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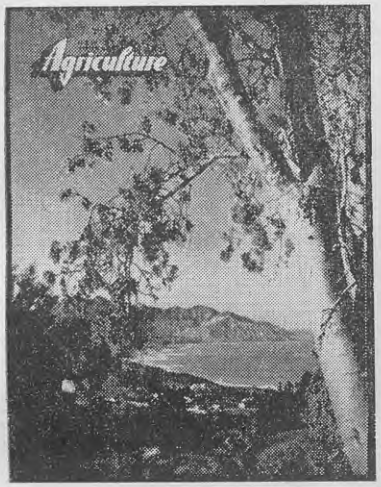
This month's cover



Flowering kowhai at Waipiro Bay is the subject of this month's cover, which has been reproduced from a natural-colour photograph by National Publicity Studios. Unusually colourful among native trees, the kowhai flowers in early spring in northern districts, a feature of the species being that it is deciduous and the flowers appear before the leaves. Waipiro Bay is 69 miles north-east by road from Gisborne and is one of the settlements of the extensive sheep farming area around East Cape, most of which was developed from heavy bush, pastures being surface sown after the trees had been felled and burnt.

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Oxford, a thriving North Canterbury township with a population of 900, is situated 40 miles north-west of Christchurch, and forms the business centre of two counties, Eyre and Oxford. From 1940 to 1945 Oxford was the headquarters for North Canterbury of the linen flax industry. The main sources of revenue are from wool, fat lambs, cereal and pulse crops, small seeds, and dairy produce.

[*V. C. Browne photo.*

EFFICIENCY AND QUALITY IN AGRICULTURE

DURING the past 6 months I have had many opportunities of meeting my fellow-farmers in a diversity of activities on and off their farms. It has been a particularly interesting experience to attend in my capacity as Minister of Agriculture conferences of most of the major organisations of the farming industry and to see in operation the machinery of the several bodies that administer the interests of different sections of primary producers. One of my deepest impressions has been of the calibre of the men taking leading parts in the conduct of the business of these organisations, and the sacrifices of time they are prepared to make toward the advancement of the industry.

Co-operation of the Industry

When some months ago the producer organisations gave me an assurance of their full support in the prosecution of the Government's increased production plans, I felt that we were on the threshold of a new era in co-operation in our agricultural development. The many instances I have had since of the strength of these organisations within their own spheres and the sound basis on which they are founded have given me new heart to face a period which may contain difficulties that will require clear thinking, mutual good will, and the co-operation of all sections of the industry to surmount.

Eagerness for Better Husbandry

Our role as a major food-exporting country has been an easy one to play for some years when our total surplus production has been assured of a ready sale. It is a healthy sign that in spite of the comparative ease with which the fruits of the soil can be produced in New Zealand, with its adequate rainfall and equable climate, there is little evidence of an inclination to let Nature do everything for us. Farmers generally are eager to exert extra effort toward better husbandry and increased production, and avail themselves quickly and intelligently of advances in agricultural knowledge developed and tested in our research stations and disseminated by an efficient extension organisation.

World Markets May Change

Reports of difficulties our representatives have met in Britain in conducting the primary produce price negotiations may have created anxieties in some minds. It may be salutary for us to be reminded after years of maximum demand at high prices for our products that the days of keen competition on the world's markets may soon return and that we may be approaching a period when our customers will be offered increasing quantities of quality products by competitive sellers. These are conditions of which many of the older men in the industry have experience and wide knowledge that will undoubtedly stand us in good stead should there be a major change in the conditions of disposal of our primary products.

It is unfortunate, perhaps, that though Nature has been bountiful in this country in the conditions of soils and climate she provides favourable to livestock production, her gifts have not been diversified. Our economic eggs must continue to be placed largely in the one basket—the export of livestock products.

Our continued prosperity and the maintenance of our standards of living can be assured only by concentrating on efficiency and quality in production. There is no more discriminating buyer than she who buys for the larder. In times of scarcity food is readily saleable and quantity may assume greater importance than quality. Let quantity be assured, however, and quality becomes the deciding factor.

