?

Answer: Westernwolths Ryegrass is not necessarily superior to Italian Ryegrass. It differs from Italian Ryegrass as being of strictly annual habit. For a one-year lea of Ryegrass and Clover, annuals should be chosen as they provide a greater quantity of feed in the time available. If the field is to be left down for two years, Italian Ryegrass should be chosen, as it holds better through the first summer and provides feed in the second year. There is some confusion in the trade between these two grasses, and tests last year showed that Dutch Westernwolths is at present the truest to name. It provides earlier feed and grows taller than Italian Ryegrass.

Extension Service

Enquiry: Would you please indicate if it is possible to secure a pure line of Bræmar Velvet Wheat?

Answer: A limited area of Bræmar Velvet Wheat was sown last year from seed which as regards purity is superior to the average seed line offering. The areas were on Mr. C. F. Hall's property, Hogg Lane, and Messrs. Boyes Bros., Clarendon, Nile. The paddocks were examined by an officer of the Department and are reported as being almost totally free from foreign varieties. Farmers requiring pure seed Bræmar Velvet will be able to obtain any quantity next year from the progeny of a heavily rogued area being grown this season in the Midlands. This seed will be well over 99 per cent. pure, and the crop this year yielded approximately 40 bushels per acre.

Agronomy Division

BUREAU SECTION

AGRICULTURAL BUREAU OF TASMANIA

SOME WORLD CHANGES IN AGRICULTURE

By THE CHIEF EXECUTIVE OFFICER

THE Agricultural Bureau is carefully watching events in other countries in connection with agriculture.

The trend of events in England towards the establishment of marketing boards and the fixing of quotas for imports has caused other countries to consider their position, and it is interesting to note that among other things propaganda is now being carried out by the Editor of a newspaper in Denmark, in the course of which he is giving lantern lectures demonstrating the great advance of farming in England. This looks like a reversal of conditions which existed a few years ago, when it was a common thing for anyone interested in agriculture who had visited Denmark to tell us all about it. Rapid changes are also taking place in other parts of the world.

The United States is taking drastic action, and as far as can be gathered the following is a brief review of the position of agriculture.

When President Roosevelt took office last year agriculture was in a desperate state, and as this industry was considered to be the basis of all prosperity the Agricultural Adjustment Act (A.A.A.) was enacted. It is based largely on the control of production.

The agriculturalist, "the ruler of his own acres," who has always been an individualist, is fast coming under the domination, if not the actual control, of the Government. Loans to the farmer on land, livestock and other products are rapidly being taken over by the Government. In his vital need for money the Government has induced him to plough up his cotton, to abandon wheat and crop lands, to sell his growing pigs and piggy sows, and to cut down pig production, all with a view to reducing the volume of products to that which can be readily absorbed by the markets.

The Government pays to the farmer a fixed amount per acre for land which has been kept from cultivation, or per head of stock which has been slaughtered in conformity with the various codes which have been put into operation under the A.A.A. The effect of this is that a considerable proportion of the farmers are now regulated in their precedure by the Government. There are indications, also, that land planning is receiving enhanced importance, even to the extent that the man who owns his land and is free from debt may have to conform to the regulations imposed by the Government. To a considerable extent the farmer in America is even now not an individualist ruler of his own acres but is controlled in his activities, and the end is not yet.

(12) Compel the Federal Reserve Banks to purchase up to 3,000,000,000 dollars in Government obligations, or as an alternative—

(13) Issue new currency up 3,000,000,000 dollars without increasing the security therefor.

(14) Reduce the gold content of the dollar any amount up to 50 per cent.

(15) Outlaw or legalise the possession of monetary gold, place an embargo on the exportation of gold, and require licenses to deal in foreign exchange.

(16) Place an embargo on imports, fix import quotas, or raise tariff.

(17) Reorganise and co-ordinate the nation's railroads under a Federal co-ordinator.

(18) Loan the farmers 2,000,000,000 dollars, together with 100,000,000 dollars to Joint Stock Land Banks.

(19) Reduce local letter rate to two cents and cancel existing air and ocean mail contracts if it is desirable.

(20) Develop Muscle Shoals and the Tennessee Valley, and if necessary compete in the sale of power with private companies.

(21) Transfer the domestic electricity tax from the householder to the power companies and to add an industrial tax of 1 per cent.

(22) Continue for one year the present Federal gasoline and other taxes.

(23) Authorise the reorganisation of governmental departments.

(24) Provide regulations governing publicity on income tax returns.

(25) Aid owners of small mortgaged homes to borrow money through a 2,000,000,000 dollars home mortgage relief corporation.

A PAGE FOR THE COOK

Supplied by A. C. IRVINE, Mistress Domestic Science,
Education Department, Tasmania

SUET DUMPLINGS

6 ozs. flour
¼ teaspoon salt
½ teaspoon baking powder
3 ozs. suet
Herbs or parsley, if liked
5 tablespoons water

METHOD.—(1) Sift flour, salt and baking powder. (2) Chop suet finely and add to flour with herbs or parsley. (3) Mix in water to a stiff dough. (4) Cut into eight and make round and cook 20 minutes in with the meat.

SAVOURY PANCAKES

4 ozs. flour
½ teaspoon salt
1 egg
½ pint milk
Dripping
4 ozs. beef or mutton
½ small onion
Salt and pepper to taste
1 tablespoon tomato sauce
1 teaspoon flour
1 gill stock or water

METHOD.—(1) Mince meat and onion and mix in salt, pepper, sauce, flour and water, and cook for half-an-hour. (2) Sift flour and salt for the pancake, make a hole in middle of flour, break in egg and mix in a little of the flour to the egg with a little milk. (3) Do this till all the flour is worked in and half the milk. (4) Beat for three minutes, then add rest of milk. (5) Make a teaspoon of dripping hot in rather a small pan and pour in four tablespoons of the batter. (6) Cook till brown underneath, then turn and cook till brown again. (7) Turn on to hot plate and put a little of the meat mixture on pancake and roll up. (8) Serve at once, garnished with parsley.

LEMON SNOW

1½ pints water
4 ozs. Maizena
3 ozs. sugar
2 lemons
2 eggs
¼ teaspoon salt

METHOD.—(1) Peel lemons very thinly and put the peel with the water on to boil. (2) When boiling, strain and return liquid to saucepan. (3) Mix Maizena, sugar and salt with a little water till smooth, and stir this into liquid over fire till boiling. (4) Cook 2 minutes, then add juice of 1 lemon. (5) Cut the other lemon in slices and put them in bottom and sides of mould and sprinkle with sugar. (6) Beat whites only of eggs and add to the mixture and pour into prepared mould. (7) Let get cold and turn out and serve with boiled custard made from the yolks.

NUT LOAF (or Sultana)

1½ cups flour
½ teaspoon soda
1 teaspoon cream of tartar
½ cup sugar
¾ cup milk
½ teaspoon salt
1 egg
½ cup chopped nuts or sultanas
1½ ozs. butter

METHOD.—(1) Get oven ready and grease two tins and their lids well. (Cerebos salt tin are good). (2) Sift flour, etc. (3) Chop nuts. (4) Beat egg. (5) Cream butter and sugar, and add egg and beat well. (6) Add milk, nuts and flour, and put into the two tins with lids on. (7) Bake in moderate oven for ¾ to 1 hour. (8) Turn out and serve cold in thin buttered slices.

PINEAPPLE JELLY CAKE

1 round sponge cake
2 pint packets jelly crystals
1 tin pineapples
Pinch salt
Water
Whipped cream, flavoured and sweetened
2 tablespoons Sherry

METHOD.—(1) Split cake in half. (2) Cut up pineapple very small and put between the cake. (3) Stand cake in a tin a little larger than the cake. (4) Take liquid from the pineapples and enough water to make 1¾ pints and put this on to boil, then strain over jelly crystals and stir well. (5) Add Sherry and salt, and pour this carefully round cake till cake is covered. (6) Let set, then turn out and cut into squares and decorate with the cream.

VANILLA SLICES

6 ozs. puff or rough puff pastry
2 level tablespoons Maizena
¼ teaspoon salt
Vanilla
½ pint milk
1 teaspoon butter
1 oz. sugar
1 egg
White icing

METHOD.—(1) Make pastry, roll and cut into two equal pieces. (2) Bake them on back of Swiss roll tins for 15 minutes or so. (3) Put milk and butter on to boil. (4) Mix Maizena, sugar and salt with a little of the milk till smooth. (5) Break in the egg and beat well. (6) Stir this into milk till boiling and cook three minutes, then add vanilla. (7) When cold, put this between the two pieces of pastry and ice the top with white icing. (8) When set, cut into squares.

CHARLOTTE RUSSE

1 pint packet jelly crystals
Sponge cake
1 gill milk
½ pint cream
½ oz. gelatine
Pinch salt
1 oz. castor sugar
½ gill Sherry
Vanilla

METHOD.—(1) Make jelly with hot water and Sherry (¾ pint water and ¼ gill Sherry) and put some of the jelly 1 inch deep in a plain charlotte mould and let set. (2) Cut cake into strips ¾ inch wide and 4 inches long and fit in tightly round the sides of the mould, placing cake with one brown side out and one plain side alternating. (3) Sprinkle cake with some of the jelly to bind. (4) Soak gelatine in the milk for half-an-hour, then dissolve slowly and mix with the whipped cream, sugar and vanilla, or any other flavouring preferred, and pour into the prepared mould. (5) Let set, turn out and decorate with the rest of the jelly chopped up.

COFFEE OR CHOCOLATE ECLAIRS

Cream puff mixture
Cream
Coffee or chocolate icing
½ oz. chopped nuts

METHOD.—(1) Get oven and tray ready. (2) Make mixture and force it through a forcing bag in finger shapes on to the tray and bake as for cream puffs. (3) When cold, fill with flavoured, sweetened cream and ice the top with coffee or chocolate icing, and sprinkle the finely-chopped nuts on top.

EGGLESS CAKE

2 heaped breakfast cups flour
½ cup butter
1 cup currants
¾ cup sugar
1 teaspoon spice
1 cup cold water
½ teaspoon salt
1 cup sultanas
1 teaspoon cinnamon
1 teaspoon soda

METHOD.—(1) Prepare tin and get oven ready. (2) Sift flour, etc. (3) Boil butter, sugar and fruit for four minutes, then let cool. (4) Add the sifted flour, etc., and cook 1½ hours in a moderate oven.

ANZACS

4 ozs. butter
1 tablespoon golden syrup
1 cup cocoanut
¼ teaspoon salt
1 teaspoon soda
1 cup flour
1 cup sugar
1 cup rolled oats
2 tablespoons boiling water
Vanilla
4 ozs. rough puff pastry

METHOD.—(1) Get oven ready and grease tray. (2) Sift flour, etc. (3) Melt butter and golden syrup over fire. (4) Dissolve soda in the boiling water. (5) Mix all ingredients together and proceed as in Cookies.

STRAWBERRY CREAM SANDWICH

3 ozs. flour
3 ozs. cornflour
¼ teaspoon salt
4 ozs. sugar
½ gill milk
Strawberries
¾ teaspoon cream tartar
½ teaspoon soda (small one)
3 ozs. butter
2 eggs
1½ gills cream
White icing

METHOD.—(1) Light oven and get two sandwich tins greased. (2) Sift flours, etc. (3) Beat yolks and whites of eggs separately. (4) Cream butter and sugar, and add egg yolks and beat well. (5) Add milk and flours and lastly the stiffly-beaten whites. (6) Bake for 20 minutes in a moderate oven. (7) When cold, put a layer of whipped, sweetened, flavoured cream, and cover with strawberries, whole or mashed. (8) If mashed, put the strawberries on cake first. (9) Put other cake on top and ice top and decorate with strawberries, fresh or crystallised.

APPLE CAKE

2 cups self-raising flour
½ cup sugar
½ cup milk
1 egg
1½ tablespoons butter
Stewed apples

METHOD.—(1) Mix well. (2) Roll out, not too thick, then on one half spread generously with stewed apples. (3) Cover, and bake in good, hot oven.

BACHELOR'S CAKE

¾ lb. flour
½ lb. sugar
½ lb. sultanas (or ¼ lb. each of dates and raisins)
½ teaspoon cream of tartar
1½ teaspoons carbonate of soda
½ packet spice
2 pieces candied peel
1½ teacups milk
2 oz. butter or dripping

METHOD.—(1) Stir butter and sugar to a cream. (2) Add milk, then easily dry ingredients all mixed together. (3) Bake in a moderate oven for two hours. (If divided into two cakes, about one hour).

CARAWAY SEED CAKE

2 cups flour
1 dessertspoon baking powder
1 cup sugar
¼ lb. butter
2 eggs
Essence of lemon
Caraway seeds

METHOD.—(1) Beat eggs and butter to a cream. (2) Add milk and other ingredients. (3) Bake in a quick oven. Currants. may be used instead of seeds, or it could be plain.

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DERBY DEMONSTRATION AREA

By F. W. HICKS, H.D.A., District Agricultural Organiser

PREVIOUS reports dealing with this work have been published in "The Tasmanian Journal of Agriculture." The first interim report was published in the February issue, 1933, and the second, dealing with the financial position on the first year of production, was published in the November issue, 1933.

In this article it is considered desirable to review briefly the previous work to enable readers to follow the progress of the demonstration up to the present time.

The demonstration was commenced in co-operation with the Australian Dairy Council, which made funds available for the work. The total area of Mr. Ranson's property is 97 acres, of which 60 have been taken for the purposes of the demonstration. The soil is typical of the better class basaltic soils of the north-east and other parts of Tasmania. The rainfall averages approximately 45 inches per annum.

The object of the demonstration is to show the application of modern methods to the problem of providing a continuous and adequate supply of feed to a dairy herd. It is also designed to show that from our typical dairy farms production can be enormously increased and that the increased production can be obtained economically.

Provision was made for the demonstration to be continued for a period of five years. The five year plan will provide for the full development of the project and safeguard against abnormalities induced by favourable or unfavourable seasons. The project is still in its initial stages and it is anticipated that when the development is complete the production of butterfat will be 200 pounds per acre. This is the objective set by the Department, and judging from the results to date there is every indication that it will be attained. Prior to the commencement of the demonstration the highest production recorded on the property was obtained during the season 1928-29, when 31 cows were milked on the 97 acres and 6,721 pounds of butterfat were produced. This is equivalent to a cow to 3.1 acres and 69.2 pounds of butterfat per acre.

The first year of production since the establishment of the demonstration was completed on June 30th, 1933. From the sixty acres it was anticipated that 8,000 pounds of butterfat would be produced during the season July 1st, 1932, to June 30th, 1933. Owing to the unfavourable summer and autumn conditions experienced, and in a smaller degree to the number of heifers in the

herd, the anticipated figure was not realised. Twenty-seven cows were milked on the sixty acres, and the total butterfat produced was 7,678.99 pounds. This is equivalent to a cow to 2.2 acres and 127.9 pounds of butterfat per acre.

Season 1933-34

The second season of production on the demonstration concluded on June 30th, 1934. It was expected that the production of butterfat this year would have been substantially increased, but owing to the peculiar combination of adverse circumstances, the year has proved one of the most disastrous ever experienced by the dairying industry.

The continued dry weather had a serious effect on production, and the caterpillar plague practically destroyed all feed during January. The above circumstances, coupled with low prices, have had a serious effect on the individual dairyman and on the industry. Yields from dairy herds have been considerably below those recorded last season, and in many cases in the north-east cows were being milked only once a day during the month of February, and in some instances the herds were completely dried off during March.

The lactation period on practically all dairying properties has been much shorter than usual, and the gap between the drying off of the herd and when cows freshen in the spring will in many cases be at least four months, and in some instances longer.

During the season under review the rainfall has been considerably lower than normal, a total of only 29.20 inches being recorded. The dry spell this season commenced during November, when 32 points of rain were recorded for the month, and continued until the end of March. The six months period from October to the end of March may be regarded as the main butterfat producing months in Tasmania, and the rainfall recorded over the above period last season was 15.46 inches; the ten year average was 15.71 inches, but only 10.07 inches were obtained for the corresponding period this season.

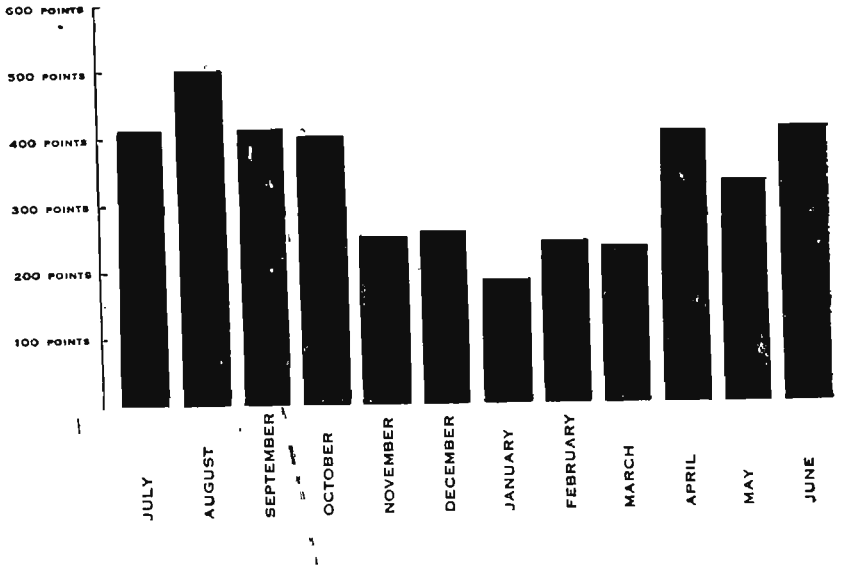
The dry conditions experienced from November onwards had a serious effect on production as dairy stock were just reaching their flush of production in November, from which time the peak of production is usually maintained for three months during a normal season, but this year production commenced to decline during December and on most properties decreased rapidly.

The rainfall graphs give a clear idea of the position and show the average monthly rainfall over a period of ten years and the monthly rainfall for the 1933-34 season.

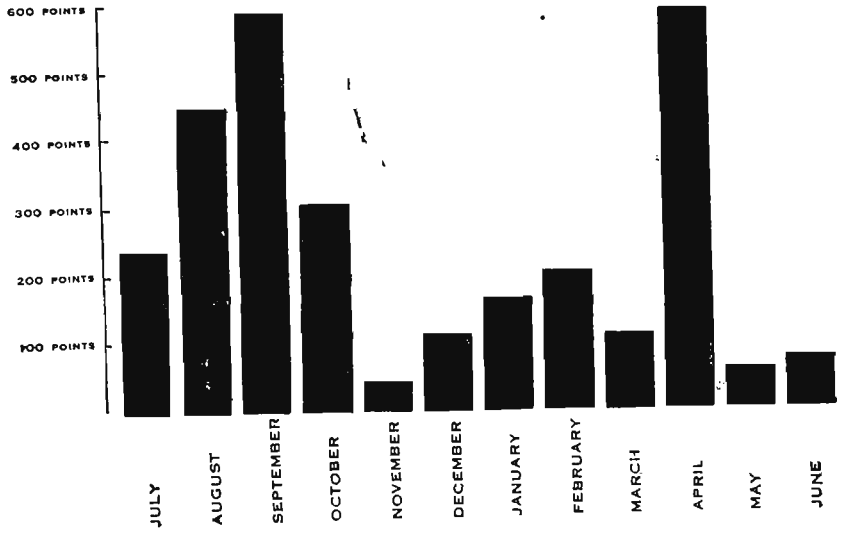
An indication of the decreases in butter production during the past season can be obtained by an examination of the output of two butter factories operating in the Winnaleah and Ringarooma districts.

The total production for the season 1932-33 from the two factories was 248 tons, but last season the total output was 194 tons, showing a decrease of 54 tons of butter from the district during the season.

AVERAGE MONTHLY RAINFALL FOR 10 YEARS
WINNALEAH



MONTHLY RAINFALL, SEASON 1933/34



Although the past season has been one of the worst on record, the production of butterfat from the same number of cows as last year on the demonstration has not decreased to any extent. The total butterfat produced for the year was 7,671.28 pounds, which is only 7.71 pounds below last season's production, and is equivalent to a cow to 2.2 acres and 127.85 pounds of butterfat per acre.

A comparison between the monthly butterfat production for the season 1932-33 and the present season, indicates that the herd should be capable of materially increasing the production next year should a normal season be experienced.

	Season 1932-33	Season 1933-34
July	425.62 lbs.	648 lbs.
August	496.79 lbs.	424 lbs.
September	695 lbs.	732.16 lbs.
October	795 lbs.	1,180.74 lbs.
November	1,012.23 lbs.	857.4 lbs.
December	984.96 lbs.	803.42 lbs.
January	838.65 lbs.	585.53 lbs.
February	604.36 lbs.	431.83 lbs.
March	460.63 lbs.	478.37 lbs.
April	383 lbs.	385 lbs.
May	366 lbs.	565 lbs.
June	489 lbs.	450 lbs.
Household requirements, 7 lbs. milk per day	127.75 lbs.	129.83 lbs.
	7,678.99 lbs.	7.671.28 lbs.

On comparing the monthly butterfat returns it will be noticed that the peak production this season was reached during October and with a normal season the period of heavy production would have been extended for an additional two months.

The chief factor influencing production is an adequate food supply, and if it had not been for a reserve supply of feed in the form of stack silage, the production on the Derby Demonstration Area would have also declined in common with that of other properties in the vicinity. As soon as the dry conditions were experienced, feeding of the reserve of silage was commenced, and by that means the production of the herd was maintained reasonably well.

Approximately 75 tons of stack silage were made on the area this year, at a cost of 4/7 per ton. One stack has been used and the other, containing approximately 45 tons, is being reserved for winter feeding in conjunction with other supplementary fodders supplied by temporary pastures and crops of chou mœllier and soft

turnips. For the past two seasons chou mœllier has given excellent results appreciably increasing the production and presenting no difficulty with cream quality. This season the stock had to be watched closely as trouble with blowing (hoven) was experienced, and although cows were allowed on the area for only short periods one death occurred.

Summary for Twelve Months' Period

July 1st, 1933, to June 30th, 1934

No. of Milking Cows on Area	27
Butterfat produced for the year	7,671 lbs.
Area under Forage Crops (Chou Mœllier, Soft Turnips and Mangolds)	10½ acres
Area under Temporary Pastures	23 acres
Silage made	75 tons
Hay made	12 tons

Interesting figures are revealed by a study of the results of the Grade Herd Recording.

The Scottsdale-Winnaleah Unit contained last season (1932-33) 472 cows, and the average production of butterfat per cow was 188.5 lbs. The average production of the herds submitted for testing in the Winnaleah portion of the Unit was 205.4 lbs. The average production on the Demonstration Area was 284 lbs. per cow, showing an increase of 95.6 lbs. over the Unit average and 78.6 lbs. above the district average. Herd Recording figures for the present season are not finalised, but the indications are that the herd will have an average very close to last year's figures.

Costs of the Work

Costs of the work have been carefully recorded and the net returns over a period of years are the basis on which the success or failure of the demonstration will be measured.

Details of the early costs in connection with the demonstration were published in "The Journal of Agriculture," November, 1933, and only a brief review will be given here.

Three independent valuations of the land were obtained and an average of the valuations taken in order to arrive at a fair interest charge for the land. The average of the valuations prior to the demonstration being established was £17, and in its present condition £27/10/-.

Improvements, therefore, are valued at £10/10/- per acre—a total amount of £630. From the total of £630 must be deducted the value of a cottage, purchased by the owner since the work commenced, its value being £200, and also the total developmental capital expended to date, a total of £242/2/6. After making the above deductions the net improved land value is £187/17/6.

For the purposes of book-keeping and to prevent needless variation in the profit and loss account, stock on the demonstration are valued on a standard valuation—

Mature Cow	.....	.....	£8 0 0
Springing Heifers	.....	.....	£6 0 0
Weaned Heifers	.....	.....	£1 10 0

Provision has been made for depreciation at the following rates:—Buildings, 3 per cent.; Fences, 5 per cent.; Plant, 10 per cent; Interest Charges, etc., 5 per cent.

The cost of producing butterfat last season was 10.3 pence per pound. For the season under review the butterfat cost 9.3 pence per pound to produce.

In compiling these costs the improved land value has been ignored.

When the first balance sheet was presented at the conclusion of the season 1932-33, it showed a loss of £30/15/8 on the year's working. During the present season, although there will not be a big difference in the average price of butterfat, the price paid over the main months of production was as low as 6½d., which must be acknowledged on the present standard of Tasmanian dairying, to be well below production costs. This year's working resulted in the total production of only 7.71 pounds below last season's figures, but the cash returns for butterfat show a decrease of £12/8/3.

The position of the dairyman as indicated by the work being performed at Derby, is a difficult one. The cash returns are small and coupled with two unfavourable seasons this means that it is taking all the average dairyman earns to provide a living, and nothing is left for farm maintenance. This is noticeable on many properties and the above conditions, combined with the depredations of rabbits, are making it difficult for many dairymen to carry on successfully.

Referring again to the Herd Testing figures, the average production for Scottsdale-Winnaleah Herd Recording Unit during the season 1932-33 was 188.5 pounds per cow of butterfat, and the average price paid for butterfat during the year was 9.03 pence. On this basis, if an average herd of 30 cows is considered it will be seen that the total returns for butter for the season would be approximately £210. The figures for the past season would be considerably lower and indicate clearly that dairymen at the present time are endeavouring to produce butterfat, the production costs of which are greater than the selling price of the article they are producing.

The Department desires to express its appreciation of the co-operation of Mr. F. W. Ranson, on whose property the demonstration is being conducted. His untiring efforts and attentions to detail have made it possible for the demonstration to proceed in a satisfactory manner.

DERBY DEMONSTRATION AREA

Statement of Receipts and Expenditure for Year ending June 30th, 1934

Expenditure	£	s.	d.
To Interest on Property	51	0	0
,, Rates and Taxes ...	5	10	0
,, Depreciation of Buildings	7	5	6
,, Depreciation of Fences	2	13	2
,, Depreciation of Plant and Implements	12	12	0
,, Interest on Plant and Implements	6	6	0
,, Fertiliser	16	19	6
,, Seeds, Annual and Biennial	29	10	8
,, Labour and Keep ...	106	0	0
,, Pig Feed (Barley)	13	19	0
,, Freight	6	1	6
,, Drench, Licks and Oil	4	13	6
,, Herd Testing	3	4	0
,, Repairs	3	7	3
,, Interest on Outlay on Clearing	4	8	5
,, Interest on Pasture Establishment on New Land	5	6	4
,, Fencing, Depreciation and Interest	3	14	4
,, New Machinery, Interest and Depreciation	4	1	6
,, Stock Adjustment	30	0	0
,, Stock Losses	16	0	0
,, Owner's Labour	104	0	0
	£436	12	8

Receipts	£	s.	d.
By Butterfat	288	6	6
,, Pigs	70	0	5
,, Young Stock	28	10	0
,, Cows	27	0	0
,, Stock Adjustment	14	0	0
,, Balance	8	15	9
	£436	12	8

ASPARAGUS CULTURE

By P. H. THOMAS, Chief Horticulturist, and T. D. RAPHAEL, M.A., Dip. Hort. (Cantab.), Horticulturist

WHILST asparagus at one time was regarded as a luxury only obtainable in the spring, to-day with the use of cool storage, rapid transport and improved preserving processes, it is available throughout the year and is becoming more popular amongst the consuming public.

Asparagus is botanically classified as a member of the Liliceæ, and is perennial in habit, eventually developing a stool of large proportions, the rhizomes spreading throughout the soil. The roots are mainly of a succulent, fleshy nature, becoming thick and tuberous as the season advances, food being stored in them for the following season. The root spread will often cover about 8 feet in width and depth, whilst the foliage in older plantations will reach 4 to 5 feet in height. The edible portions which find such favour are the young miniature shoots, removed when about 12 inches in length.

Varieties

Although asparagus has been grown in Tasmania for a great many years, plantings have been conducted on a comparatively small scale and no serious attempt has been made to develop the industry on a large commercial basis. A number of varieties have, however, been tested, and amongst these Cannovers, Colossal, Harwood's Giant and Palmetto have been the popular choice. Mary Washington, an American variety, develops a fine stem and is stated to be resistant to the rust fungus *Puccinia asparagi,* which is one of the most serious diseases affecting the plant's growth. Little loss, however, has been experienced from this trouble in Tasmania.

Propagation and Selection

Plants may be raised easily from seed, but where the grower requires quick returns the purchase of good 1 or 2-year old stools is recommended. Owing to their more vigorous growth they will soon repay the extra initial outlay involved.

Where it is intended to raise asparagus from seed, the first essential is to select plants of good type as parent stock and obtain seed from these in due course. When adopting this method seed should be saved only from prolific stools producing an abundance of well developed buds which are firm, tightly packed, and of the desirable quality. The time and uniformity of maturation are also important points. Asparagus plants are mainly dicœcious in nature (that is, there are separate male and female plants) and it has been found that the former produce larger crops than the latter, though the quality of the individual shoots is not quite so good. Male plants may be separated by examination of the flower, and a bed consisting for the most part of these can be established.

Propagators also find that the plants which branch high above the ground produce buds superior to those produced from plants of a low branching habit.

The seed is developed in the red berries, each of which contains from three to six seeds. When collecting on a large scale the berries are placed in a bag, and after pulping to disintegrate the fleshy parts the mass is transferred to a tank of water. After standing for a period of 24 hours all the good seed will sink to the bottom and can easily be removed, dried and stored for future use.

Nursery beds are generally sown during September, the seed being thinly scattered in rows from 18 inches to 24 inches apart and covered with soil to a depth of from one to one-and-a-half inches. The soil for these beds should be well prepared and be moderately rich. Since the seed is slow to germinate a light sprinkling of radishes may also be sown to mark the rows and so enable early hoeing to be carried out without danger to the germinating asparagus. When the young plants have developed to a height of about 3 inches they may be thinned to 3 inches apart in the rows; this, combined with constant hoeing and judicious watering, will ensure good yearling plants, which are generally considered to be the most satisfactory for setting out in the permanent bed during the following spring.

Initial Soil Preparation

Probably the most generally suitable soil for asparagus growing is a light, rich, sandy loam, and though cultivation may be profitably undertaken in most types of soil provided the right method of cultivation is used, those of a sandy nature are preferable. In the season prior to planting asparagus, it is advisable on the lighter soils to plough in a good green crop so that the humus and water holding capacity of the soil may be improved. Where farmyard manure is available a dressing of 30 tons or more to the acre will produce lasting results. The land should be deeply worked and must be free from serious weeds.

Planting Systems

Several methods of planting permanent asparagus beds are used, the most satisfactory system being governed largely by the soil and type of plant grown. The following are the two main systems employed.

Single Row or Ridge System.—In this the rows are 4 to 7 feet apart and the plants 12 inches to 18 inches in the row. Planting distances may be increased considerably if a higher class stick is required, though the yield per acre will be reduced somewhat.

Double Row System.—The plants are placed at 18 inches square in the double row and four feet between each double row. Triple rows have also been tried, but as considerably more hand cultivations are required both in this and in the double rows, the method has not been favoured except in small market gardens.

Planting

Planting is usually commenced in September provided conditions are favourable. On smaller areas and where labour is less costly, trenches 9 inches wide and 12 inches deep may be taken out, a little well-rotted farmyard manure worked into the bottom and the plants carefully placed with the roots well spread. A fine soil covering of about three inches follows, the remaining soil being gradually filled into the trenches with summer cultivations. Commercially, large areas are planted by taking out a plough furrow in the prepared soil to a depth of about 8 inches, placing the plants and ploughing the furrow back. Whilst on a large scale careful planting may not seem practicable, nevertheless, care in this respect will amply repay the grower and result in a quick take, fewer misses, and better early returns.

Routine Work and Manuring

After planting, the bed is practically flat, and when growth has commenced the rows of plants are inter-cultivated in the ordinary way. Frequent hoeings and stirring of the surface soil will produce good results during the growing season. Ridging is commenced in the third spring by means of a double-breasted plough or adapted disc plough, the soil from between the rows being thrown up over the stools to a final depth of about 12 inches. The bed remains ridged until the cutting of the crop has been completed, after which summer cultivations and hoeing eventually level the surface once again.

It is advisable each summer to inspect the beds thoroughly, marking any "misses" and unhealthy or weak stools; in spring such may be filled and replaced by healthy young stock. When the foliage of the plants commences to change colour in autumn it should be cut down close to the ground and the tops burnt. Not only does this tend to check the spread of disease, but the berries which would seed and develop later crops of undesired seedlings are also removed.

The manurial treatments adopted will again depend largely upon the soil under cultivation, but as this is generally light in nature the following programme might be taken as a basis on which to work.

Good farmyard manure, whilst being generally beneficial, can seldom be obtained in quantities sufficient for a proper dressing. The risks of weed introduction are also present when this is used. Whilst it is not possible to generalise on soils, a commercial fertiliser comprising the following proportionate quantities of plant food might be applied—5 phosphate, 3 nitrogen, 2 potash.

Of all the soil constituents a deficiency of potash produces the most serious results in asparagus, and since the lighter soils are the most used, applications of this plant food may be regarded as essential. Lime is also an important constituent, and only soils of a neutral nature should be planted. If slightly acid soils are under consideration, good dressings of lime must be applied at regular intervals. A spring dressing of 2 cwt. of nitrate of soda per acre is also beneficial to soil lacking humus.

Harvesting

The first cutting of asparagus is generally made in the third spring from planting, and since the bed is still comparatively young only two or three shoots should be removed per plant, and these not later than the end of November. In later years many more shoots may be removed per stool and the period of harvesting extended, but too great a prolongation of the cutting season may seriously affect the following season's crop. The actual stage at which the shoots should be removed will largely depend upon the type desired for market, but generally speaking, the best time is when about two to four inches of brownish-green tip has emerged from the soil. Tips are detached by means of a special chisel-shaped knife which is inserted into the ground and the shoot removed at the base. Care should be taken that the crown of the plant is not injured in this operation. The shoots thus obtained are divided into several grades according to length, girth, and such qualities as colour and compactness, after which they are bunched in a bunching machine or "cradle." Where asparagus is grown in quantity certain definite grades have been established, the size of the bundles regulated and the containers standardised. An example of this may be taken from the Evesham growers in England, where the "bundle" is 3¼ inches standard girth and the grades "Giant" (over 15 m.m. diameter), "Selected" (11 to 15 m.m.), "Choice" (6 to 11 m.m.), and "Prue" (less than 6 m.m.) Such standardisation has many advantages, and if growers intending to market asparagus commercially adhered to some such system in Tasmania they should have little difficulty in disposing of it at remunerative prices. Double stems or faciets are regarded unfavourably by the trade. These, together with culls and inferior stalks, are sometimes marketed in small boxes for soups and other culinary purposes.

