Some recent rural radio talks

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Some recent rural radio talks

Authors
CURRENT EXPERIMENTS WITH VEGETABLE CROPS

By T. WACHTEL, Agricultural Adviser, Horticultural Division

The purpose of this talk is to give a brief and general outline of the experimental work carried out by the Vegetable Section of the Department of Agriculture this year. Some of these experiments were started years ago, the trials this year being, as it were, just a further step in a series. Some other experiments which were started this year, will be followed by further steps next year, and perhaps several years after. Experiments very seldom yield final results in one season.

Two potato fertiliser trials which were planted out this year, one at Manjimup and the other at the Vegetable Research Station in Perth, are a further step in a series of trials of this kind that have been carried out over the last three years. The previous experiments have given reasonably good indications as to the requirements of this crop for major plant nutrients. The work is carried one step further this year, partly by testing these requirements on another soil type, that is, on sand under sprinkler irrigation, and partly by testing the best time of fertiliser applications. The ultimate aim is to determine the best fertiliser mixture and the best method of its application for all the important potato-growing districts of the State. When the results of several experiments are analysed and compared, due regard will be paid to economic considerations, that is, it will be attempted to give recommendations which will result in highest net profit, not merely in highest yield. It is important to bear in mind that highest yield and highest net profit are not necessarily coincident. In fact, they very seldom are.

Another experiment which has been conducted for several years and is continued again this year, is a series of potato variety trials. Most of the varieties tested had been developed in the Eastern States and released to growers in recent years. Some others have been grown on a commercial scale for a long time. From previous experiments here, it appears that there are at least two varieties which show promise, and may eventually compete with the local Delaware variety, regarding both yield and quality.

Onions are another major crop with which experiments of increasing scale have been commenced this year. In the past few years, many varieties were tested, some imported from the Eastern States, some others from the United States of America. None of these varieties proved suitable to our growing conditions. The major aim of these trials was to find a variety of better keeping quality than our locally-grown onions. Poor keeping quality is one of the major problems connected with the onion industry in our State, resulting in considerable financial losses year after year. It appears, however, that there is no easy solution to this problem. Several experiments have been carried out in the last three years with a chemical called Maleic Hydrazide applied as a...
spray to the crop shortly before harvest. This chemical has been successfully used in many parts of the world, and it is reported that it prevents sprouting in storage. However, our experiments gave rather poor results, probably due to the low solid content of bulbs when grown in sandy soils and heavily irrigated. Nevertheless, it will be tested again this year, using stronger concentrations and applied at different growth stages of the plants.

Another attempt to improve our local onions is the commencement of a line selection and breeding programme this year. It is a frequent experience that a crop grown from locally produced seed shows a lack of uniformity with respect to size, shape and colour. The reason for this is quite simple. Onions are pollinated by insects, and when seed is produced in gardens situated in close proximity to each other, the crossing of different types is inevitable. Bulbs which were of desirable appearance were selected from commercial crops last year, and are now planted out at the Vegetable Research Station to produce seed. Each individual plant will be self-pollinated this year, and the progeny tested next season. From the progeny, several selections will be made again, and the work carried out in this fashion until a pure line of desirable characters will be produced that can form the nucleus of a variety which has adapted itself to local growing conditions. It is rather a long-term project, but a very important one.

A new method of onion production is also being tested this year, perhaps the first time in Australia, although it is widely practised in Europe and America. With this method, the crop is planted with, what is called, dry sett instead of seedling. The dry setts are produced by planting onion seed very thickly. In a close stand the plants will compete for light, water and nutrients, and the bulbs will not develop to full size, but remain small, about one-half to five-eighths of an inch in diameter when fully mature. A very large number of these small onion bulbs can be produced on a small area. When mature, they will be lifted from the soil, cured and stored for next season. Instead of planting seedlings the next season, these dry setts will be planted at normal planting distance, and the bulbs will develop to full size, producing a normal commercial crop. Several advantages are attributed to this method. The crop planted with dry setts matures several weeks earlier, thus occupying the area for a shorter time. They are not generally subject to, or rather resist more successfully, the attacks of root maggot flies. But the main advantage is that the setts can be planted mechanically and hence reduce labour costs. It would be too early to make predictions concerning the success of this method in comparison with the one used at the present by commercial growers.

As it was pointed out at the beginning, this brief account was not intended to be more than just an indication of the type of experimental work being carried out with vegetable crops. Time does not permit me to give details of all the experiments done with over 30 different vegetable types. Another point which I wish to emphasise again, is that it generally takes several years of very exacting work before final recommendations can be given.

**PEDIGREE SEED PLANTING**

**BREEDERS** of all types of stock will pay fabulous prices to obtain what they consider to be the best animal for their own particular studs. They do this with the avowed object of improving the quality of the stock as well as their chances of obtaining better prices for animals of their own particular breeding. With cereal crops and pastures, it is just as desirable and necessary that best quality seed be used.

Throughout the world, various organisations go to great pains to produce seeds of a very wide range of plants, which have been subjected to exhaustive procedures to ensure that the ultimate product is not only what the buyer asks for but is also of the highest quality. In this State the Agricultural Department has for many years,
been certifying subterranean clover seed. The label carrying the endorsement “Government Certified Seed” is a warranty to the buyer that the seed sold is true to name and purity.

It is very necessary that a cereal producer maintains the purity of his seed stocks, as admixture indicates inefficiency and can lead to difficult harvesting, lower yields, and reduction in quality. It is desirable, therefore, that all growers should, from time to time, procure seed which is of pedigree stock, that is, seed which has been bred from the right strains and selected to produce superior types of seed, free from admixture and extraneous material.

Breeding of pedigree cereal seed, in this State, has been a major activity at the research stations in the cereal and sheep areas since 1912. At two stations in particular, Merredin and Wongan Hills, there are special staffs concerned with the breeding, selection and production of the foundation or “pure line” seed stocks used for planting the stud and bulk areas on the stations. Over the years, thousands of bags have been supplied annually in small lots.