Increasing World Population

World population figures have mounted rapidly in recent years and the cultivable area of the earth's surface has decreased. If food distribution problems that have concerned such organisations as FAO in recent years could be overcome and world economy could be geared to the solution, no food-exporting country need be concerned about disposal of surpluses. Although the thoughts of all men who have mankind's welfare, and even survival, at heart must be bent to such a solution, in the meantime we must hold our place in an imperfect world.

Unused Potential of Farmlands

It is our present duty to use to the full the resources at our disposal. We would be failing in that duty if, while there are peoples in the world with less than the means of subsistence, we did not assure maximum production from our farmlands. I have frequently asserted that our full potential is yet far from being realised, and this conviction has been strengthened by a recent report of an economic survey in my own county of Akitio. This shows that production there could be increased by full application of present agricultural knowledge and improved management methods to the value of nearly half a million pounds. Similar surveys are being conducted in other counties as part of the increased production programme. With the support of the farming community and producer organisations, knowledge we are accumulating of the unused potential of our farmlands can be applied quickly and efficiently. If, with increased quantities, we also maintain a jealous regard for quality, we should have little to fear in the foreseeable future.

K. J. HOLYOAKE, Minister of Agriculture.

CARE OF LIVESTOCK DURING SEPTEMBER

Contributed by the Animal Research Division.

WELL-REARED cattle at the Department of Agriculture Animal Research Station, Ruakura, outproduced their poorly reared mates by a total of 40lb. of butterfat over the first two lactations; both groups were treated alike from first calving onward. Frequent changes to good, clean pasture are essential if calves are to be successfully reared. (See notes in the July issue of the "Journal".) Rotational grazing avoids deaths in winter, eliminates the need for drenching against worms, and produces yearlings 100lb. heavier than those kept in the one paddock for weeks at a time.

ROTATIONAL GRAZING OF CALVES

* * *

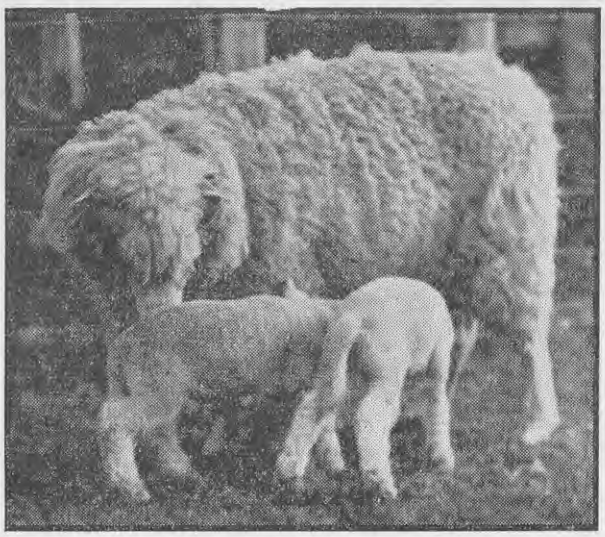
Autumn-saved pasture is almost equal to high-quality spring pasture as a milk-producing fodder. It should therefore be rationed to the milking cows to make it last until the spring feed comes away and hardens up. An electric fence is essential for efficient utilisation, enabling it to be grazed in small breaks. Unless sufficient reserves of this pasture are available for full feeding, the balance should be made up with silage. Make sure enough hay is retained to balance up the lush spring growth.

FEEDING THE MILKING HERD

* * *

For the first month or 6 weeks of its life a lamb depends almost entirely upon its mother's milk. Research has shown that ewes rearing twin lambs give considerably more milk than those rearing singles. Ewes with singles are capable of producing more milk in the early part of lactation than the lamb can drink. This is not the case with ewes rearing twins, the two lambs together soon being able to take all the milk which the ewe can produce. For this reason ewes with twin lambs should be grazed separately and given the best feed available. Many farmers have worked out practical methods of achieving this.