This article endeavours to set down as briefly and completely as possible only the main points to be observed in asparagus culture, as a guide to intending growers. Considerable modifications of the systems employed may be necessary under the wide series of soil and climatic conditions experienced in the different districts throughout the State and further advise for such specific cases may be obtained from the Department of Agriculture.

SEED TESTING

Record of Operations for the Year Ended 31st May, 1934

By A. H. WOODFORDE, F.L.S., Senior Seed Analyst

FOR the year ended the 31st May, 1934, 1505 seed samples were received at the official seed testing laboratory at Launceston, representing an increase of 79 on the number submitted during the previous year. The distribution of the samples showed little variation from last year, and practically all the classes of agricultural and garden seed used in Tasmania were represented. The number of samples of Perennial Ryegrass and Subterranean Clover shows a significant increase, owing largely to the interest now being shown by farmers in growing these seeds for market. Certified seed accounted for over 20% of the Perennial Ryegrass samples, the numbers being fairly evenly divided between Tasmanian and New Zealand seed.

The survey of strain-quality of the perennial ryegrass seed on the market was continued by the application of the ultra-violet light test to all samples submitted for germination test. The results will be found in Table 3, and a study of the particulars here set out is of some interest. The average percentage of "fluorescence" (indicating contamination with annual types) for all samples was 35.3%, a figure somewhat lower than that usually obtained for "commercial" seed, and due to the inclusion of certified samples. The average percentage for all commercial samples was 48.1%. For Tasmanian-grown commercial seed the average was 38.3% as against 52.9% for imported. From the table it will be seen that 13 out of the 38 locally-grown samples exhibited less than 5% of "fluorescence" which demonstrates the influence of certified seed on the standard of seed produced for market in the ordinary way. The quality of imported commercial seed shows little improvement, that of New Zealand origin in particular being of high fluorescence. The columns of figures in Table 3. except the first two, show the number of samples which exhibited "fluorescence" within the limits indicated at the head of the columns.

The average percentage of pure seed and impurities, the average percentage of germination and the distribution of germination for all samples of seeds scheduled under the Seeds Act are shown in Tables 1 and 2.

There is comparatively little departure from the figures for last year except in the purity of Subterranean Clover. The average percentage (86.6) is not in this instance a true reflection of the quality of the seed, owing to the inclusion of a number of unsatisfactorily cleaned samples which were submitted for an estimation of impurity content. (By far the greatest proportion of impurity consisted of soil particles). A study of Table 2 shows that germination in a number of instances left much to be desired. The

columns in this table show the number of samples in each class germinating within the limits indicated at the head of the columns. Thus, in the case of Perennial Ryegrass 5.5% of the samples germinated under 60%, 2.5 between 60 and 69%, 8.6 between 70 and 79% and 83.4% between 80 and 100%. The final column shows the average germination of all the samples and is the same as column 9 of Table 1. A number of clover samples have this season been somewhat high in hard-seed content, particularly Subterranean Clover and several lots of White Clover. There has been considerable speculation among seedsmen and farmers as to the nature of hard seeds and their ability to germinate. These seeds occur very commonly in clovers and related species, and especially in lines that have not been subjected to a certain amount of friction such as is normally applied in the hulling and machine cleaning of the seed. Subterranean Clover seed presents rather more difficulty in this respect than most other species on account of the tough burr in which it is contained and the inner membrane which surrounds the actual seed. These coverings tend to protect the seed-coat to a certain extent in hulling, with the result that seed often does not receive the necessary abrasion. Hard seeds do not germinate readily, simply due to the fact that their coats are impervious to water. A natural softening takes place in the soil, but often so long after sowing that they do not strike until the following season. At its last congress the International Seed Testing Association gave provisional sanction for a percentage of hard seeds occurring in germination tests to be classified as germinable, and such practice will in future be adopted in this laboratory. The permissible percentages are:—One-half the percentage of hard seeds in the case of Red Clover and Lucerne, and one-third in the case of other clovers, etc.

The distribution of all seed samples received for testing during the year was as follows:—

Grasses		Clovers		Cereals, Pulse and Forage		Miscellaneous	
Ryegrass:		Red Clover and Cowgrass	85	Oats	12	Vegetable	282
Perennial	209	White Clover	57	Wheat	3	Flower	196
Italian	65	Subterranean Clover	110	Barley	109	Seeds Mixtures	8
Westernwolths	41	Other clovers	43	Peas (Field)	1	Miscellaneous	14
Wimmera	6			Swede and Turnip	96		
Cocksfoot	66			Rape	19		
Other grasses	52			Kale	4		
				Mangold	27		
Total	439	Total	295	Total	271	Total	500

Total, 1,505

The weed seed content of the samples examined was, in the majority of cases, below one per cent., but samples containing as much as 2-3 per cent. were by no means uncommon. Considering

TABLE 1

Average Percentage of Pure Seed and Impurities, and Average Germination

Species	PURITY					GERMINATION (of Pure Seed)					
	No. of Samples	Pure Seed	Other Crop Seed	Weed Seed	Inert Matter	No. of Samples	1932-33	1933-34	Maximum	Minimum	Hard Seed
Ryegrass:											
Perennial—											
All Samples	153	94.2	2.4	1.1	2.3	163	87.5	86.4	100	16	—
Tasmanian	55	86.5	5.4	2.1	6.0	63	90.9	90.1	—	—	—
Imported	98	98.6	.6	.4	.4	100	84.5	83.0	—	—	—
Tasmanian Certified	21	94.9	.5	1.1	3.5	21	93.3	94.7	99	89	—
Italian	64	96.9	.5	1.5	1.1	64	84.8	85.9	98	45	—
Westernwolths	41	96.4	.4	1.0	2.2	40	84.3	92.1	99	80	—
Wimmera	6	95.7	1.8	.4	2.1	6	79.1	72.3	91	57	—
Cocksfoot	66	86.2	1.7	.3	11.8	65	75.6	77.4	93	52	—
Clovers:											
Red Clover	78	98.5	.1	.3	1.1	85	82.1	86.5	99	35	7
White Clover	56	96.9	1.8	.6	.7	55	77.5	79.0	97	53	12.1
Subterranean Clover	101	86.6	—	—	13.4	62	75.1	78.8	99	27	15.4
Swede	54	99.4	—	—	.6	57	85.6	80.3	98	51	—

TABLE 2

Showing the Percentage of Samples which Germinated within Different Percentage Groups

Species	Percentage of Samples Germinating in Groups				Average Germination
	Under 60%	60–69 %	70–79 %	80–100 %	
Ryegrass:					
Perennial	5.5	2.5	8.6	83.4	86.4
Italian	6.3	1.5	9.4	82.8	85.9
Westernwolths	2.6	—	—	97.4	92.1
Wimmera	33.3	16.6	—	50.0	72.3
Cocksfoot	7.7	6.2	36.9	49.2	77.4
Red Clover	1.2	2.3	11.8	84.7	86.5
White Clover	7.3	10.9	27.3	54.5	79.0
Subterranean Clover	4.9	16.4	16.4	62.3	78.8
Swede	7.0	12.3	24.6	56.1	80.3

TABLE 3

Showing Average Percentage and Distribution of Fluorescence of all Perennial Ryegrass Samples Received Between 1/1/33 and 31/5/33, According to Type and Origin

Type and Origin	No. of Samples	Average % Fluorescence	No. of Samples Showing Fluorescence in Groups						
			0–5 %	6–10 %	11–20 %	21–40 %	41–60 %	61–80 %	81–100 %
All Samples	161	35.3	57	6	7	17	33	25	16
All Commercial Samples	116	48.1	13	5	7	16	35	26	14
Tasmanian Commercial Samples	38	38.3	13	1	1	6	6	7	4
Imported Commercial Samples	78	52.9	—	4	6	11	28	19	10
All Certified Samples	45	2.4	44	1	—	—	—	—	—
Tasmanian Certified Samples	21	2.3	21	—	—	—	—	—	—

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Average Percentage of Pure Seed and Impurities, and Average Germination

Species	PURITY					GERMINATION (of Pure Seed)					
	No. of Samples	Pure Seed	Other Crop Seed	Weed Seed	Inert Matter	No. of Samples	1932-33	1933-34	Maximum	Minimum	Hard Seed
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Tasmanian	55	86.5	5.4	2.1	6.0	63	90.9	90.1	—	—	—
Imported	98	98.6	.6	.4	.4	100	84.5	83.0	—	—	—
Tasmanian Certified	21	94.9	.5	1.1	3.5	21	93.3	94.7	99	89	—
Italian	64	96.9	.5	1.5	1.1	64	84.8	85.9	98	45	—
Westernwolths	41	96.4	.4	1.0	2.2	40	84.3	92.1	99	80	—
Wimmera	6	95.7	1.8	.4	2.1	6	79.1	72.3	91	57	—
Cocksfoot	66	86.2	1.7	.3	11.8	65	75.6	77.4	93	52	—
Clovers:											
Red Clover	78	98.5	.1	.3	1.1	85	82.1	86.5	99	35	7
White Clover	56	96.9	1.8	.6	.7	55	77.5	79.0	97	53	12.1
Subterranean Clover	101	86.6	—	—	13.4	62	75.1	78.8	99	27	15.4
Swede	54	99.4	—	—	.6	57	85.6	80.3	98	51	—

TABLE 2

Showing the Percentage of Samples which Germinated within Different Percentage Groups

Species	Percentage of Samples Germinating in Groups				Average Germination
	Under 60%	60–69 %	70–79 %	80–100 %	
Ryegrass:					
Perennial	5.5	2.5	8.6	83.4	86.4
Italian	6.3	1.5	9.4	82.8	85.9
Westernwolths	2.6	—	—	97.4	92.1
Wimmera	33.3	16.6	—	50.0	72.3
Cocksfoot	7.7	6.2	36.9	49.2	77.4
Red Clover	1.2	2.3	11.8	84.7	86.5
White Clover	7.3	10.9	27.3	54.5	79.0
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TABLE 3

Showing Average Percentage and Distribution of Fluorescence of all Perennial Ryegrass Samples Received Between 1/1/33 and 31/5/33, According to Type and Origin

Type and Origin	No. of Samples	Average % Fluorescence	No. of Samples Showing Fluorescence in Groups						
			0–5 %	6–10 %	11–20 %	21–40 %	41–60 %	61–80 %	81–100 %
All Samples	161	35.3	57	6	7	17	33	25	16
All Commercial Samples	116	48.1	13	5	7	16	35	26	14
Tasmanian Commercial Samples	38	38.3	13	1	1	6	6	7	4
Imported Commercial Samples	78	52.9	—	4	6	11	28	19	10
All Certified Samples	45	2.4	44	1	—	—	—	—	—
Tasmanian Certified Samples	21	2.3	21	—	—	—	—	—	—

Ryegrass (all species), Cocksfoot and White Clover alone, 83 samples contained more than one per cent. of weeds. These were distributed as follows:—Five samples contained one per cent., 25 contained from 1.1 to 1.5 per cent., 17 from 1.6 to 2.5 per cent., and 36 contained from 2.6 to 3 per cent. and over. No farmers' samples were included in this analysis, and, so far as can be ascertained, at least the majority were intended for sale without further machine-dressing.

The weed species occurring most frequently in samples were (see Table 4):—Sorrel, Hairgass (Silver Grass or Squirrel Tail), Goose Grass *(Bromus mollis)*, Catsear, Hawkbit and other flat weeds, Ribgrass, Fat Hen, Chickweed, Spurrey, etc. Many other species were represented, but only the most common have been included in the table, which sets out the percentage of samples of each of the species shown at the head of the columns which contained the impurities in Column 1. The table does not indicate the quantities in which the various impurities occurred.

The occurrence of impurities scheduled under the Seeds Act as noxious weeds was notably infrequent. Two samples of Cocksfoot and two of Red Clover contained minute traces only of Californian Thistle *(Cnicus arvensis)* and one sample of Subterranean Clover contained Onion Weed *(Romulea bulbocodium)*. Dodder was not found in any of the samples.

TABLE 4
Showing Frequency of Occurrence of Impurities

Impurities	Perennial Rye	Italian	Westernwolths	Wimmera	Cocksfoot	Red Clover	White Clover	Subterranean Clover
Sorrel	24	42	24	67	9	27	75	2
Docks	7	6	7	—	8	18	4	2
Catsear	12	28	7	—	11	—	—	—
Ribgrass	14	25	5	—	18	76	70	—
Hawkweed	20	22	12	—	—	—	—	—
Hawkbit	22	19	10	17	5	—	—	1
Scarlet Pimpernel	5	6	5	17	2	3	7	—
Fat Hen	1	3	—	—	—	15	39	—
Common Chickweed	—	—	—	—	—	—	29	1
Mouse-ear Chickweed	1	3	—	—	2	3	9	—
Catchfly	5	13	12	—	2	1	2	—
Hairgrass	65	73	12	100	18	—	2	2
Spurrey	4	13	17	—	—	4	18	—
Self Heal	—	—	—	—	—	4	5	—
Sow Thistle	2	8	12	—	11	—	—	—
Goose Grass	54	77	59	83	17	1	—	2
Yorkshire Fog	36	41	34	67	59	—	7	1
Field Madder	2	2	2	—	—	1	—	—
Suckling Clover	29	33	44	17	—	1	52	2
Clustered Clover	14	3	10	33	2	—	11	2
Black Medick	—	—	—	—	—	5	32	—
Californian Thistle	—	—	—	—	3	3	—	—
Dodder	—	—	—	—	—	—	—	—

DAIRY PRODUCTS EQUALISATION SCHEME

By J. T. ARMSTRONG, B.Sc. (Agr.), Chief Dairy Officer

ALTHOUGH the Dairy Products Equalisation Scheme came into operation on July 1st of this year, so many enquiries have been received as to the objects and details of the scheme that it is felt a short explanation in this Journal might be appreciated.

The objective of the scheme is—

(1) To increase the average returns to producers from the sale of dairy produce by fixing a price for dairy products sold in Australia which will be independent of the fluctuations of the London market, and one which will be based solely on economic conditions ruling in Australia.

(2) To provide by legislation that every manufacturer will receive his fair share of sales on an enhanced local market and must accept his full share of the less remunerative export market.

There are two aspects of this scheme—one statutory and one voluntary.

The statutory part of the scheme is contained in the Tasmanian Dairy Products Act, 1933, and the Commonwealth Dairy Produce Act, 1933. The State Act is administered by the Tasmanian Dairy Products Board, and provides that—

(1) The Minister shall declare a quota.

(2) That no manufacturer shall sell more than his quota on the Tasmanian market.

(3) That all manufacturers of, agents for, or dealers in dairy products shall be registered with the Board.

(4) That all such persons, if required by the Board, shall furnish returns of manufacture and sale of dairy products. No fee is charged for registration, and a certificate once issued does not require annual renewal.

The Tasmanian Act, by means of the quota system, assures every manufacturer of his fair share, and his fair share only, of sales in this State, but cannot interfere in the matter of interstate sales.

The Commonwealth Act, however, prohibits a manufacturer after selling his full quota in Tasmania, from sending the balance to another State, say Victoria, and therefore depriving some Victorian manufacturer of his fair share of that market. The Commonwealth Act provides that no manufacturer can sell Dairy Products Interstate until he has satisfied the Commonwealth Minister for Commerce that he has exported, or will export, his quota. Thus, if 50 per cent. was proclaimed a quota for local sales the export quota would also be 50 per cent., and no manufacturer could sell dairy products interstate until he has exported 50 per cent. of his production.

The two Acts, therefore, combined, insure that every manufacturer will obtain has fair share of Australian sales and must take his fair share of the risks of the export market.

To insist on the strict observance of this legislation would throw all present marketing arrangements into a chaotic condition and would definitely put the farm butter maker out of business, since under the Commonwealth Dairy Produce Export Regulations, he is prohibited from sending butter overseas.

To obviate these difficulties the Equalisation Scheme has been put into operation. This scheme is purely voluntary, in so much that it is not covered by legislation, and the Committee in control can only function by reason of agreements signed by manufacturers and by the Committee.

Under this scheme manufacturers will continue to make sales just as at present, but each manufacturer will agree, in the event of overselling his quota, to make reclamation through the Committee with one who is thereby compelled to undersell his quota.

Under this scheme all manufacturers will receive equal returns for the same grade of Dairy Produce whether they sell here or overseas, and although the actual letter of the quota legislation is broken the spirit will have been observed.

All factories will submit returns to the Committee each month giving details of their manufacture and sales position, and in the case of oversellers, will make reclamation on the amount oversold at a price per lb. which will be equal to the difference between London and Australian prices.

The Australian price at which Dairy Produce will be taken into equalisation will be the price fixed by the Committee, and London prices will be determined from cabled information.

Farm Butter makers will always be oversellers, and must in each case pay reclamations, and in their case, however, some modifications of this system will be required since few, if any, farmers keep reliable records of the amount of butter they actually manufacture for sale and many would be placed in rather an invidious position if forced to make reclamations at the end of the month to the Committee, particularly if they did not know until then the amount they would be asked to contribute. In order to eliminate the necessity of the Farm Butter maker submitting returns of the amount of his manufacture, and so that he may know from day to day how much will be required of him in reclamations, the Committee has decided that instead of requesting the Farm Butter maker to contribute so much on every lb. by which he oversold his quota, to strike a lower rate which will be payable on every lb. manufactured for sale. This rate is at present 3d. per lb. but will be varied from time to time dependent on quota variation and the fluctuations of the London market.

After a considerable amount of discussion the Committee has decided that the simplest method of collecting reclamations is by the sale to farm butter makers of printed slips, one of which must be firmly attached to the wrapper of all butter made for

sale. The manufacturer can obtain these slips direct from the Secretary of the Committee, or his dealer, provided that the dealer is agreeable to obtain a supply for him.

The use of the slip affixed to the wrapper obviates the necessity of the farmer making returns of butter manufactured and sold and simplifies the matter of administration by the Committee since it is possible to see at a glance if butter submitted for sale has paid the required reclamation.

The advantages of this Scheme to the Dairying Industry are obvious. If some such scheme were not in operation the price of "Choicest" Factory butter in Australia would be London parity, approximately 8d. per lb. with dairy butter averaging 2d. to 3d. per lb. below this price. Under this scheme approximately 50 per cent. of our butter is being sold at 1/3 per lb., the remainder being sold at London parity, a gain of 7d per lb. for at least half of our production through the operation of the scheme. In Tasmania at present the profit is 8d. per lb. since the wholesale price of butter is 1/4. In the case of farm-made butter the manufacturer is at present even showing greater profit since he sells the whole of his production at a price of 8d. per lb. above what he would receive if it were not for this scheme, and is only required to contribute 3d. per lb. in order to obtain the extra profit.

COMMON FARM WEEDS: THEIR CHARACTER AND CONTROL

By R. H. BEVIN, Dip. C.A.C., B.Agr., Chief Agronomist

Section 2: The Twitches

THE term twitch or couch grass is applied generally to those weeds of the farm which resemble the cultivated grasses but which develop strong underground, or overground, stems in such a manner as to ramify through the upper soil layers. These spreading "roots" when strongly developed dominate the root space of the land they occupy and render the cultivation of farm crops difficult and in extreme cases almost impossible.

The methods of dealing with weeds of this type apply equally to all the species mentioned below, but a description of the more general twitches is given first so as to indicate their appearance and habits before going on to the matter of their control.

Creeping Bent *(Agrostis stolonifera)*

This twitch is also known as "Water Twitch," and erroneously "Brown Top," to which grass it is closely allied. It has long overground stems (stolons, hence *stolonifera*) which send out roots at the nodes or knots along their length. This development of roots and creeping stems leads to the formation of a carpet-like turf which, as time goes on and fresh growth develops, attains a depth of an inch or more over the ground surface. Creeping bent usually flourishes best on damp locations such as river flats and marshes, but it can also prove troublesome on heavy land under high rainfall conditions.

In appearance it is a fine-leaved grass of fairly low-growing habit. The seed heads do not grow more than 1 foot to 18 inches high and can be identified by their "feathery," open appearance.

Twitch or Couch Grass *(Agropyron repens)*

Unlike Creeping Bent, this, the common twitch, spreads by means of underground stems of rhizomes which develop roots at the nodes. These rhizomes spread rapidly and can, in loose soils, run two or three feet in a year. At the tip of each is a sharp, hard, protective region which can pierce obstacles in its path such as decaying roots, potato tubers or the like. With such aggressive growing habits it rapidly ramifies through the surface soil successfully competing with any crop which may be planted on an indifferently prepared seed-bed.

The plant grows to a height of 18 inches to 2 feet; the seed head is sometimes mistaken for ryegrass, but can readily be distinguished as the spikelets are set side on to the main stem, while in ryegrass the edge is next to the stem. *Agropyron* is more generally found on fertile soils of fairly open texture, and is not often observed on our poorer clay land.

Onion Twitch *(Arrhenatherum avenaceum)*, is a plant often seen in our older cultivated lands. It takes its name from the onion-like swellings which occur in groups along the underground stems. These swellings readily break apart when ploughing and cultivating take place and their scattering is one of the main causes in spreading the weed.

The flower stems of Onion Twitch grow vigorously to the height of 3 feet or more and the spreading plumed head sets a large quantity of seed which further helps the spread of the pest.

Creeping Fog *(Holcus mollis)* closely resembles Yorkshire Fog (Soft Grass), but it has the twitch habit strongly developed, its rhizomes growing in a manner similar to those of *Agropyron*. In addition to these underground runners, Creeping Fog develops a seed head similar in appearance to Yorkshire Fog. The seed is light and easily transported by wind, and so is soon widely spread about any centre of infection.

Poa pratensis, often called Kentucky Blue Grass, is a twitch developing underground stems, though they are not so aggressive in character as are those of *Agropyron* or Creeping Fog. It is, however, a fairly good pasture grass and this renders methods of eradication less important than in the case of other twitches. In Tasmania it is rarely met as a troublesome weed.

Control of Twitches

The whole question of twitch control depends on two basic principles—

(1) Plants must not be allowed to set seed. (This applies particularly to Onion Twitch and Creeping Fog).

(2) All cultivation must aim at exhausting the food stored up in the runners, bulbs, etc., and at the same time preventing the renewal of overground growth once the plants have been turned under.

The prevention of seeding is reasonably easy to accomplish. Open paddocks for pasture where twitch occurs should be closely grazed through the summer. Late ripening crops should not be grown on twitch-infested land where eradication is contemplated. A hay crop may be attempted, but it would need to be cut green if seeding is to be effectually checked.

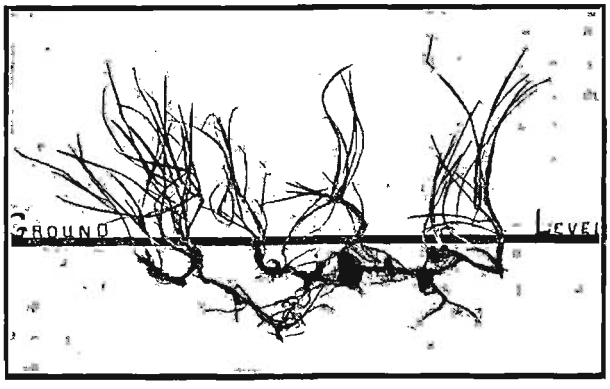
Exhaustion of the runners, bulbs, etc., is one of the most difficult tasks an agriculturalist can undertake. A definite system of cultivation has to be carried on throughout the summer, and on most agricultural properties the demand of harvest operations is such that there is usually insufficient horse strength to cope with the additional work. Failure to carry out cultivation at the appropriate time may enable the twitch to throw up green leaves which immediately transfer food material to the runners so that the work of exhaustion already done is partially counteracted.

The system usually applied in twitch control by cultivation is to plough the land in October to the depth of the twitch roots. Cultivation should follow, using the disc harrow as little as possible and concentrating on the spring-tooth or the rigid tyne cultivator

so as to bring runners to the surface. If possible (and it is highly advisable), sheep should be kept moving over the fallow, as they readily eat the roots and runners. Cultivations should be carried on throughout the summer to take advantage of the dry weather as far as possible, and at all times they should be so judged that the twitch has no opportunity of throwing up leafage.

While it is almost impossible to achieve a hundred per cent. kill of twitch, a determined effort to get somewhere near it will, under favourable weather conditions, result in an almost complete eradication. The effect of the cultivation is readily noticeable in the increased vigour of the following crop, and if this can be made a smother crop, such as oats and vetches or peas for hay, a further check to the twitch is given.

Where such intensive cultivation is impossible owing to wet summer conditions, and where the twitch has made cropping a risky business, the most suitable plan for control is to carry out the best possible soil preparation and sow the paddock down to permanent pasture. Under well-controlled grazing conditions such plants as Subterranean Clover, Wild White Clover, Perennial Ryegrass and Cocksfoot will successfully compete with and dominate most of the twitches, but the full details of pasture management—topdressing, harrowing, close grazing, etc.—must be carefully observed. Otherwise, it will be but a matter of time till the pasture runs out and twitch once more takes possession.



SHOWING TYPICAL ARRANGEMENTS OF UNDERGROUND STEMS (RHIZOMES) IN TWITCH PLANTS

Control by cultivation should aim at prevention of any growth above ground level so as to exhaust the rooting portion of the plant.

STRAWBERRY VARIETIES

By T. D. RAPHAEL, M.A., Dip. Hort. (Cantab.), Horticulturist

Plant Selection

UNFORTUNATELY, only a small proportion of strawberry growers seem to realise the full value of careful selection and propagation of plants in the maintenance of healthy, economic and heavy cropping types for their commercial plantations.

In recent years the number of really thrifty areas has declined, and whilst this may be due in part to slumped markets bringing neglect and disease in their trail, lack of care in selection and propagation are an all too common source of disappointment.

FIG. I.
A SELECTED PLANT OF ETTERSBURG 89 "TREE" STRAWBERRY, SHOWING THE UPRIGHT HABIT AND HEALTHY FOLIAGE
(1lb. Punnet in Foreground)

It has been definitely ascertained that most plants which have been continuously propagated by vegetative means tend, where care and selection are lacking, to lose vigour, become more subject to attacks of parasites, and contract certain "physiological" troubles known as virus diseases which may ultimately reduce cropping and vigour below economic standards. Strawberries have proved no exception to the general rule, for, not only have disease and virus taken their toll, but their prolific runnering and free seeding habits under certain conditions have resulted in considerable confusion.

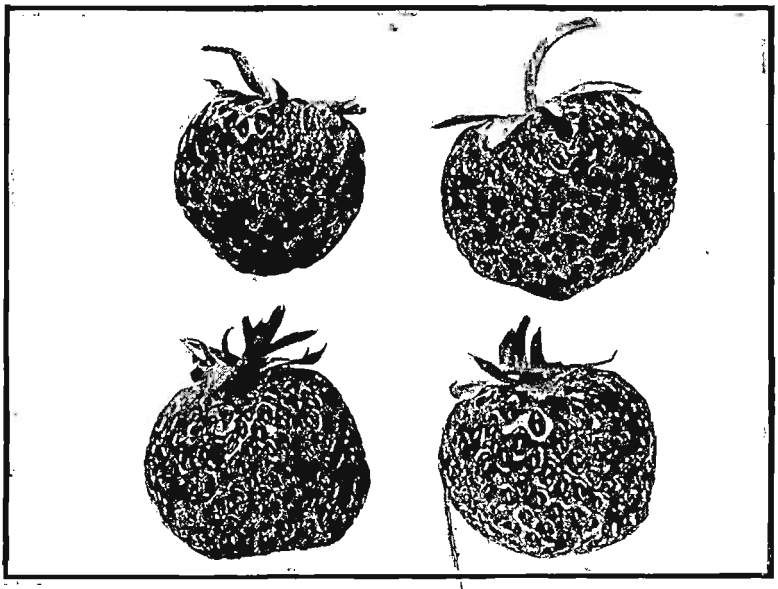


FIG. III.

FOUR TYPICAL SPECIMENS OF ETTERSBURG 89 FROM THE COLLINSVALE DISTRICT

During the past season the Department of Agriculture made a preliminary survey of strawberry varieties and strains in the South and has established a small area of selected plants for trial against imported varieties recently acclimatised in the State. This work should prove interesting and will be, it is hoped, of assistance to growers at a later date.

FLEAS AS HOUSEHOLD PESTS

By H. M. NICHOLLS, Microbiologist

DURING the last few years several cases of flea plagues in country houses have come to the notice of the writer, and as these familiar insects are capable of producing considerable risks to health as well as personal discomfort it has been considered desirable that something should be made known as to their life history and habits and the means of getting rid of them.

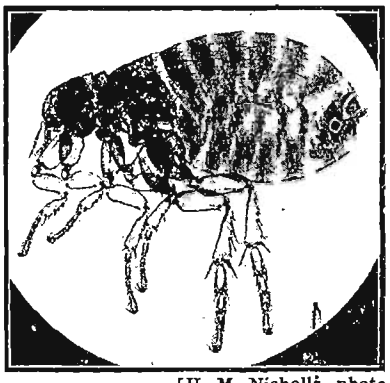
Fleas, in their metamorphoses and the formation of their mouth-parts, bear a strong resemblance to some of the two-winged flies, and there is reason to believe that at some remote period they actually possessed wings, but when they adopted parasitic habits and these appendages became of less use to them they gradually became reduced and finally disappeared altogether. As a compensation, many species of fleas developed remarkable powers of jumping, as this attribute proved a much surer means of escaping the pursuit of their enraged hosts than flying would have been. The common species of fleas are what are known as partial parasites, as they do not spend the whole of their time on the hosts they infest, but there are others, such as the sticktight fleas, which live entirely on their hosts.

Fleas begin their lives as minute, whitish, legless grubs which hatch from the eggs laid by their parents in cracks of floors, in rubbish or litter of any kind, in the debris of dog-kennels, the lairs of animals and the nests of birds, and they feed upon any decaying organic matter that they find in their surroundings. In some cases the eggs are laid in the fur or hair of the host and fall off soon afterwards. When they reach the limit of larval existence, which is generally about seven days in the case of the human and dog fleas in this country, they spin minute, flimsy cocoons, from which in the course of a short time the perfect fleas emerge. The fleas that attack the human being can multiply for several generations without sucking blood, but the power of reproduction under these circumstances is gradually lost and they die out. This explains why fleas temporarily increase to such an extent in deserted huts, old pig-styes and such places.

The species of fleas concerned in flea-plagues that have come under the notice of the writer in Tasmania have always been the common human flea, *Pulex irritans,* or the dog flea, *Ctenocephalus canis.* The human flea has been the special attendant of the human race from time immemorial, but the dog flea was originally a parasite of the Carnivora. The long association of dogs and cats with human beings has led to the dog flea acquiring a taste for human blood, and in some parts of the world it has become the human flea and driven out *Pulex irritans* altogether. On the other hand, the human flea, from long association with domestic animals, has acquired a taste for the blood of dogs and cats, and, in some cases, of pigs and rats as well.

Fleas are good jumpers, but their powers in this respect have been popularly exaggerated. It has been shown by actual experiment that a human flea in the pink of condition can jump 7½ inches

vertically and 13 inches horizontally. This is useful knowledge, as if bed-clothes are always kept 12 inches from the floor no flea can use them as a means of invading the bed and disturbing the slumbers of the occupant.



[H. M. Nicholls, photo.

PULEX IRRITANS, THE HUMAN FLEA (FEMALE)

(Magnified)

The best means of discouraging fleas from breeding in houses is to cover the floors with linoleum, as this covers up all possible breeding places in the cracks and interstices of the boards. Washing the floors with carbolic soap once a week is also useful. Five per cent. kerosene emulsion is perhaps the cheapest and best remedy both for washing floors and flea-infested animals and spraying the insides of dog-kennels, chicken-houses and pig-styes. It may be used with safety anywhere, as it is non-inflammable. It is made by dissolving 2 ozs. of hard soap in 1 quart of water over a fire. When the water is boiling and the soap is all dissolved, the vessel is removed from the fire and 2 pints of kerosene added. The mixture should then be violently agitated with a beater (an egg-beater will answer very well) until it forms a white emulsion from which the kerosene will not separate on standing for half an hour. Water is then added to make 5 gallons. This forms 5 gallons of emulsion containing 5 per cent. of kerosene. Free kerosene has an injurious effect on the skin of animals, and it is important to see that none is visible before the emulsion is used for washing dogs and cats. The skin of cats is much tenderer than that of dogs, and it is generally advisable to further dilute the mixture in their case. If cats will not consent to be washed, insect powder or flake naphthaline should be rubbed into their fur. In washing animals it is important to wash their heads carefully, as the fleas on them will always make for this part when they find themselves submerged. One flea plague that came under the writer's notice originated through the owner carting the earth out of an old pig-stye on to his flower beds for manure. Another was caused by the owner keeping dogs under the house. In this case the whole of the ground under the floors had to be sprayed several times with kerosene emulsion before the plague came to an end.

MILK FEVER

By W. G. BENNETT, B.V.Sc., Veterinary Officer

MILK FEVER is a disease of cows well known to most dairy farmers, and usually affects animals in high condition and heavy milkers. Notwithstanding its name, there is no fever present, but as a rule the temperature is below normal; it is also non-contagious.

The disease first became known very early in the nineteenth century, coinciding with the adoption of intensive feeding of milking cows in order to increase production, and there can be no question that heavy feeding immediately prior to calving, with lack of exercise, is one of the vital predisposing causes.

Until quite recently, although many theories had been advanced, nothing was known of the actual cause of the symptoms seen, but intensive research in the last few years has shown definitely that a considerable drop in the lime content of the blood is always present, and treatment along these lines has given good results. There are certain conditions which definitely predispose an animal to an attack, high-producing animals in good condition being particularly susceptible. Age is quite an important factor, most cases occurring after the third or subsequent calving, and the easier the calving the greater the probability of an attack. Rarely is it seen when the delivery of the calf has been difficult. As a rule the symptoms are seen in the first three days after calving, but may be delayed as long as a week after; or, more rarely, may occur prior to that event. Once a cow has been affected, an attack at each subsequent calving must be looked for, and prevented if possible.