The pedigree seed production system briefly is that each year at harvest, single plants are selected from the current pure line rows. These are the most prolific and true to type, and are retained for planting next year’s pure line rows. The balance of the grain is bulked and sewn in an accumulation plot. The grain obtained is distributed to various stations for planting their “stud” plots. The following year the seed obtained is used for the bulk areas from which the farmer obtained his supplies. By means of this system the farmer is able to obtain seed which is virtually the product of the selection of single plants from a single seed.

By obtaining this pedigree seed, the farmer can establish his own stud plots and maintain the purity and vigour of his own crops.

This year the demand for the varieties available—ten varieties of wheat, five of oats, two of barley and the early “Merredin” strain of Wimmera ryegrass—has been heavy and the limit for varieties to each applicant is likely to be only a bag or two.

THE RUAKURA ROUND FARROWING HOUSE

By P. BECK, Field Assistant, Dairying Division

SOME 20 to 25 per cent. of all pigs farrowed die before weaning and 50 per cent. of these deaths occur in the first week after farrowing, which is the most critical period in the pig’s life. Such high losses should not be tolerated, for every time a pig dies on the farm it means a lowering of the net income to the farmer.

Preweaning death in young piglets is not altogether inevitable, for a great majority of the mortalities experienced are within the jurisdiction of preventive control by the farmer in most cases by simply using a little foresight and ingenuity in his management methods.

There are two predominant and closely-linked aspects to be considered in reducing baby piglet losses during the birth to weaning period. They are the care and husbandry of the pregnant sow and the provision of adequate, warm farrowing-house facilities. Both, because of their very close relationship are of great importance, and the efficiency with which they are managed must be of an equally high standard.

Briefly, the objective is to keep the in-pig sow in a healthy, firm and trim condition and towards the end of the gestation period she should be on a rising plane of nutrition, to ensure a sustained and high milking capacity after farrowing and to avoid overfatness which is predisposing to the overlying and trampling of baby piglets.

In general, losses may be attributed to three main causes, namely infections at, or shortly after birth; chilling with a subsequent loss of vigour; and overlying or trampling by the sow.

The conventional type of farrowing house of square or rectangular plan, together with modifications such as the addition of hover boards and artificial
heating has met with varying success in reducing piglet losses, but has not proved highly successful in this aspect.

The most recent development in the endeavour to design a practical, easily-managed farrowing house affording maximum protection to newly-born pigs, is the Ruakura round farrowing-house designed in New Zealand.

The Ruakura pen consists of an exterior circular wall of good insulating material, usually concrete, with a doorway; inside is a semi-circular wall set seven inches off centre towards the front of the pen. The remainder of the inner circle is made up of guard rails which allow free movement in and out by the young pigs, while keeping the sow out. It is over this safety zone that an infra-red ray lamp can be set up if so desired, giving the young pigs a centrally-heated area in which the danger of trampling or overlying is eliminated.

Because the central hover or safety zone is off-centre, and owing to the curves of the farrowing rail and guard rails the sow can only lie in one position and this is such that her udder is facing, and in close proximity to the safety zone. The young piglets therefore, have only to move a very short distance to suckle, thus affording them a maximum of protection.

At present the most controversial point regarding the round pen is roof design, and this requires careful consideration in the erection, as it is a major factor in temperature control within the pen. This is especially important in some of our areas where a wide variation between day and night temperatures is experienced. At Ruakura, many types of roof design are being observed in an endeavour to arrive at the most suitable type, which, in easy operation may be manipulated for air circulation control, to ensure as near as possible, the optimum 65° to 75° F. temperature range within the pen.

I would now like to give some figures indicating the relative reduction in piglet losses in the round pen compared to losses in the conventional type.

At Ruakura where the pen was designed, losses have been cut from 8 per cent. to 4 per cent. and comparable results are being obtained on commercial pig-raising establishments in New Zealand. At Roseworthy in South Australia losses which were formerly in the vicinity of one pig per litter have been cut to the extent of only six losses in 40 litters.

Denmark Research Station in our State is experiencing only one-eighth of the piglet losses incurred in the conventional pen, by using the round type, and Muresk Agricultural College reports greatly reduced losses in their four pens of this type.

It is obvious from these results that the Ruakura round farrowing pen is worth considerable thought by any enterprising pig raiser who is endeavouring to reduce piglet losses to a minimum.

HOW THE RANDOM SAMPLE LAYING TEST COULD AFFECT THE POULTRY INDUSTRY

By R. H. MORRIS, Officer-in-Charge, Poultry Branch

For many years now, day-old pullet chicks have been retailing at about £15 a 100 and from the interest which breeders and hatcherymen are taking at the present time in breeding better stock I would say there is every possibility of the chicken buyer being asked to pay a good deal more for his chicks during the years ahead.

Hatcherymen are likely to increase their chick prices and I am of the opinion that the average chicken buyer will be more than pleased to pay these higher prices.

To suggest that people will, within a few years, be happy to pay upwards of £18 a 100 for sexed pullet chicks, when we know very well how hard it is to extract even an extra 10s. a 100 from most chick buyers today, might to some people, seem a fantastic proposition and one not worthy of further consideration.

But just a minute, how fantastic is this proposition?
If I asked you for £60 and could give you a reasonable assurance that within 18 months this particular £60 would clear £240 for you, wouldn't you be inclined to give me the £60? I think that you would.

But how can we fit an attractive proposition like this into the chicken business?

Well it is like this.

If I were a hatcheryman and the commercial chicks which I sold were capable of returning a profit of 3s. a bird more than the stock which another hatcheryman might be offering for £15 a 100, a chicken buyer, could afford to pay me as much as £30 a 100 for my sexed pullet chicks and still make as much profit as if you had bought my competitors' chickens for just half the price.

Now as the Americans would say "Isn't that something?"

But just what does an extra 3s. per bird profit represent?

Well if we confine the discussion to egg production it would mean that my fowls would have to lay an extra 10 or 11 eggs a bird more than the stock selling for £15 a 100. That is based on an egg price of 3s. 6d. per dozen, and it is assumed that the many other factors which influence profitability such as the ability of the stock to live, egg size, food consumption, etc., are constant.

Now let us assume that you are a commercial egg producer and interested in buying 2,000 day-old pullet chicks.