CARE OF EWES WITH TWIN LAMBS



* * *

Late-farrowed spring litters should receive special attention, since they will be approaching weaning age. Creep feeding is the secret of securing the heavy weaner, and best results will be obtained by having a supply of meal and milk always before the litter. Weaned pigs must be well fed, and if meal has been used before weaning, its use should be continued for at least a fortnight to avoid an after-weaning check. The meal ration should be reduced as the skimmed-milk supply increases. It is preferable to feed meal to weaners up to half their daily rations and give the milk saved to the store pigs rather than feed meal to the older pigs at this stage. Sows should be hand mated, and receive sufficient milk and meal to enable them to regain some of the weight lost during the previous suckling.

CARE OF PIGS

* * *

On farms where scabby mouth occurs each new crop of lambs should be vaccinated, and this is most conveniently done at marking. If lambs are not protected, they are liable to suffer a severe check, as the disease makes eating very painful. The vaccine, which is available free through any office of the Department of Agriculture, gives very good protection if properly used. Care is necessary to keep the needle prong clear of grease. If it becomes blocked, no vaccine is applied and lambs may still be susceptible.

VACCINATION AGAINST SCABBY MOUTH

* * *

Mastitis is usually most prevalent in spring. Milk from all quarters should be carefully examined in a strip cup each day. If there is any abnormality, treat the quarter without delay, using three tubes of penicillin cerate at 24-hour intervals. Prompt treatment at this time of the year will greatly reduce loss in production from light or dry quarters.

MASTITIS

* * *

To prevent coccidiosis in chickens it is necessary to keep them growing steadily. Any check is dangerous. Cleanliness is very important, as the disease spreads through the soiling of food by droppings. If an outbreak occurs, sulphamezathine should be used in the drinking water. Full particulars of dosage may be obtained from Poultry Instructors of the Department of Agriculture.

COCCIDIOSIS IN POULTRY

Improving Strains of Bees by Artificial Insemination

THE application of artificial insemination of queen bees at the Department of Agriculture's Animal Research Station, Wallaceville, to a project for the improvement of strains of bees in New Zealand is described in this article by T. Palmer-Jones, a Research Officer at the station, and G. E. Miller, Horticultural Cadet, Auckland. Artificial insemination is the only method showing promise of being of practical value in the removal of the element of chance from the mating of queen bees and its replacement by a controlled method. Application of the method is still in the experimental stage, but great possibilities of improving strains of bees are evident.

COMMERCIAL beekeepers have long realised that the progeny of queen bees vary a great deal in their capacity to gather honey, tractability, swarming tendency, and other qualities. Selective breeding of queen bees for desirable qualities is the accepted practice, but in the past it has been much handicapped by the fact that the queen bee mates only in the air and not necessarily with drones from her own hive.

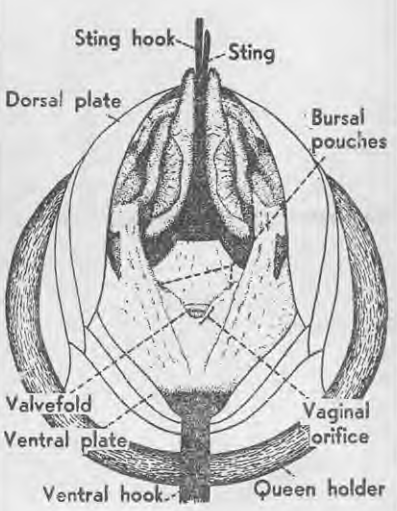
Commercial breeders of queen bees usually attempt to overcome this difficulty by placing their queen-rearing apiaries in isolated localities and stocking them entirely with what they regard as suitable bees for breeding. Under these conditions the air surrounding the apiary is saturated with drones of the right type and mismating is unlikely to occur. At best this method gives somewhat haphazard results and does not permit improvement of strains of bees by the methods which have been used with success in the breeding of domestic animals.

Many unsuccessful attempts were made to remove the element of chance from the mating of queen bees and to replace this with a controlled method. These attempts included mating the queen with approved drones in enclosures, mating the queen with a drone by the manual manipulation of the operator, and early attempts at artificial insemination. Artificial insemination was the only method which showed promise of being of practical value. After much painstaking work, Watson in America was able to demonstrate in 1926 a satisfactory method of artificially inseminating queen bees. Since then many American workers have gradually improved the instruments used and the technique of insemination.