Symptoms

The affected cow exhibits a complete range of symptoms from intense excitement to complete unconsciousness. The earlier excitement is, however, frequently absent or missed by the owner, when the animal may rush around or bellow. A restlessness and staggering, with obvious weakness of the hindlegs is, however, usually shown, with a wild look in the eyes. Soon after, she lies or falls down and is unable to rise, rapidly passing into a state of coma similar to that induced by an anaesthetic such as chloroform, and adopting a characteristic attitude, lying slightly on one side with the head turned round and resting on the chest. If the head be pulled out straight and let go, it immediately swings back to its original position. The pupils are dilated, and the breathing deep and slow. Occasionally saliva is noticed dripping from the half opened mouth, indicating an inability to swallow due to paralysis of the muscles of the throat. For this reason it is fatal to attempt to drench a cow while she is down with milk fever.

Treatment

As indicated previously, treatment with a view to rapidly replacing the lime in the blood has now been adopted by the veterinary prefession, and consists of the injection of calcium chloride solution directly into the large jugular vein. Results from this treatment are spectacular, but owing to the risks involved it is not suitable for use by the layman.

No satisfactory treatment was known until about the beginning of the century, when a Danish veterinarian adopted a method which was highly successful, and with modifications is the one in most general use at the present time. Owing to its simplicity it is ideal for use by the owner, involving very little risk to the animal if properly carried out, but it is essential that treatment be commenced as soon as possible.

The precedure is as follows:—Make the cow as comfortable as possible with straw or bags of grass hay, propping her on her chest, and keep her warm with rugs or bags. Remove some of the milk from the udder and thoroughly cleanse the outside with soap and warm water, to which has been added a little disinfectant. Next inflate each quarter with air until visibly distended, massaging the udder in order to distribute the air. Do not over distend, as this may result in the udder tissue being seriously damaged. Absolute cleanliness of all instruments used is essential, and cannot be too firmly stressed, in order to prevent the possibility of carrying germs or dust particles into the quarters; and this is best effected by the use of a milk fever outfit. which consists of a small air pump forcing air through a cylinder containing sterilised cotton wool, and into the quarter by means of a small teat-syphon. The latter must be sterilised by boiling for at least ten minutes, and failure to do so will invariably lead to acute mamitis. In an emergency, in the absence of an outfit, a cleansed bicycle pump may be used for inflation, but all precautions as to cleanliness must be in no way relaxed. The escape of air from the teats can best be prevented by pushing them in a telescopic fashion, into the udder, and is much to be preferred to tying them with tapes, as this may lead to trouble. However, where tying is unavoidable the broadest tapes possible should be utilised and taken off at the first opportunity.

Recovery usually takes place within two hours of treatment, and the cow gets up unassisted. If, however, she does not do so, repeat the treatment until she is on her feet.

Under no circumstances must the animal be drenched while lying down, since the results are almost certain to prove fatal. As soon as she rises to her feet, however, give her one tablespoonful of calcium chloride and one tablespoonful of Ammonium chloride in one pint of water. This is most efficacious in preventing a relapse, and should the early symptoms be seen, the same drench given before she goes down has proved effective in preventing the disease from developing.

The cow should not be milked for at least 12 hours after recovery, and for the next two or three days only enough milk should be taken away to relieve the udder and prevent congestion. After treatment should comprise good nursing and small feeds of a laxative ration.

'Prevention is better than cure,' and this can be attained by giving due care to keeping down the condition of the cows immediately prior to calving, and in animals which have previously suffered from the disease do not milk right out for the first few days after calving. In the latter case also a drench consisting of one and a half lbs. of Epsom Salts, half lb. Treacle, and four tablespoonsfuls of ginger in one and a half pints of water should be given a week or ten days prior to calving, and the calcium and ammonium drench immediately after she has calved.

All cows require a mineral supplement to the feed, and particularly is this so in the case of high producers. As pointed out previously, milk fever is invariably accompanied by a drop in the amount of lime in the blood, so that regular and continuous feeding of bonemeal must have some effect in controlling the number of animals affected; this in addition to the enormous amount of good it will do to the animals' general health and condition.

NOTES ON TOBACCO CULTURE

By C. B. DOLPHIN, Tobacco Officer

Seed, Seed-Beds and Seedlings

DURING the past three seasons practically the whole of the seedlings raised in Tasmania were grown in beds in the open air. Not only were the plants raised by this method expensive insofar as time and labour were concerned, but also it was found almost impossible to have the plants ready for planting out by early November.

Last season two growers made a trial with plants raised in beds artificially heated, and attained a marked degree of success. The beds used were of the type evolved at the Bathurst experiment Farm in New South Wales, and are built in frames about 20 feet by 7 feet overlying two 4in. flues heated by a small furnace, the beds being kept covered during the growing period of the seedlings.

These beds were primarily designed to check the losses from blue mould in seed beds and have proved very successful in New South Wales for the past twelve years. It is anticipated that 95 per cent. of seedlings in Tasmania will be grown by this method this year, and full details of construction may be had from the Department of Agriculture, Hobart.

Sterilisation of Soil

All soil used in seed-beds should be thoroughly sterilised in order to kill weed seeds, insect life, and spores of fungous diseases. To sterilise soil it should be heated to about 210° Fahr. and held at that temperature for 30 minutes. This may be done either by forcing steam under a pressure of 60 to 80 lbs. through the soil or by placing the soil on an iron tray and baking. If the soil is baked see that it is moist and turn continuously on the tray in order to prevent overheating of the lower layers. Temperatures much in excess of 220° Fahr. will result in the burning of the humus or organic matter in the soil, with consequent reduction of its fertility. In connection with soil sterilisation, growers are referred to Vol. IV., No. 3, p.p. 108-112 of "The Tasmanian Journal of Agriculture" for a comprehensive article on this subject.

Fertiliser for Seed-Beds

A complete fertiliser has been found most suitable for seed-bed work, and the following is recommended:—

Nitrate of Soda	5 lbs.
Sulphate of Potash	5 lbs.
Superphosphate	10 lbs.

This mixture should be applied to the seed-beds prior to planting at the rate of 1 lb. per 100 square feet and worked into the soil. If a poor soil has been used for the beds the plants may exhibit lack of vigour and growth, and in such cases a top-dressing of fowl manure or nitrate of soda should be given.

Fowl manure can be applied best in liquid form, but may be used dry if finely pulverised. The usual method is employed of half-filling a drum with manure, filling up with water, and stirring at regular intervals. After about nine days the application can be made. The proportion is 1 gall. of liquid to 10 galls. of water for an area of 100 square feet. On small beds nitrate of soda mixed in the proportion of 1 lb. to 10 gallons of water may be used to better advantage than by broadcasting.

For very small seedlings, or soon after germination, the above solutions should be reduced in strength four times.

Seed

A good crop can be obtained only from good seed. If the seed is poor neither fertilising nor labour can produce a good crop from it. A strong seed produces a strong plant and a weak seed produces a weak plant. Mixing is only reducing the value of the crop. There is no doubt that more money is lost through the planting of unsuitable plants than is caused by pests. Sow only strong, sound seed that will produce strong, healthy plants which, when planted out, take strike immediately.

In order to guard against blue mould all tobacco seed should be sterilised in a silver nitrate solution before using, and although the Department will, if required, carry out this work for farmers the process is a simple one and, with care, may be performed on the farm. A solution is made of 17½ grains of silver nitrate crystals dissolved in 2 pints of clean, cold rain water. The seed is immersed in this solution for 10 minutes, taken out and dried quickly. When dry it is again immersed for a further 10 minutes and dried again. It is then ready for sowing. If not sown immediately, store in a clean, dry, screw-top jar and do not allow the seed to come into contact with any tobacco or untreated seed as re-infection may occur.

Sowing

A level teaspoon of seed contains about one-twelfth of an ounce, or 25,000 seeds, and is sufficient to sow 100 square feet. Mix thoroughly with about 10 lbs. of fine sand or ashes, divide the mixture into two equal parts and sow one part across the bed and the other lengthwise in order to get even distribution. Cover the seed-beds with about a quarter of an inch of fine river sand in order to prevent washing of the seed when watering the beds, and to prevent insects removing the seed.

Treatment During Growing Period

Tobacco seeds do not contain large food reserves, and once the seed germinates plants very soon wilt and die when the soil becomes dry. Consequently, regular waterings are essential to keep the soil in a moist condition. Irregular waterings cause bare patches and uneven growth throughout the bed. Excess of watering has also to be guarded against, as this, combined with lack of ventilation, produces a disease known as "damping off." It attacks the stems of the seedlings at the soil surface, eventually causing

the seedling to wilt and die. It can be controlled by reducing watering to a minimum and by spraying infested parts and a narrow margin of healthy seedlings with a solution of commercial formalin—1 part to 25 parts of water, or the Cheshunt compound.

Use of the Cheshunt compound as described in the Journal for August, 1933, is probably the best and safest method of control. The compound consists of a mixture of finely divided copper sulphate (2 parts) and fresh ammonia carbonate (11 parts) thoroughly mixed and stored in an air-tight container for 24 hours. The solution is made up at the rate of 1 oz. of the mixture to 2 galls. of water and is applied by means of a sprinkler. A regular weekly spraying with either of the compounds mentioned above will do much to prevent the entry of diseases such as "damping off."

When watering use only a very fine spray, and on beds artificially heated use only water warmed to the temperature of the beds. Never use cold water as it may kill the young plants. If the water is likely to be contaminated in any way it would be wise to sterilise it by boiling before use.

Thinning

Grass and weeds should be removed as they deprive the young seedlings of plant food and moisture, and over-crowding should be remedied by pulling out surplus plants until there is one plant to about a square inch. This operation can be best accomplished when the plants are about 1½ inches to 2 inches high, as they have sufficient root system to prevent undue disturbance.

When the seedlings are almost ready for transplanting—i.e., in about six weeks with heated beds—the waterings should be reduced until only sufficient water is being supplied to prevent wilting. This will encourage root development and thus produce a plant that will "strike" easily and quickly when put out in the field. At the same time as the waterings are reduced, the covers should be removed for gradually increasing periods during the warm part of the day in order to harden off the plants. In the case of a sudden cool change, however, the covers should be replaced.

Before pulling the plants, thoroughly water the section to be lifted in order that the plants may come away easily and without undue root damage and to keep as much soil round the roots as possible. Discard all weak or woody plants—i.e., plant with tough stems.

In conclusion, it should be pointed out that tobacco is a crop that requires painstaking care and attention from the time the seed is planted until the leaf is baled; but of all the operations entailed it would appear that under Tasmanian conditions it is most important to get early plants. The growing period here is short, and if the first batch of plants fails there is no time for producing a second lot in time for early planting. Shortage of seedlings will always result in the use of poor and weak plants and the production of late tobacco, which is invariably of poor quality and often unsaleable. A plentiful supply of plants at the right time of the year is the only sure foundation for a successful crop.

PARASITES OF HORSES

By W. SMITH, B.V.Sc., Veterinary Officer

PARASITES of horses belong to two classes, viz., internal and external, of which the former are by far the more common. This form of trouble is responsible for much loss of condition but only comparatively small numbers of death. However, the economic loss to farmers due to extra feed required and the decreased working ability of the horse demands more attention being paid to the subject than is usually granted.

The external parasites of horses in Tasmania are limited to lice and even these are not very common, at least in numbers sufficiently great to be noticeable. When present in large numbers lice may lead to scratching and nibbling and thus lead to general unthriftiness. When a horse is noticed scratching, an examination of the neck and shoulders may reveal a scurfy condition of the skin and the presence of lice and eggs. Generally it is only during the winter months that this parasite becomes noticeable. The eggs of the louse hatch in about 16 days but may take up to 30 days. Dry heat, however, is rapidly fatal to the eggs while the louse itself will only survive about 4 days apart from the horse.

Treatment consists of two applications over the entire body of ordinary arsenical dip of 10 lbs, to 400 gallons, or kerosene emulsion at 14 days intervals. Inspection after the second application should reveal whether or not another washing is necessary. All harness, rugs and stalls should be disinfected to prevent reinfestation.

The internal parasites of horses present a far more serious aspect from a health point of view. Although there are quite large numbers of parasites infesting the stomach and intestines of horses only a few of these cause serious effects.

Perhaps the best known and commonest of these parasites are the common "Bots". Contrary to the generally held opinion bots do not cause the extensive damage or numbers of deaths attributed to them. Post-mortems on horses which have died of other troubles have shown large numbers of bots clustered together in the stomach and even up into the œsophagus or "food gullet." However, there is no doubt that they do cause loss of condition and sometimes by penetrating into the stomach wall will lead to peritonitis and death.

The life cycle of this parasite is very interesting and briefly is as follows:—The bot-fly, of which there are three distinct types, lay their eggs on different parts of the body. One type lays eggs of a bright yellow colour on the mane, flank, shoulder and legs; another type deposits them on the hairs behind the jaws; the third type, commonly known as the "nose bot," lays eggs of a black colour on the hairs of the lips, but this type is not definitely known in Tasmania.

The eggs hatch out in 9 to 11 days, and the larvæ pass to the stomach and remain there for about 10 months, passing out in the manure in the spring. This should be considered when treating a horse for bots.

To prevent infestation, singeing of the hairs is the only sure method as the eggs are very resistant to ordinary disinfectants. Treatment consists of dosing with half to 1 oz. of carbon bisulphide in gelatine capsules after starving for 12 to 18 hours.

The tapeworms of horses are not very common, and of practically no pathogenic importance. The large round worms of horses are not nearly so important as the smaller varieties, and as the treatment is similar no further details need be given.

The most important worms of horses are the small red worms inhabiting the large bowel. The size of these worms varies from slender, threadlike worms about half an inch long to worms about two inches long and rather thick. The infestation of these worms may become enormous and the contents of the bowels appear to be a moving mass.

A horse affected very heavily with the worms becomes a "bad doer," loses condition, the coat becomes starey, and the animal may become so weak as to be unable to rise.

Treatment consists of balling with carbon tetrachloride, half to 1 oz. in gelatine capsules after starving for 12 to 18 hours. Also drenching with 1 to 2 ounces of oil of turpentine to 1 pint of linseed oil has a fair degree of efficiency. The use of Fowler's solution in 1 oz. doses given daily for 14 days is also quite useful.

If the animals are to be kept free from these parasites, dosing as above at about monthly intervals is necessary as fresh worms may enter the bowels from the intestinal walls where they pass part of their life cycle. Reinfection may also come from the pastures as the young worms may live for some time on the grass under damp, shady conditions.

The last type of parasite which causes trouble in horses is the oseyurid worm. The mature female worm of this type passes out with the manure and lays her eggs in batches on the skin under the tail. This leads to much irritation characterised by the horse rubbing its hind quarters against posts, trees, etc. A horse so affected may be noticed to have a hairless area on each buttock and on the butt of the tail due to the continued scratching.

The treatment here consists of long, soapy enemas, scrubbing the tail region thoroughly, and dosing with half to 1 oz. carbon tetrachloride in order to clean out the male and immature female forms of the parasites.

In conclusion, it is necessary to state that if a horse is noticed to be a "bad doer," it is no harm to dose for worms as these may possibly be the cause of the condition. Horses kept continually in the same paddock have every chance of picking up a heavy infestation of parasites, and to such horses some treatment is very often necessary.

TEWKESBURY FARM COLONY

By C. A. HOLLAND, Dip. Agr. (A.U.C.R.), District Organiser

DURING October of last year the Department of Agriculture acquired a potato station at Tewkesbury, on the North-west Coast, for the purpose of producing supplies of improved potato seed. In order to make some contributions to the solution of the problem of unemployment among youths it was also decided to establish a farm colony for unemployed youths and to provide facilities for training in farm work.

The primary objective of the Colony is to find a healthy congenial occupation for youths between the ages of sixteen and twenty years who, through no fault of their own, have been unable to find employment. At the same time, there is a good opportunity for those who adapt themselves to farm conditions to obtain a good practical training in farm work.

A LECTURE ON THE HORSE

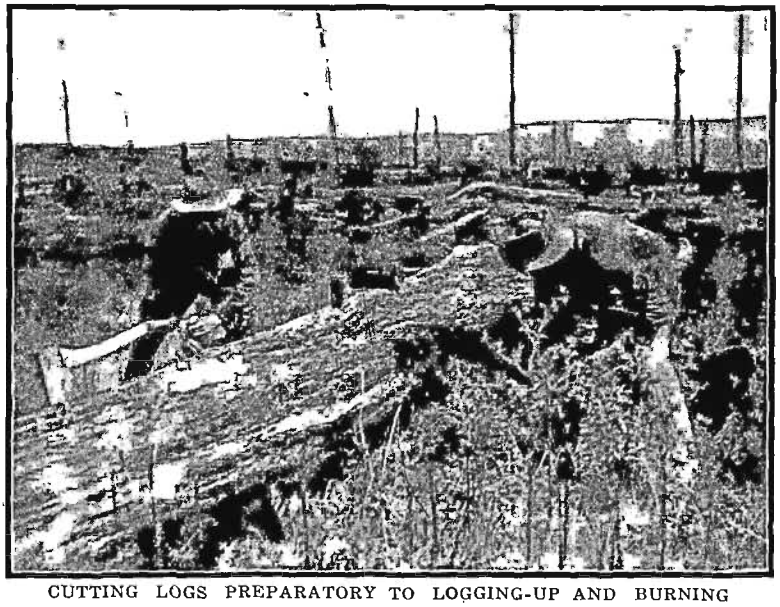
The potato station consists of an area of approximately 600 acres, most of which is in a relatively undeveloped state. This enables the boys to take part in the work which is necessary when opening up virgin country and in the subsequent farming operations which are essential to maintain a fixed acreage under potatoes.

The boys are under the control of a resident supervisor who, besides being responsible for instructing them in farm work, supervises messing arrangements and organises their recreation.

Routine work is allocated in turn, so that each boy has his share of milking, care of horses, fatigue work etc., thus, besides equally dividing those farm duties which call for earlier rising and longer hours, each boy is able to gain experience in the necessity of thorough care of all livestock.

Work undertaken by the boys to the present date includes the following:—Log cutting, fern cutting, wood splitting, ploughing, harrowing, cultivating, discing, drilling, potato planting, digging, fencing and building construction.

In order to assist the boys to understand the work which they are doing, a few hours each week during the winter months are devoted to studying the theoretical work which is essential for the successful application of practical experience. Boys are given instruction in such subjects as breeding and feeding of live stock, rotation of crops, potato diseases, simple farm book-keeping, uses of the various fodder plants, etc., and each week they write up their own account of the subject which has been under discussion. A record is kept of this work and each month points are allotted by the supervisor for practical work, general behaviour and tidiness in camp. By this means a record of each boy's pregress is kept.



CUTTING LOGS PREPARATORY TO LOGGING-UP AND BURNING

Boys applying for admission to the Colony must be prepared to remain for a minimum period of six months unless they are able to obtain permanent employment in the meantime. At the completion of the six months, those with satisfactory records are granted eight days leave and thereafter have the option of returning to the colony for the period of twelve months. Such discipline as is necessary for the well-being of all concerned is insisted upon, and any boy who is not prepared to conform to the rules of the colony is liable to be dismissed.

The boys do their own cooking, the cook continuing the work for several months, and a different assistant being appointed each fortnight. Very many improvements are plainly visible since the commencement of the colony, the cooking being by no means the least outstanding. Cakes and puddings are now quite well made, and one can always rely on the boys having plenty of wholesome, well-cooked food.

Healthy recreation, both indoors and out, is encouraged in every way possible, and the thanks of the colony are due to Dr. W. Fleming and many prominent Burnie citizens who have taken a keen interest in the welfare of the boys. As a result of their efforts the boys were provided with additional comforts at Christmas and were all brought down to the annual sports fixture at Burnie on New Year's Day, where they spent a most enjoyable day. Arrangements are now in hand for the boys to be able to attend the Burnie Agricultural Show and to have an opportunity of visiting Burnie on the occasion of the visit of His Royal Highness the Duke of Gloucester.

Several of the boys are playing football with the West Ridgley team and have all proved themselves worthy of the positions which they hold. A very pleasing feature in connection with such outings is the comments which have often been made to the writer regarding their good behaviour.

Several games, including bagatelle, table tennis and draughts have been obtained by the kindness of Burnie friends, and thanks to the Warden of Burnie (Cr. J. R. Hilder), who has donated a wireless set, the winter evenings have been considerably shortened.

Since the commencement of the colony the weather at Tewkesbury has been most favourable on the whole, but it must be remembered that the winters can be severe on this part of the Coast.

While every necessary step is taken to ensure the health of the boys, the life could not always be described as an easy one, for being situated twenty-two miles south of Burnie, there are no town comforts to which many of the boys have been accustomed, and visits to town are possible only on special occasions.

Results to date are certainly pleasing, for apart from assimilation of knowledge and increased usefulness on the farm, a distinct physical improvement is noticeable after the boys have been with us for a few months.

Vacancies occur periodically, and application should be made to the Superintendent of Extension Service, Department of Agriculture, Launceston. The type of boy required is one who, in addition to possessing the necessary grit and ambition which is required if progress is to be made in any walk of life, is prepared to contribute his share towards the good spirit of comradeship which already exists.

STRYCHNINE POISONING IN DOGS

By W. E. CHAMBERLIN, M.V.Sc., Veterinary Pathologist

RECENTLY a case of what appeared to be strychnine poisoning was brought under our notice at the Veterinary Laboratory. As the animal concerned was a valuable sheep dog, a note on the subject of strychnine poisoning might be of some value, particularly as dogs are affected by eating the carcases of poisoned rabbits and by consuming baits laid for rats, mice and other vermin.

Strychnine is one of the most powerful vegetable poisons known. It is an alkaloid which is obtained from the ripe seeds of the plant *Strychnos nux-vomica*. In very small doses strychnine has valuable medicinal properties.

The poisonous dose varies greatly in different animals. Dogs are particularly susceptible, then horses, and, to a lesser extent, cattle. Dogs have been destroyed with as little as 1/60 grain, whereas fowls and other birds have a considerable degree of resistance and can tolerate much larger doses.

Strychnine is usually taken into the system by the mouth, although it may be absorbed rapidly through abrasions of the skin. It then passes into the blood, from which it exerts its specific action on the nervous system. It is only slowly eliminated in the urine.

The symptoms of strychnine poisoning are quite characteristic and vary in severity according to the amount of drug taken. The first thing that is noticed is uneasiness or anxiety, then restlessness and a haggard expression and fixed look about the eyes. Sometimes salivation and vomiting occur. These symptoms are quickly followed by twitching of the muscles and stiffening of the neck. Muscular spasms then appear affecting the whole of the body. These convulsions are usually intermittent with periods of depression, but can be excited by the slightest stimulation, such as touching the animal with the hand. The spine becomes curved, the pupils dilated, breathing difficult, and the animal suffers great pain. The duration of symptoms depends on the amount of strychnine absorbed. In fatal cases, convulsions follow each other with increasing rapidity and death may take place within a few minutes. Death is due to suffocation during one of the convulsive fits.

Treatment consists in keeping the animal as quiet as possible in order to avoid unnecessary stimulation. Emetics are usually of little value unless administered before the poison has had time to become absorbed. Those worth trying are sulphate of zinc, common salt and mustard.

THE VEGETABLE GARDEN

By H. A. TURNER, Horticulturist

THE next three months will be busy ones in the vegetable garden, but if it has been possible to take advantage of the fine weather most of the heavy digging should now have been done. Any beds not dug should be manured and turned over as soon as possible so that full attention can be given to sowing and planting.

During August main sowings can be made of carrots and parsnips, more particularly the latter as they require a long growing season. Carrots for the main crop should be one of the long varieties, but a row or two of one of the short-horn varieties put in at the same time will be ready for use in from three to four months from time of sowing.

Peas should also be sown in good quantity, and there is still time for a successful sowing of broad beans. Beet, leeks, turnips, spinach, radishes and lettuce should be sown. If lettuce plants are available and planted now they will be ready for use a little sooner than from seed.

Where onion plants have been grown they should be transplanted as soon as big enough. The soil for this crop must be fairly well compacted, and on no account should the plants be set too deeply; the best bulbs are those that grow on the surface. Asparagus roots may be planted until the end of August provided the bed has been properly prepared.

In districts where severe spring frosts are not experienced, early potatoes can be planted, but in frosty districts it usually pays to delay planting until September. Artichokes can be planted immediately. They require the same treatment as potatoes, and being heavy croppers an extensive planting is not necessary.

The mistake of sowing or planting out too much of any one crop at a time is rather a common one, and very often results in a surplus of certain vegetables followed by a shortage. It is much better to set out only one or two rows of such vegetables as peas, beans, cabbage, lettuce, etc., and leave room for successional sowings so that an even supply is maintained over a long period.

Main crop varieties of both cabbage and cauliflower should be sown for succession from now on until October, after which late or winter maturing varieties are best.

If any small fruits remain to be planted they should be got in before the end of August.

Throughout September, seed of all crops mentioned for August may be sown, and in addition a few seeds of some of the half-hardy crops such as dwarf and climbing or runner beans. The latter do very well in Tasmania and do not appear to be so susceptible to disease as the dwarf kinds.

The established asparagus bed, where it has not received attention, should be weeded and mulched. Before putting on the mulch a moderate dressing of sulphate of ammonia will be beneficial.

Towards the end of September and through October is a good time to sow and plant all the more tender kinds of vegetables. These include pumpkins, marrows, melons, cucumbers, sweet corn, tomatoes, cape gooseberries, and the main crop of dwarf and runner beans.

Sweet corn as a vegetable is rather neglected by gardeners in Tasmania, but it is well worth a trial. Golden Bantam is a good variety and should be sown in rows three feet apart, allowing nine inches to a foot between the plants. A good method is to put in the seeds two together, at intervals of, say, ten inches. If much rain follows sowing there is a danger of some of the seed rotting, hence the two seeds. In cases where both seeds germinate, one should be pulled out soon after the plants show above ground. The plants should be earthed up a little when sufficiently grown, but except for this and watering during dry weather little attention is necessary.

When grown for the first time, difficulty may be experienced in deciding just when the cobs are ready for use. The grains should be fully grown, but not in the ripening condition. This stage is reached about the time, or soon after, the "silk" or "tassel" has withered. The cobs are usually cooked by boiling for about half-an hour and are then served with butter, but there are other ways of cooking them. When corn does well each plant will bear heavily and it is not advisable to sow too liberally at once, but rather to sow a row at a time at intervals of two or three weeks.

Tomatoes are perhaps the most important crop that should be planted during early October. Through plants being set out too early in the season they frequently become stunted and sickly through cold and wet, and the results are disappointing. Coming originally from regions much warmer than Tasmania, a certain ground temperature is necessary before tomato plants can make normal growth, and under average conditions that temperature does not obtain in most districts of Tasmania before October.

The object of early planting is, of course, early fruit; but in most instances the fruit will mature just as early from plants put out during the first or second weeks of October as it will off those set out in September. Over and above this the yield will be greater and the plants will have a much better chance of escaping disease.

The ground intended for tomatoes should be deeply dug in early August if not before, and sprinkled with lime. At the beginning of October apply the necessary fertiliser, dig it over again, and it should then be in good condition for planting.

In planting tomatoes for home use it is a good plan to use more than one variety. The large-fruited variety known as Australian Red is perhaps the best of all for the main crop. It is a very free cropper and a strong grower and is an excellent variety for sauce, pickles, etc., but it has rather a short season. For this reason it is advisable to plant also some of the round-fruited, tall-growing or tree tomatoes. If staked and given good attention, they have a long-bearing season and will bear good fruit until the advent of cold autumn weather.

Choice of location for a garden is generally restricted by the necessity of having the garden accessible to the home, but when circumstances permit consideration should be given to such matters as aspect and soil quality.

Where it is possible to exercise a choice, several considerations should be kept in mind. It should be recognised that frost is less likely to injure vegetables growing on high ground than those in low places, particularly hollows, into which cold air naturally settles; that crops will come to maturity most rapidly on land that has a sunny north or north-easterly aspect; that a warm, sandy loam will produce an earlier crop and is much easier to work than a heavier soil that retains more water; that the garden should be moderately level, and, above all, that drainage should be good. The importance of drainage can hardly be over-estimated, and unless natural drainage is exceptionally good it is always advisable to artificially drain a garden. Cold, wet soils will generally make quite a good vegetable garden after being thoroughly drained, and even the most fertile soil will be made additionally productive. Over and above getting rid of surplus water, drainage, by promoting aeration, keeps the soil much warmer, sweeter, and more uniformly moist, with the result that striking increases in crops will be noticed and the soil will be much easier to cultivate.

After drainage, lime is one of the most important factors in keeping the vegetable garden in good heart. Tests made on a large number of soil samples indicate that much of the soil in Tasmania is deficient in this constituent, and experience has shown that almost all vegetable crops do best on soil that is fairly well supplied with lime.

There is no need to use lime every year. The usual custom—which appears to be a satisfactory one, is to apply a dressing every three or four years. The amount that should be applied varies with different soils, but if the average garden were treated with ground limestone at the rate of four hundredweights per square chain every four or even five years, crops would benefit considerably. Old gardens, particularly when large quantities of organic manure have been used for a number of years, will often respond remarkably well to a dressing of lime.

The practice of crop rotation, although a very old one, is often overlooked. It is a practice which, if neglected, will soon lead to diminished yields. As a matter of fact, with some crops it often leads to disastrous results in two or three seasons.

Rotation is simply a system of alternate cropping, so that the same kind of crop does not occupy the same piece of land for two successive years. One crop repeatedly grown tends to cause an early exhaustion of the soil and also has a strong tendency to encourage the development of fungous diseases and insect pests peculiar to it. Take, for instance, an onion crop which had been attacked by white rot. If onions are planted on the same land again the following season the amount of infection will certainly be greater, and if anyone were foolish enough to persist in trying to grow them for a third time after an infected crop, probably not one sound bulb would be harvested. "Club root" disease of the

cabbage family, and several diseases of tomatoes might be mentioned to emphasise the necessity for crop rotation. The diseases mentioned are extreme examples as few vegetable crops are attacked by disease of such virulence as these, but all vegetables suffer to a greater or lesser degree when grown too often on the same soil.

Owing to the small area of the average garden and to the large variety of crops usually grown, it is almost impossible to devise a standardised system of rotation, but with a little forethought and by grouping the vegetables of the same botanical family, a system can be evolved for changing the position of each group annually.

CHILD WELFARE

By OLIVE M. GREEN, Sister-in-Charge, Baby Health Clinic, Launceston

Baby's Clothes

THE first thing to remember when clothing baby is, always clothe him according to the temperature of the day, not the date on the calendar.

The commonest fault of baby clothing is that it is too thick, heavy and hampering, thus preventing free kicking and exercising, and also giving rise to sweating and irritation of the skin. This often leads to grave trouble in the form of eczema and other skin diseases.

The lighter the clothing the better, provided it is warm enough; so whenever possible choose light, porous, fluffy flannel or other woollen materials and avoid all thick, close-woven fabrics of any kind. Do not use flannelette as the risks of the body being burnt through wearing this very inflammable material are too great.

The best all-round material for baby's petticoat, night-dress or jacket is the cheapest flannel procurable as it is more porous and open in texture than the expensive flannels. It not only shrinks less but is decidedly warmer, weight for weight, on account of the air imprisoned both in the meshes and between the successive layers.

The best materials to use next to the skin are porous cellular cotton or linen, or silk and wool. Pure wool worn next to the skin is most irritating, even though the garment be of the finest, softest texture.

The Binder

There is a very common idea that the binder prevents rupture and helps to support the back and abdomen; but this is not so. The sole purpose of the binder should be to keep the cord dressing in place until the scar is healed. The effect of keeping the binder on beyond this time is to weaken the muscles of the abdomen and back, and so help to cause rupture. The use of the binder also restricts deep breathing, even if lightly applied, and this weakens the whole system.

During the first two weeks when a binder is necessary, use a soft, porous bandage 4 to 5 inches wide, made of butter muslin of any light, open bandaging material which is entirely non-irritating. Such material is in every way preferable to a flannel bandage. The binder should be changed once a day when the cord is dressed.

The Singlet

To prevent any irritation and to allow for a free circulation of air next to the skin, use a cellular cotton material such as Aertex or silk and wool. For the young baby this garment should be made with long sleeves.

The Vest

Over this cellular singlet put a soft, knitted woollen vest. It is wise to shrink the wool before knitting up by immersing the skeins in a basin of cold water, then hanging them up dripping. (Do not squeeze the water out of the wool before hanging up to dry). This vest need not have sleeves.

The Napkin

The napkin, though used as a protection to baby's clothing, is one of the most important of his garments. If put on clumsily and made too bulky it hampers movement and is likely to cause bandy legs. To prevent this, only one thickness should be pinned up between the legs. Care should be taken to prevent a baby becoming chilled or uncomfortable through lying long in a wet napkin. Do not use waterproof pilchers; they act as poultices.

Napkins should be 24 inches square, and the best material to use is a soft towelling. If the buttocks are sore, place a soft square of cotton or linen on the folded napkin so that the towelling does not touch the inflamed area. Baby needs 2 to 3 dozen napkins.

The Petticoat

The petticoat should be made simply—no constricting bands or bodice—and may fasten either down the back or one one shoulder. It should be 19 to 20 inches long, and 11 yards of unshrinkable flannel about 30 inches wide is sufficient to make three petticoats, three nightgowns and three jackets. These should last baby for one year.

The Frock

This may be made Magyar style or with a yoke, and should be 20 to 22 inches long when finished. Use cashmere, nuns' veiling, viyella, delaine, cotton-crepe, or artificial silk. Allow just over 1¼ yards of material, 30 inches wide, for each frock. Light knitted frocks are useful for colder weather, but the most serviceable material is the ordinary white cotton crepe.

Long clothes are out of fashion for the young baby, being a sheer waste of material as well as restricting movement of the lower limbs.

On cold days baby may wear a flannel or woollen jacket over his frock. Bootees and gloves may be made from odds and ends of flannel left over from the making of his other garments.

The Nightgown

Like the petticoat and jacket, this garment should also be made of flannel—never of flannelette. It should be made long enough to cover baby's toes—about 24 inches. A little less than 1¾ yards of material 30 inches wide makes one nightgown.