You come to my hatchery and I convince you that my stock is worth something less than £30 a 100 but not being greedy I agree to charge you only £18 a 100. As the figures given in this talk are not intended to be regarded as a standard I can of course afford not to be greedy. Now let us assume that this price of £18 is £3 a 100 more than that asked by my competitor whose stock lays 10 eggs a bird a year less than mine. So your 2,000 chickens are going to cost you an extra £60 but an extra profit of 3s. a bird on 2,000 amounts to £300 and if we deduct the extra price of the chickens namely £60 from this figure, you are left with an extra £240 in the bank.

Quite a fair investment to say the least and it is obvious that my chickens are worth more than £19 a 100 but just how much more depends on the ability of my stock to perform consistently well over several years in the Random Sample Laying Test conducted by the Department of Agriculture.

Let us not forget that the production of highly profitable poultry stock can only result from the outlay of much time and expense on a properly conducted poultry breeding programme. Such a programme entails a lot of extra work and expense which hatcherymen and breeders cannot afford under today's chick prices. Extra staff is required for managing the breeding stock, for trapnesting, for recording, and for analysing the results of the various matings and for all the other work associated with a properly run breeding programme. This staff has to be paid and the other expenses met.

We have seen, how you with your 2,000 chickens have been able to bank an extra £240 by buying quality stock, but how do I fare? Well if I was in the hatchery business in a reasonable way and sold 50,000 day old pullets annually and received an extra £3 a 100 for them (the difference between £18 and £15) I would clear an extra £1,500 annually which in my own interests I should plough back into poultry improvement work, with the object of maintaining steady improvement in my stock thereby ensuring your custom for years to come.

The Random Sample Laying Test does of course provide hatcherymen with an opportunity to prove to the buying public that the quality of their stock is good and continually improving and I am pleased to report that the number of entries for the second Random Sample Laying Test was equal to those of last year. The keen interest being shown in the Test which is a new type of test to Western Australia is indicative of the interest being taken by breeders and hatcherymen in this State to raise the quality of our poultry.

Departmental officers are already working in with many hatcherymen in an attempt to raise the egg-laying capacity of the State's poultry flock and are anxious to co-operate with other hatcherymen who may be contemplating launching out on a new breeding programme. So if you are interested please let us know.
FEEDING THE MILKING GOAT

By K. NEEDHAM, Dairy Cattle Husbandry Officer

To most people who are not actively engaged in the care and management of milking goats a popular fallacy exists that these animals will produce milk on a very low plane of nutrition and that they are capable of surviving and producing almost exclusively by means of scavenging. How frequently when discussing goats, one hears the comment, made partly in joke, but very often in all sincerity, that these animals will consume paper bags, rubbish and clothing hung out on the line to dry.

It would be as well, right now, to make it perfectly clear that for a goat to thrive and to produce to capacity, it is equally important that it be as well fed as the dairy cow. It is true that goats will eat rubbish and paper bags, but for that matter so will any animal which is, in effect, starving.

Contrary to this popular belief, goats are actually very “fussy” feeders and prefer a wide variety of high-quality foodstuffs. To the breeder of high-quality animals it should be pointed out now that whilst these animals prefer variety, changes in foodstuffs should be made gradually, otherwise, digestive upsets will occur and production will be seriously affected.

All milk-producing animals must be fed to supply two main requirements. The first is known as “maintenance ration” which satisfies the energy requirements of the body to maintain the normal bodily needs of digestion movement, feeding, perspiration and respiration. Over and above this the second portion of the ration is required for the process of production, and this part of the ration must consist of high quality protein with normally a minimum of 16 per cent. crude protein.

Many dairy farmers, and the same can probably be said of goat breeders, tend to be wasteful when feeding the protein portion of the ration. Any source of protein is expensive and for its feeding to be economical it should be supplied according to the production of individual animals. Where they are under test or are hand-milked into a bucket it is a relatively simple matter, and as this is normally the procedure in goat herds there seems no practical reason why these animals should not be fed according to the pounds of milk they produce, individually, per day.

Once the maintenance ration has been supplied it is generally accepted that the goat which does not have access to pasture will require approximately 1 lb. per day of a 16 per cent. protein concentrate for every quart of milk produced. In other words, this is equivalent to 4 lb. per gallon.

In addition to providing concentrate in the bails, goats, like all ruminants, require a supply of roughage and this can be obtained either from hay, chaff, or, to some extent and depending upon the time of the year, from grazing in the paddocks. A supply of good quality roughage is equally essential as that of protein because every ration must be balanced in relation to protein and roughage.

In this State it would seem that more use could be made of high quality pasture for grazing goats, and by this means it will be possible to reduce the purchased concentrate bill.

Goats by nature prefer twigs and leaves to pasture and this aspect is always raised by the goat enthusiast. Nevertheless, it has been established beyond a doubt that if goats are given access to good quality, short-leaved, pasture, they will thrive and produce large quantities of good quality milk.

These animals are particularly fond of lucerne either as green-feed or hay and if supplies of it are available in either form it is possible to reduce the amount of concentrate in the form of grains or meatmeal which are fed in the bail at milking time. It should be remembered, however, that when they are being fed green lucerne they should have access to adequate quantities of roughage, otherwise, troubles can result.
Finally the diet of the milking goat will not be complete without access to mineral licks. A typical one consists of 2 parts bone meal to 1 part of coarse salt. This can be left available to the animals ad lib. to take it as they wish. Such a lick as this is particularly desirable when the animals are run under the intensive system, and have no access to paddock grazing.

Care in the feeding of goats and the use of some discretion in the preparation of their ration will repay amply the time spent in giving this attention.

FERTILISERS FOR VEGETABLES IN SUMMER MONTHS

By J. P. FALLON, Senior Adviser (Vegetables), Horticultural Division

Each year at the Department of Agriculture, a number of requests for advice are received from both commercial growers and home gardeners regarding the failure of vegetable crops during the very hot weather. This applies particularly to such crops as tomatoes, beans, melons, pumpkins and sweet corn. In nearly all cases, when an investigation has been carried out, it is found that the trouble is due to an imbalance of fertiliser.

High production of good quality vegetables is closely linked with the use of correct fertilising methods. Since the necessary plant foods can be largely provided by proper methods of fertilising, the grower is able to exercise considerable measure of control over yield and quality. Most fertiliser mixtures contain the three major plant foods, namely nitrogen, phosphate and potash. If plants are unable to obtain any one of these three, a depression of growth results and definite characteristic symptoms become apparent. It is therefore important to use a fertiliser mixture which will supply all of the major plant nutrients. However, it is also essential to ensure that the three are provided in balanced proportions.