The apparatus now used for artificial insemination, the technique of the method, and sufficient of the anatomy of the reproductive organs of bees for its understanding are described in a manual by Mackensen and Roberts (1) from which the following account is largely taken.

Anatomy of Queen Bee

In brief, instrumental insemination consists of removing semen from selected drones with a microsyringe and injecting it into the oviducts of a virgin queen bee. To make the process clear it is necessary to describe the anatomy of the queen bee in some detail.



[From Mackensen and Roberts.

Fig. 1—The sting chamber of a queen bee properly opened for insemination.

The tip of the abdomen of the queen consists of an upper, or dorsal, plate and a lower, or ventral, plate, which close at the tip like the two halves of a shell. The cavity enclosed by these plates is called the sting chamber. In Fig. 1 the tip of the abdomen is shown in proper position for artificial insemination, with the dorsal plate and the ventral plate drawn apart to expose the sting chamber and its structures, including the sting and the vaginal orifice.

1. Mackensen, O., and Roberts, W. C. (1948): "A Manual for the Artificial Insemination of Queen Bees," United States Department of Agriculture.

HEADING PHOTOGRAPH: The apiary used in the insemination project at the Animal Research Station, Wallaceville.

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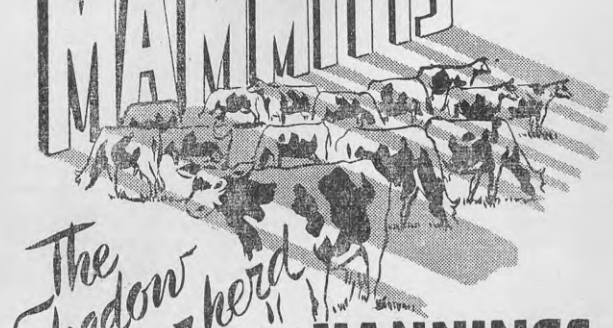

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Fig. 2 illustrates the internal portions of the reproductive tract with the side toward the observer removed. A fold across the anterior floor of the sting chamber loosely separates a region called the bursa copulatrix from the sting chamber proper. The vagina, through its vaginal orifice, and the bursal pouches open into this region. The spermathecal duct from the spermatheca enters the vagina in front from above. Just below the opening of this duct is the valvefold, a large, tongue-like structure with transverse ridges, which make it distinguishable from other tissues when viewed through the vaginal opening. Its position is such that it can close the passage between the vagina and the middle oviduct with a valve-like action. The paired oviducts enter the middle oviduct anteriorly. They are large fluted structures capable of great expansion for the temporary storage of sperm after mating and of eggs in a laying queen. Each paired oviduct leads to an ovary. In Fig. 2 the reproductive tract is extended, but during insemination the queen is held in such a way that the vagina is collapsed, and the valvefold often appears to be just inside the vaginal opening (Fig. 1).

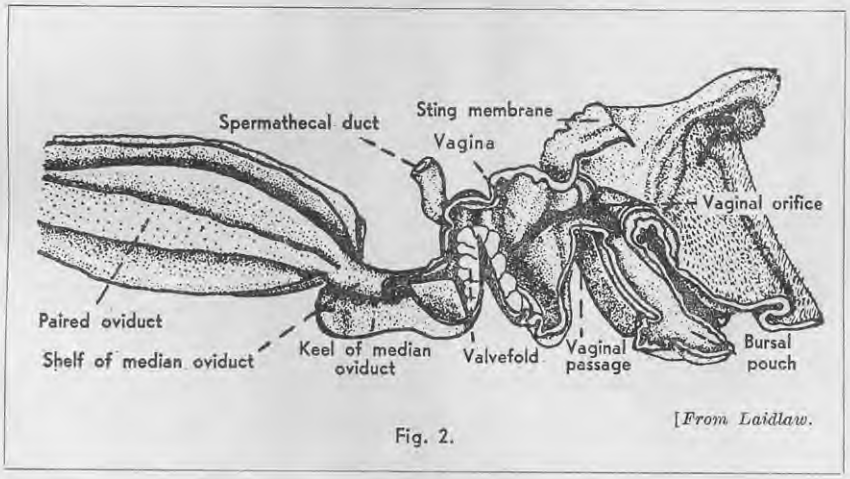

Fig. 2. [*From Laidlaw.*

A knowledge of the anatomy of the reproductive organs of the drone is not required for artificial insemination.