The following is a list of the necessary garments usually recommended for baby's first year:—

4 cotton cellular shirts
4 wool or silk and wool vests
4 petticoats
4 frocks
3 coatees
4 nightgowns
3 binders
4 pairs of bootees and gloves
1 large and 2 small soft shawls
3 dozen napkins
2 pairs of knitted pilchers
2 bonnets (only to be worn outside on a cold or windy day).

Washing of Woollens

Nowadays, so many of baby's garments are made from woollen material or hand-knitted from wool that it is necessary, if they are to be kept open and soft, to know how to wash them.

(1) Shake the article free from dust.
(2) Turn inside out.
(3) Dissolve Lux or pure soap or soap jelly in a little hot water.
(4) Add sufficient to warm water to lather.
(5) To wash, squeeze the woollens; do not rub or wring out.
(6) Squeeze water out and rinse in warm water.
(7) Squeeze again and rinse in cooler water if the day be very cold.
(8) Lie flat on a towel and fold, pressing as dry as possible. Place on towel to dry outside or hang in clean pillowslip on line.

All these woollen garments must be thus carefully washed to keep them soft and a good colour, otherwise they become felted and yellow. A good idea is to make soap jelly by boiling 8 ounces of soap and 2 ounces of borax with one quart of water, and keep on hand to make the lather for washing flannels. When borax is used no ammonia is required.

AGRICULTURAL BUREAU OF TASMANIA

REPORT OF THE EXECUTIVE FOR THE YEAR ENDING 30th JUNE, 1934

IN presenting the sixth Annual Report it is pleasing that, despite the cumulative effect of the depression and low prices for products, interest in Bureau work has been maintained and in some cases strengthened.

A more diverse range of subjects have been considered by Branches and the Executive during the year and greater activities have been devoted to the securing of reduction in taxes, rebates and concessions from Governments, Banks, Railways and Shipping Companies.

There has been a decrease in membership in some branches but this is inevitable when the low income of farmers precludes the spending of any money that can be avoided, especially in expenses of such a nature as attending Branch meetings some distance away. It is gratifying, however, that some Branches have increased their membership and that the recognition of the necessity of an organisation of farmers has recently become so general throughout the State that many branches are re-organising with a determination to become constructive and helpful units. There is every evidence to show that this is the beginning of a general movement to make the Bureau a stronger and more effective organisation.

The Executive has met eleven times and the Finance Committee fourteen times during the year.

Members who retire this year are Messrs. Neil Campbell (State Member), R. C. Grubb (Northern Member) and D. McLennan (North Eastern Member). They are eligable for re-election.

Major T. H. Davies (State Member) who has been very helpful as a member of the Executive recently became a Minister of the Crown. The results of this appointment is that your Executive has lost his services as one of its members and this will necessitate the election of a member to fill the vacancy. It is also regretted that Mr. R. C. Thompson (South-Eastern Member) has resigned owing to pressure of business and this vacancy will also have to be filled.

The progress of negotiations with various bodies on important matters having been conveyed to members of the State Council and Chairman of Branches during the year it is unnecessary to give more than a brief review of these activities.

The serious position of producers caused concern during the year and your Executive has been exploring various avenues for relief. Representatives of the Government, leading bankers and business men and others were met with the object of securing reductions in interest and other costs.

A conference of State Council members and Chairman of Branches on the North West Coast was held at Burnie, after which the Government were again approached with a request for immediate relief in cases of hardship, and for a comprehensive plan of rehabilitation as it was contended that the business of agriculture should be recognised as a national and essential service which must be carried on.

It is pleasing to record that interest charges by the Agricultural Bank and the Trading Banks have been reduced as well as more liberal treatment accorded to primary producers.

Lengthy consideration has been given by the Executive to the Land Settlement Scheme submitted by the Combined Circular Head Branches.

In view of the importance of the scheme it was necessary for the Executive to be absolutely satisfied before they could recommend its adoption.

The Executive decided to ask the Government for a complete survey of agriculture so that the proposals submitted from Circular Head, together with all other available information, could be properly considered.

It is recognised that several of the measures in the Land Settlement Scheme have already been adopted and that the proposals have been very helpful.

The Executive desire to thank Mr. F. M. Medwin for the amount of thought and time devoted to this matter.

The case prepared by the Bureau for the purpose of bringing about the standardisation of wearing parts of agricultural machinery is receiving support from producers' organisations throughout the Commonwealth. The Executive greatly appreciates the active co-operation of mainland organisations and the personal attention being given by Federal Ministers to what is proving to be a most difficult problem mainly on account of the hostility of the manufacturers to any attempts to bring about standardisation.

The Bureau desires to acknowledge the valuable assistance rendered by Mr. P. E. Keam and the Hon. J. W. Cheek.

Following upon the conference with the Postmaster-General by Bureau representatives with regard to country telephone charges and facilities, the Executive has been advised that hours of service have been extended at a number of country exchanges and communications established to additional places. The Executive again recently brought the matter of a reduction in charges under the notice of the Minister and requested that the rentals of telephones be reduced to a nominal amount. Advice has been received that full consideration will be given to the representations made by the Bureau when the Budget is being dealt with.

The question of a reduction in the cost of electricity and greater facilities for country users has received attention and a sub-committee of the Executive met the Hydro-Electric Commissioner (Mr. W. E. McLean) and placed before him the views of Bureau members with regard to guarantees, charges and general policy with

regard to country users of hydro-electric current. A sympathetic hearing was accorded and the result of the conference will be made available at the Council meeting.

Repeated representations have been made to the Commonwealth and State Governments with the object of continuing or extending assistance to cheapen the cost of fertilisers. The concession of 2/6 per ton in the rail freight is welcomed and it is confidently anticipated that the representations made to the Federal Government with regard to lessening the cost substantially will be successful in the near future.

In furtherance of its policy to strive for reductions in costs, the Executive has been watching the incidence of sales tax, and from time to time made representations for its removal from various items. Our thanks are due to the Federal Government for further concessions during the year.

The various industry committees and boards associated with the Bureau movement have met whenever necessary, and much effective work has been accomplished.

Special attention has been given to many matters affecting the fruit industry, which is one in which many problems concerning transport and marketing remain to be solved. Representations were made to expedite the granting of assistance to growers and to secure a substantial reduction in shipping freights, the matter being taken up with the Government and the Australian Apple and Pear Export Council. Following the resolution of the State Council that endeavours be made to secure a reduction in charges for the cool storage of fruit, the proprietors were approached and a reduction of 2d. per case on long storage fruit was made. It was also stated that if growers can guarantee that stores will be reasonably filled over a period of from three to five years, substantial reductions could be granted. Shed facilities for repacking fruit rejected by inspectors was discussed with the Director of Agriculture. Suitable sheds adjacent to wharves are difficult to obtain, but the Director has the matter under consideration.

Many resolutions relating to the industry have been forwarded to the State Fruit Advisory Board for its consideration, and a conference with the Board was also held with a view to promoting closer co-operation in the interests of the fruit industry. It is understood the Board has prepared a draft constitution for the purposes of the industry, but such has not yet been submitted to the Executive of the Bureau. A few of the many other matters dealt with include the sale of fruit drinks and cider, finance for the purchase of fruit cases, removal of obstructions imposed on road transport, and lifting of clauses of the Navigation Act to help fruitgrowers.

The Small Fruits Committee continued to watch the interests of small-fruit growers and met on a number of occasions. During the year Mr. Townsend (Chairman of the Sugar Concessions Committee) visited the State and conferred with the Committee and leading processors. The getting together of these interested parties resulted in much valuable information being forthcoming regarding canning, jam and pulp. The concessions available under the

Sugar Concessions Committee were fully discussed, together with price fixing. The marketing of fresh small fruits on the mainland was again attended to. The Hon. James Murdoch has been appointed to the Committee as a representative of apricot growers. A request has been received for more intense organisation in the industry, and the matter is now receiving consideration.

Meetings of dairymen were convened at various centres selected by the Dairy Stabilisation Committee, and speakers provided by the Committee placed details of the proposals for stabilising the dairy industry before producers. The support given at these meetings materially assisted in legislation being enacted to give effect to the plans.

The Executive communicated with butter factories throughout the State requesting the Directors to do all in their power to reduce overhead expenses, particularly with regard to the overlapping of cream carts. The replies indicated that results would largely depend upon the interest taken in the matter by branches and individual suppliers.

During the year a Board of Enquiry was set up to investigate the operations of the State Meat Board, and questions relating to the meat export industry. The Executive made representations to the Government requesting that the recommendations of the Board of Enquiry be carried out. The Executive recorded its disappointment in regard to the new legislation particularly in so far as the control of the development of the industry has been removed from the producers.

In view of the request of the Minister for the Bureau to make a nomination to the State Meat Board, and in conformity with the Act the Executive agreed to make the nomination desired as an expression of their faith in the industry, and Mr. R. Oldrey was nominated.

A request was made to the Commissioner for Railways asking for more care to be exercised in the shunting of stock, and an assurance was given that definite instructions had been given to improve this matter.

At the request of the Longford Branch, a Conference was arranged between Woolbrokers of Launceston, and Messrs. I. C. Boyes and Keith Headlam, representing the Bureau, in connection with the deductions made by woolbrokers for the weight of bags. The matter was subsequently referred to the Woolbrokers' Association. The question of private selling was also discussed, following upon communications which the Executive had with members of the Wool and Pastoral Committee. It was pointed out that not only would members frequently lose money by selling privately, but that the success of the sales in Tasmania were largely dependent upon the volume of wool offering, a splendid selling organisation having been built up by woolbrokers.

Attention was given by the Cereals and Pulse Committee to many matters. It was recommended that arrangements should be made for trial parcels of ungraded and graded peas to be sent to England to test the market, and that bushel samples of European blue peas be obtained for trial sowings in Tasmania. Trial ship-

ments have gone forward through the co-operation of the Department of Agriculture and the Pea Growers' Association. The Bureau is indebted to the Commonwealth Department of Commerce for samples and information regarding varieties and the volume of various peas which compete with Tasmania on the London market.

The Committee also recommended that the Government be again urged to provide an area of land for the production of cereals and grasses most suitable for the various soil and climatic conditions in different districts.

The Executive consistently urged that this very necessary Governmental activity should be undertaken, and it is hoped that it will not be further delayed.

It is gratifying that a start has been made at Longford in producing subterranean seed in commercial quantities. Harvesting, threshing and dressing operations are all intricate. Good progress has been made and a production of 21 tons of seed in the first season is satisfactory. The present experiments now being carried out are expected to solve the problem of producing a perfectly clean sample of seed from any class of land.

The Poultry Committee has been active and met when necessary. The Committee again stressed the necessity of tested and graded eggs being supplied to Government institutions, and that regulations should be gazetted making it compulsory to stamp any eggs which have been preserved with the words "chilled" or "preserved."

A deputation met the Minister for Agriculture, the Commissioner for Railways and the Chief Secretary, at which various matters relating to the industry were placed before them.

Following upon the Bureau request for a reduction in the freight on eggs, we have to acknowledge a reduction of 20 per cent. in the tonnage freight on eggs to the Egg Floors during export season, together with a reduction in the minimum quantities from 3 cwts. to 1 cwt., also the privilege of allowing consignments to Egg Floors to be aggregated.

The Executive met the Minister for Agriculture (Hon. Alan Wardlaw) and the Director of Agriculture (Mr. F. E. Ward) in conference to discuss a poultry policy. Details were submitted to the Committee. The Bureau was represented at mainland conferences dealing with the marketing of Australian eggs in Great Britain.

At a meeting of the Education Committee the Director of Agriculture and the Director of Education were present, and among other matters discussed were the various Gepp schools and pasture competitions and farm book-keeping. The Committee viewed with extreme gratification the progress already made with agricultural education in schools. The Director of Education indicated that it was proposed to establish junior branches of the Bureau amongst boys at the schools on the lines which had already been successfully demonstrated. Consideration would also be given to including farm book-keeping in higher grades of the school.

Judging in connection with the Sir Herbert Gepp Trophies was carried out, with the result that the Sheffield State School (Headmaster, Mr. Fleming) won the Schools' Trophy. The Temporary Pasture was won by Mr. C. D. Edwards, and the Permanent Pasture Competition by Mr. F. T. Edwards, who are both members of the Winnaleah Branch. The presentations were made at well attended meetings.

Bulletins dealing with a variety of subjects have been gathered together by the Bureau from various parts of the world and catalogued. Members desirous may obtain this catalogue upon application and have the use of bulletins for a reasonable period.

Great interest is being taken in the Bureau films, and arrangements have now been made to enable them to be shown at all country districts. The first Bureau film, dealing with the barley industry, has been completed. We are indebted to the Commonwealth Department of Commerce for its whole-hearted co-operation through its Film Department, in charge of Capt. Maplestone. Not only have Australian films been freely made available, but films have also been secured from the Canadian Government at the request of the Bureau.

Copies of the Journal of the Department of Agriculture have been made available to all financial members of the Bureau, and during the coming year will be forwarded to all members who are financial at the 30th June up to 31st December, 1934. After this date copies will be made available to members who are financial for the current year.

Through the courtesy of the Conservator of Forests pamphlets were obtained dealing with the planting of shelter belts and the growing of commercial timber on farms, and these were made available to Bureau members on application.

Many field days, social gatherings, branch competitions and meetings have been held throughout the State during the year. The co-operation of officers of the Agricultural Department contributed largely to their success.

Representation on the Fauna Board has been ably carried out by Major T. H. Davies, and the Executive appreciates the work being done by the Board. Attention is drawn to the loss of 30 to 40 per cent. through the bad preparation of furred skins, sheepskins and hides, and it is hoped that as the result of propaganda better conditions and a corresponding saving of money will be brought about. The co-operation of Bureau branches is requested and a suggestion has been made to the Fauna Board that a fully qualified man be made available for purposes of instruction.

A request was made to the Council for Scientific and Industrial Research on behalf of the Flinders Island Branch to have a soil survey of the Island carried out. Advice has been received that the matter will be favourably considered as soon as possible.

Representation was made to the Federal Commissioner for Taxation requesting that consideration be given to the simplification of Income Tax returns.

Lengthy consideration has been given by Branches and the Executive to rabbit destruction. The matter was discussed at a representative conference at Campbell Town, and is being followed up by a sub-committee.

The Chairman of the Animals and Birds Protection Board conveyed a resolution to the Executive from the Mutton Birders Association requesting the Bureau to help improve the marketing of the birds. The Chief Executive Officer and a member of the Executive visited the Islands and several conferences with mutton birders were held. Many constructive suggestions were forthcoming as a result of which both the quality of the birds and conditions generally were improved.

A careful watch is kept by the Bureau on all overseas developments so that no opportunity is lost of informing our members of matters of interest in connection with extending markets for Tasmanian produce.

The Bureau is represented on the State Committee formed to study and promote trade with the East in co-operation with the Commonwealth Committee.

Communications have been maintained with Government Departments, Bureaux, and marketing organisations in other countries and information has been regularly received relating to production and international trade movements, and prices of agricultural products, reports on the working of schemes designed for the assistance of agriculture have also been received.

The Executive met the High Commissioner, Mr. S. M. Bruce, and discussed the position regarding the British market for Australian products. To ascertain the effect of the High Court's judgment in the Queensland Peanut Case as it affected marketing legislation, reports were obtained from the Commonwealth Crown Solicitor and the New South Wales Egg Marketing Board, and also a summary of High Court decisions regarding interstate trade.

Delegates from East Tamar Branches met the Minister of Agriculture and the Executive and discussed matters of interest to their district.

Bureau branches in the vicinity of Devonport held a Social Evening on the night of the Devonport Show at which His Excellency the Governor was present.

On behalf of Bureau Members the Executive desire to pay a tribute to the valuable work and assistance rendered the movement by the Director and officers of the Department of Agriculture who by their advice and attendance at Bureau meetings have been most helpful.

The co-operation of the Production Committee has been welcomed and as it is the wish of the Committee to avoid publicity, we refrain from referring to details of the valuable assistance which has been forthcoming to our Executive. Mention, however, might be made of the fact that the action of the Committee resulted in the price of Limestone from Southern manufacturers being reduced from 23/- to 12/6 per ton.

With regard to the finance of the Bureau and following upon a Conference in February with the Minister for Agriculture the Executive were advised that the Premier would at the end of his term leave a letter addressed to the incoming Premier recommending that the Bureau vote of £3,000 per year be continued for the next four years as arranged.

Publicity was given to a number of queries raised by the Auditor-General on the accounts for the year ending the 30th June, 1933. These queries have been satisfactorily answered and the certificate of the Auditor-General as to the correctness of the accounts for that period has been received.

The Executive cannot close its report without expressing its thanks to the Government of Tasmania for its continued assistance to the Bureau movement, to the Press for the publicity which it has so generously given Bureau work, and to many public bodies and others who have so readily accorded their co-operation to the movement.

SURFACE ESTABLISHMENT OF SUBTERRANEAN CLOVER

THE surface introduction of Subterranean Clover on existing pastures is proving a sound practice and is receiving the attention of many farmers. One of the most important factors influencing the length of time necessary to establish a productive clover sward is the strike resulting from the first sowing of seed. In most instances the seed has been broadcast before or after the land has been scarified; in a few cases disc-coulter drills have been used to sow the seed and manure, and the successful strikes following this method of sowing suggest that it could be used more extensively on suitable soils. Enough pressure is necessary on the coulters to ensure that they cut the turf and leave the seed and manure in direct contact with the soil. This gives the seed every chance of germinating and the growth stimulus provided by the proximity of the manure ensures the early establishment of the plants.

The disc-coulter drill could also be employed with advantage to introduce ryegrass into established Subterranean Clover pastures. It is not suggested that the sowing of clover and ryegrass with the drill obviates the necessity of cultivating the pasture. Cultivation will prove valuable in improving the conditions for germination and growth by loosening the soil and at the same time the existing clovers and grasses will be invigorated.

Extension Service

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CREAM QUALITY

CREAM supplied to the butter factories during the past season has shown a big improvement in quality over that of previous years. During the season 1930-31, only about 20 per cent. of the total amount of cream received by factories was graded as choicest, while for the 1933-34 season almost 75 per cent. of the total quantity received was given choice grade. This rise in quality reflects great credit on the dairymen, but there is still room for improvement along certain lines. At present the most common cause of cream scoring below choice grade is due to the careless use of foods which give off a strong odour and flavour, such as turnips, rape, chou mœllier, and certain clovers at some period of the year. This flavour may be practically eliminated by the use of the small cream cooler followed by frequent stirring of the cream. Cream passing over the cooler has a very large thin surface exposed to the air. This both cools and ærates the product and promotes the evaporation of the harmful gases which would otherwise be retained; then by frequent stirring more of the gases are allowed easy exit.

When feed flavour is very pronounced it will also be necessary to remove the cows from the offending pasture at least two hours before milking. Another method recommended is to cut the pasture and allow it to wilt before feeding to cows.

Dairy Division

DISTRIBUTION OF CERTIFIED BROWNELL SEED POTATOES

THE First Harvest Certified Brownell Seed Potatoes grown under high country conditions from seed distributed by the Department of Agriculture last year will be available to all farmers this season. Care has been taken that the crops from which the seed is produced were grown under conditions of suitable isolation and altitude and under the supervision of Departmental Field Officers, who have inspected all crops in the field and advised rogueing where necessary in order to eliminate weak or backward plants. In order to distinguish this seed from any other lines each bag will carry the seal of the Department and a label descriptive of the contents.

For the information of farmers who desire to obtain First Harvest Brownell Seed this year, the following is a list of growers whose crops have been certified:—

Biggins, J., Yolla	Lillico, Elliot, Wilmot
Butler, Alan, Sheffield	McGinty, J., Ridgley
Chamberlain, J., Preston	Murfet, A. W., Paradise
Clarke, L. J., Natone	Page, G. S., Upper Burnie
Day, Chas., Sheffield	Rothwell, H., Somerset
Day, G. M., Sheffield	Rothwell, W. E., Henrietta
Hilder, J. R., Burnie	Stitz, C., Hampshire
Jacobs, F., Needles	Taylor, G. P., Ulverstone
Lawson, E., Upper Natone	Thomas and Parsons, Thirlstane

In each case the postal address is that accompanying the name.

Chief Agronomist

A PAGE FOR THE COOK

APPLE CHEESE-CAKE

Half pound of apple pulp, ¼lb. sugar, 4 eggs, ¼lb. buttter, rind and juice of a lemon; add sugar and butter, well beaten, leaving out the whites of 2 eggs. Mix well, and put into patty tins, lined with crust.

APPLE SNOW TARTS

Make a good puff paste, cut out 2 rounds with cake cutter, cut small round out of one, place on top of plain round, and bake. Bake 3 large apples, remove skin, and pass pulp through a sieve; beat whites of 2 eggs to a stiff froth; by degrees add to the froth 3oz. sugar and the apple pulp; beat all till it is light and soft like snow. Pile roughly on the paste, and serve with or without cream or custard. The apple snow may be piled in a dish without paste.

CHAMPAGNE CRUST (FOR STEWED FRUIT)

One large cup flour and 1 teaspoon cream of tartar, well mixed; then add ½ cup sugar; dissolve 1 teaspoon carbonate of soda in ½ cup milk, and add with a well-beaten egg; melt ¼lb. butter, and add last. Pour over stewed fruit while hot, and bake half an hour.

CINNAMON TARTS

Half pound butter, ½lb. sugar, 1lb. flour, 1 egg, 1 teaspoonful of baking powder. Mix flour and butter; add sugar, and mix with egg and a little milk until sufficiently moist to roll and cut. Make icing, and mix in some cinnamon powder. Cover each cake, and put on chopped almonds while the icing is moist.

CORNISH PASTIES

Half pound meat, 1 good-sized potato (if liked), 1 small onion, minced; cut meat and potato into dice; mix with onion; sprinkle over salt and pepper, mix well. Make short pastry from 10 oz. flour, 2½ oz. lard, 2½oz. dripping, large half-teaspoonful baking powder, cold water to mix. Turn pastry on board, and cut into as many pieces as needed; roll pastry into rounds; put on some meat mixture; about a teaspoonful cold water. Bake in a moderate oven half an hour. (Try potatoes with skewer, and if done meat will be done also). Gather the edges of pastry together, along the top of pastry, and prick with fork. Nice for picnics.

CREAM CONES

Make some nice puff paste; have some little tins the shape of a cone; cut the pastry in strips and roll round the tin, and bake in a very quick oven; slip the tins out and stand up the cases for pastry to cool. When quite cool, fill them with whipped cream and pile on dish, dusting them with sugar.

DATE SQUARES

Line a flat, square tin with puff pastry and put a thick layer of dates, a little dark sugar and spice, sprinkle with water, and put another layer of pastry and prick the top with a fork, and bake in a quick oven. When cooked, sprinkle with icing sugar and cut in squares.

COCOANUT CAKE

Two cups flour, 1 cup sugar, ½ cup butter, ¾ cup milk, 2 teaspoons desiccated cocoanut, 2 eggs, 2 teaspoons baking powder. Mix butter and

sugar to a cream; stir in eggs, then milk; lastly, flour and baking powder. Bake in Victoria cake tins for 10 or 15 minutes. Do not remove till cold.

Icing for above.—One cup icing sugar, whites of 2 eggs. Beat till stiff enough.

COCOANUT CHEESE CAKE

Four ounces grated cocoanut, 2oz. butter, 2oz. sugar, 2 eggs, few drops essence of lemon. Cream together butter and egg; add the other ingredients, and mix well. Make short crust and bake in small tins.

COCKLES

Three eggs, their weight in self-raising flour, cornflour, butter and sugar. Beat eggs separately; drop small teaspoonful on greased tin, jam and put together.

COFFEE CAKE

Cream ¼lb. butter, add ¼lb. sugar, then 2 eggs and beat well. Stir into this mixture 1 tablespoon of coffee essence, 5oz. flour and 1 teaspoon of baking powder.

Ice with the following:—Cream 2oz. butter with 4oz. icing sugar and add about 1 teaspoon of coffee essence.

AMMONIA BISCUITS

(Very economical)

One pound butter, 4lb. flour, 1lb. sugar, 1 pint milk, 2oz. ammonia. Boil the milk and pour boiling over the ammonia and sugar, rub butter into flour, then mix well together and roll out very thin, and do not knead too much with the hand, nor use much flour in rolling out. Bake quickly. This quantity makes a lot of biscuits and will keep as long as desired, and are most wholesome and digestible.

ALMOND FINGERS

Half pound butter, ¼lb. sugar, yolks of two eggs, 2 tablespoons cold water, 2 teaspoons baking powder, 1lb. flour. Cream butter, add sugar, eggs, water and flour, into which the baking powder has been mixed; roll out, and spread with icing made of the whites of 2 eggs and icing sugar; sprinkle with chopped almonds which have been previously blanched; cut into fingers and bake in a moderately hot oven.

BOILED BISCUITS

1lb. sugar, 1 cup milk, 1 teaspoon carbonate soda; boil these together for 2 or 3 minutes. Rub into 2lb. flour, ½lb. butter; add ¼lb. desiccated cocoanut; mix, pour in the mnxture when lukewarm. Bake a pale biscuit colour on a floured slide.

BROWN ALMOND FINGERS

Beat 3oz. butter to a cream, then add castor sugar, 5oz. self-raising flour, 2 eggs; beat whites separately from the yolks. Mix the yolks with the above ingredients; beat the whites to a stiff froth and mix all well together. Butter a square tin and spread the mixture; then sprinkle some almonds, chopped very fine, over the top, and bake for 10 minutes and cut into fingers.

BRANDY SNAPS

1lb. flour, 1oz. dripping, 2lb. dark sugar, less than gill water; roll out as thin as a penny. Bake in a very slow oven.

The Tasmanian

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Editorial

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THE CRISIS IN AGRICULTURE

IN practically all countries the problems confronting the farmer are no longer exclusively, or even mainly, agricultural, but are largely the outcome of social and industrial changes, and to some extent the consequence of the politico-military policies being pursued by many of the larger nations. That the rural position had begun to present difficulties before the existing economic and monetary crisis is illustrated by the fact that during the twenty-year period up to 1925 the number of farm bankruptcies in the United States of America increased tenfold while there was no increase in the percentage of failures in commerce. Although somewhat masked by the influences of the war, the same trend was apparent in countries of the Old World.

The production of foodstuffs and other staple products is still the first consideration of mankind, but with the enormous changes which have been introduced through the use of machinery and the application of science, primary production has become of diminished importance and has been overshadowed by the activities of the secondary industries. There has consequently been a movement of labour from the land towards the industrial centres, and the extent of this migration is illustrated by the fact that towards the end of the eleventh century, of the population of England seventy per cent. was then engaged in agriculture. America, throughout its history has been largely self-contained, and has supplied most of its own rural products. In 1850, fifty-six per cent. of all occupied persons in the U.S.A. were engaged in rural

production, but by 1920, although the percentage had dropped to twenty-six it was obvious that too many persons were still employed on the land.

Changes necessitating the migration and change of occupation of large numbers of people are not easily effected, and there is no doubt that inertia has been responsible for keeping more workers in the rural industries than are required to produce all the foodstuffs which the people of the Western civilisation are capable of consuming. We do not state that at the present time there is an actual overproduction of foodstuffs or other primary products, although, with certain lines, markets are certainly oversupplied, but it is contended that, given anything like the organisation of production in the rural industries which has been brought about in the major secondary industries, then over-production would result. Our appetites set a limit to the use we can make of farm products, but there appears to be no limit to our capacity to utilise the output of secondary industry. Were all our material wants fully supplied there would still be ample opportunity for applying labour in cultural interests and in the beautification of our environment.

These considerations lead us to the conclusion that if we are to apply our labour to the greatest advantage it will be to an increasing extent utilised in producing and making available the amenities of life, and that while the production of food and the provision of shelter will always be our first considerations these tasks will not constitute our major activity.

Given free play, economic laws would result in the new countries such as Australia acting as the granaries of older countries which in turn would provide us with manufactured products. Unfortunately, artificial trade restrictions are interfering with the play of natural forces, and the present tendency is for each country to become independent of its neighbours. The inevitable result of such a policy is an unnecessarily low standard of living and a waste of energy. For example, provided we were prepared to build and maintain the necessary hot-houses, it would be possible to produce our own bananas in Tasmania. As yet we choose to import them from other countries where they can be produced with a fraction of the labour and at a fraction of the cost; let us hope that we retain enough sanity to continue to do so; but to attempt banana-growing in our State would be comparable with many of the activities which are being attempted in order to make the nations self-contained. Recently an Italian commercial house offered wheat free of cost and freight paid to an Austrian firm

and later sweetened the offer with a cash bonus. This offer evidently arose from a desire to stabilise the Italian market and to reap the benefit of the large bounty on the export of wheat. It was declined because of a large import duty on wheat entering Austria.

Such absurdities must ultimately be recognised and result in the removal of artificial restrictions to trade, but unfortunately, although such restrictions may be imposed almost overnight, their removal is generally a more protracted undertaking. From present indications it would appear doubtful if a healthy economic condition will be attained within twenty years, and consequently it becomes desirable to consider our own position.

With many of our products it would appear unwise to attempt greatly increased output, although wool and fat lambs offer possible exceptions to the general rule. Our main efforts might most profitably be directed to the lowering of production costs and effecting an improvement in the quality of our products. By concentrating on these points we will be in a position to reap the maximum benefits from those markets which are still available, and when more stable conditions are in evidence we will be favourably situated to commence a forward movement. In the long run it is likely that our efficiency will be the measure of our prosperity, so that on individual farms and throughout the rural industries there is ample inducement to make every possible effort to obtain more economical production.

In some quarters there still lingers a belief that the solution of our economic troubles lies in settling more men on the land, and almost daily such a policy is advocated by one person or another as a means of solving the problem of unemployment. On the social side of such a proposal it is not incumbent for us to express an opinion, but from the agricultural aspect it may be pointed out that such a policy presents grave short-comings. Its wholesale adoption would result in the further glutting of markets already oversupplied and would also tend to lower the average standard in the efficiency of production. It might easily result in the development of a poor peasantry rather than a community of prosperous landholders, and it savours too much of an attempt to shelve the problem of social and industrial re-organisation to make a wide appeal.

It may well be that our best course would be to seize the present opportunity to consolidate the rural industries by abandoning sub-marginal lands and concentrating available resources on country which is more likely to give an adequate return for the labour and finance expended upon it. In all new countries

pioneering zeal results in the settlement of land which is likely to remain below the level of profitable production once its virgin fertility is exhausted. Such areas exist in Tasmania and are still occupied by settlers who are putting up a brave but losing fight against impossible conditions. Sooner or later it will be necessary to allow such sub-marginal land to revert to a state of nature, utilise it in forestry, or, according to circumstances, allow it to revert from arable to pastoral country. A national policy designed to consolidate the rural industries by transferring men from such inferior country on to that which will give cheaper production and provide a better return for their labour should be sympathetically regarded by all who have the welfare of the State and its people at heart.

A large portion of the apples, however, showed very little evidence of injury until they were cut transversely, when a number of necrotic areas were visible in and around the core line vascular bundles. It appears these bundles are susceptible to low temperatures and that there is a line of conductivity between them and the sepals or stamens.

During the ensuing season the fruits were kept under observation and further examinations were made at different stages of development. Prior to the harvesting of the crop some typical specimens of frost injury from amongst the different varieties were selected. These showed marked variation in regard to malformation and blemish. A brief description is appended.

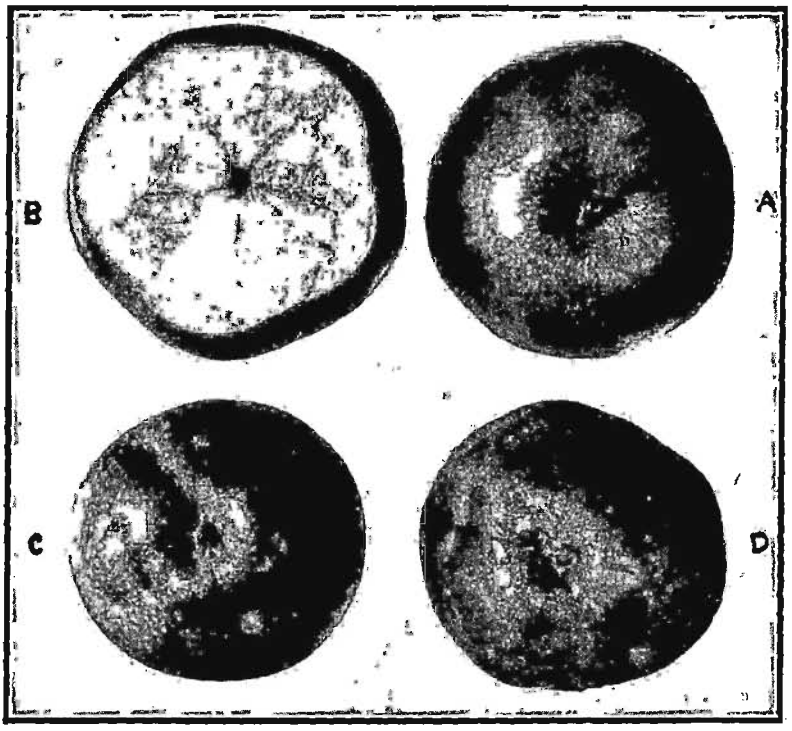


FIG. II.—VARIETY: CLEOPATRA

A—Normal Apple. B—*Frosted* Apple, transverse section. C and D—Frosted Apples. *Note* peculiar crinkled effect on skin surface.

Variety: Sturmer Pippin (Fig. I.)

A large portion of the crop was affected, the apples being lopsided. Growth was constricted around the basin, producing a furrowed effect (C and D). Fruits cut transversely to the core showed brown necrotic areas which were confined to the core line on the injured side of the apple (B). All fruits were sound and kept from six to eight weeks without further deterioration. The malformation of the basin would mike it difficult to determine the variety unless it was known.

Variety: Cleopatra (Fig. II.)

The photos (C and D) are typical of the injury of a large portion of the crop. With the Cleopatra this took an entirely different form from other varieties, the skin surface being scored and pitted as with a knife, producing a deep crinkle.

Fruits cut transversely showed injury to the core line vascular bundles (B), and except for this the flesh was sound and firm, and without decay.