Many growers, rather than purchase a ready-mixed fertiliser, prefer to use a fertiliser which they have made up themselves and which they believe to be best suited to the particular crop and conditions under which they are growing. Very often, these growers, if they give insufficient attention to the matter of fertiliser balance, find that, particularly during hot weather conditions, their crops exhibit symptoms of disorder.

Throughout the study of fertiliser and manurial practice and in fact, all plant relations, it is well to remember the principle of the limiting factor. It is a matter of common observation that no amount of fertiliser added to a soil will give a crop if too little moisture is present. Here moisture may be called the limiting factor.

Plant growth is dependent on many factors including light, temperature, moisture and nutrients. Performance in a given instance is not determined by the average of all factors or by the factor that is present in most favourable degree. Rather, it is governed by the factor that is present in least favourable degree in other words by the limiting factor.

During the summer months when vegetable crops grow so rapidly, many growers are apt to over-stimulate growth by the use of heavy dressings of nitrogenous fertilisers. This promotes an abundant top growth of succulent foliage but unfortunately the root system does not always develop in proportion. As a result, under heat wave conditions or during periods of hot drying winds, the plant finds it is incapable of maintaining a sufficient supply of moisture through the root system to meet the demand of the extensive foliage area. Such plants very often become stressed for moisture even though the soil may be quite moist. In the case of plants like tomatoes, beans or melons, this stress for moisture may result
in flower drop. In the case of tomatoes the fruit may develop a trouble known as Blossom End Rot. Similar effects occur with other crops.

The value of organic matter as a means of maintaining the moisture capacity of our metropolitan area sandy soils during summer months is well appreciated by most growers. However, the fact that organic matter also plays an important part in retaining fertiliser constituents against leaching is sometimes forgotten.

Under sprinkler irrigation, both nitrogen and potash fertilisers are very rapidly leached out unless the organic matter status of the soil is good. Nitrogen is replaced in the topdressing normally carried out but unfortunately, in many instances, the replacement of potash is overlooked.

Growers are advised to give particular attention to the matter of balanced fertiliser applications especially during periods of very hot weather. Care should be taken to apply only the smallest necessary amounts of nitrogenous manures which encourage succulent leaf formation and to ensure that adequate supplies of potash and phosphate fertiliser are available to the plants.

PASTURES AND THEIR CARRYING CAPACITY

By H. G. ELLIOTT, Assistant Superintendent of Dairying

The term pasture is very widely used by dairy farmers in the South-West, and usually refers to any form of cleared land carrying vegetation ranging from poor annual weed species to the best of clover and grasses. Naturally, looking at the position from this point of view it is of little wonder that there is such a wide variation in carrying capacities from farm to farm. Again one is frequently informed by the owner that he is carrying a certain number of stock on so much land—disregarding the amount of fodder, concentrates or grain products which are purchased and fed to them—and thereby giving a false value to the pasture.

Now let us consider how the carrying capacity of a pasture can be altered. A pasture field may have vigorous growth with an excellent mixture of grass and clover capable of carrying a large beast to four acres the year round, but within a few years unless closely watched and carefully managed, it can lose vigor, alter botanically and only produce sufficient for one large beast to eight or more acres.

Why this change? This lowering of carrying capacity can be brought about by many causes such as poor management, insufficient fertiliser, deficiencies of major or minor elements, diseases and insect pests, and finally the use of poor strains and species of pasture plants in the sward. Any one or more of these can cause a decline in production.

Can we say that we have reached maximum production, or the highest carrying capacity of annual pastures, if managed efficiently have carried better than that. Yield figures have indicated that a dry matter yield of 5 tons or more per annum is not impossible. If that is the case a carrying capacity of one beast per acre for the year round should not be impossible, but it is not obtained, due principally to the bulk of the material being produced in five months, while the animal requires grazing over 12 months. Much loss of valuable nutrients occurs during the latter part of the plants’ life and when the material is dry. Probably the largest loss of the most valuable protein material occurs with leaf drop and shattering from maturity onwards.

Every means possible should be made to utilise the production of high-class pasture material, by efficient grazing under a rotational system, by use of electric fences and by conserving as much as possible of the surplus spring production in the form of high-quality hay and silage. This surely will assist in lifting the carrying capacity of good pastures.
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Again if all the good pasture species were freed from competition by vigorous-growing weeds such as capeweed and other early low-quality feed such as speargrass, silvergrass, hop clover, etc., much greater production could be expected. Similarly if pests such as the rabbit, red-legged earthmite, lucerne flea, cutworms, slugs, etc., were all controlled, and plant diseases kept down much higher overall yields and carrying capacities of the pastures could occur.

Apart from the points already mentioned, much greater carrying capacity could be expected from many pastures if they were efficiently drained, and where necessary supplied with whatever element or elements, both major and minor, may be deficient. On most farms, phosphate is applied, on many potash is needed, and many of the areas in the South-West require one or more minor elements, such as copper, zinc and molybdenum.

The effect of poor renovation, lack of a ley system or cropping, and uncontrolled grazing on pastures all tend to reduce their carrying capacity.

If some of these matters receive attention, greater carrying capacity could be obtained, resulting in far greater incomes to the owners of the pastures. It has been worked out that by raising the present estimated carrying capacity from one beast to 4½ acres to one to 3½ acres on present prices the farmers would have an increased gross return of £3 million in the higher rainfall pasture areas of 1½ million acres.

**POLLINATION**

By J. CRIPPS, Adviser, Horticultural Division

Some knowledge of the mechanics of pollination should be of interest to orchardists since it directly affects their livelihood. The union of two cells which takes place at fertilisation and as a result of pollination gives rise to the fruit, which represents the profits.

Fruit trees are usually wind or insect pollinated. Wind-pollinated trees include walnuts and chestnuts and these produce large numbers of tiny inconspicuous flowers which produce vast quantities of pollen to compensate for the enormous waste which occurs in its transfer. Wind-pollinated trees are self-fertile, and pollination depends on weather conditions. The orchardists can therefore do little to ensure an adequate set of fruit or nuts.