In order that the semen may reach its natural position by artificial insemination, the valvefold must be pushed down to permit the point of the syringe to pass into the middle oviduct. If the syringe enters only the mouth of the vagina, the semen presses the valvefold against the middle oviduct and is forced back around the syringe and out into the sting chamber. The vagina is not easily distendable, but the oviducts expand to hold a large quantity of semen.

Equipment Used

A microscope and microscope lamp, an apparatus for delivering a steady flow of carbon dioxide, and a manipulating apparatus for holding the queen and instruments during insemination constitute the equipment used.

Microscope: The collection of semen from selected drones, the preparation of the queen for insemination by opening the sting chamber with instruments, and the insemination itself are all carried out under a microscope with a strong light focused on the queen. A magnification of 22.5 times is commonly used in the work. In Fig. 3 the operator on the right is shown using the apparatus to inseminate a queen while the operator on the left uses similar apparatus to load a syringe with semen from a drone.

Fig. 3.

Carbon dioxide supply: A very slow stream of carbon dioxide gas is passed over the queen to keep her anaesthetised while she is held in a plastic queen holder for insemination. The gas is supplied from a cylinder in which it is confined at a high pressure, and the pressure must be reduced before the gas reaches the queen. The apparatus for this purpose is shown in Fig. 4. At Wallaceville the ordinary diaphragm reducing valve (B), though capable of reducing the gas pressure to a few pounds, was found to be too insensitive. The difficulty was overcome by passing the gas, after it left

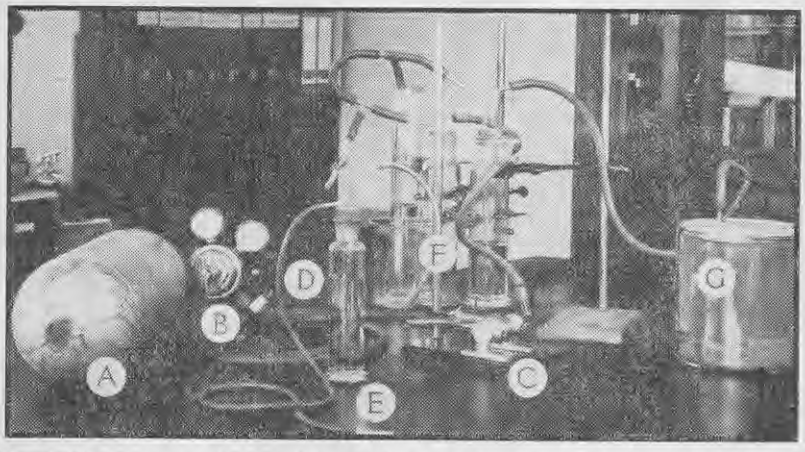

Fig. 4—The apparatus for supplying carbon dioxide gas for the anaesthetisation of queen bees during insemination. A: Cylinder of carbon dioxide. B: Diaphragm reducing valve. C: Chamber fitted with needle valves. D: Bubbler tube. E: Plastic tube for delivering gas to the queen holder. F: Alternative bubbling system. G: Container in which caged queens are treated with carbon dioxide.

the reducing valve, into a small chamber (C) fitted with leads the entry of gas into which could be controlled by fine needle valves. From one of these leads the gas was passed, through a bubbler tube (D) partly filled with water to the plastic tube (E) which delivered it to the queen holder. The gas could also be passed directly from the reducing valve (B) through a tube which could be closed with a stopcock and through the bubbling system (F) to the container (G) which was used for anaesthetising caged queens. The supply of carbon dioxide to the queen could be gauged easily by the rate of bubbling in the bubbler and regulated to give the minimum flow needed to keep the queen completely anaesthetised during insemination.