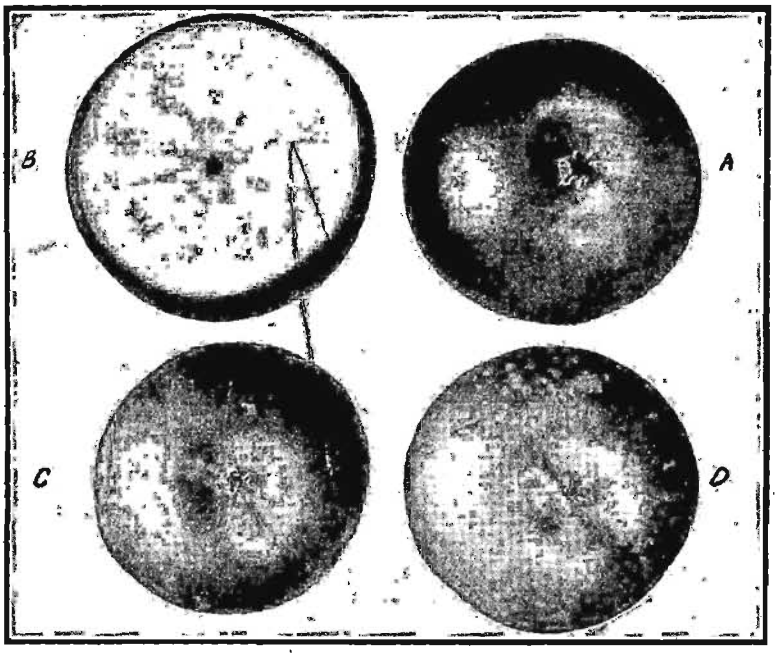


FIG. III.—VARIETY: SCARLET

A—Normal Apple. B—Frosted Apple, transverse section. C and D—Frosted Apples. Note scab-like russeting of skin surfaces.

Variety: Scarlet (Fig. III.)

The Scarlets were of special interest. The affected fruits were only slightly malformed, the basins being slightly wider and shallower than normal. With this variety the injury was practically confined to the skin surface which was covered with a number of raised, russetted scabs (C and D), very similar to the injury attributed to powdery mildew *(Podosphaera leucotricha, Sal.)*.

When cut transversely the fruits showed the characteristic injury to the core line vascular bundles, the necrotic areas being plainly visible in the illustration (B). Specimens of affected fruits were kept for eight weeks without further deterioration or decay.

Variety: Jonathan (Fig. IV.)

The Jonathans were most seriously affected by the frost. The apples were more advanced than the other varieties and a larger percentage were rendered unmarketable.

The injury to this variety was manifest in different form, the whole of the basin being depressed and widened (C and D). The flesh injury was also confined to the region around the basin (B), the necrosed areas being larger but similar to bitter pit lesions. The Jonathans were also kept for eight weeks without any further deterioration or decay.

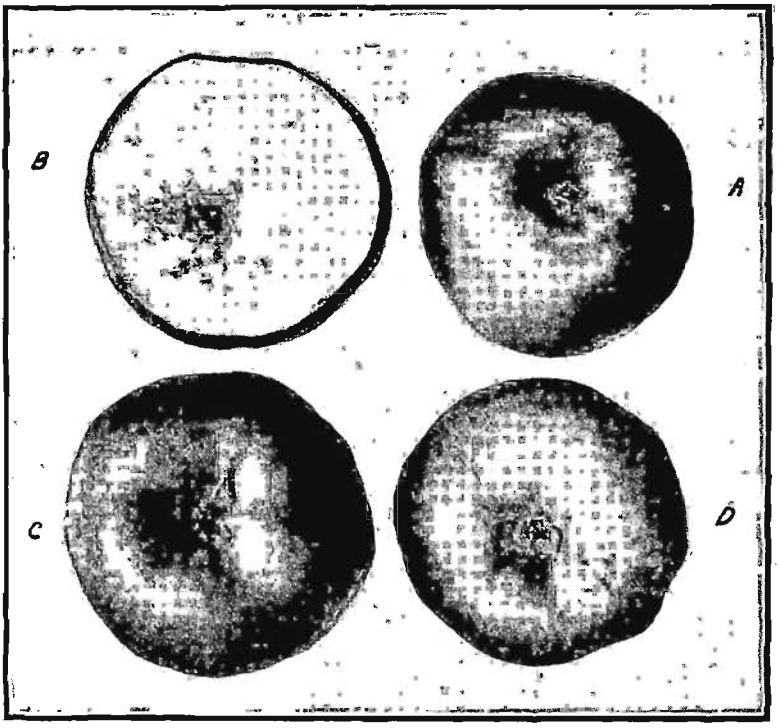


FIG. IV.—VARIETY: JONATHAN

A—Normal Apple. B—Frosted Apple, transverse section. C and D—Frosted Apples. Note wide, depressed basins.

Comment

Injuries similar to those which have been described were also apparent on fruit in other orchards where frost was experienced, particularly the scab-like russeting described on the Scarlets.

In recording the effects of frost on the varieties enumerated, it is interesting to note the variations manifested. In fact, if specimens of the different apples had been submitted for examination

without previous knowledge of the conditions under which they had been produced, a number of different diagnoses and causes might have been suggested as being responsible for the blemishes and malformations.

Frosts of varying intensity are recorded in a number of apple districts during the periods of blossoming and fruit development, particularly during the month of November. Where these are severe the injury is at once apparent. The observations and data collated, however, suggest that the effects of light frosts on developing fruit are not fully recognised, and a number of skin blemishes and malformations may be due to their influence.

The minimum temperature recorded was 32.5 degrees Fahr. This was on a hillside, and the temperatures on the river flats would be from 2 to 3 degrees below that of the hillside.

LIME SULPHUR

Method and Cost of Preparation

By R. J. VEALE, B.Ag., Dip. C.A.C., District Agricultural Organiser

LIME SULPHUR has recently come into general use both as an insecticide and as a fungicide. It is used during all seasons of the year and constitutes one of the main items of expenditure in the direction of disease control in the orchard. Although it is well known among orchardists that the concentrated solution can be made successfully on the farm, the practice of home manufacture has developed only to a small extent. This can be understood in orchards where the saving effected would not be sufficient compensation for the disagreeable nature of the work in a small plant. The large scale orchardist, and more particularly communities of fruitgrowers, could well consider the possibilities offered in a plant where the greater production would reduce, to a very low figure, the cost per gallon of the concentrate.

Lime sulphur is made from quick lime and ground sulphur by boiling these two substances together in water. The quality of the product depends upon the nature of the raw materials and upon attention to the main features of the process which are discussed later in this article.

Lime

The quality of the lime has a most important bearing upon the final product and also upon the ease with which the process is carried out. Though by no means the most expensive item in the manufacture, yet the effect is such that an extra £1 per ton is well spent if a first-class stone is secured.

A high percentage of calcium carbonate (over 90 per cent.) together with a low percentage of magnesium carbonate (less than 5 per cent.) is desirable.

In order that allowance can be made for impurities, analysis of the stone should be made periodically. Well and freshly burnt stone is essential. As the lime is handled for weighing, any pieces of unburnt stone should be discarded along with partially or completely airslaked material.

Poorly burnt lime causes excessive grit, some of which passes with the solution to the spraying machine, where it quickly effects nozzles and valves. The airslaked lime produces a large proportion of insoluble sludge. The discarded lime can be disposed of for agricultural purposes.

If several sources of supply are available the slaking quality of the different samples can be taken into account. A quick slaking stone is to be preferred as the heat generated can be used to greater advantage in boiling the solution, and such a lime usually breaks down to a much finer state than one of the slow slaking variety.

Sulphur

Commercial ground sulphur is used and supplies are obtainable in Tasmania at a reasonable price. This sulphur requires rubbing through a fine mesh sieve before using in the cooking vessel.

Proportions of the Mixture

The proportion of lime and sulphur to water varies according to the Beaume test desired.

For local use where transport is not a big item, it is not advisable to depart from the general formula of

Sulphur	200 lbs.
Quick Lime	100 lbs.
Water	100 gallons

which should give a product with a density of 25 degrees Beaume.

Allowance in weight should be made for impurities in the lime and the sulphur. Sulphur can be taken as 98 per cent. pure and the lime calculated on analysis.

A more concentrated product can be made by increasing the proportion of lime and sulphur to water. It will be found, however, that as this is done the amount of sludge is increased also.

With the above-mentioned formula, large quantities of concentrate have been made at 25 degrees Beaume with 4 per cent. of sludge, but in the same plant when the density was increasd to 28 or 29 degrees Beaume the proportion of sludge increased to between 15 and 20 per cent.

To syphon the clear liquid from the top of the concentrate after it has settled causes too much waste and an effective filter press is too costly to include in a small plant, where the product is not put on the market to compete with commercial lines. The small amount of sludge in the sulphur testing 25 degrees Beaume allows it to be used without filtering and without noticeable effect upon spraying operations.

Method of Cooking

In small outfits where only a few barrels are required for the season, the liquid can be boiled over an open fire out of doors. The method is, however, wasteful, costly and unpleasant, and cannot be recommended except on a very small scale.

Where large quantities are made, steam cooking is profitable. This is done by passing the steam direct from the boiler into the mixture in the cooking vessel. Boiling by this method can be regulated as desired, overflowing and waste being avoided.

The limiting factor to the production of any steam plant is the amount of steam available. A large boiler at 60 lbs. pressure is preferable to a smaller unit at a high pressure. A 3½ h.p. vertical cross-tube steam boiler will supply sufficient steam at 50 lbs. pressure to cook from 450 to 600 gallons of mixture per day. An 8 h.p. boiler of the same type will boil 2400 gallons per day.

There is no great difference in price between the smaller sizes of boilers, and a few extra pounds spent upon one of ample capacity for the work will soon be regained in labour saved.

Cooking Vessels

Two common systems are used in steam plants. First there is the cheaper but less efficient method of boiling in a number of 40-gall. wooden casks. The main advantage of this system is the small capital outlay.

The number of barrels used depends upon the steam available. A 3½ h.p. boiler will deal with three casks at the one time, each being heated by a ½in. steam pipe which opens within six inches of the bottom of the cask. Two extra barrels are needed to mix fresh lots while the others are cooking.

The three-barrel plant will produce 450 gallons per day, while, if the same boiler is well stoked with good wood and coal, and four casks are boiled at one time, it is possible to produce 600 gallons.

To avoid boiling over, the casks are not filled, only 25 gallons being made at one time.

The second and more satisfactory method is that of cooking the mixture in large wooden vats such as are used in outfits for spraying orchards from a central pumping station. Two of these vats make a more economic unit than a single one as while one is being boiled the other can be prepared with the use of labour which would otherwise be idle.

The vats are filled with the mixture to only three-quarters of their total capacity and the heating can be done effectively with half-inch steam pipes two feet six inches apart.

The daily output of twin vats can be taken as eight times the capacity of one vat.

Thus with a 3½ h.p. boiler and two·100 gallon vats, each boiling 75 gallons at a mixture, a daily production of 600 gallons can be made, and this with one man less than is the case with the same boiler and four barrels. An 8 h.p. boiler heating two 400 gallon vats each cooking 300 gallons per filling will produce 2400 gallons per day. In a well designed plant three men will work the 600 gallon outfit with vats and four men will suffice to handle the 2400 gallon output.

Agitation of the Mixture

A most important point is the thorough and continual stirring of the mixture during the whole time of cooking. If this is neglected the effect is at once noticed in a lower Beaume test and in an increased amount of sludge. During a breakdown in the stirring mechanism of a large plant hard stirring was resorted to and a drop of four degrees in density was noticed together with a large increase in the amount of coarse sediment and uncombined sulphur.

The method of cooking in barrels does not permit thorough agitation. Any mechanical contrivance is cumbersome and costly and hand labour cannot be relied upon to do this part of the work efficiently.

On the other hand the large vats can be fitted with a horizontal shaft running from end to end at about eight inches from the floor. Twelve inch diameter propeller blades are fitted at three feet intervals and these rotating at 120 revs. per minute will stir thoroughly and allow no accumulation of sediment at the ends.

If sufficient steam is available the agitators can be worked by a small steam engine. Otherwise a 2½ h.p. petrol engine will do the work for two 400-gallon vats.

Method of Mixing

The method is practically the same in all sizes of plant. A supply of hot water heated by steam in a separate tank or barrel should be available. This is used to mix the required amount of sulphur in the cooking vessel to the consistency of thin cream.

In barrels this operation is done with a broad paddle. A small quantity of water is used to commence with and is increased as the sulphur works into a paste. In the vat about a third of the total water is used and the sulphur is added after sieving and weighing. The agitators will mix the sulphur and water to the required condition.

This operation is assisted by using to each 100 gallons of mixture a cupful of soap solution made by dissolving a bar of soap in two gallons of water.

The sulphur and water being mixed, more water is added to half the total quantity in barrels and two-thirds in vats. The lime is now added. With barrel cooking it is better to mix the lime in a separate tub and tip it into the cooking vessel when it has slaked into a thick boiling mass.

Where vats are used the lime is dealt with by constructing boxes with wire netting sides and bottoms. These are made to be suspended from the sides of the vat with the bottom of the box a few inches above the agitator blades. The lime, after sorting and weighing, is tipped into the box and the swirling sulphur and water quickly slacks and washes away the lime into the mixture.

The balance of the water is added at this stage and the heat from the lime and steam should bring the mixture to the boil.

Time of Cooking

The time is taken from the moment at which the completed mixture comes to the boil, and vigorous boiling should be continued for 45 minutes.

It is advisable to conduct tests at the commencement of operations in order that the optimum time for cooking may be determined for the mixture being used.

After the mixture has boiled for thirty minutes, samples should be taken and tested at five minute intervals until one hour has

elapsed. If a filtration test is made in conjunction with the Beaume test a time can be arrived at for cooking which will give the best combination of density and freedom from sediment.

Arrangement of the Plant

It is not intended to discuss in detail the arrangement of any type of plant, but whatever design is selected certain features should be adhered to.

The cooking of the mixture is best done on a platform raised above the general level of the rest of the plant. There can be provided simple arrangements which will allow the cooking vessels to be emptied quickly into a large settlement tank below the level of the platform. Agitation should be continued during this emptying.

The liquid should be drawn from an outlet near the top of the settlement tank, thus leaving the coarser sediment behind, and passing from here through a coarse strainer to remove charcoal from the lime. This part of the outfit should be arranged in such a manner that it requires the minimum of attention during operation.

Storage Tanks

Where any large amount of material is being made in one season it will probably prove profitable to store the concentrate and draw supplies as required. Provided it can be kept from the air, lime sulphur can be stored indefinitely and large tanks can be sealed by covering the surface with a layer of waste oil about half an inch in thickness. In considering the need for storage it must be realised that lime is cheaper when purchased in large quantities and that it must be used before it becomes at all airslaked. Unless facilities are made for keeping the lime fresh, the continuous working of the plant on a small scale is impracticable.

The main items of expenditure are lime, sulphur, fuel and labour. The first three are constant factors, and the only economy available is in the direction of wages. A plant working at full capacity for a short time will produce a cheaper article than will a continuous unit in which the labour cannot be used efficiently (unless, of course, the demand for the product is unlimited).

In view of these points it appears that some type of storage is necessary. Galvanised iron tanks are satisfactory if they are treated on the inside with an anti-corrosive paint. The storage tanks should be mounted on a stand which will bring the outlet of the tanks high enough to fill drums on a motor lorry.

The liquid can be raised from the settlement tank to the storage tank by means of a small centrifugal pump.

Cost of Production

The figures quoted are taken from the actual working of a plant producing 50,000 gallons of concentrate per annum. Figures are given at two stages—first, when a small boiler and two casks were used for cooking, and second, when the plant was enlarged to an

8 h.p. boiler with two large vats. Even in cases where the plant is considerably smaller than these, there is no reason why the cost of production should be much greater than that quoted.

Cost of Plant Having 600 gallons Per Day Capacity

PLANT—			
Building	£120	0	0
Steam Boiler, 3½ h.p., Second-hand	30	0	0
Steam Fittings	5	0	0
Engine, 1½ h.p.	30	0	0
Settlement Tanks	13	10	0
Pump and Piping	7	10	0
Storage 4,000 gallons	20	0	0
Tank Stand and Loading Platform	20	0	0
	£246	0	0

Cost of Production, Based on Output of 50,000 Gallons

Sulphur, 47 tons at £12	£564	0	0
Lime, 25 tons at £2/10/-	62	10	0
Wood, 100 tons at 8/-	40	0	0
Labour, 4 men 90 days at 12/-	216	0	0
Petrol and Oil	3	10	0
Cartage on Lime and Sulphur	18	0	0
Interest	12	10	0
Depreciation	25	0	0
	£941	10	0

Cost per Gallon, 4.5d.

Note.—Labour.—At the time of manufacture 10/- per day was the ruling rate for labour, but on account of the rather dirty nature of the work, and as a means of inducing full production in the plant, an increase of 2/- per day was made.

If vats were installed in place of barrels in this plant, it is probable that the cost would be reduced by ¼d. per gallon due to saving of labour. The 100-gallon vats with agitators would not cost more than £12/10/- each.

Cost of a Plant Having 2400 Gallons Per Day Capacity

PLANT—			
Building	£120	0	0
8 h.p. Steam Boiler, Second-hand	50	0	0
Steam Fittings	7	10	0
Vats with Agitators, two 400-galls.	50	0	0
3 h.p. Engine, Second-hand	30	0	0
Shaft Pulley and Belting	9	0	0
Settlement Tank and Fittings	13	0	0
Pump and Piping	7	10	0
Storage for 14,000 gallons	100	0	0
Tank Stand and Platform	20	0	0
	£407	10	0

Cost of Production, Based on Output of 50,000 Gallons

Sulphur, 47 tons at £12	£564	0	0
Lime, 25 tons at £2/10/-	62	10	0
Wood, 30 tons at 16/-	24	0	0
Labour, 4 men 30 days at 12/-	72	0	0
Petrol and Oil	3	10	0
Cartage	18	0	0
Interest on Plant	20	0	0
Depreciation	40	0	0
	£804	0	0

Cost per Gallon, 3.5d.

In considering the cost of this material it must be remembered that the figures quoted are for concentrate at 25 degrees Beaume with 4 per cent. sludge.

Commercial samples test on the average 30 degrees Beaume and are free from sediment.

The figures given are also for lime sulphur at the place of manufacture, and no allowance is made for containers or transport.

TUBERCULOSIS IN POULTRY

By W. E. CHAMBERLIN, M.V.Sc., Veterinary Pathologist

TUBERCULOSIS has been recorded in the majority of the domesticated birds, including the fowl, turkey, duck, goose, swan, canary, parrot and pigeon. Wild birds kept in captivity are also susceptible. Ducks and geese kept under ordinary conditions are rarely affected. The disease is recorded as far back as 1882. It is practically world-wide, having been reported from almost every country in which poultry farming takes place, and it is one of the serious pests of the poultry industry. It may exist sometimes amongst large flocks, failing to kill sufficient birds to attract attention, while in other cases it may take on a more virulent form and destroy an appreciable number of birds over a short period of time. Tuberculosis of birds is not only closely related to mammalian tuberculosis, but bears a marked resemblance to that disease.

A number of cases of tuberculosis of fowls have been diagnosed in the Veterinary Laboratory at Launceston. It would appear from these cases that the disease is fairly widespread, which fact is of interest in view of the low incidence of bovine tuberculosis in this State. Both virulent and less-virulent forms have been noticed.

The disease is caused by a very minute organism or germ called *Bacillus tuberculosis,* which is closely allied to that which causes tuberculosis in man and animals. Three strains of the germ are recognised, *viz.,* human, bovine, and avian. As the name implies, the common strain causing the disease in birds is the "avian," although parrots are frequently infected with either the "human" or the "mammalian" type. The germs are quite characteristic in structure, and, when stained and examined under the microscope, have the appearance of bundles of sticks. These germs can be grown in the laboratory on specially prepared media. They are very resistant to ordinary methods of staining, and, in fact, cannot be stained at all unless methods are used by means of which their outer waxy coat is dissolved to enable the stain to penetrate.

Tuberculosis is essentially a disease of adult birds, more commonly seen in fowls three to four years old. It is rarely found in fowls under the age of six months. Under natural conditions the germs gain entrance to the body by means of the digestive tract. Here they multiply very rapidly until vast numbers of the organisms are produced. The characteristic symptoms of tuberculosis birds are the progressive wasting and anæmia. The skin, comb and wattles grow pallid and affected birds become light and show a disinclination to move. Wastage of the breast muscles usually occurs. Lameness, due to affected joints (sometimes called rheumatism), and extreme weakness are frequently found. Feathers may appear ruffled and diarrhœa may set in. Eyes may be bright and appetite ravenous, sometimes capricious or greatly impaired. In parrots, tumors and ulcers on the head or limbs may be tubercular in origin.

On post mortem examination small tubercles or nodules may be seen covering the internal organs. These tubercles contain colonies of live germs. In early cases of the disease the tubercles may be white in colour and minute in size. As the disease progresses, however, nodules varying up to half-an-inch or more in diameter may be found, the older nodules appearing yellowish and containing a cheesy type of material. The nodules may be confined to the intestine or to the caul in the vicinity of the intestine. In an advanced stage of the disease it is usual to find the intestinal canal and also the liver and spleen involved. The walls of the intestine become thickened and studded with nodules. The internal surface of the bowel may become ulcerated and the liver and spleen peppered with yellowish-white tubercles which, in contrast with the lesions of many other diseases of poultry, stand out above the surface of the organs. In some cases, however, practically every organ in the bird is affected. The fact that it is only in rare cases that lungs are involved rather indicates that the mode of natural infection in birds is not by means of the respiratory tract.

Diagnosis in the laboratory may be clinched by the microscopic examination of a stained smear made from one of the tubercular areas when it should be possible to demonstrate the presence of countless organisms of the typical size and structure.

Tuberculosis of poultry should not be confused with wasting due to other causes, such as ordinary "going light," parasitic infestation, cancers, pullorum disease and blackhead of turkeys.

The disease is of particular economic importance in that pigs may become infected from poultry. In America it has been found that an increase in the incidence of avian tuberculosis has coincided with increased tuberculosis among pigs, and that up to 90 per cent. of all cases of swine tuberculosis are due to infection with the avian bacillus. In pigs, however, although the disease may be sometimes generalised it is usually localised to the glands in the region of the head and neck. Cattle are not as susceptible as pigs, but cases of the avian type have been found in the bovine population. Horses and goats are sometimes affected, and the disease may also be a source of personal danger to the poultry farmer and his family.

Avian tuberculosis may be diagnosed by means of a tuberculin test similar to that applied to cattle. This method of diagnosis is used to a considerable extent in America. In applying the test, tuberculin is injected into either the comb or the wattles. A positive reaction is indicated by the presence of a large swelling about the point of inoculation, and by heat and tenderness.

Once infected birds are introduced into a flock, food, water, sheds, and even the ground on which the birds are running, become contaminated by the enormous numbers of organisms which are continually passing from these birds in their droppings. These germs may live for nearly two years in the rubbish and scrapings from poultry yards. With thousands of organisms passing daily from each infected bird, and these organisms contaminating the various runs, it is not hard to realise the difficulty which confronts a poultry farmer once an infection is established. Even rats and

mice may act as mechanical carriers of the germs, and infected material my be spread from place to place by means of the feet of birds and attendants.

Treatment of infected birds is, of course, quite useless. Once tuberculosis has been diagnosed, all affected birds and in-contacts should be destroyed and burnt. Healthy birds should be transfered to uncontaminated ground. New houses should be erected on this ground and the birds, if possible, kept in permanent confinement. As very few disinfectants are of any value against this particular germ, all contaminated sheds and buildings should be burnt. Particular attention should be paid to scrapings from fowl-houses and to litter to which the fowls have had access. Dung from infected yards should not be used for manure, but should also be burnt.

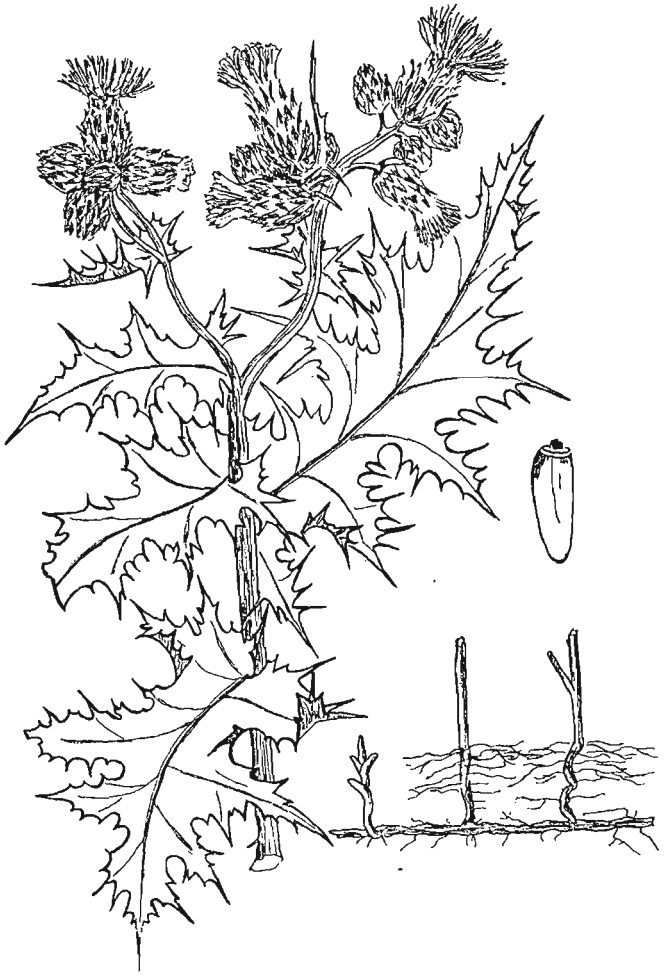
Once the disease has become firmly established on a property, eradication is practically impossible, and it would seem that, from the point of view of controlling this disease, not only should the affected birds and in-contacts be destroyed, but poultry-raising on that property should be abandoned for a number of years.

COMMON FARM WEEDS: THEIR CHARACTER AND CONTROL

Section 3: The Thistles

By R. H. BEVIN, B.Agr., Dip. C.A.C., Chief Agronomist

THIS series of articles was commenced in the "Journal" for May, 1934, with a description and suggested methods of control of some common weeds of the cabbage family *(Cruciferae)*. Section 2, which appeared in the last number (August, 1934) dealt with the "twitches," a term—together with that of "couch"—applied to certain grasses which spread by means of creeping underground or



CALIFORNIAN THISTLE

Flowering branch with its leaves, also a seed 10 times magnified, and portion of the root with shoots. Note the smooth stem as compared with Slender Thistle.

surface runners, often causing serious interference with the cultivation of farm crops.

In the present article some of the more objectionable thistles are described and methods of control indicated.

Creeping or Californian Thistle *(Cirsium arvense)*

This is probably the most troublesome weed pest over large areas of Southern Tasmania, and certainly the most difficult to eradicate once it becomes firmly established. It is a perennial with thick running rootstocks which spread laterally and send up new shoots over comparatively wide areas, and also penetrates deeply into the subsoil. By this means the plant is able to secure moisture in the driest seasons. If the roots are broken and dragged about by implements the pieces will grow and assist in spreading infection.

One of the commonest sources of infection with Californian thistle is its presence in fodder such as grain, chaff or hay. If these are gathered from a paddock where Californian thistle is growing, the feeding of such material to stock, or the sowing of infected seed, will result in rapid establishment of the pest on clean land. Farmers should be specially careful to see that purchased seed or fodder is free from this as from many other noxious weeds.

The plant grows from one to four feet high, but usually stands about 18 inches to two feet. The leaves are waved and prickly. Numerous purple flowers are produced which have a characteristic faint scent like honey. While certain plants produce flowers which are practically sterile and thus set no seed, a large quantity of seed is produced annually in the average crop.

Contamination of clean areas is usually brought about, as mentioned above, by sowing thistle-infected seed or by feeding stock with chaff or hay containing mature seeds.

Effective control of Californian thistle may be secured by two methods—

(a) Spraying the plants with a 5 per cent. solution of sodium chlorate; or, alternatively, top-dressing them with the dry preparation, either pure at 2 ozs. per sq. yard, or else mixed with sand or lime so as to give an equivalent quantity of sodium chlorate;

(b) Fallowing in early spring and cultivating throughout the summer with a shaver or cultivator with broad, overlapping tynes.

The first method is applicable only on small isolated areas. On a large scale it is probably not economical. Care should be exercised in using the preparation in solution as clothing which has become dried after saturation with the spray catches fire very readily from a naked flame.

Method (b) is an exacting and laborious one. It aims at the exhaustion of the food stored up in the underground runners by preventing the growth of above-ground parts of the plant. Any

interruption of the programme which permits green leaves to be thrown up allows the transfer of food material to the runners, and thus any good result already achieved is largely offset.

Where this method is applied over an extensive area, fallowing should be accompanied by heavy stocking with sheep. The sheep trample and bruise the runners and at the same time many of them will be eaten. To thoroughly eliminate the weed such fallowing should be followed by the sowing of a grass pasture and leaving it for five to seven years.

Scotch or Spear Thistle *(Cirsium lanceolatum)*

This thistle is universally known and needs little description. It is biennial, producing a spiny rosette in the first season, and

SLENDER THISTLE

Flowering branch with leaves. Note the spiny nature of the stems and the sessile flowers.

throwing up branched and spiny flower stems in the second year. The large purple flower heads are borne in clusters at the ends of the branches. The edges of the leaves continue down the stem in the form of narrow "wings."

The plant dies after setting seed, which is produced copiously and germinates very readily. If the plants are cut off before seeding, much subsequent labour will be saved.

Winged or Slender Thistle *(Carduus pycnocephalus)*

is an annual or biennial. The leaves are green above and cottony below, and, like those of the Scotch thistle, are continued down the stem as "wings," but more broadly and conspicuously. The plant derives its name from this feature. The flowering stems are slender, spiny and tall. The flower heads are short and narrow, and closely clustered together at the ends of the branches.

The slender thistle also sets plenty of readily germinable seed, which is usually shed in proximity to the centre of infection, and is not wind-borne to any degree.

Variegated or Milk Thistle *(Carduus marianus)*

This is no relation to the well-known sow thistle, also known as milk thistle. It is a conspicuously tall plant, often over six feet in height, and has large, pale green leaves with milky white markings, but no wings as in the preceding species. The flower heads are very spiny.

Milk thistle is more common on headlands and waste areas and in pastures than on cultivated land. Like the winged and Scotch thistle, it is only of short duration and reasonably easy to kill. Control by cutting or dusting with sodium chlorate should be put in hand before seeding has commenced.

The thistles, with the exception of the twitch-like Californian thistle, are moderately easily controlled on open country, being as indicated above, of annual or biennial habit. They should be cut off with a hoe at ground level before seeding, and will not again develop. If too thick and widespread for hand treatment the plants can usually be cut with a mower. Control by stocking is also effective if sheep are put on to the area in sufficient numbers while the plants are still small and tender. Land which has become fouled by the repeated seeding of annual thistles can be cleaned by thorough cultivation as the seeds germinate quickly and do not retain their vitality for more than two to three years in the soil.

Where heavy infestation of Californian thistle or slender thistle has reached a stage when cropping becomes not only troublesome but uneconomic, the wisest policy is to lay the land down to permanent pasture and follow by heavy stocking. Although the thistles may appear for the first year or two, they rapidly thin out and disappear owing to their being unable to withstand grazing and the strong competition of such grasses as perennial ryegrass and cocksfoot.

ARMY CATERPILLARS

By H. M. NICHOLLS, Microbiologist

DURING the spring of last year numerous reports were received by the Department of Agriculture as to the invasion of standing crops and grass lands by armies of caterpillars, which in some cases did very serious injury. These invasions are generally to be expected during a wet spring following a dry winter, and if looked for and dealt with promptly the invading armies can nearly always be destroyed before they do any appreciable damage. When, as is very often the case, they get into standing crops before the owner is aware of their presence, there is practically nothing that can be done to control them.

There are several species of moths belonging to the family Noctuidæ, the caterpillars of which have the habit of migrating in hordes, and they are known in all parts of the world where cereals are grown to any extent. There are at least two species of army caterpillars in Tasmania, but the commonest is the so-called "barley grub," which is the larva of the moth *Persectania (Mamestra) ewingi*. These caterpillars are of a dark greyish-green colour, with darker stripes on the back and sides, and reach a length of about one-and-a-half inches. The moth is of an inconspicuous grey colour and measures about one-and-a-quarter inches across the forewings, which are slightly mottled with darker shades.

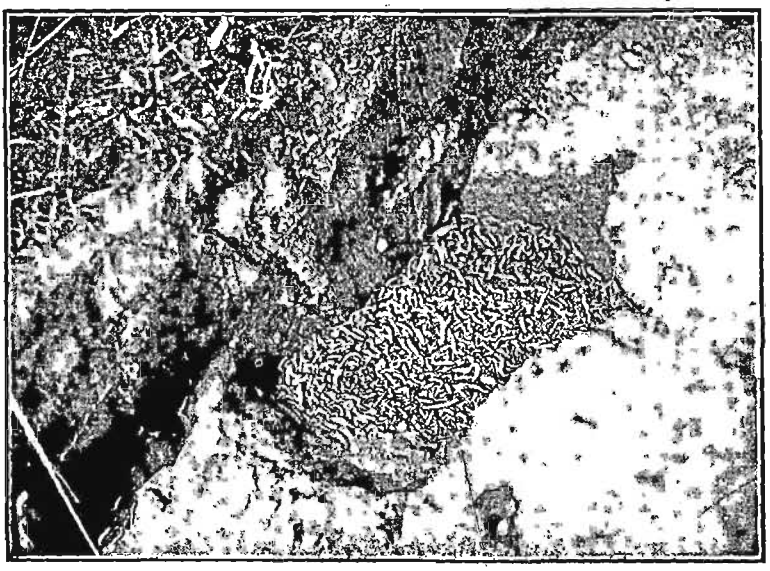
When these caterpillars get into a crop, whether of wheat, oats or barley, they climb up the stems and gnaw them through just below the head, which falls off. The fallen heads or ears are never eaten, as the caterpillars appear to confine their feeding entirely to the stems. It has been recorded that on some occasions they have invaded orchards and eaten through the stems of the young apples, causing them to drop off.

The presence of caterpillar armies on the march can often be recognised by the number of birds, principally starlings, that follow them to feed, but sometimes this warning signal is not visible. Every farmer should patrol the neighbourhood of his cereal crops at frequent intervals during the spring and early summer, and he would soon discover if there were any enemies of this nature in the neighbourhood.