This is not the case, however, with other types of fruit, the flowers of which are insect-pollinated; these are supplied with anthers (which shed pollen on to visiting insects) and stigmas equipped with a sticky surface to collect pollen adhering to insects. Most insect-pollinated flowers are arranged so that they cannot be fertilised with their own pollen. Usually pollen maturity does not synchronise with stigma receptivity in the same flower, and the anthers most commonly mature before the stigmas. Pollen may be received from other flowers on the same tree in which case the variety is self-fertile. If pollen has to be obtained from another variety self-sterility is indicated.

The honey bee is usually considered to be the most effective agent for the transfer of pollen from one flower to another, but various other insects do this work. Unfortunately, honey bees only work under good weather conditions and other insects are probably of more use in bad weather. Also, if efficient cross-pollination is to be effected, bees should be so numerous that competition for nectar forces them from one tree to another.

The mere transference of pollen from one flower to another does not necessarily mean that fertilisation has been achieved however.

After the pollen grain has alighted on the adhesive stigma, fertilisation is actually effected by a pollen tube which grows down the stigma into the ovary at its base and fertilises the ovum. But if the pollen is of low viability it may fail to germinate on the stigma. Low viability is
usually due to the condition of the tree from whence it came, and may be caused by poor health or an inadequate supply of nutrients during the differentiation of the flower buds.

Even if the pollen grain does germinate and commence to grow, the pollen tube may not reach and fertilise the ovum due to its slow rate of growth, or to the length of the stigma. Lastly, if the pollen which alights on the stigma fails to fertilise the ovum it may be because the variety is self-sterile, in which case pollen must come from the flowers of another variety.

The only variety of fruit which will set fruit without fertilisation is the Bartlett pear which does produce seedless or parthenocarpic fruit, but more fruit often results from cross-pollination.

Other varieties may be self-fertile, partially self-fertile or self-sterile and we must consider various fruits in slightly more detail.

Some apple varieties are partially self-fertile and under favourable weather conditions may set reasonably satisfactory crops with their own pollen. The Delicious variety is a possible exception. However, in seasons of adverse weather conditions, crops may be light and it is felt that the planting of large blocks of apples without a suitable pollinator involves a definite risk. Granny Smith, Delicious, Jonathan and Yates will all pollinate each other.

Pears, such as Bartlett and Packhams, normally set heavier crops when pollinated by another variety, but Packhams will not pollinate Comice, and Bartlett is better utilised.

All apricots and peaches except J. H. Hale are self-fertile and pollinators are unnecessary. Some Japanese plums are partially self-fertile but it is wise to provide for pollinators. Wickson appears to be self-sterile and is best pollinated by Satsuma or Santa Rosa. Narrabeen and Ruby Blood also need pollinators.

It is, of course, obvious that if a variety is known to need a pollinator, one must be selected with a flowering period which overlaps that of the variety to be pollinated. Further it should be well distributed through the planting. Two main systems are satisfactory. The first is the "one in nine" system, which, in fact, means that the pollinator occupies every third position in every third row so that 11 per cent. of the trees in any planting are pollinators. This system usually provides adequate pollination under local conditions.

Another method is for the pollinating variety to occupy every third row, so that one-third of the trees in any particular planting are of the pollinating variety. Apart from providing more adequate pollination, this system has certain economic advantages with regard to spraying and harvesting.

Before planting an area with fruit trees, the orchardist should therefore find out whether the varieties he has chosen require pollinators, and if so make provision for planting one or more suitable varieties in the most effective system both for ease of working and adequate pollination.

AEROPLANES AND INSECT PEST CONTROL

By P. N. FORTE, Senior Entomologist

The use of aeroplanes in agriculture has received great impetus in Australia since World War II. This was due mainly to the availability, ex disposals, of large numbers of small aircraft which could be converted to apply sprays and dusts for agricultural purposes. In America, also for similar reasons, there are now about 5,000 aircraft engaged in aerial agriculture.

You might ask "What can the aeroplane do to help the farmer?" Well, it has proved an efficient machine for applying sprays and dusts to control insect pests of crops and pastures. Similarly it has proved its use in applying weedicides, to control weeds in crops and pastures and finally it has been used to apply super-
phosphate efficiently to areas of land which ground equipment could not treat. Most people have heard of this being done in New Zealand but actually a large area is treated in this way in Australia and is increasing each year. For instance in 1957 well over one million acres of land in Australia had superphosphate applied by this method and 25,000 acres of this was in Western Australia.

During 1957, aircraft sprayed liquids such as weedicides and pesticides to over 200,000 acres in Western Australia—an acreage almost equal to that sprayed in all the other States put together.

Many farmers in Western Australia are aware of this method of applying insecticides and find it an effective solution to their problem of insect pest control. There are also many farmers who are not sufficiently acquainted with the industry of aerial agriculture to appreciate its usefulness to them.

The obvious advantage is that an aeroplane flying at 75 m.p.h. can cover many more acres per day than any ground equipment. Furthermore, as it passes through the air at low levels the aeroplane causes the spray to be broken up into fine droplets and forced down onto the ground. During wet winters the paddocks are frequently too boggy for ground equipment and can only be treated from the air.

I am sure that most farmers would appreciate these advantages this season with its plague of web worms and red-legged earth mite. The thousands of acres which have been treated this year in Western Australia could never have been treated by any other method.

Fundamentally the problem we have is applying a determined amount of a given insecticide evenly over a given area. Not so very long ago this was done by using 30 lb. of dust per acre or 100 gallons of spray. However with the aeroplane correctly equipped and flown we are able to reduce the volume applied per acre to as low as \( \frac{1}{4} \) gallon under good conditions.

The Department of Agriculture has conducted a large number of trials to test this method of applying insecticides and these were started in 1949. Since then it has established the success of the method and although most of this work has been done on grasshoppers the results are applicable to other insect pests of crops and pastures.

The following crops have been successfully treated by aircraft in Western Australia for insect pests: Potatoes, peas, linseed, flax, wheat, oats, barley and pasture.

The following insects have been successfully controlled in Western Australia with insecticides applied by aircraft: Red-legged earthmite, lucerne flea, webworm, climbing cutworm, pea weevil, grasshoppers and pasture caterpillars.