The best method of checking the advance of a caterpillar army is to plough or dig a deep trench across its line of march. When the caterpillars reach the trench they fall into it, and instead of crawling up the other side they nearly always travel along it. If holes similar to post holes are dug at intervals they will fall into these in heaps and can easily be killed by pounding with the end of a pole, or any other means which suggests itself. In America it is the practice to make the trenches with a rounded bottom and, when the caterpillars have fallen into it in sufficient numbers, to drag a heavy log, which just fits the shape of the bottom of the

trench, over them. In this way they are killed in vast numbers. As the armies feed as they progress, heavily poisoning the grass or low vegetation across their line of advance will often kill them before they do any damage.

The reason why army caterpillars, which in ordinary seasons are seldom seen by the average farmer, increase suddenly in such a remarkable way is not thoroughly understood. Caterpillars of this type are ordinarily kept in subjection by large numbers of parasites and predators. Amongst the former are included the Tachina flies and the parasitic Hymenoptera, and amongst the latter numerous species of carnivorous beetles, reptiles and small mammals. It is supposed that conditions arise which hinder the



[H. M. Nicholls, photo.

ARMY OF CATERPILLARS IN A PIT IN A ROUGHLY-MADE TRENCH ROUND A WHEAT CROP.

They were killed with sheep-dip.

activities of the beneficial forms, and thus allow a corresponding increase of the injurious ones. Phenomena of this nature occur in all lands. In Sachalin and the Kurile Islands recently, the Lasiocampid moth *Dendrolimus albolineatus*, which is generally kept in complete control by hymenopterous parasites, increased to such an extent for several years that valuable pine forests were destroyed on a wholesale scale, and all repressive measures proved futile until the parasites again multiplied and asserted themselves.

A caterpillar army on the march is often attended by large numbers of parasitic insects. The Tachina flies, which look very much like large house-flies or small blowflies, are often very numerous. These flies lay their eggs on the caterpillars, and the little maggots which hatch out bore through the skin and feed on

the interior organisation of their hosts, leading sooner or later to their death. There are also numbers of Hymenopterous insects to be seen as a rule. These lay their eggs under the skin of the caterpillar by means of a sharp ovipositor, so that the victim cannot get rid of it by changing its skin, as it sometimes does with the eggs of the Tachina flies. The principal parasites of the Noctuidæ in Tasmania are the large red ichneumons belonging to the Ophioninæ, the commonest and most beneficial of which are the members of the genus Paniscus. These ichneumons are to some extent nocturnal in their habits and are very often to be seen round lights. They are the most valuable agents we have in keeping army caterpillars and cut worms under control, and they should be protected instead of being killed as "wasps," as is too often the case.

It is quite probable that the present wet spring, if followed by warm and dry weather, may lead to caterpillar outbreaks, and farmers in all parts of the State are advised to be on the lookout for them.

MANURES AND MANURIAL PRACTICE

No. 2: Phosphatic Manures

By R. A. SHERWIN, B.Agr.Sc., Acting District Agricultural Organiser

THE introductory article of this series dealt briefly with the early history of manuring, the relationship of manures to the plant foods, the absorption of these by the plant, and the reasons for manurial responses of crops. In this article consideration will be given to the phosphatic manures, treating in detail those which have particular significance under Tasmania conditions.

Phosphates

More than three centuries have elapsed since bones were first recognised as having a fertilising effect on the soil, but it was not realised until the beginning of last century that the calcium phosphate present in the bones was the actuating principle. This latter discovery marked the beginning of the march of science in the world of manures. Since then it has been responsible for many important discoveries the practical application of which has enabled the farmer to improve his methods of culture. All the phosphatic manures of any importance are phosphates of calcium or lime, of which there are several forms, each possessing slightly different properties. But to simplify the comparison of the various manures for the trade, it is common to estimate the phosphatic content as phosphoric acid, the substance from which the calcium phosphates are formed.

The phosphoric acid can combine with one, two, or three parts of calcium to give the three calcium phosphates which are most frequently found in manures. Each of these forms varies in its properties of which the most important is the solubility, for this determines the availability of the manure. The form containing the least lime is the most soluble, *e.g.*, superphosphate, which is water soluble, and as the lime content increases the solubility of the manure decreases. Soil moisture has a greater dissolving power than pure water, hence the solvent power of the latter cannot be used as a standard for estimating the availability of manures. A test involving the use of citric acid has been adopted for this purpose. Two per cent. citric acid, which has approximately the same dissolving power as the soil moisture, is mixed with a definite quantity of manure for a given time, and the amount of phosphate dissolved is estimated. This quantity is said to be "citric soluble." The test, although only approximate, gives a standard for the comparison of phosphates which are insoluble in pure water. Besides citric-soluble and water-soluble phosphate, citric-insoluble phosphate and total phosphoric acid are shown on manure certificates. Citric insoluble phosphate becomes available only slowly in the soil.

Bone Manure

Bone manure was used extensively until about twenty years ago, when they were almost completely replaced by the cheaper and quicker-acting phosphates. A change in financial circumstances which demanded that the farmer should obtain a quicker return from his capital probably hastened this change-over. Several grades of bone manure containing the equivalent of 20 to 30 per cent. of phosphoric acid were on the market. The phosphate was present in the form of tricalcic phosphate, and, as such, was only slowly soluble in the soil moisture, hence the benefit of the manure was apparent over a number of years. In many cases the response was much greater in the second and third years than in the first. Finer grinding enabled the phosphate to be rendered available more quickly, but even so the manure was very slow in action compared with superphosphate. Bone manure was used for both crops and pastures, and in some cases dressings of a ton to the acre were applied in the expectation of receiving benefit over a comparatively long period. There is little doubt that this method of treatment was responsible for the development of some splendid white clover pastures in the English counties where it was practised.

To-day little use is made of bone manure except in the common blood and bone manure. A few of the older generation of farmers still use it for top-dressing pastures and for root crops. In both these cases good results are secured, for the bones become slowly available and the plants are sure of a constant supply of phosphate. However, responses occur later than with the more soluble phosphate manures.

Rock Phosphates

The discovery of the manurial value of phosphates directed the attention of scientists to the large deposits of rock phosphate existing in different parts of the world. On analysis, the deposits were found to contain the equivalent of 20 per cent. to 40 per cent. of phosphoric acid, but as it was combined in the same form as that existing in bones it suffered from the same disadvantage—that is, slow action. The direct use of ground rock phosphate as a manure has never been so widespread as that of bones, but it has achieved much more distinction as the raw material supplying the phosphate in the manufacture of superphosphate. Very fine grinding has rendered rock phosphate more available, and consequently better results have been secured from its use. Under high rainfall it shows to greatest advantage, and it is possible that further investigation will show it to have a place in some of our districts. The best results have been secured when the finely-ground phosphate has been used with sulphate of ammonia, which helps to bring the phosphate into solution. However, before considering the highly soluble and quick acting superphosphate, it is desirable to have some knowledge of the influence soluble phosphates have on plant growth.

The Effect of Soluble Phosphates on Plant Growth

The first effect of an adequate supply of soluble phosphate is to stimulate root development, and consequently an extensive root

system is obtained early in the plant's life. This is important, as a plant possessing such development has every chance of securing sufficient food and moisture, thus rendering it less susceptible to dry conditions. In particular, quick root establishment and the consequent hastening of leaf growth are important factors with spring sown crops, which are always liable to experience dry and unfavourable conditions soon after sowing, and also with autumn sown crops, which have only a short time to establish themselves before winter renders them dormant. With cereals, phosphates encourage tillering, and subsequently there is an increase in the number of shoots bearing ears. All these effects culminate in crops ripening one or two weeks earlier when they are supplied with sufficient phosphate. Such a feature becomes of considerable importance in late districts where inclement weather at the end of the summer is liable to spoil, in some measure, the quality of the harvest.

Under some conditions phosphates have the ability to stimulate clover growth to a remarkable extent. This is due partly to the fact that clovers are heavy phosphate feeders, and partly to the effect soluble phosphates have on the nitrogen-fixing bacteria living in the nodules on the roots of clover. The plants have the power of using the nitrogen obtained from the atmosphere by these bacteria, and their successful growth depends largely on the presence and action of these bacteria on their roots. Before entering the clover roots, the bacteria exist in a non-motile form in the soil, but the presence of a supply of soluble phosphate hastens their transformation into a motile form, thus allowing them a much greater opportunity of finding and entering the clover roots and subsequently causing the plants to flourish. This action explains why top-dressing with superphosphate or basic slag will cause clovers to appear conspicuously in pastures which previously contained very few. In all probability, clovers did exist as seedlings before the manure was applied, but because the bacteria failed to enter their roots they did not develop, and so remained inconspicuous. Good clover growth quickly raises the fertility of land, mainly as a result of the increased supply of nitrogen rendered available by the clover bacteria and of the greater supply of organic matter added in the form of plant refuse and animal droppings. This feature has been widely demonstrated on many poor Tasmanian soils which have been made much more productive by the introduction of subterranean clover combined with the practice of top-dressing.

It is interesting to note that where well-managed pastures are manured with soluble phosphates, growth commences earlier in the spring and is maintained later in the summer. This latter effect is contrary to what one might expect after observing the earlier ripening brought about by manuring cereals with phosphates.

Many soils throughout the world, and particularly in the Southern Hemisphere, suffer from phosphate deficiency. Tasmania has her share of these soils which in most cases are poor crop and pasture producers. Unfortunately, pastures growing on these areas have a low phosphate content, and consequently animals grazing for a considerable period on these areas, and especially

where the areas carry natural pasture, suffer from deficiency diseases. In some cases deaths result, but more often the disease causes unthriftiness and lowered vitality, thus increasing the susceptibility of the animals to other ailments and diseases. The top-dressing of pastures with phosphates helps to remedy the condition, but where extensive areas exist this is often impracticable and resource has to be made to the feeding of mineral licks containing phosphates.

Superphosphate

The manufacture of a quick-acting phosphatic manure in the form of superphosphate must be regarded as one of the most important discoveries in the realm of agricultural science. For most soils and crops it has proved itself to be the most effective phosphatic manure on the market. This superiority is due, in the main, to the easy solubility of the calcium phosphate which is available for immediate use.

When it was first manufactured bones provided the raw material, but these were soon displaced by the richer and more abundant rock phosphates. Large deposits of these are being worked in North Africa, America, and in some of the Pacific Islands, the last mentioned supplying Australia and New Zealand. In the manufacture of superphosphate, the rock phosphate is finely ground before being mixed in definite proportions with sulphuric acid, and as a result of the chemical action which takes place a certain amount of lime is removed from the rock phosphate, leaving it in a form which is readily soluble. Several grades of superphosphate are marketed, but the form most popular in Australia is that containing the equivalent of 20 to 22 per cent of phosphoric acid, nearly all of which is soluble in water.

Action of Superphosphate in the Soil

When superphosphate comes in contact with the soil moisture it dissolves, and in a short time it is distributed throughout the surface layer of the soil. Here it combines with lime, but if this is not available, as is sometimes the case, it combines with iron or aluminium. Where lime is the combining substance the new compound is rendered less soluble, but it is still in a form which the plants can absorb. The iron and aluminium compounds formed in the absence of lime are practically insoluble, and consequently the phosphate cannot be utilised by the plant. In neither instance are the compounds sufficiently soluble to be wasted out of the soil in the drainage water, so that phosphates, when once applied to the soil, remain there until extracted by the plant. The interaction of superphosphate and iron or aluminium probably accounts for the inability of some of our soils to respond to superphosphate. Where this is suspected the condition may possibly be remedied in one of the following ways—

(1) By the application of lime;

(2) By applying the superphosphate in smaller quantities at intervals throughout the year so that the plants may

have more than one opportunity of securing the phosphate before it is locked up in combination with the iron or aluminium.

(3) By applying basic phosphate instead of superphosphate.

(4) By ploughing in a crop of green manure on the land. This not only improves the fertility and the physical condition of the soil, but the organic matter so formed also acts as a buffer between the phosphate and the iron or aluminium, and thus prevents the formation of insoluble and unavailable phosphate.

A common fallacy fairly widespread among farmers is that the continued application of superphosphate will ultimately cause the soil to become acid. In practice the reverse of this is more often true. Some soils have been known to be less acid after many years of manuring with superphosphate. It might be thought that the annual application of this manure would quickly exhaust the lime in the soil, but such does not happen as the amount taken up when the superphosphate enters the soil is freed when the plant absorbs the manure. However, it is possible that much better results would be obtained if more consideration were given to lime in its relationship to soil fertility.

Basic Slag

Another important development of later years was the introduction of basic slag, or Thomas' phosphate, a by-product in the manufacture of steel. Slag enjoyed wide popularity for many years, but with the cheapening of superphosphate it has been slowly displaced in the Australian market. Several grades of slag, differing in their phosphate content and in their availability, are produced. Their phosphoric acid content varies from 8 per cent. to 20 per cent., and the availability of this may be anything above 40 per cent. Basic slag contains a small percentage of free lime, but though this may have been partially responsible for the value attached to the manure, its benefit has not been definitely established. The manure has given outstanding results on some classes of soil, and heavy clays in particular are responsive. In England it is still used extensively on pastures, being more suited for these than for crops; and were it not for the high cost of the transport from Europe, basic slag would probably be used widely in Tasmania to-day.

Basic Phosphate

Basic phosphate has received limited prominence during recent years, and there is little doubt that it has a use on many of our farms. It is made by mixing superphosphate and lime, resulting in the formation of a citric soluble calcium phosphate. As such, it is not readily soluble in the soil moisture, yet the plants are able to absorb it. The disadvantage of being less soluble than superphosphate may, under some conditions, prove an advantage. Two instances are worthy of mention; the first occurs when soils deficient in lime are being treated, in which case the additional lime contained in the basic phosphate prevents it combining with iron or aluminium and thus becoming unavailable; and secondly, when the use of a soluble phosphatic manure is likley to cause

injury to germinating seeds. Where large quantities of soluble phosphate are sown in contact with some small seeds, the strong solution formed when the manure dissolves may harm the young seedlings and reduce the germination. Crops of the cabbage family, and in particular turnips and rape, are most likely to be affected in this way, but where basic phosphate is sown with the seed there is little chance of this happening.

The cost of the manure is the biggest factor restricting its wider use. The process of manufacture does not appear to be economical, for insoluble calcium phosphate is first treated with sulphuric acid to render the phosphate soluble, and then lime is added to give a less soluble phosphate. Basic phosphate contains from 12 per cent. to 16 per cent. of phosphoric acid, against the 20 per cent. to 22 per cent. present in superphosphate. Compared only on this point, the basic phosphate must take second place. It usually contains a small amount of free lime, which adds slightly to its value on some soils. Where this manure is likely to be beneficial, farmers who desire to secure it most cheaply should consider the possibility of applying super and lime independently, or of mixing these two materials prior to sowing.

Other Phosphatic Manures

Comparatively recently, several proprietary phosphatic manures have appeared on the market. They are mostly highly concentrated or else contain considerable quantities of other fertilising ingredients. Their main advantage lies in reduced bulk, which is a consideration where transport and handling charges are high. At present most of them are so expensive that this advantage is not sufficient to warrant their use.

Fertilisers Act

For the protection of farmers a Fertilisers Act was first passed in 1912, and since then has been amended on several occasions. The Act demands that all persons conducting businesses connected with the manufacture or sale of manures shall be registered. All classes of manures exposed for sale must have attached or branded upon them the maker's name and trade mark, and show an analysis of the manure indicating the amount of nitrogen, phosphoric acid or potash present. This declaration is taken as the seller's warranty and at the same time it provides the farmer with a basis upon which to compare the various manures. Phosphate content must be shown under four headings, namely, water soluble, citric soluble, citric insoluble phosphate, and total phosphoric acid. With basic slag and bone manures it is necessary to supply an extra statement giving the fineness of grinding. Given these figures, the farmer possessing a knowledge of manures should have little difficulty in discriminating between the various grades of phosphates and determining their relative values.

POULTRY ON THE FARM

By A. E. POWELL, Poultry Husbandryman

THE commercial poultry farmer who is specialising in egg production is wont to pride himself on how he has, by superior methods of breeding, increased egg production from a few dozen eggs per hen per annum to round about 12 to 14 dozen in the same period. Good breeding is of great importance, but it is likely that the increased production is due in no small measure to better feeding, housing and management, apart altogether from breeding.

Taking the different sources of egg production, we find that in point of productivity they stand much in the following order:—

The keen back-yarder who makes a hobby of poultry;

The commercial poultry farmer who is dependent upon it as a business;

The side-liner who runs poultry as an adjunct;

The general farmer or grazier who runs poultry to supply the homestead with eggs, but who regards his birds as scavengers and not in the same category as his other stock.

A rough estimate of the average egg production from the respective sources mentioned would be something as follows:—

The keen back-yarder, about 14 dozen per hen per annum;
The commercial poultry farmer, 12 dozen;
The side-liner, perhaps 10 dozen; while

The farm and station probably will not exceed six dozen per annum, with but few eggs laid in the slack season of production, March to July inclusive. Although the flocks of all these sources of production are being constantly recruited from some of the best yards in the State, the production on the general farm leaves much to be desired. The principal reason is indifferent or bad methods of feeding and management. The birds are not fed, housed, or managed in a way conducive to high laying results. The observant traveller having a knowledge of poultry-keeping cannot help but have noted that, on most farms where there is any attempt at keeping poultry, usually many times the number of birds are kept as would, if properly fed and managed, supply all requirements in eggs. Yet there are times when there are few, if any, being laid. The reason is that birds of unknown ages are kept from year to year, fed, perhaps, on a grain ration without extras of any kind, and generally treated as scavengers on the farm. The remedy is simple if rightly applied.

Better methods with fewer birds will give more satisfactory returns. Let there be a calculation of the requirements in eggs to supply the farm or station on a basis of, say, 10 to 12 dozen eggs per hen. There need be no thought of any special breed or strain, outside the fact that they are good birds and one of the recognised utility breeds, say, Orpingtons, Langshans, Rhode Island Reds, Sussex as heavy breeds, and White or Brown Leghorns as light breeds.

The idea that hens do not require special feeding but can pick up all they require on the farm should be abandoned. While such pickings may form the greater part of their food, supplements are necessary for satisfactory results. For instance, it is found from practical experience and experiments that grain only — whether wheat, maize, barley or oats—does not constitute a balanced ration sufficiently high in protein for laying hens. In cases where the birds are fed extensively on vegetable matter, such as grass, potatoes, turnips and the like, the case is still worse, as such foods are not sufficiently concentrated, being too bulky; and poultry, including ducks, cannot eat enough of them to extract the amount of sustenance necessary to supply their bodily requirements and sustain high production. Even pollard and bran (wheaten products) which show a much higher protein content than wheat itself if fed as a mash once a day, with grain at the evening feed, do not bring up the protein content of the daily ration to the required standard ration of 1 to 4.5. Hence, in order to secure a proper ration, even where pollard and bran are fed as a mash once a day, we must feed a small portion of meat or meat concentrates—usually about 5 to 7 per cent. of meatmeal or its equivalent in meat—or blood meal should be included in the mash. Meat may be fed in any way convenient. On a farm where there is an adequate supply of skimmed milk, the ordinary mash will contain all that is needed, but without a mash feed the high productivity obtained by the commercial poultry farmer is unlikely to be obtained.

FOOT ROT IN SHEEP

By THE CHIEF VETERINARY OFFICER

IT is recognised that there are two forms of this disease, one of mild character following on injuries to the foot, and one a very virulent contagious form due to infection by micro-organisms. The first is a mild form in which few sheep are affected, while the second may spread rapidly through a flock and be the cause of a large economic loss, and much work and worry to the sheep owner.

The greatest predisposing cause in excessive moisture. This excessive moisture brings about a softening of the horn, which in this state is more likely to be injured by stones, rough grass, stubble, ferns, etc. The moisture also favours an overgrowth of horn, and as a result the hoof grows irregularly. An overgrown and deformed foot is not healthy, as properly distributed pressure is necessary for a healthy foot.

Foot rot may also occur on dry, sandy soil in the summer. In these instances there is excessive wear in the foot and weakening of the tissues, and the foot becomes inflamed, thus predisposing it to infection.

Symptoms

Lameness in a few of the flock is noticed first. There is a rapid extension of this and the lameness becomes more pronounced, and the affected sheep soon fall away in condition.

Examination of affected animals will show the feet to be hot and painful, with swellings around the coronet and between the claws. The parts may become reddened and ulcerated, and a characteristic odour of diseased horn is very evident. In neglected cases the hoof may slough off, leaving a mass of proudflesh and dead tissue.

Treatment

The best results are obtained by early treatment. First of all, the affected animals should be drafted off from the non-affected. The feet must be so prepared that the medicaments which are used will reach the affected parts; therefore, it is necessary to clean up the feet and pare off all loose, decayed or under-run horn.

In early stages, when only a few animals are affected, it will pay to treat the animals individually. The feet may be dressed with either of the following:—

1. Crude Carbolic acid ..... 1 part
   Glycerine .... 10 parts
2. Butter of antimony and
   tincture of myrrh ..... equal parts

These may be applied with a brush.

When flock treatment becomes necessary a race footbath is the most satisfactory and most economical way of treatment, but even in these cases the preliminary preparation of the foot is essential

to ensure the best results. The sheep should pass slowly through the footbath on to a bed of slaked lime, and thence on to a dry paddock. The footbath should be 8 to 15 feet long and 8 to 10 inches deep.

If a copper solution is used the trough should be made of wood and filled to a depth of four inches. The following may be used as a footbath:—

1.	Copper sulphate	3 ounces
	Water	1 gallon
2.	White Arsenic	1 lb.
	Washing soda	1 lb.
	Water	50 gallons
3.	Formalin	5 lbs.
	Water	25 gallons

The copper sulphate will dissolve in a quart of boiling water, when water up to a gallon should be added.

The arsenic and soda should be boiled in about 4 gallons of water and then cold water added to make up 50 gallons.

Affected animals may be run through the footbath twice a week and on infected properties, as a precautionary measure, it would be advisable to run the unaffected animals through the footbath and lime once a fortnight.

When the disease is prevalent, care should be exercised in purchasing sheep, and it would be as well to isolate new purchases for four or five days.

CERTIFICATION OF RYEGRASS

Results of Trials Carried Out to Test the Relative Merits of Seed Lines of Perennial Ryegrass

By L. H. RADEL, Q.D.A., Agronomist

FOR the last three years the Department has advised farmers to sow ryegrass pastures with Certified Perennial Ryegrass in preference to the uncertified "commercial" lines offering. The work of Levy and Davies in New Zealand showed clearly the superiority of certified seed for permanent pastures, and it was considered that the New Zealand experience and results were applicable to Tasmanian conditions.

At the same time it was considered necessary to apply field tests under local conditions in order to—

(1) Prove the contention that New Zealand certified lines were superior, and

(2) Provide a demonstration area which would be available for inspection by farmers, who could then see and judge for themselves the relative merits of the various lines under test.

SECTION I.

Early in 1932 the work was commenced on the property of Major H. J. Dumaresq, Perth.

Soil Type.—Grey soil carrying a high percentage of river sand and not generally considered suitable for ryegrass pasture owing to its tendency to dry out excessively in summer owing to low organic matter content.

Seeding and Layout.—The seed-bed was well prepared, and seeding was: Ryegrass, 35 lbs. per acre; Certified Wild White Clover, 8 lbs. per acre; superphosphate and sulphate of ammonia in the ratio of 2 to 1, applied at 2 cwts. per acre. Plots were laid out 5 links wide and 12 links long. These were arranged side by side with no dividing strips. There were in all three blocks of plots. The total number of plots was 77, made up as follows:—

Certified N.Z. Perennial Ryegrass Mother Seed (placed as controls regularly throughout)	18
Commercial Ryegrass (N.Z.)	27
Tasmanian Ryegrass	17
Irish Ryegrass	8
Commercial Ryegrass (origin unknown)	7

Commercial and Irish lines were obtained from samples submitted for examination to the Seed Testing Station. The Tasmanian lines were small parcels of seed gleaned where possible from old established pastures throughout the State.

Technique Adopted.—Each block of plots was divided lengthwise into three strips each 4 links wide. The southern strip was cut with the lawn mower at such periods as were required to maintain the grass at "sheep" height, 2 to 3 inches. The northern strip was similarly treated at "cattle" height, 3 to 5 inches, while the centre strip was allowed to grow to the hay stage, when it was harvested with the scythe.

Because of the uniformity of soil type, no replication of plots was made with lines other than the control A36 (N.Z. certified seed). The uniformity of behaviour in this line indicates that replication of the other lines would probably have been of no great advantage because of the large differences between lines, while it would have entailed a great deal of extra labour.

Sowing was carried out on April 6th, 1932. All seed germinated well and the strike of grass was gratifyingly uniform, 100 per cent. cover being attained by the end of August. Growth was somewhat slow in early spring, but after the end of September development proceeded rapidly. The first cut was made in mid-September. The southern end was mown four times and the northern end twice by October 11th, when growth observations were taken to gain a general impression of the relative recovery of the various plots after mowing the mean height of the plants being the basis of measurement. (Hay section was omitted from the observations). The plant type of the various strains was subject to classification along the lines advocated by Levy, and from observations made it was apparent that the false-perennial commercial lines showed greater initial vigour of growth. This, expressed in terms of height, showed as much as a 30 per cent. increase over the true perennials.

This bears out the opinion that the poorer permanent pasture types may deceive the farmer in the field because of their early heavy feeding quality, but such is often an indication that true perenniality or persistency is absent.

The next stage in the trial was to establish this fact. Mowing of the plots was continued through 1933, and in April, 1934—two years after laying down, a point quadrat analysis of plots was made. This method was applied so as to give thirty strikes or points on each differential treatment— in all, 90 points per plot.

Record was made of the number of ryegrass plants struck during the analysis. By this time considerable thinning out of the swards had followed the unusually long dry spell which was experienced. The remarkable fact was that on such poor soil the mortality was not very much higher.

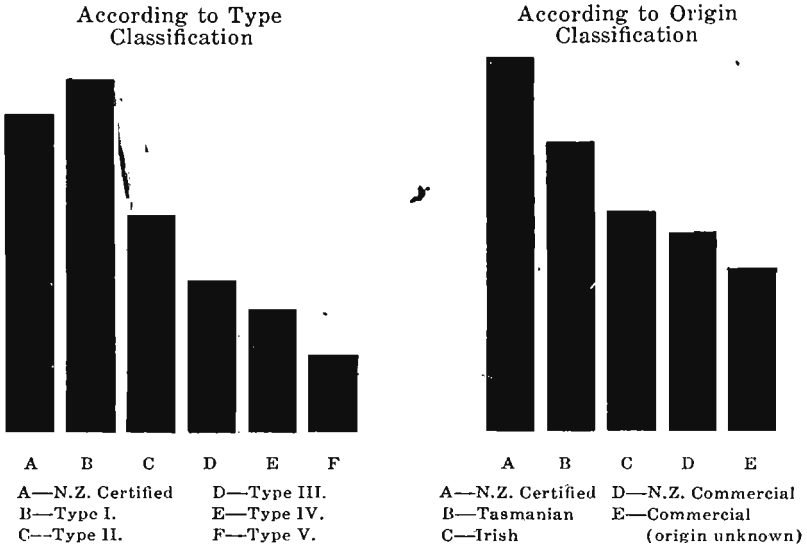
Examination of the analysis figures shows the following:—

Persistency: Average of Plots

1. N.Z. Certified	42%	cover
2. Type I.	47%	„
3. Type II.	29%	„
4. Type III.	20%	„
5. Type IV.	16%	„
6. Type V.	10%	„

From the figures taken on the differential treatments shown above it is apparent that once the Type I. material is departed from the drop through the Commercial lines to the almost pure Italian is steadily progressive.

PERSISTENCY OF GROUPS



Another interesting feature is the persistency behaviour of the differential treatments. In the "sheep" mown section the strikes were more numerous for N.Z. Certified than in the "cattle" and hay sections, while in the poor types the close continuous mowing practically killed out the grass altogether. The following table shows the relative degree of survival on the various types.

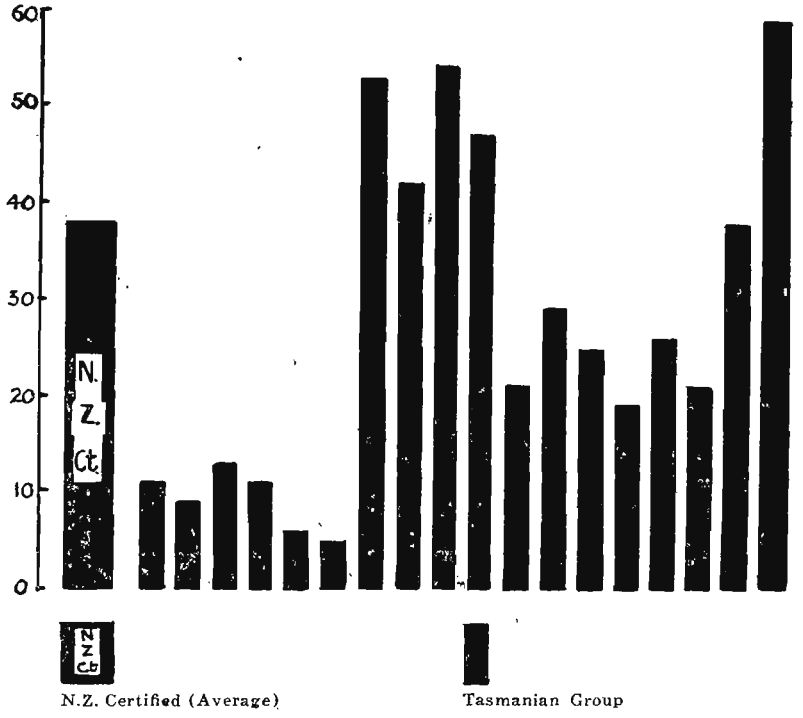
Type	"Sheep" % Cover	"Cattle" % Cover	"Hay" % Cover
N.Z. Certified	50%	33%	40%
Type I.	44%	44%	52%
Type II.	25%	26%	35%
Type III.	17%	13%	29%
Type IV.	13%	10%	24%
Type V.	3%	7%	20%

These figures give an explanation of the often expressed opinion of farmers that ryegrass will not "do" on their country. Types II.,

III., IV. and V. are typical of the commercial lines used almost exclusively before the introduction of certified seed. In Tasmania persistency is largely a matter of strain or type. Our soils and climate generally favour the growing of ryegrass, and by using certified seed and applying reasonable management to the pasture it may be confidently stated that the permanence of the pasture can be reasonably assured.

In the opinion of the writer, our main obstacle is the Tasmanian Grass Grub *(Oncopera)*, which can at times be devastating in its effect, but observations on this pest have indicated that *Oncopera* is much more destructive to the poorer types of ryegrass than to the certified lines.

PERSISTENCY OF TASMANIAN SAMPLES COMPARED WITH NEW ZEALAND CERTIFIED



Comparison Between the Various Lines—According to Origin

Taking the persistency of N.Z. certified as 100, then the following figures give the relative value of other lines.

TOTAL PERSISTENCY

Group Origin	With N.Z. as 100
Tasmanian	76
Irish	58
N.Z. Commercial	53
Commercial (unknown)	42

Comparing the persistency of the "sheep," "cattle" and "hay" sections, the following position is shown:—

PERSISTENCY

Group Origin	"Sheep"	"Cattle"	"Hay"
N.Z. Certified	100	100	100
Tasmanian	71	77	82
Irish	43	47	81
N.Z. Commercial	39	47	72
Commercial (unknown)	35	32	61

These figures show that throughout, the N.Z. certified lines are superior to all others. At the same time, those Tasmanian lines which fall into Type I. were, if anything, superior to the average of the N.Z. certified lines, but this superiority is discounted in the aggregate owing to 11 of the 17 samples falling into the following types: Type II., 4; Type III., 1; Type IV., 6.

SECTION II.

Work at Strathroy

In 1933, ryegrass certification began on a fairly wide scale. Only "mother" seed lines were admitted for registration, although a limited number of paddocks which had been sown previously with first harvest certified seed were admitted provisionally.

In order to have check plots under observation, the "Strathroy" area near Launceston was obtained from Mr. P. B. Grubb, and here, along with other work, the certified ryegrass samples taken at seeding time from all registered areas were sown on plots 14 links by 6 links.

In order to enhance the value of the area from the demonstration point of view, "controls" were sown. The seed of these controls was made up of an aggregate sample of several commercial lines. The seeding was at the rate of 35 lbs. Ryegrass with 4 lbs. certified Wild White Clover. Sowing was commenced on 25th and completed on 30th May, 1933. Superphosphate and sulphate of ammonia in the ratio of 2 to 1 were applied at the rate of 2 cwts. per acre. In all, there were 85 plots, comprising—

N.Z. Mother Seed	44
N.Z. First Harvest	4
Tasmanian First Harvest	12
Tasmanian Old Pasture	2
Commercial	23

All lines were tested for fluorescence, the average of each group being—

N.Z. Mother Seed	2.5%
N.Z. First Harvest	3.0%
Tasmanian First Harvest	2.8%
Tasmanian Old Pasture	3.2%
Commercial	35.0%

The technique of mowing was similar to that adopted at Perth, in order to follow up and correlate the latter experimental series with the results obtained at Strathroy.

When study had been made of the establishment of the blocks it was found that, as a result of the climatic conditions obtaining, at sowing time, a considerable irregularity was apparent between the various blocks, and thereafter, instead of the whole area, each block was taken as a unit for the purpose of averaging. In allotting points for establishment, Block 1 had a mean of 7.8; Block 2, 6.1; Block 3, 5.8: and Block 4, 3.5, which illustrates the progressive falling off from Blocks 1 to 4. Generally speaking, there was little variation between the plots constituting the blocks.

Growth.—From the start the commercial control line A145 provided a much greater bulk until about mid-November, when the mown portions began to thin out. The "hay" section exceeded in growth the certified plots until the time of cutting, 13/12/33.

Colour.—Throughout the season the typical "pseudo perennial" blue colouration was most marked on A145, and the seed stalks showed markedly red compared with the green and yellow seed stalks of the certified lines. Two point quadrat analyses were made, one on 13/12/33 on the mown sections, and the second on 24/4/34 on all three sections. Three readings of ten points each were made on the sections, the number of strikes on ryegrass plants being recorded along with weeds and bare ground.

The following figures give the comparative persistence between the average of the controls and the average of the certified lines.

		SHEEP MOWN			CATTLE MOWN		
Date of Point Analysis	Block	Commercial	Certified	% Increase Certified over Commercial	Commercial	Certified	% Increase Certified over Commercial
13/12/33	1	46	75	157%	41	67	163%
24/4/34		17	67	394%	17	75	441%
13/12/33	2	53	82	154%	33	62	188%
24/4/34		12	74	617%	8	62	775%
13/12/33	3	50	73	146%	21	44	209%
24/4/34		15	65	433%	9	56	622%
13/12/33	4	44	75	171%	16	47	294%
24/4/34		13	61	469%	3	54	1800%

From the table given the superiority of certified ryegrass under mowing conditions is clearly shown. Probably the most interesting aspect of the figures is the marked decline of the number of plants per block in the commercial lines from the first analysis in December, 1933, to the second analysis in April, 1934. During this period

drought conditions prevailed and the pseudo perennial plants were practically wiped out, especially on the cattle mown section.

The certified plants held their own throughout, in some cases the second analysis yielding more strikes than in the first case. These differences are, however, not significant, whereas the commercial results are definitely so. It will be noticed, too, that the collapse of the commercial lines was more apparent in the cattle mown sections.

In this connection both Strathroy and Perth experiences have shown that defoliation when the plots are three inches high appears to be much less injurious than when they are permitted to reach a greater height. This factor appears to have a definite economic significance in pasture establishment and management, and substantiates the basic principles of "on and off" or rotational method of grazing which the Department has been advocating and which has been successfully exploited in other countries.

From the results obtained the most oustanding points to be gleaned are—

(1) Certified perennial ryegrass has on performance justified the action of the Department in advocating the sowing of this seed in preference to uncertified lines for permanent pastures.

(2) There are in Tasmania types of perennial ryegrass which compare favourably with those of New Zealand origin.

(3) The work at Strathroy confirmed the experience at Perth.

(4) The application of the technique adopted for this series of trials to the check testing of all lines submitted for certification is considered essentially sound, and the results obtained at both Perth and Strathroy show that it is quite possible to determine the type of any seed line after one season's treatment. Such observations are strengthened by two other factors—

(1) The mercury vapour lamp test for fluorescence, and

(2) Field observations taken on the type of plant during the growing stage.

A NOTE ON A SALT-AFFECTED APRICOT ORCHARD AT TEA TREE

By C. G. STEPHENS, M.Sc., Division of Soils, C.S.I.R.

EARLY in the present year the author was taken by Mr. P. H. Thomas, the Chief Horticulturist, to the apricot orchard of a Mr. Pearce, near Tea Tree, in the Southern Midlands. It was considered by Mr. Thomas that some unusual soil trouble was causing a portion of the orchard to exhibit unfamiliar symptoms, in many cases causing the death of the trees. The Chief Horticulturist also stated that the weed Fat Hen *(Chenopodium album)* was of a much more vigorous habit on the areas where the trees were failing.

The owner informed the writer that the symptoms always appeared over a period of hot weather such as was then being experienced. During the rest of the year growth was apparently normal. The rainfall is about 18 inches or 19 inches.

The trees, in the nature of the death of the leaves and branches, exhibited characteristic salt -affected symptoms. Five soil profiles were sampled, taking the top six inches of soil and the following 12 inches of subsoil as separate samples. These soils were examined in the laboratory for sodium chloride and total salt content, the former being determined by using a silver-silver chloride electrode (Best, J.Ag.Sc., 19, 533, 1929). The soil profile consists of a variable depth of black clay-loam over a yellow clay containing calcium carbonate.

The following table correlates the results of the laboratory determinations and the condition of the trees.

Soil No.	% NaCl	% Total Salts	Condition of the Trees
1a	.058	.098	Trees dead and replaced
1b	.046	.067	
2a	.073	.092	Trees dead and replaced
2b	.071	.097	
3a	.028	.087	Good
3b	.030	.095	
4a	.076	.097	Trees dying
4b	.058	.092	
5a	.026	.081	Excellent
5b	.023	.098	

It will be observed from the above arrangement that soils 1, 2 and 4 on which the trees are effected have a much greater NaCl (common salt or sodium chloride) content than either 3 or 5, where the trees are good and excellent respectively. As far as the total

salts are concerned, it is doubtful if the differences in the soils are significant. Although the surface soils of 3 and 5 are lower in total salts than the others, they are only slightly so, and this difference is not large enough to account for the difference in the condition of the trees, whereas the difference in the sodium chloride content is large enough to do so.

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POTASH — MURIATE OR SULPHATE?

The following notes have been supplied by the Research Service of Pacific Potash Limited, Sydney:—

Muriate of Potash is a chemical compound of Potassium Oxide and Chlorine. One cwt. of this compound contains 58-60 lbs. of the pure Oxide, which is the active plant food constituent. Chlorine is, in small quantities, essential to the proper nutrition of plants.

Sulphate of Potash is a compound which, as its name implies, supplies Sulphur, which is also a useful soil constituent. This grade supplies about 54 lbs. of pure Oxide per cwt. of compound.

As far as the quantity of produce is concerned, the most careful experiments have generally failed to indicate any difference one way or the other. Some crops have seemed to favour the one form, whilst other crops have at times indicated a slight preference in the other direction; but, as a rule, there is no significant difference one way or the other.

For Tobacco, in the growth of which Potash is very important, the Muriate tends to affect adversely the burning quality of the leaf, and consequently Sulphate is used almost exclusively for this particular crop. There are also indications that Sulphate is the better form to use on Pineapples. With these two exceptions, there is no reason to favour Sulphate unless the soil concerned is extremely "sour" or acid. It will occur to all progressive growers that the soil should never be allowed to get into a state of high acidity, but should be treated liberally with lime, and therefore it might be said that on any soil that is in good condition Muriate may safely be used.

Some growers fancy that the higher cost of Sulphate is an indication of higher quality, but it may be explained that the two forms are prepared from the same raw materials, and that the process of purification results first in the production of Muriate, from which, by certain additional treatments, the Sulphate is produced. The extra cost, therefore, is merely a reflection of the more costly manufacturing processes.

One point in favour of Sulphate is of importance to those growers who do their own mixing—as opposed to the use of ready prepared commercial mixtures—and that is, that Muriate has a tendency to set in wet weather.

Broadly, however, it may be said that for all crops grown Muriate may be used with all confidence.

GRADE HERD RECORDING

Summary of Annual Report

By J. T. ARMSTRONG, B.Sc. (Agr.), Chief Dairy Officer

DURING the year 274 herds, comprising a total of 5,584 cows, were submitted for test under the Grade Herd Recording Scheme, and of this number 4,999 cows completed their lactation period before the 30th June. The following table shows the number of herds, number of cows, and the average production for the last four years.

	Herds	Cows	Milk	Average Test	Butterfat
1930-31	361	6,280	4,159	4.4	184.9
1931-32	258	5,630	4,184	4.33	181.48
1932-33	302	5,623	4,612	4.40	203.19
1933-34	274	4,999	5,151	3.54	182.5

The figures for this year show a decrease in the average production per cow over figures for the previous year of 591 lbs. milk and 20.7 lbs. butterfat—a decline of 10.6 per cent. of the milk yield and 10.1 per cent. in the butterfat production. This decrease can quite definitely be attributed to adverse climatic conditions and not to any falling off in the quality of the stock.

It is regretted that there has been a decrease in the number of herds submitted for test, but this is due more to the low prices ruling for dairy produce than to any lack of interest in testing.

The following table gives details of testing in each unit and show the number of cows which were in milk for six months or more. In comparing the figures for the last few years it is extremely encouraging to note the increased number of cows which are milking for eight or nine months. In the last column is shown the number of cows which were not included in the herd average. These cows were still in milk on the 3rd July, and their record will be shown in next year's report.

GRADE HERD TESTING, 1933-34

Name of Unit	No. of Herds	No. of Cows	COWS COMPLETING 180 DAYS OR MORE						COWS NOT TESTED 180 DAYS					TOTAL	Cows not Included in Herd Avge.
			No.	Milk, lbs.	B'fat, lbs.	Av. Milk	Av. B'fat	181 or over	151 to 180	121 to 150	91 to 120	61 to 90	Under 60		
Kentish	20	331	266	1,180,228	57,109.5	4,249	207.2	179	53	36	25	11	27	331	65
King Is. No. 1	14	641	480	2,247,570	95,095.6	4,682	198.1	462	76	29	26	14	34	641	161
King Is. No. 2	9	370	262	1,214,480	51,320.6	4,635	195.9	283	39	21	16	5	6	370	108
Ridgley	24	300	276	1,205,940	56,413.8	4,160	182.8	152	39	37	42	25	5	300	24
Circular Head	17	332	316	1,448,925	61,929.4	4,412	195.4	250	44	23	10	2	3	332	16
Flinders Island	25	603	589	2,717,106	115,099.5	4,440	189.7	409	61	48	27	26	18	603	14
South Leven ...	24	373	373	1,531,335	70,329.1	4,114	190.0	274	45	25	19	8	2	373	—
Scottsdale-Winnaleah	27	516	480	1,840,253	87,178.7	3,710	178.7	292	75	69	23	16	5	516	36
Table Cape	21	448	430	1,561,262	70,360.6	3,574	163.6	208	104	90	29	10	7	448	18
Forest	23	337	318	1,093,344	47,240.8	3,456	148.8	186	40	38	46	20	7	337	19
Wilmot	14	197	170	5,724,230	23,957.4	3,216	133.7	94	31	29	9	5	3	197	26
Ringarooma ...	10	233	232	682,875	27,480.2	2,829	119.6	21	65	82	37	21	6	233	1
Marrawah	22	393	374	1,341,185	60,185.6	3,848	155.2	207	81	62	17	7	—	393	19
Deloraine	24	510	433	1,962,986	88,963.0	4,712	212.6	361	37	21	11	3	—	510	77

PURE-BRED HERD RECORDING SCHEME

Summary of Annual Report

By J. T. ARMSTRONG, B.Sc. (Agr.), Chief Dairy Officer

DURING the Herd Recording year 1933-34, 25 herds were submitted for recording under the Pure-Bred Recording Scheme, and 290 cows completed their lactation period. The average production of all cows which completed their record was 261.3 lbs. of butterfat and 5,525 lbs. of milk with an average test of 4.72 per cent. in 273 days.

The following table will show the number of cows recorded and the average production of butterfat per cow for the past ten years. The figures for this season show that thirty-three more cows were tested, but that there was a decided decrease in production over the figures for the previous year. The average milk yield per cow showed a decline of 962 lbs., or 14.8 per cent., whilst the butterfat yield was 35.3 lbs., or 12 per cent. lower than that recorded during the 1932-33 season.

Year	No. of Cows	Av. B'fat Production
1924-25	177	327.0 lbs.
1925-26	129	324.0 ,,
1926-27	99	339.2 ,,
1927-28	166	317.6 ,,
1928-29	234	299.3 ,,
1929-30	271	318.2 ,,
1930-31	219	337.6 ,,
1931-32	240	294.0 ,,
1932-33	263	296.6 ,,
1933-34	290	261.3 ,,

The decrease in production can mainly be attributed to the particularly unfavourable season. Droughty conditions all over the State limited the spring and summer growth of pastures and fodder crops, and the position was further complicated by plagues of caterpillars, which in many districts destroyed what little feed was available, and the majority of breeders were not in a position to purchase fodders owing to the abnormal low prices obtainable for dairy produce and the very limited demand for young stock even at low prices.

Whilst a cursory glance at the figures would indicate that our pure-bred stock are deteriorating so far as production is concerned, a full knowledge of the conditions under which the records were produced would serve to dispel this idea. It is quite safe to say that never in the history of dairy cattle breeding in Tasmania have stud owners paid more attention to the productive ability of the animals contained in their herd sire's pedigree than is the case at present.

The productivity of the herd depends primarily on the success of the owner in obtaining a bull whose heifers will be equal, if not superior, to their dams, and in this respect to the selection of their herd sire, the stud breeder has a much more difficult task to fulfil than the average dairyman. Whilst it is comparatively easy to procure a bull which will improve a herd averaging about 200 lbs. of butterfat, it is not such a simple matter to procure a herd sire for those with averages of 300 lbs. or more of butterfat, and in addition to the productive ability of his stock, the studmaster, if he is to effect remunerative sales, must study closely both breed type and conformation.

The average dairyman is concerned generally with production and conformation alone, and since breed type is not so essential he has a wider range of bulls from which he may select. It is regretted that more stud owners do not take advantage of the facilities provided under this scheme and obtain for their own information, if for no other purpose, a definite record of the productive ability of their cows and a check of the capability of the herd sire to improve the average yield.

In many cases the financial position of the stud owner has been the determining factor as to whether or not the herd is to be submitted for test, but it is felt that if all breeders of pure-bred stock realised how much they would lose if the herd sire, instead of improving the herd, actually sired daughters who were less productive than their dams, the majority would find some way of raising the necessary finance to cover the cost of testing.

List of Leading Cows in Each Class

Class	Name of Cow	Herd Book No.	Owner	Milk Lbs.	Av. Test	Butfat Lbs.
Mature Cows	Palmerston Primrose	14,698	Townsend, A. W.	9,376	5.40	506.6
Snr. 4-yr.-old	Clifton Dorothy	22,287	Griffin, J. V.	6,788	5.20	353.4
Jnr. 4-yr.-old	Palmerston Hawthorn 4th	28,267	Cowie, A. E.	8,694	5.14	447.3
Snr. 3-yr.-old	Melton Vale Blossom	31,275	Stuart, L. A.	7,717	6.11	471.7
Jnr. 3-yr.-old	Hallston Floss	34,402	Richardson, G.	7,060	5.55	391.9
Snr. 2-yr.-old	Hallston Pride	34,403	Richardson, G.	7,581	5.42	410.8
Jnr. 2-yr.-old	Valma May	42,362	Stuart, L. A.	8,350	5.21	435.1

Herd Summary

No.	Herd Owner	Breed	Average Milk Per Cow	Test	Average But'fat Per Cow	M	4	3	2	Total
1.	Townsend, A. W.	J	5,978	6.20	370.9	4	1	3	4	12
2.	Stuart, L. A.	J	6,254	5.66	354.6	—	4	6	5	15
3.	Richardson, G.	F & J	8,170	4.22	345.5	3	1	4	8	16
4.	Griffin, J. V.	J	6,313	5.33	336.9	5	3	3	1	12
5.	Perkins, V.	J	6,122	5.15	315.6	1	—	2	3	6
6.	Wing, G. H.	A	7,075	4.30	304.5	3	1	1	2	7
7.	Proctor, C. A.	J	5,805	5.10	296.5	5	—	1	3	9
8.	Cowie, A. E.	J	5,646	5.14	290.3	6	1	3	8	18
9.	Trethewie, R. J.	AIS	7,326	3.96	290.2	4	—	—	—	4
10.	Barnett, D. G.	J	5,950	4.55	271.2	3	2	—	—	5
11.	Bovill, H. Y.	AIS	6,057	4.34	262.9	1	—	1	3	5
12.	Napier, G. H.	A	6,739	3.88	261.8	7	1	1	4	13
13.	Thompson, J. H.	RP	6,737	3.88	261.7	3	—	5	7	15
14.	District School Farm	J	5,022	5.13	257.9	1	—	1	4	6
15.	Relbia Farm and Dairy Pty. Ltd.	J	4,952	5.14	255.0	2	2	1	8	13
16.	Mackay, Prof. J. H.	J	4,722	5.23	247.1	4	1	—	1	6
17.	Mervyn Brae Jersey Stud	J	4,867	4.98	242.3	2	—	1	4	7
18.	Percy, A.	J	5,036	4.78	240.8	2	1	—	3	6
19.	Sadler, B. T.	J	4,020	5.88	236.4	—	—	2	2	4
20.	Hall, E. G.	A	5,912	3.72	220.0	5	4	2	7	18
21.	Foster, R. J. L.	A	5,448	4.02	219.5	7	7	3	1	18
22.	Harding, W. T.	J	4,086	5.20	212.8	3	2	2	8	15
23.	Blundstone, J. E. (Estate)	RP	4,570	3.95	180.9	9	8	4	3	24
24.	Waters, G. L.	A	4,197	3.87	162.5	4	—	1	11	16
25.	Reed, Mrs. A. M.	A & J	3,599	4.20	151.4	10	—	1	9	20
						94	39	48	109	290

List of Cows in Order of Merit

MATURE COWS

Standard: 350 lbs. Butterfat

o.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
1.	Palmerston Primrose	J	14698	Townsend, A. W.	11.1	4.8.33	9,376	5.40	506.6
2.	Martigny Queen Pontiac	F	3623	Richardson, G.	5.5	3.2.33	13,845	3.61	500.8
3.	Hillbrow Fairy's Rosebud	J	25209	Townsend, A. W.	5.1	5.8.33	7,036	6.58	463.1
4.	Clifton Belle	J	20964	Griffin, J. V.	8.2	12.8.33	8,138	5.39	439.0
5.	Rosevale Lady Colantha Posch	F	2887	Richardson, G.	8.0	7.2.33	13,655	3.19	436.6
6.	Hillbrow Laurel	J	21064	Townsend, A. W.	6.7	3.11.32	6,667	6.44	429.4
7.	Palmerston Pansy	J	14697	Townsend, A. W.	11.1	18.8.33	7,695	5.43	418.1
8.	Clifton Helen	J	20967	Griffin, J. V.	7.0	21.10.32	7,770	5.28	410.4
9.	Martigny Sylvia Flora	F	3625	Richardson, G.	5.3	20.12.32	11,227	3.58	402.2
0.	Palmerston Rose	J	25109	Cowie, A. E.	5.2	24.10.32	9,083	4.41	400.7

MATURE COWS (continued)

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
11.	Victoria Cutty Belle	RP	1283c	Thompson, J. H.	9.6	23.9.33	10,582	3.80	400.5
12.	Palmerston Maid	J	16874	Proctor, C. A.	9.7	31.7.33	7,701	5.06	390.1
13.	Palmerston Dulcie 2nd	J	24725	Perkins, V.	6.10	14.9.33	7,348	5.25	386.1
14.	Lowestoft Holly	J	28309	Relbia Farm and Dairy	5.2	25.9.33	6,891	5.59	385.7
15.	Clifton Bluebell	J	20966	Griffin, J V.	8.1	26.9.33	7,194	5.28	380.2
16.	Relbia Bride	J	18584	District School Farm	8.1	12.10.32	7,718	4.91	379.0
17.	Moola, Vanity of	A	14316	Wing, G. H.	8.0	30.9.32	7,863	4.56	359.0
18.	Moola Pansy	A	20545	Wing, G. H.	10.0	20.10.32	8,164	4.36	356.4
19.	Glenore, Minnie of	A	13116	Napier, G. H.	10.0	1.10.32	9,317	3.80	354.3
20.	Glenore Pearl Queen	A	21580	Napier, G. H.	9.0	23.8.33	9,374	3.73	350.1
21.	Glen Vina Queenie	J	25163	Proctor, C. A.	5.2	23.6.33	6,065	5.66	343.8
22.	Gleneira Daisy Bell	A	14462	Foster, R. J. L.	8.8	12.9.33	8,350	4.10	342.9
23.	Mill Farm Lily 7th	AIS	17814	Trethewie, R. J.	7.9	10.7.33	7,981	4.27	341.4
24.	Rannoch Girl	J	23770	Mervyn Brae Stud	6.9	16.8.33	6,313	5.35	338.1
25.	Relbia Effie	J	23765	Relbia Farm and Dairy	6.10	13.9.33	7,075	4.77	338.0
26.	Relbia Dainty	J	21036	Mervyn Brae Stud	8.0	12.8.33	7,595	4.41	335.5
27.	Flowing Vale Fairy 2nd	RP	1784c	Thompson, J. H.	11.9	6.6.33	8,721	3.82	333.0
28.	Moola Primrose	A	23132	Wing, G. H.	5.1	16.10.32	7,808	4.24	331.1
29.	Hillcrescent Poppy	J	23775	Percy, A.	8.2	10.11.32	7,151	4.62	331.0
30.	Wingaroo Gealda	RP	2442b	Thompson, J H.	5.2	17.9.33	9,025	3.64	329.0
31.	Knole Firefly	J	25164	Proctor, C. A.	6.5	3.9.33	6,825	4.81	328.3
32.	Nalinga Adrina 2nd	RP	NYA	Blundstone, J. E. (Estate)	8.8	13.7.33	8,452	3.86	326.4
33.	Mill Farm Lily 13th	AIS	17818	Trethewie, R. J.	5.8	2.5.33	7,888	4.10	324.1
34.	Palmerston Mary	J	25107	Cowie, A. E.	5.8	30.5.33	6,107	5.30	323.9
35.	Mill Farm Lily 11th	AIS	17817	Bovill, H. Y.	6.0	13.9.33	7,777	4.16	323.7
36.	Darleymore Gertie	A	NYA	Foster, R. J. L.	5.11	4.6.33	8,561	3.69	316.5
37.	Oakbank Eleanor	A	15230	Hall, E. G.	8.8	5.4.33	8,283	3.67	305.2
38.	Palmerston Hawthorn 2nd	J	25106	Cowie, A. E.	5.4	14.12.32	5,370	5.62	302.2
39.	Olive Dale Flexy	A	20600	Napier, G. H.	6.10	24.9.33	7,673	3.87	297.4
40.	Clifton Dot	J	25118	Griffin, J. V.	5.10	25.8.33	5,667	5.17	293.4
41.	Mill Farm Ranee 11th	J	21018	Mackay, Prof. J. H.	7.2	11.10.32	6,579	4.44	292.6
42.	Mill Farm Ranee 14th	J	25156	Mackay, Prof. J. H.	5.3	23.10.32	4,960	5.89	292.5
43.	Flowing Vale Beauty Spot	RP	1774c	Blundstone, J. E. (Estate)	7.8	10.5.33	7,492	3.86	289.5
44.	Hillstead Silver Queen	J	23750	Barnett, D. G.	7.0	13.9.33	6,267	4.50	282.3
45.	Glenore Starlight	A	18129	Napier, G. H.	7.6	2.5.33	6,756	4.17	281.8
46.	Lady Bank Meadow Queen 2nd	A	21878	Napier, G. H.	8.0	21.11.32	7,077	3.92	277.5
47.	Palmerston Maid 2nd	J	24727	Cowie, A. E.	6.8	15.6.33	5,960	4.65	277.4
48.	Glen Vina Maid	J	25162	Proctor, C. A.	5.3	7.8.33	5,931	4.58	272.2
49.	Lowestoft Princess	J	24878	Reed, Mrs. A. M.	6.10	20.5.33	5,601	4.78	268.0
50.	Hillstead Duchess	J	12761	Barnett, D. G.	11.9	12.7.33	6,503	4.10	266.7
51.	Palmerston Bud 2nd	J	16871	Cowie, A. E.	10.2	5.9.33	4,941	5.35	264.7
52.	Rockfield Daisy 2nd	A	22038	Napier, G. H.	6.10	30.8.33	6,877	3.79	261.3
53.	Clifton Cream Socks	J	25117	Griffin, J. V.	6.0	24.8.33	5,244	4.95	259.8
54.	Daisy Bell of Gleneira	A	14462	Foster, R. J. L.	7.9	—.9.32	6,241	4.05	253.2
55.	Lady Bank Rarity	A	20439	Waters, G. L.	11.1	5.10.32	6.796	3.70	251.6
56.	Darleymore Lilac	A	22675	Reed, Mrs. A. M.	6.2	27.9.32	6,689	3.74	250.3
57.	Mill Farm, Harriett of	AIS	13770	Trethewie, R. J.	10.8	2.7.33	6,498	3.84	249.6
58.	Hillbrow Lass	J	24886	Percy, A.	10.8	13.4.33	5,147	4.84	249.4
59.	Mill Farm Lady Cerise 21st	J	25152	Mackay, Prof. J. H.	5.0	6.10.32	4.457	5.56	247.8
60.	Newstead, Stately 12th of	AIS	18628	Trethewie, R. J.	5.7	3.10.33	6,939	3.54	245.9
61.	Rockfield Peace's Pride 2nd	A	22039	Napier, G. H.	6.11	19.9.33	6,342	3.83	243.3
62.	Flowing Vale Dinah	RP	1781c	Blundstone, J. E. (Estate)	7.9	11.7.33	6,489	3.68	239.1
63.	Mill Farm Lady Cerise 17th	J	23759	Mackay, Prof. J. H.	5.11	2.11.32	3,799	6.13	233.2
64.	Alanvale Molly	A	14861	Hall, E. G.	9.6	22.4.33	7,327	3.18	233.1
65.	Hillstead Golden Bell	J	25127	Barnett, D. G.	5.11	27.8.33	5,100	4.55	232.1
66.	Palmerston Lady	J	18570	Cowie, A. E.	8.10	11.9.33	4.690	4.80	225.5
67.	Glen Vina Fairy	J	25161	Proctor, C. A.	5.9	11.5.33	4,128	5.44	224.8
68.	Moola Betty	A	16493	Waters, G. L.	7.1	12.11.32	5,546	3.95	219.5
69.	Hawthorn Ladybird	A	18242	Foster, R. J. L.	6.9	22.8.33	5,623	3.82	215.1
70.	Hillstead Jewel	J	25129	Harding, W. T.	6.3	9.8.33	4,280	5.06	214.3
71.	Flowing Vale Winsum	RP	1796c	Blundstone, J. E. (Estate)	7.6	20.3.33	5,226	4.06	212.5
72.	Hillstead Joyful	J	20981	Harding, W. T.	8.1	9.8.33	4,692	4.52	212.3
73.	Hawthorn, Kathie of	A	10680	Reed, Mrs. A. M.	11.2	12.11.32	5.392	4.18	202.6
74.	Glenore Melody	A	21578	Foster, R. J. L.	5.10	6.9.33	5,349	3.77	202.0
75.	Lowestoft Lady May	J	23716	Reed, Mrs. A. M.	5.11	3.7.33	4.581	4.29	196.9
76.	Alanvale Maid	A	22374	Hall, E. G.	5.2	6.10.33	5,376	3.63	195.2

MATURE COWS (continued)

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
77.	Nalinga Tulip 2nd	RP	1625a	Blundstone, J. E. (Estate)	7.0	25.3.33	4,589	4.19	192.7
78.	Flowing Vale Merle	RP	1425a	Blundstone, J. E. (Estate)	7.8	3.6.33	5,442	3.52	191.7
79.	Olive Dale Leaf	A	20603	Foster, R. J. L.	5.10	19.8.33	4,938	3.73	184.5
80.	Ashfield Solo	A	21004	Reed, Mrs. A. M.	8.9	17.7.33	4,785	3.60	176.6
81.	Hillstead Laurel	J	23747	Harding, W. T.	6.9	11.10.33	4,014	4.29	172.4
82.	Alanvale Sunshine	A	20988	Hall, E. G.	6.0	8.10.33	4,737	3.55	168.4
83.	Olive Dale Fawn 2nd	A	21972	Foster, R. J. L.	5.0	30.10.33	4,284	3.87	165.5
84.	Alanvale Melody	A	23409	Hall, E. G.	5.1	30.9.33	4,722	3.49	165.0
85.	Lowestoft Firefly	J	23715	Reed, Mrs. A. M.	8.9	16.6.33	3,756	4.34	163.1
86.	Nalinga Goldie	RP	NYA.	Blundstone, J. E. (Estate)	5.10	11.8.33	4,432	3.47	154.1
87.	Lowestoft Lily	J	19135	Reed, Mrs. A. M.	8.6	31.7.33	3,213	4.78	153.7
88.	Brook Hill, Eclipse 4th of	A	12646	Waters, G. L.	10.2	27.11.32	4,565	3.32	151.7
89.	Moola Betty	A	16493	Waters, G. L.	7.11	14.9.33	4,047	3.51	142.1
90.	Lowestoft Erica's Hope	J	14350	Reed, Mrs. A. M.	11.5	11.3.33	2,523	5.34	134.9
91.	Flowing Vale Penny Belle	RP	1717b	Blundstone, J. E. (Estate)	7.11	16.7.33	3,037	3.75	114.0
92.	Lowestoft Lovely	J	20924	Reed, Mrs. A. M.	6.8	3.9.33	3 144	3.43	107.8
93.	Flowing Vale Goldie	RP	1424a	Blundstone, J. E. (Estate)	7.9	4.7.33	2,336	3.30	77.2
94.	Lowestoft Lady Owl 2nd	J	8998	Reed, Mrs. A. M.	15.2	21.10.33	1,152	3.55	40.9

Average for Mature Cows

Milk: 6,353 lbs. Test: 4.71 per cent. Butterfat: 299.4 lbs.

SENIOR 4-YEAR-OLD

Standard: 330 lbs. Butterfat

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
1.	Clifton Dorothy	J	28287	Griffin, J. V.	4.9	24.7.33	6,788	5.20	353.4
2.	Moola Lottie	A	20542	Wing, G. H.	4.10	28.9.32	8,029	4.37	351.3
3.	Hillstead Milkmaid	J	28297	Barnett, D. G.	4.6	7.9.33	6,261	5.52	345.8
4.	Clifton Bluebell 3rd	J	28285	Griffin, J. V.	4.9	30.8.33	6,312	5.33	336.7
5.	Nalinga Topstone	RP	NYA	Blundstone, J. E. (Estate)	4.9	27.3.33	6,117	4.38	268.4
6.	Alanvale Sincerity	A	23410	Hall, E. G.	4.7	22.4.33	7,222	3.61	260.8
7.	Break o' Day Princess Pearl	A	21067	Napier, G. H.	4.8	30.8.33	7,250	3.57	259.4
8.	Nalinga Diana	RP	NYA	Blundstone, J. E. (Estate)	4.10	26.6.33	5.959	4.32	257.8
9.	Moola Vectis	A	21939	Foster, R. J. L.	4.10	14.7.33	6,443	3.92	252.9
10.	Olive Dale Delight	A	21970	Foster, R. J. L.	4.11	18.8.33	5,825	4.19	244.4
11.	Olive Dale Jenny	A	21973	Foster, R. J. L.	4.10	13.8.33	6,264	3.89	244.2
12.	Quantock Coombe Fanchette	A	24238	Foster, R. J. L.	4.11	28.8.33	5,127	4.69	240.9
13.	Mill Farm Ranee	J	25158	Mackay, Prof. J. H.	4.11	23.10.32	4,700	5.00	235.2
14.	Alanvale Snow	A	NYA	Hall, E. G.	4.8	17.7.33	5,952	3.88	231.3
15.	Moola Lena	A	21937	Foster, R. J. L.	4.9	21.9.33	5.534	3.68	204.1
16.	Hillstead Daphne	J	34395	Harding, W. T.	4.6	13 10.33	3.207	5.87	188.5
17.	Nalinga Adrina 4th	RP	NYA	Blundstone, J. E. (Estate)	4.11	17.6.33	4,244	3.93	166.9

Average for Senior 4-Year-Old

Milk: 5,954 lbs. Test: 4.38 per cent. Butterfat: 261.2 lbs.

JUNIOR 4-YEAR-OLD

Standard: 310 lbs. Butterfat

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
1.	Palmerston Hawthorn	J	28267	Cowie, A. E.	4.0	7.7.33	8,694	5.14	447.3
2.	Melton Vale Gladys	J	31277	Stuart, L. A.	4.0	12.7.33	8,374	5.32	445.7
3.	Hillbrow Fairy's Princess	J	25208	Townsend, A. W.	4.2	12.12.32	6,367	6.90	439.3
4.	Martigny Doreen Pietertje	F	3620	Richardson, G.	4.3	6.12.32	10,842	3.60	390.9
5.	Melton Vale Charm	J	31276	Stuart, L. A.	4.0	8.1.33	6,681	5.63	376.7
6.	Clifton Charm 2nd	J	28286	Griffin, J. V.	4.4	7.4.33	6,506	5.56	361.7
7.	Valma Bell	J	31294	Stuart, L. A.	4.5	12.9.33	5,497	6.48	356.5
8.	Melton Vale Melba	J	31279	Stuart, L. A.	4.2	11.9.33	6,736	5.25	353.7
9.	Relbia Jane	J	34429	Relbia Farm and Dairy	4.3	24.7.33	6,131	4.59	282.0
10.	Alanvale Topsy	A	23412	Hall, E. G.	4.2	16.11.32	7,034	3.68	259.4
11.	Alanvale Maid	A	22374	Hall, E. G.	4.2	23.10.32	7,126	3.52	250.7
12.	Inglis Gem	J	28320	Percy, A.	4.2	23.1.33	4,840	4.93	238.8
13.	Moola Viola	A	21940	Foster, R. J. L.	4.1	27.11.32	5,295	4.45	236.0
14.	Hillstead Handsome Ettie	J	34399	Harding, W. T.	4.1	6.6.33	3,841	6.08	233.6
15.	Relbia Sheila	J	34432	Relbia Farm and Dairy	4.4	23.10.32	4,775	4.82	230.4
16.	Hillstead Ladybird	J	34400	Barnett, D. G.	4.2	17.9.33	5,619	4.08	229.3
17.	Nalinga Topnotch 3rd	RP	NYA	Blundstone, J. E. (Estate)	4.2	4.9.33	5,361	4.21	226.1
18.	Strathavon Zono	A	22112	Foster, R. J. L.	4.2	6.10.32	4,698	4.21	198.2
19.	Nalinga Topstone 2nd	RP	NYA	Blundstone, J. E. (Estate)	4.4	24.9.33	4,146	4.21	174.7
20.	Nalinga Beauty Spot	RP	NYA	Blundstone, J. E. (Estate)	4.1	30.5.33	3,567	4.37	156.0
21.	Nalinga Mavis	RP	NYA	Blundstone, J. E. (Estate)	4.4	24.6.33	3,643	3.94	143.5
22.	Nalinga Cherry Blossom	RP	NYA	Blundstone, J. E. (Estate)	4.4	18.10.33	819	3.99	32.7

Average for Junior 4-Year-Old

Milk: 5,754 lbs. Test: 4.78 per cent. Butterfat: 275.6 lbs.