"KILL THOSE FLIES"

By H. MASLIN, Dairy Instructor, Busselton

FLIES are carriers of disease which can be transferred to milk and to human beings, so it is the duty of every dairy farmer to do all he can to prevent them from feeding and breeding on his property. Do not allow them to feed and breed on dirty milk drums, manure heaps, decaying matter or in filthy drains.

There are two main species of flies which are most commonly seen around dairy premises. One of them—Musca domestica—feeds on decaying vegetable matter, dung and all types of filth. The other species, Stomoxys calcitrans is the fly which bites and feeds on blood. It breeds in straw and decaying hay, rotting grass or grain.

Regulations under the model by-laws of the Health Act provide that the milk room shall be fly-proof and the farmer shall not allow dung to accumulate around the dairy premises.

The dairy instructor does not ask for manure heaps to be removed from the vicinity of the dairy premises just because they are unsightly, but because they are
breeding places for flies and a serious hazard to the purity of the milk. Pick up the dung from the cow-yard daily and remove the heaps from the vicinity of the cow-yard at short regular intervals. This helps to control flies breeding and thus assists control of flies in the dairy.

It takes approximately 10 to 14 days for the egg of a fly to develop into the adult insect, so elimination of breeding places such as manure heaps and drains covered with rotting grasses and hay is much more effective than killing the adult flies which are each capable of laying many eggs.

Cans of milk or cream that have to be held in the dairy should be covered with clean fly-proof covers, such as fly-wire or mosquito netting.

The best way to attack the adult fly is by sprays and baits. When selecting sprays, care should be taken to choose the most effective mixtures and to use them in accordance with the manufacturer's instructions.

The ordinary household fly spray, which usually contains such agents as pyrethrum or lethane, quickly kills any flies which come in contact with it, but once the air clears the killing effect ceases. Therefore in such open places as the milking shed it is not very efficient, but in the milk room which can be closed up it is more effective.

Residual sprays usually contain lindane, DDT or other insecticides which remain effective for weeks and are very suitable for spraying in the milking shed. The use of DDT sprays in the milk room is not recommended as milk and cream will absorb the odour.

For best results the insecticides should be sprayed freely on the walls, ceilings and any structures within the milking bails. Care should be taken to cover any feed boxes in the milking shed before spraying. Diazinon fly bait should be used around all window ledges and any other places within and around the dairy premises where it presents no danger to children, livestock and poultry.

Let us beat the fly by:

1. Removal of any favourable breeding grounds. Shift the manure regularly. Keep drains clean. Remove any decaying or rotten vegetation from around the dairy premises.
2. Keep the dairy premises and utensils clean at all times. Wash the skim milk drums and pig-feeding tins regularly.
3. Use a recommended fly spray and bait to attack adult flies.
4. Rinse the milking machine before milking with a sodium hypo-chlorite solution (one dessert-spoonful per gallon of water).

Safeguard your health and your cream by beating the fly.

GRAZING FOR PIGS

By P. BECK, Field Assistant, Dairying Division.

The pig is the fastest-maturing of all farm livestock and the pig-raiser's main objective is to make money by the conversion of feedstuffs—per medium of the pig's digestive system—into edible meat that will conform to the requirements of the consumer.

Although the pig is able to adapt itself to poor conditions of management, its ability to make profitable liveweight gains is considerably reduced when it is subjected to such circumstances. It is necessary, therefore, in planning accommodation that the farmer should consider the health and comfort of his livestock and plan, so far as possible, to prevent disease by adopting suitable methods of housing, feeding, and management.

The foremost consideration in planning is sanitation, and this applies irrespective of whether the pigs are maintained by the grazing or open air system or the indoor or intensive system. Both types of pig-raising have the one common objective, in that bare dirt yards, muddy areas and
uncleaned pens must be avoided. Disease-causing organisms which can be extremely detrimental to the health of livestock are harboured under these conditions.

Where the property is large enough the paddock system has many definite advantages and even if the area is restricted, combined intensive and grazing methods are especially convenient for sows and litters.

In the heavier rainfall districts where first-class grazing land is available it is usual to allow approximately one acre per sow and progeny, but in the drier wheat-belt conditions the allowance should be increased to five or even ten acres.

Let us now take a closer look at the merits of the grazing system of management. Perhaps the main feature is that a number of paddocks of different size may be utilised in rotation and during the resting period cultivated, and if possible cropped. This makes use of the fertilising value of the manure and is instrumental in reducing worm infestation by destroying the eggs.

The value of good green actively-growing pastures and fodder crops shows itself in its ability to provide minerals and vitamins often lacking in the basic meal ration. Pastures such as mixtures of oats or barley and clover, Kikuyu grass, also field peas and kale are of great value. Lucerne, elephant grass and maize are usually hand-fed, while root crops like fodder beet, sugar beet and mangels may be harvested by the pig or alternatively pulled and hand-fed. Potatoes of course must be boiled before feeding.

It is estimated that 6 lb. of good pasture is equal in feeding value to 1 lb. of concentrate meal, and with the provision of good grazing, the intake of concentrates over a large number of pigs can be reduced with a subsequent reduction of feed costs. The amount of capital outlay on buildings is considerably reduced where grazing is practised—the intensive houses are unnecessary—as all growing pigs can be successfully brought to market weight on pastures and self-feeders.

In the selection of a site for the piggery the situation should be as central as possible, sheltered from the prevailing winds and with a north or north-easterly aspect to ensure adequate penetration of sunlight. Drainage away from the pens, proximity to water and shade are distinct advantages. All paddocks should be sized according to the class of pig they are to carry and linked by lanes which join the central area at the farrowing pens and feeding sheds. Shelter sheds must be installed in each paddock and should be portable as the area adjacent to fixed sheds soon becomes what may be termed as “pig sick.”

Special attention to construction of farrowing sheds is of great importance as young pigs require every protection from overlying by the sow and being chilled in the cold damp weather. Give your young pigs every advantage of good grazing and husbandry to achieve earlier market weights and faster, more profitable returns.

"FEED FLAVOURS IN CREAM"

By an officer of the Dairying Division.