SENIOR 3-YEAR-OLD

Standard: 290 lbs. Butterfat

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
1.	Melton Vale Blossom	J	31275	Stuart, L. A.	3.11	11.12.32	7,717	6.11	471.7
2.	Rosevale Cora Sylvia Posch	F	3723	Richardson, G.	3.11	21.10.32	11,826	3.45	408.4
3.	Clifton Dawn	J	34383	Griffin, J. V.	3.8	20.6.33	7,323	5.24	384.3
4.	Break o' Day Queenie	A	22537	Napier, G. H.	3.10	27.8.33	8,777	3.89	341.8
5.	Clifton Patience 2nd	J	34384	Griffin, J. V.	3.10	15.9.33	5,909	5.75	339.9
6.	Melton Vale Floss' Charity	J	34904	Stuart, L. A.	3.6	6.11.32	6,855	4.78	328.1
7.	Mill Farm Squaw 5th	AIS	3224	Bovill, H. Y.	3.10	14.7.33	7,371	4.42	326.4
8.	Relbia Becky	J	34427	Relbia Farm and Dairy	3.11	12.9.33	5,973	5.41	323.2
9.	Valma Bell	J	31294	Stuart, L. A.	3.6	9.10.32	4,513	6.96	314.5
10.	A'anvale Avolo	A	24526	Hall, E. G.	3.7	13.11.32	8,421	3.48	293.9
11.	Palmerston Pet	J	28274	Cowie, A. E.	3.9	4.1.33	5,335	5.47	291.9
12.	Glen Vina Elf	J	31285	Proctor, C. A.	3.10	18.4.33	5,723	5.09	291.5
13.	Calthorpe Beauty	J	28321	Perkins, V.	3.9	1.9.33	5,502	5.06	278.7
14.	Wingaroo Gilda	RP	3164b	Thompson, J. H.	3.9	11.6.33	6,396	4.26	272.8
15.	Nalinga Merle 2nd	RP	NYA	Blundstone, J. E. (Estate)	3.8	4.3.33	6,091	4.14	252.5
16.	Mooia Lena	A	21937	Foster, R. J. L.	3.10	7.10.32	6,027	3.85	232.5
17.	Hillstead Firefly	J	34397	Harding, W. T.	3.10	11.9.33	4,953	4.68	232.0
18.	Palmerston Charm	J	28265	Cowie, A. E.	3.7	21.2.33	4,257	5.38	229.4
19.	Nalinga Marjorina	RP	NYA	Blundstone, J. E. (Estate)	3.9	7.8.33	6,091	3.67	223.8

SENIOR 3-YEAR-OLD (continued)

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
20.	Stronach Diana	J	34450	District School Farm	3.7	18.7.33	3,632	5.65	205.4
21.	Nalinga Diana 2nd	RP	NYA	Blundstone, J. E. (Estate)	3.10	3.4.33	4,247	4.16	176.9
22.	Nalinga Wonder	RP	NYA	Blundstone, J. E. (Estate)	3.11	15.5.33	3,870	4.13	160.2
23.	Olive Dale Daisy	A	23148	Foster, R. J. L.	3.11	4.10.33	3,099	4.35	134.9

Average for Senior 3-Year-Old

Milk: 6,082 lbs. Test: 4.65 per cent. Butterfat: 283.2 lbs.

JUNIOR 3-YEAR-OLD

Standard: 270 lbs. Butterfat

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
1.	Hallston Floss	J	34402	Richardson, G.	3.3	18.12.32	7,060	5.55	391.9
2.	Hillbrow Fairy's Betty	J	28356	Townsend, A. W.	3.3	19.10.32	5,969	6.47	386.6
3.	Hillbrow Audrey	J	34464	Townsend, A. W.	3.2	10.9.33	5,742	6.64	381.3
4.	Hillbrow Gem	J	28357	Townsend, A. W.	3.5	19.11.32	6,172	6.14	379.5
5.	Melton Vale Lucy	J	31278	Stuart, L. A.	3.2	4.12.32	6,349	5.64	358.4
6.	Melton Vale Melba	J	31279	Stuart, L. A.	3.3	3.10.32	6,651	5.35	355.8
7.	Scottsdale Folly	J	NYA	Richardson, G.	3.0	7.9.33	6,318	5.25	331.8
8.	Calthorpe Fairy Belle	J	31284	Perkins, V.	3.3	19.10.32	5,877	5.44	319.9
9.	Rannoch Marguerite	J	28335	Sadler, B. T.	3.2	3.10.32	5,554	5.51	306.5
10.	Palmerston Maid 4th	J	41484	Cowie, A. E.	3.3	2.10.33	4,974	5.98	297.7
11.	Clifton Bluebell 5th	J	34881	Griffin, J. V.	3.2	2.7.33	5,144	5.72	294.6
12.	Melton Vale Treasure	J	31280	Stuart, L. A.	3.3	20.3.33	5,136	5.71	293.5
13.	Alanvale Pauline	A	24530	Hall, E. G.	3.2	7.10.32	7,000	3.92	274.5
14.	Wingaroo Lily	RP	3069a	Thompson, J. H.	3.5	30.4.33	6,799	4.01	272.8
15.	Wingaroo Dable 2nd	RP	3065a	Thompson, J. H.	3.0	11.6.33	6,874	3.96	272.6
16.	Melton Vale Amy	J	34903	Richardson, G.	3.2	10.7.33	6,017	4.50	271.0
17.	Rannoch Valinda 2nd	J	28344	Sadler, B. T.	3.4	6.10.32	4,027	6.63	267.0
18.	Moolata Mattie	A	23130	Wing, G. H.	3.0	26.10.32	6,219	4.09	254.6
19.	Wingaroo Romany Lass	RP	3074a	Thompson. J. H.	3.5	20.4.33	6,405	3.73	239.3
20.	Mervyn Brae Meg	J	34374	Mervyn Brae Stud	3.5	29.3.33	4,401	5.26	231.7
21.	Quantock Coombe Lilac	A	23190	Reed, Mrs. A. M.	3.3	12.2.33	5,080	4.20	213.7
22.	Hillstead Pleasure	J	34898	Harding, W. T.	3.1	10.8.33	4,344	4.87	211.9
23.	Wingaroo Zefellana	RP	3078a	Thompson, J. H.	3.4	24.3.33	4,824	3.93	189.9
24.	Strathavon Shamrock	A	25456	Waters, G. L.	3.0	28.10.33	2,943	3.89	114.7
25.	Quantock Coombe Lucky	A	24240	Foster, R. J. L.	3.2	23.10.32	2,280	4.08	93.1

Average for Junior 3-Year-Old

Milk: 5,526 lbs. Test: 5.06 per cent. Butterfat: 280.1 lbs.

SENIOR 2-YEAR-OLD

Standard: 250 lbs. Butterfat

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
1.	Hallston Pride	J	34403	Richardson, G.	2.7	30.10.32	7,581	5.42	410.8
2.	Hillstead Firefly	J	34397	Harding, W. T.	2.11	4.10.32	7,085	5.13	363.9
3.	Palmerston Polly	J	34951	Perkins, V.	2.11	4.3.33	6,939	4.85	336.9
4.	Palmerston Hawthorn 5th	J	41482	Cowie, A. E.	2.9	24.6.33	6,250	5.18	324.0
5.	Glen Vina Rosebud	J	39849	Proctor, C. A.	2.9	10.1.33	6,598	4.89	322.8
6.	Wingaroo Quince	RP	3167b	Thompson, J. H.	2.7	6.6.33	5,150	4.38	310.9
7.	Melton Vale Tess	J	34908	Stuart, L. A.	2.10	7.4.33	5,560	5.58	310.5
8.	Stronach Venus	J	34451	District School Farm	2.10	16.10.32	6,176	4.93	304.6
9.	Relbia Becky	J	34427	Relbia Farm and Dairy	2.11	1.10.32	5,040	6.01	303.1

SENIOR 2-YEAR-OLD (continued)

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
10.	Palmerston Fancy 2nd	J	41481	Cowie, A. E.	2.10	9.7.33	5,729	4.90	280.9
11.	Melton Vale Floss's Pride	J	34906	Stuart, L. A.	2.11	11.4.33	4,842	5.62	272.1
12.	Melton Vale Sunshine	J	34907	Richardson, G.	2.8	25.3.33	6,104	4.42	269.8
13.	Palmerston Maud	J	28273	Cowie, A. E.	2.10	23.10.32	5,003	5.37	268.8
14.	Wingaroo Sylvia	RP	3073a	Thompson, J. H.	2.11	11.6.33	6,196	4.22	261.8
15.	Wingaroo Rialto 2nd	RP	3073a	Thompson, J. H.	2.7	20.6.33	6,782	3.49	237.3
16.	Alanvale Mossy	A	NYA	Hall, E. G.	2.6	21.5.33	5,948	3.98	237.0
17.	Wingaroo Belano	RP	3162b	Thompson, J. H.	2.11	23.12.32	5,741	4.02	231.0
18.	Stronarch Aurora	J	NYA	District School Farm	2.8	8.7.33	3,958	5.66	224.1
19.	Alanvale Aurora	A	24525	Hall, E. G.	2.7	13.10.32	5,938	3.77	223.7
20.	Wingaroo Zeabelana 2nd	RP	3077a	Thompson, J. H.	2.8	1.6.33	5,673	3.79	215.5
21.	Moola Viol	A	23134	Waters, G. L.	2.10	16.11.32	5,637	3.59	202.9
22.	Break o' Day Melody	A	23473	Napier, G. H.	2.10	26.8.33	5,229	3.72	194.5
23.	Clifton Margaret	J	NYA	Griffin, J. V.	2.6	2.10.33	3,768	5.04	190.2
24.	Pleasant Banks Gertie	A	NYA	Foster, R. J. L.	2.11	13.10.32	4,136	4.59	190.1
25.	Lowestoft Firefly 2nd	J	40769	Reed, Mrs. A. M.	2.6	12.5.33	3,524	5.18	182.8
26.	Wingaroo Nancy	RP	3070a	Thompson, J. H.	2.11	3.6.33	4,864	3.72	181.3
27.	Break o' Day Peaceful	A	23474	Napier, G. H.	2.8	17.9.33	3,783	4.25	160.8
28.	Strathavon Myrtle	A	25454	Waters, G. L.	2.10	21.9.33	3,423	4.32	148.1
29.	Nalinga Merle 3rd	RP	NYA	Blundstone, J. E. (Estate)	2.8	4.3.33	3,661	3.71	135.9
30.	Alanvale Stella	A	NYA	Hall, E. G.	2.7	9.9.33	2,937	3.94	115.8
31.	Quantock Coombe Lotus	A	25376	Reed, Mrs. A. M.	2.10	4.8.33	2,847	3.89	110.8

Average for Senior 2-Year-Old

Milk: 5,293 lbs. Test: 4.58 per cent. Butterfat: 242.6 lbs.

JUNIOR 2-YEAR-OLD

Standard: 230 lbs. Butterfat

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
1.	Valma May	J	42362	Stuart, L. A.	2.3	12.9.33	8,350	5.21	435.1
2.	Hallston Charity	J	NYA	Richardson, G.	2.0	3.10.32	6,580	5.94	391.5
3.	Valma Pride	J	42364	Stuart, L. A.	2.3	7.4.33	6,292	5.72	359.9
4.	Scottsdale Pride	J	NYA	Richardson, G.	2.1	4.10.32	6,163	5.82	359.1
5.	Martigny Flora 2nd	F	NYA	Richardson, G.	2.0	10.5.33	9,447	3.56	337.1
6.	Hillbrow Blonde	J	40230	Townsend, A. W.	2.3	7.8.33	4,763	6.71	319.6
7.	Palmerston Mystic	J	NYA	Cowie, A. E.	2.1	8.9.33	6,063	5.16	313.0
8.	Palmerston Hester	J	NYA	Cowie, A. E.	1.10	19.9.33	5,820	5.28	307.4
9.	Calthorpe Beauty's Surprise	J	34949	Perkins, V.	2.2	3.12.32	5,812	5.09	296.1
10.	Valma Ruby	J	42365	Stuart, L. A.	1.11	15.10.32	4,264	6.73	287.4
11.	Calthorpe Mignonette	J	39173	Perkins, V.	1.11	2.10.33	5,258	5.24	275.9
12.	Hillbrow Blanche	J	40229	Townsend, A. W.	2.3	8.7.33	4,331	6.14	266.0
13.	Mill Farm Harriett 7th	AIS	3247	Bovill, H. Y.	2.3	24.10.32	5,914	4.38	259.6
14.	Moola Vesta	A	24132	Wing, G. H.	1.11	25.10.32	5,984	4.32	258.7
15.	Glen Vina Buttercup	J	39845	Proctor, C. A.	2.0	28.3.33	4,607	5.54	255.6
16.	Bellefaire Roylright's Roylbonette	J	NYA	Harding, W. T.	1.11	18.7.33	4,484	5.69	255.4
17.	Alanvale Saidie 2nd	A	NYA	Hall, E. G.	2.4	16.12.32	5,994	4.24	254.4
18.	Hillbrow Brunette	J	40231	Townsend, A. W.	2.2	3.7.33	4,132	6.12	252.9
19.	Hallston Valda	J	40147	Cowie, A. E.	2.3	3.8.33	5,097	4.84	246.9
20.	Hillstead Napoleonette	J	40247	Harding, W. T.	1.11	12.8.33	4,448	5.51	245.1
21.	Glen Vina Mermaid	J	39847	Proctor, C. A.	1.10	30.4.33	4,671	5.14	240.1
22.	Stronach Ariadne	J	NYA	District School Farm	1.11	21.10.32	4,659	5.14	239.4
23.	Mill Farm Starfinch 3rd	J	34942	Relbia Farm and Dairy	2.2	15.10.32	4,044	5.86	237.3
24.	Tasma May 2nd	J	34902	Richardson, G.	1.7	24.11.32	4,561	5.17	236.0
25.	Hillstead Lady Blonde	J	40246	Harding, W. T.	1.10	7.8.33	4,407	5.35	235.8
26.	Inglis Model	J	34947	Percy, A.	2.1	26.9.33	4,913	4.73	232.5
27.	Inglis Jess	J	34945	Percy, A.	1.9	23.6.33	5,148	4.49	231.5
28.	Hallston Pansy	J	40146	Richardson, G.	1.10	12.6.33	4,475	5.12	229.1
29.	Relbia Countess 2nd	J	34954	Relbia Farm and Dairy	1.5	18.10.32	4,710	4.83	227.8
30.	Moola Poppy	A	24131	Wing, G. H.	2.2	30.11.32	5,458	4.04	220.8

JUNIOR 2-YEAR-OLD (continued)

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
31.	Mervyn Brae Glenn's Girl	J	41010	*Mervyn Brae Stud*	2.5	17.2.33	3,975	5.54	220.6
32.	Mervyn Brae Dainty 2nd	J	NYA	Mervyn Brae Stud	2.2	5.8.33	5,001	4.40	220.2
33.	Palmerston Mattie	J	41485	Cowie, A. E.	1.7	10.11.32	3,849	5.69	219.3
34.	Relbia Freda	J	41748	Relbia Farm and Dairy	1.9	28.7.33	4,266	5.13	218.8
35.	Break o' Day Twilight	A	NYA	Napier, G. H.	2.2	17.8.33	4,799	4.54	218.2
36.	Moola Violet 2nd	A	24133	Waters, G. L.	2.3	25.3.33	5,874	3.70	217.4
37.	Mervyn Brae Buttercup	J	NYA	*Mervyn Brae Stud*	1.11	31.7.33	4,231	5.12	216.8
38.	Enstone Minnie 4th	AIS	3275	Bovill, H. Y.	2.5	8.3.33	4,417	4.75	210.0
39.	Mill Farm Rosemaid	J	34941	Relbia Farm and Dairy	2.1	19.10.32	3,743	5.57	208.5
40.	Hillbrow Budget	J	40232	Townsend, A. W.	2.2	3.9.33	3,489	5.97	208.5
41.	*Hillstead Sweet Bell*	J	40248	Harding, W. T.	1.7	12.6.33	3,501	5.90	206.7
42.	Palmerston Hope	J	NYA	Cowie, A. E.	2.2	10.9.33	4,406	4.66	205.7
43.	*Relbia Bell*	J	41743	Relbia Farm and Dairy	1.10	21.6.33	4,122	4.98	205.6
44.	Alanvale Flower	A	NYA	Hall, E. G.	2.1	25.3.33	5,412	3.77	204.2
45.	Lowestoft May Lily	J	34856	Reed, Mrs. A. M.	1.10	6.3.33	3,966	5.06	200.8
46.	Relbia Junetor	J	41751	Relbia Farm and Dairy	1.11	14.10.32	4,372	4.37	200.2
47.	Rannoch Silver Duchess	J	34444	Sadler, B. T.	1.8	26.10.32	3,883	5.07	196.9
48.	Stronach Fortuna	J	42066	District School Farm	1.8	11.5.33	3,990	4.89	195.3
49.	Enstone Lily 3rd	AIS	8340	Bovill, H. Y.	1.11	22.9.33	4,809	4.05	195.1
50.	*Mill Farm Ranee 24th*	J	34939	Mackay, Prof. J. H.	1.11	9.10.32	3,839	4.73	181.7
51.	Strathavon Myrtle	A	25464	Waters, G. L.	1.10	6.10.32	4,204	4.31	181.3
52.	*Wingaroo Fealty*	RP	3067a	Thompson, J. H.	2.4	25.5.33	5,085	3.50	178.0
53.	Rannoch Silver Baby 2nd	J	34443	Sadler, B. T.	2.1	28.9.33	2,616	6.70	175.4
54.	Alanvale Shadow	A	NYA	Hall, E. G.	2.0	7.9.33	4,225	4.11	173.6
55.	Quantock Coombe Mattie	A	25377	Reed, Mrs. A. M.	2.1	30.10.32	4,036	4.09	165.3
56.	Break o' Day Flossy	A	23472	*Napier, G. H.*	2.5	8.4.33	4,364	3.76	164.2
57.	Inglis Queen	J	24948	Percy, A.	1.0	11.10.32	3,021	5.36	162.0
58.	Martigny Queen 7th	F	NYA	Richardson, G.	1.9	7.8.33	5,028	3.21	161.6
59.	Strathavon Elsie	A	25461	Waters, G. L.	2.4	2.11.32	4,026	4.00	161.2
60.	Strathavon Sadie	A	25455	Waters, G. L.	1.11	6.10.32	3,818	4.16	158.9
61.	*Hillstead Beliere*	J	40244	Harding, W. T.	2.0	14.9.33	2,823	5.51	155.8
62.	Relbia Dot	J	41746	Relbia Farm and Dairy	1.9	22.7.33	3,234	4.77	154.4
63.	Olive Dale Boree	A	25352	Waters, G. L.	1.11	8.10.32	3,780	4.03	152.4
64.	Hillstead Harebell	J	40245	*Harding, W. T.*	1.9	12.8.33	2,931	5.01	147.0
65.	Alanvale Hazel	A	NYA	Waters, G. L.	2.0	12.9.33	3,831	3.83	147.0
66.	Quantock Coombe Fun	A	24239	*Reed, Mrs. A. M.*	2.3	2.11.32	3,867	3.75	145.1
67.	Mervyn Brae Meg 2nd	J	41009	Mervyn Brae Stud	2.2	18.12.32	2,553	5.32	136.9
68.	Quantock Coombe Bonny	A	25374	Reed, Mrs. A. M.	2.0	6.11.32	3,145	4.18	131.6
69.	Nalinga Mary 2nd	RP	NYA	Blundstone, J. E. (Estate)	2.3	20.10.33	3,144	4.12	129.8
70.	Strathavon Shamrock	A	25456	Waters, G. L.	2.2	5.12.32	3,162	3.96	125.2
71.	Strathavon *Emma*	A	25452	Waters, G. L.	2.0	20.10.32	3,048	4.06	123.9
72.	Hillstead Sweet July	J	NYA	Harding, W. T.	1.3	12.11.33	2,337	5.06	118.4
73.	Alanvale Silverine	A	NYA	*Hall, E. G.*	2.3	13.9.33	2,766	4.12	114.1
74.	Strathavon Violet	A	25458	Waters, G. L.	2.0	26.11.32	2,461	4.16	102.5
75.	Lowestoft Fancy	J	34854	*Reed, Mrs. A. M.*	2.0	29.9.33	1,860	4.11	76.5
76.	Lowestoft Primula	J	34857	Reed, Mrs. A. M.	2.2	12.10.33	1,506	3.92	59.1
77.	Quantock Coombe Silesia	A	25379	Reed, Mrs. A. M.	2.0	12.10.33	1,317	3.49	47.9
78.	Nalinga Mavis 2nd	RP	NYA	Blundstone, J. E. (Estate)	2.4	23.10.33	1,230	3.44	42.4

Average of *Junior* 2-Year-Old

Milk: 4,310 lbs. Test: 4.78 per cent. Butterfat: 206.2 lbs.

365 DAYS TESTS

No.	Name of Cow	Breed*	Herd Book Number	Owner	Age	Date of Calving	Milk, lbs.	Test, %	Butterfat Lbs.
	Newstead, Emerald 18th of	AIS	18627	Trethewie, R. J.	3.10	9.8.32	10,295	3.57	367.5
	Moola Viol	A	23514	Waters, G. L.	2.10	16.11.32	7,695	3.56	274.4
	Hallston Charity	J	NYA	Richardson, G.	2.0	3.10.32	8,177	6.00	491.2
	Scottsdale Pride	J	NYA	Richardson, G.	2.1	4.10.32	7,572	6.01	455.4
	Strathavon Elsie	A	25451	Waters, G. L.	2.4	2.11.32	5,622	4.01	225.8

CONCRETE ON THE FARM

ONCE it was considered quite normal for the cow yard and bails to be an absolute quagmire in wet weather, but this is no longer necessary since cement concrete has come to the aid of the farmer. Likewise, those paths at the front and the back of the house can be laid inexpensively and effectively in concrete by the men folk on the farm. Concrete work is so extremely simple that if it were better understood every country home would be made more comfortable and attractive by its use. For any concrete work the requirements are broken metal or river gravel, sand and cement; the country abounds with material for the work, and any clean sand and metal, free from clay or roots, may generally be used.

In most country districts there are natural gravel pits, and in most instances this material can be used direct from the pit, the proportion of fine and coarse materials being approximately correct. The overlying dirt and roots should be removed, otherwise a reduction in strength will be caused.

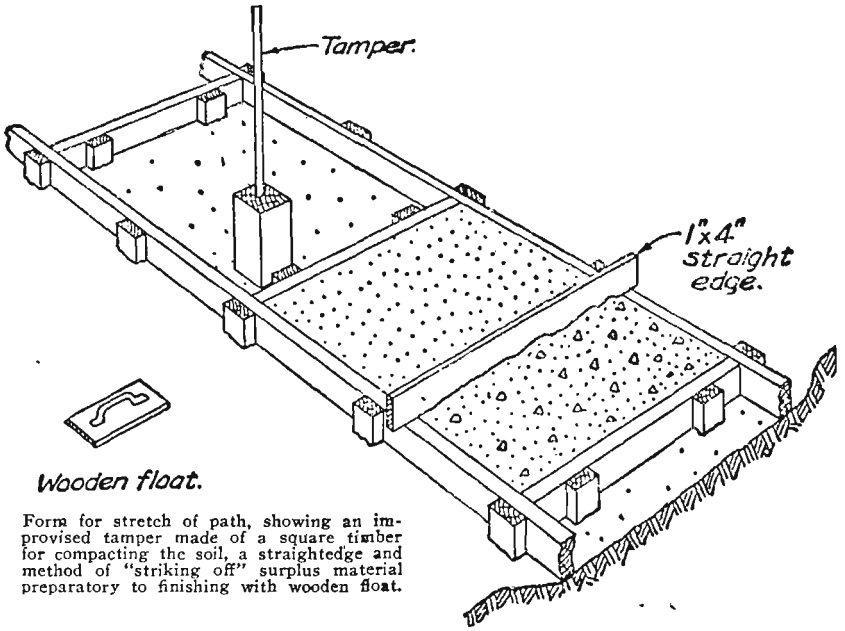
As most country men are not familiar with concrete work, and it would lead to confusion to deal with it too generally, let us assume that it is required to lay a path from the back door to the dairy, a distance of, say, 30 feet. A width of three feet would be suitable, and as the traffic will be light a depth of 2½ inches of concrete will be quite sufficient.

Foundation

The first thing to do is to lay out the foundation of the path, using pegs and string. If the soil is sandy or of sandy loam, it need only be trimmed and rolled in order to consolidate it. Unsuitable soil, such as clay, requires to be removed for a depth of, say, three inches. On this may be laid a bed of sand about half an inch thick. This sand must be rolled or tamped solid before concreting. On particularly bad foundations it may be necessary to excavate to a greater depth; for example, if there is a spring of water, or the foundation is likely to be moved by seeping water, it is advisable to excavate to a greater depth and fill with solid stones, cinders, etc. If, however, the foundation is reasonably firm, little foundation is required.

Formwork

In order to keep the work within bounds, wooden forms are used to mould the path or floor. For a path 2½ inches deep, timber 2½ inches by one inch would be sufficiently sturdy. These battens are laid edgewise on the foundations and held in place by being nailed into stakes driven into the ground. Should the pathway be curved, light timber can be used, and held true to shape by using additional stakes. The path may be laid in one long strip, but it is preferable to divide it into smaller sections to make provision for expansion and contraction, so the long strip is divided into



Form for stretch of path, showing an improvised tamper made of a square timber for compacting the soil, a straightedge and method of "striking off" surplus material preparatory to finishing with wooden float.

sections or bays about six inches long by laying cross pieces of $2\frac{1}{2}$ inch by one inch timber, held in place by stakes.

The finished surface of concrete may be either perfectly flat or slightly rounded, or else set on a slope to run off water.

Mixing Concrete

Supplies of cement, clean sand, and screenings, gravel or broken metal are mixed together with water—good, clean water being essential as certain organic materials in water are harmful to concrete. Generally speaking, water which is fit to drink is fit for concrete making. Measure the materials according to the proportions given in Table I. — a kerosene tin makes quite a useful measuring device. Take, say, four tins full of metal, two tins of sand and one tin of cement; or the materials may be proportioned by measuring in half-tins, so long as the materials are correctly proportioned, any quantity may be taken for mixing provided it can be mixed conveniently by turning over with a shovel or spade, If using a natural gravel, composed of both fine and coarse materials, take six parts of the gravel to one of cement, and mix in the dry state as when using metal, sand and cement. A sheet of iron, or wooden boards, should be laid down as a mixing platform. Place on this surface the metal, sand and cement (or gravel and cement) and mix them thoroughly with a shovel or spade by turning them over and over. When perfectly mixed add the water. The general tendency is to use too much water; only just sufficient to make the mass into a plastic condition, such as a thick mud, should be used. The action of the setting of cement is similar to the hardening of glue—i.e., the more water that is used, the thinner the glue and the less the strength.

Care should be taken in the selection of the sand and metal. Most materials are suitable for concrete work, but the sand should be free from clay, roots, etc., as these impurities weaken concrete.

Placing Concrete

With the foundation properly prepared and the forms in position, the placing of the concrete may be proceeded with. The concrete mix should be deposited in alternate sections, spread evenly over each area, and tamped into position. The the surface should be approximately levelled or shaped to position by means of a screed board. This board can be curved so as to give a rounded surface. When the surface dries off to be just workable, high spots may be rubbed off and the whole surface smoothed off evenly with the wooden float as shown in sketch.

The wooden float removes all irregularities and gives a gritty surface, which is agreeable in appearance and is not slippery in wet or frosty weather. Trowelling with a steel trowel is not desirable, as it gives a glass-like surface, which is dangerous to people walking on it. It should be remembered that after the concrete has been in place for one hour it should not be disturbed.

The next morning the work should be covered with damp bags or damp sand. This is necessary to prevent evaporation of water from the half-hardened concrete, and will give a harder wearing surface.

While this concrete is being cured, the dividing strips of wood may be removed and the alternate sections filled with concrete in exactly the same way as the first sections. No special care should be taken to bond the old and the new work; it is better that they should not bond, as the joint will allow for earth movement, foundation settlement, etc. Care should be taken when placing the second batch of concrete that the edges of the green concrete adjoining are not injured. When the path is finished the covering of bags or sand should be kept damp for at least a week. At the end of this time the path is ready for use.

This paving slab is quite suitable for foot traffic, but for heavier loads, such as motor cars, drays, etc., it is necessary that a greater thickness of concrete should be used.

TABLE I.

3ft. x 2½in. Path, no special wearing surface—

	30 ft. long	60 ft. long
Metal	16.8 c. ft.	33.6 c. ft.
Sand	8.4 ,,	16.8 ,,
Cement ...	4.2 ,,	8.4 ,,

3ft. x 2½in. Path, ½in. wearing surface—

	Bottom Course		Top Layer	
	30 ft. long	60 ft. long	30 ft. long	60 ft. long
Metal	13.45 c. ft.	26.7 c. ft.	——	——
Sand	6.72 ,,	13.44 ,,	3.96 c. ft.	7.92 c. ft.
Cement ...	3.36 ,,	6.72 ,,	1.35 ,,	2.7 ,,

The proportions given consist of four parts of metal, two parts of sand and one part of cement, and just sufficient to be easily mixed at one time should be taken, as described above, by measuring with kerosene tins. It is also essential that a section of a slab once started should be completely finished. Do not leave it half finished, as it may be difficult to effect a perfect join.

Surface of Path

In some cases a special wearing surface, using extra cement, is put on the top half-inch of path. In such a case the bottom two inches of concrete would consist of four metal, two sand, one cement concrete, while the upper half-inch would be composed of three parts of sand and one part of cement; while if greater perfection be required the top surface may be coloured, using red, green, blue or black pigments. This extra work and added expense is not generally necessary, as a perfectly level and hard-wearing surface is obtained with the 4:2:1 concrete. If a top course is desired, this should be placed on the base course before it has set.

These instructions can be safely followed in laying any paths or floors, but these are not the only uses of concrete on the farm. It is finding use in foundations, fence posts, troughs, steps, wells, dips for sheep, water dams, etc.

Further information is always freely given on application to the Goliath Portland Cement Company Limited, at Railton, Tasmania.

BUREAU SECTION

AGRICULTURAL BUREAU OF TASMANIA

WHAT IS THE BUREAU?

THE Bureau is an organisation of farmers, designed to improve the condition of primary production in Tasmania. Authority six years ago, when the Bureau was started, considered the movement essential. The foremost authorities still hold that view.

The Bureau's constitution provides that its objects should be the general advancement, representation and protection of the interests of primary producers, including promoting, assisting and improving rural education, rural finance, marketing, production, and social conditions. It is fair to look at the efforts it has made to realise those objects.

A State Production Committee was set up, with the responsibility of endeavouring to increase the production of exportable commodities. That committee, composed of some of the best brains in the producing and commercial world, still carries on unobtrusively and effectively, the Bureau supplying secretarial assistance.

Production Costs

Costs of primary production have been reduced through the Bureau's activity. For instance, Bureau activity has meant exemption from primage and sales tax of farming articles, freight concessions on railways, and better accommodation for owners who intended travelling with their stock to shows. The privilege of sending partially-loaded trucks at full truck rates was obtained on behalf of small producers; the carriage of lambs for export was reduced to store stock rates.

The standardisation of wearing parts of agricultural implements has been well forwarded by the Bureau, whose case was being used throughout Australia. Finance in many aspects has had attention. Some of the benefits achieved or attempted may be gleaned from the following:—

Investigations of land settlement were conducted in search of a scheme for the better safeguarding of the interests of producers and of those who had advanced money on agricultural properties. The Bureau also associated itself with the movement to secure a reduction in the price and charges in respect to the selection of Crown land, the extension of repayments for a long period, and a remission on the first few years' payments to encourage more rapid development of selections.

As far as rural finance was concerned, the Bureau claims considerable advance, as the result of a Divisional Council meeting held at Scottsdale was the starting point of the rural credit scheme and the beneficient extension of the activities of the Agricultural

ST. GEORGE'S PUDDING

Mix together ½ lb. each of breadcrumbs, minced apples, sultanas and chopped suet, ¼ lb. flour grated rind and juice of 2 lemons, 2 tablespoonfuls marmalade, 1 teaspoon baking powder, pinch salt, 2 beaten eggs and 1 gill milk. Boil 3 hours in a greased basin.

SIDCUP PUDDING

Four tablespoons flour, 2 of butter, 1 of sugar, 1 egg, 1 cup milk, 1 teaspoon baking powder; spread jam round the basin, pour in the mixture and steam quite an hour.

SILK PUDDING

One cup tapioca, soak all night in ¾ pint of cold water; next day add another ½ pint water. Put on a slow fire and boil till quite clear; add cup raspberry jam, mix well, pour into a mould. When set, turn out and serve with custard.

SNOW PUDDING

Take 2 tablespoons of cornflour, 1 teacup of sugar, juice of 2 lemons. Mix all together, add 1 pint of boiling water (must be boiling). Mix all together and put on the fire until it comes to the boil (do not allow to boil). Add whites of 3 eggs beaten to a stiff froth, and beat in well. Serve cold with custard made with the yolks of the eggs, sugar, and 1 pint of milk. Boil to proper thickness.

SODA PUDDING

1 teaspoonful soda, 2 cups flour, 1 cup sugar, ½ lb. suet, ½ lb. raisins, a few currants, ½ pint milk (new), little lemon peel. Mix well before adding milk. Boil 3 hours.

SOMERSET RICE

Put into well-boiled hot rice, a piece of butter the size of an egg, ½ cup sugar, ½ grated nutmeg, ½ cup sultanas. Steam in rice basket till sultanas are cooked.

SOUTHPORT PUDDING

Six ounces breadcrumbs, 1 teaspoon baking powder, 5 oz. sugar, 3 oz. suet, 1 oz. lemon peel, 6 oz. apples, minced, pinch of salt, a little nutmeg, 2 eggs. Cut peel finely, mix together with egg beaten, and a little milk. Steam 2 hours. Serve with sweet sauce.

SPONGE PUDDING

Half cup sugar, 1 cup flour, 1 egg, 1 dessertspoonful baking powder, 1 cup milk, butter about the size of an egg. Beat all together; when baked, spread top with strawberry jam and whipped cream.

"AFTERNOON TEA" SCONES

One pound self-raising flour, 4 oz. sugar to taste. Mix with milk, roll out and cut small, in various patterns.

BROWN SCONES

One pound wheatmeal, tablespoonful of lard or butter, 1 tablespoonful of golden syrup, 2 teaspoonsful cream of tartar and 1 of bicarbonate soda. Mix with milk to a rather soft dough; only handle once. Bake in moderate oven.