CREAM for butter-making is purchased at the factory on the basis of its grade and test. The grade means the quality of the cream as to flavour, odour, and appearance. The factory grader is a qualified operator, who has had long experience in detecting the various odours and flavours which affect cream quality and he holds a certificate for this work issued by the Department of Agriculture, after having passed the examinations prescribed by the Dairy Industry Act.

Because butter factories are now equipped with up-to-date vacuum distillation units for cream treatment there is a tendency to think that feed and other inferior flavours are not important, but any undesirable flavour in your cream will lower the grade, resulting in a lower price. Furthermore, to effectively treat it, the
factory manager has to slow up the rate of processing and increase the pasteurising temperatures according to the proportion of this class of cream received. This increases the cost of manufacture, which cost is ultimately borne by all producers.

There are many avenues through which flavour and odour may be affected. Most of these are of bacterial origin due to contamination during production and can be controlled by improving the general hygiene in the milking shed and dairy premises.

Cream quality, however, can be greatly affected by the food which the cow eats. The particular flavour of each food is absorbed by the blood stream during the process of digestion and passes via the blood stream to the udder where during the production of milk it becomes associated with the butter-fat. Good mixed pasture imparts a desirable clean, nutty flavour to cream. In practically all West Australian pastures the dominant legume is subterranean clover and whilst this is an extremely valuable feed, its flavour in cream is pronounced. Many pastures have a large proportion of Capeweed in their make-up and many are infested with scrub and other weeds. The combination of these produce feed flavour in cream which is very noticeable and it increases during the season as the plants approach the flowering stage. It is rarely severe enough to warrant classing the cream as second-grade but at ordinary intensity, will prevent it being graded “choice.” Feed flavour in very thin cream is often associated with gas production, known as “feedy ferment,” and this cream is always second-grade.

Where cows are grazed on lush pastures of the type just mentioned, it is not possible to completely exclude feed flavour from the cream but here are some methods by which the condition can be greatly improved. Firstly the cows should be removed from the pasture at least two hours prior to milking, particularly the evening milking. The taint is thus given a chance to be worked out of the system, apparently through the lungs. Secondly, the separator should be set to skim at 40-42 per cent. fat. This gives a cream of good consistency and reduces the tendency to gas formation. Feed flavours are fairly volatile and can be improved by aeration; therefore if the cream coming from the separator is run over a surface cooler in a clean atmosphere the taint will be reduced considerably and the temperature lowered; further aeration can be gained by frequent stirring in the can using a metal plunger with a mushroom end.

These suggestions are not new; they have been common knowledge for many years but they should not be treated lightly. The quality of the raw cream is still the chief factor determining the quality of the finished butter, and the production of good butter from “feedy” cream is at best, doubtful and is costly to all sections of the industry.

THOSE OLD MILK AND CREAM CANS

By D. C. MICKLE, Dairy Instructor, Bunbury

The trend of modern dairy equipment continues more and more towards the use of stainless steel. Have you ever considered the reason for this? I suggest that the reasons be in—

(a) The superior standard of cleanliness which can be achieved;
(b) economy in plant replacements;
(c) improved flavours in the finished product; and
(d) a pride in the appearance of equipment which promotes sales and service.

There can be no doubt in any producer’s mind as to the suitability of stainless steel as a material with which to build milk and cream cans, particularly cream cans, for these vessels are daily in use as means of storing cream awaiting transport to the factory. Too often we find that cream which has developed a high degree of natural acidity has been stored for up to four and five days in a battered old can, the tinned surface of which has practically disappeared.
Many old cans seen at factories have large areas of rusty, exposed iron, and others have numerous pin-holes of tinless metal on the interior surfaces of the can. This condition causes the development of a metallic flavour in the cream or milk, particularly when acid production has commenced. This is a typical, astringent flavour which develops in the cream with the production of metallic salts. The acid in the cream enters into chemical combination with metals such as the exposed iron or steel of the can.

The really bad feature, too, is that pasteurisation of the cream or milk intensifies this chemical action, and as the metallic salts formed possess catalytic properties, their action continues, resulting in flavours of fishy, tallowy nature in the finished dairy product.

It will therefore be quite obvious to you that using only the best equipment can give satisfactory results. Certainly, stainless steel cans require a big financial outlay in the first instance, but remember, the initial cost is the last cost. Don't take too much pride in having used the same old can for the past 25 years—"and never been tinned yet"—if its tinning is not bright and it has even a trace of metal showing. Take a lesson from the stainless steel separator bowl and discs now in common use on farms. They will never wear out if treated with care.

If you cannot afford the outlay on the best then you are strongly advised to examine your milk and cream cans now and to discard the old battered cans which have really served you well. Those cans of sound construction which are dull and lacking in tinned surface and have bare metal exposed should be re-tinned immediately.

It is well to remember that a badly pitted surface in cans does not always re-tin satisfactorily. This is due to the tendency of the tin to stretch across some of the pits rather than to fill them and rust spots soon make their appearance where this tin breaks away.

By the appearance of many of the old rusty-looking cans used in transport of milk and cream to the factories, it seems possible that in between seasons such cans are used as water containers, or for other purposes, or are left outside in the weather until wanted again. They become wet and sometimes are left with water in them. This is the start of poor appearance followed by rust development. The careful producer stores his un-used cans in a clean, dry area and ensures their good condition by covering the internal and external surfaces with a thin coating of petroleum jelly. When daily milk production applies, the cans should be placed on a rack up-side-down to ensure that they can dry out. They should then be sterilised just before use. The attention given to some cans is quite obvious on the factory grading floor and their good condition merits the pleasure the cream grader finds in handling such cans.

Again I emphasise that a wet can is the start of a rusty can, unfit for use in production of dairy products.

"OVERUN" IN BUTTER MAKING AND QUALITY IN HOME-MADE BUTTER

By A. H. Hobbs, Dairy Produce Inspector

We frequently hear farmers say that the weight they get paid for when they send cream to a butter factory is lower than if they made the same cream into butter on the farm. This is explained by the fact that the Regulations under the Dairy Industry Act require that cream for butter making supplied to a factory shall be bought from the farmer on the basis of its fat content.

Each supplier's cream arriving at the factory is weighed and sampled and the percentage of fat in it is determined by a chemical process known as the Babcock Test. Then by multiplying the weight of cream in lb. by the percentage fat test, the lb. of fat are calculated and paid for at so much per lb. fat.
Suppose a farmer sends in 10 lb. of cream testing 40 per cent. of fat; this means that the cream contains 4 lb. of pure fat. If Mrs. Farmer had made this cream into butter, the butter would contain 4 lb. of fat, plus water and salt, and also some curd from the butter milk. The name given to this water, salt and curd is "overrun," and it usually amounts to about 22 per cent. of the weight of the fat; so that the 4 lb. of fat in the cream would be increased by 22 per cent. to make nearly 5 lb. of butter.

Now the amount of water, salt and curd in butter varies, therefore the amount of butter made from a certain quantity of cream will vary from day to day. But the amount of fat in cream at a certain test is constant, and that is why it is compulsory for factories to buy on this basis. Butter normally contains 15 to 16 per cent. of water, 1½ to 2 per cent. of salt and about 1 per cent. of curd. As the farmer has no means of testing the butter, it will be found that the water, salt and curd are often greater than these amounts, with the result that the overrun on farm butter may be 25 per cent. or higher.

However, I would not deter farmers from making butter for their own use. If you are a long way from town it may be convenient and profitable. Fresh, well-made farm butter can be very palatable. It should however, be made in small batches because it is normally made from cream in which the acid has developed to the stage where the cream is slightly sour; and while this gives the butter a desirable flavour when fresh, it is the main reason why farm butter will not keep. On the other hand, factory-made butter in Australia may have to stand up to storage periods of seven to eight months and sometimes longer. Therefore, the acid in sour cream delivered to the factory is carefully neutralised back to the sweetness of table cream. This butter has a milder flavour, but it will remain in good condition for long periods in low temperature storage.

Do not forget, also, that to make good butter on the farm the temperature of the cream needs to be kept at about 50° F. for several hours, and after churning, the butter grains need washing with clean water at the same temperature. This gives a firm fat which allows sufficient working, to give even distribution of the water and salt, and develop a plastic spreadability without becoming greasy.

Cleanliness, of course, is of prime importance. All utensils after use should be scrubbed with hot water containing washing soda, then finally rinsed in plenty of boiling water and left to dry without wiping. They should be scalded again and then dipped in cold water for a few minutes before making the next batch.

**MILK FLOW INDICATORS**

By G. W. SCOTT, Dairy Instructor, Head Office

**DURING** recent years, considerable attention has been given to efficient machine milking, both in the research field, and in passing worthwhile information to dairy farmers. While many farmers have applied the recommendations with excellent results there are still those who are reluctant to change the methods to which they have become accustomed over years. However, it is recognised by most dairy farmers that fast milking has considerable advantages, such as saving time in the shed, allowing more grazing time for the herd, and other things being equal giving increased production.

There are many factors which contribute to fast, clean milking, including the type of milk flow indicator incorporated in the machine, and today it is proposed to elaborate on this subject.

Most early, model milking machines were not equipped with indicators and the only method of determining when cows were milked out was to feel the milk pipes by hand, and judge the position by the warmth of the pipes.

Many of these machines are still in use and it is admitted that some operatives are surprisingly accurate in gauging the end point of milking. However, the element of guesswork must always be...
present under these conditions, and there is a tendency to leave the cups on longer than necessary, particularly when machine stripping.

In this modern age it is recommended that cows should be stripped by the machine instead of by hand and it is considered that the majority of farmers now use the machine method, for stripping, which calls for the use of reliable milk flow indicators.

Several types of indicators are installed on milking machines as standard equipment or they are available for fitting to most makes of machines. The early type of indicators consisted of a short length of glass tube placed in the rubber milk line from the teat cup claw, and although these are inefficient they are still used on some farms and in general when herd-testing buckets are used. The most common type consists of an inverted glass jar fixed at the junction of the milk dropper tube and the main milk line, or a glass cylinder clamped between two end plates.

These types are considered to be quite useful but do not give a definite end point indication when the cow is milked out, and once again there is the tendency to leave the cups on the teats longer than necessary. This is due to the fact that a very small quantity of milk passing through the indicator appears to be of much greater significance than it really is. In effect, a few drops of milk will spread and cover the inside surface of the glass which is misleading to the operator.

In order to overcome this, research workers in New Zealand designed the Ruakura milk flow indicator which is simple, easily cleaned and readily available for fitting to all makes of machines. Basically it consists of a bakelite body with a circular glass window approximately two inches in diameter. While the milk is flowing freely the space behind the window is completely filled with milk, but as the milk flow decreases the level behind the glass falls accordingly and can be observed as a well defined line without the splashing and surging which is evident in other types. When the milk level in the indicator falls close to the bottom of the glass it is the signal for machine stripping to be commenced. This is done by pressing down on the teat cup claw and giving the udder a small amount of massage. When this stripping is started the level on the indicator glass will rise slightly if the cow is still giving milk. As soon as the milk disappears from behind the glass the rate of milk flow has dropped to half a pound per minute and milking is completed.

Before concluding, it is felt that a few hints on the installation of the Ruakura Regulator may be worthwhile.

Firstly, it is essential that it is mounted with the two fixing screws truly horizontal. Secondly, it is desirable that it should be mounted with a slight slope out at the bottom to assist in keeping the flap closed, and thirdly, it is an advantage to have the milk dropper tap at the bottom of the dropper tube instead of at the top.

**LAMB PRODUCTION AT ESPERANCE**

Recent recommendations by the Esperance Development Advisory Committee were that the area should be developed primarily on a pasture-stock basis for the production of wool and meat.

This has been the policy of the Esperance Plains Research Station since its inception. Registered and commercial flocks of Corriedale sheep, together with some Merinos, have been maintained on the research station for several years and a breeding unit of Aberdeen Angus cattle was established there early last year.

The scope of investigation into stock husbandry is being further widened to include quality fat lamb production during the coming season. Two Southdown and two Suffolk rams were acquired recently and these will be mated to Corriedale ewes which are known to be good mothers for fat lamb production.

Good quality fat lambs have already been produced in this area, but more precise knowledge will be obtained by comparing the carcass quality of lambs obtained by different breeds of sires.
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