The manipulating apparatus consists essentially of a heavy stand on which are mounted the queen holder, the syringe, and the holding hooks in such a way that they can be moved and adjusted easily (Fig. 6).

Syringe and instruments: A and B in Fig. 7 are the components of one of the latest-pattern syringes. It consists of a metal plunger which can be screwed up and down a barrel to exert pressure on a rubber diaphragm by way of an intervening piece of pointed metal. A plastic screw tip holds the diaphragm in place. Before use the syringe tip is unscrewed and its base filled with water. Then the semen is sucked into the tip by screwing the plunger back in the barrel. The probe (D) is used to push down the valve-fold so that the syringe can be inserted in the vagina. The holding hooks (E and F) are used to hold the sting chamber of the queen open during insemination. E is the ventral hook, which fits over the ventral plate, and F the dorsal or sting hook used to press the sting out of the way. A blunt dissecting needle is used to push down the sting so that the sting hook can be placed in position.

The manipulating apparatus, syringe, and instruments described were bought from the Department of Economic Entomology, University of Wisconsin, U.S.A. In the apparatus supplied the syringe mounting block could be adjusted to no greater extent than the ventral-hook and sting-hook mounting blocks. It was found of great convenience, however, to modify this part of the apparatus slightly by passing the screw supporting the syringe holder through a horizontal slot cut in a plastic syringe mounting block, which was then mounted on the metal pillar. The screw was flattened and fitted the slot closely so that it could not turn. The syringe holder could thus be moved in the horizontal plane in the same fashion as the queen holder. This arrangement allowed greater flexibility in adjusting the instruments before insemination and reduced the time of the operation.

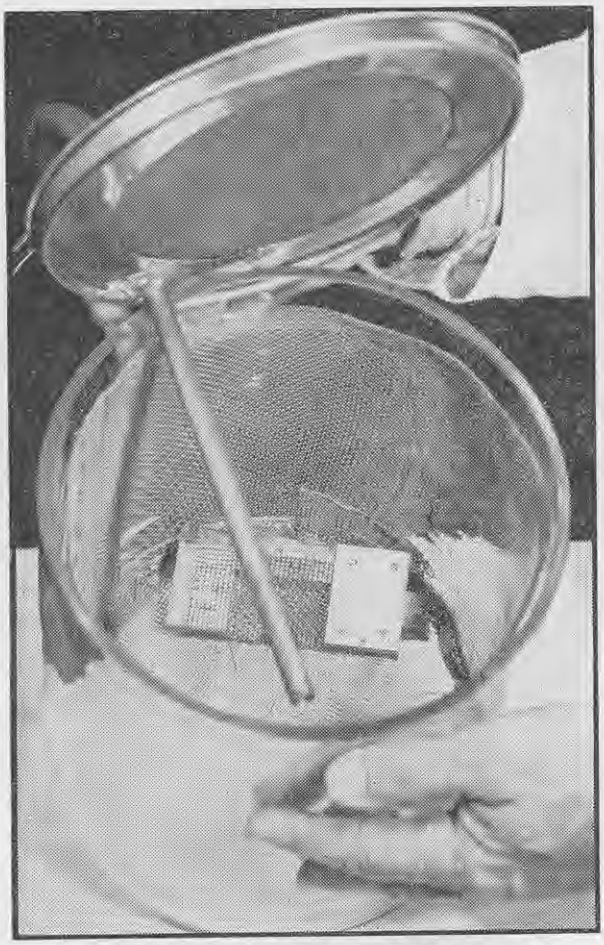

Fig. 5—A closer view of the container in which caged queens are treated with carbon dioxide.

The queen holder is a tube tapered at one end and with a movable stopper fitting closely inside. The queen is backed into the tube and held with the stopper so that her abdomen projects beyond the end. The stopper is bored out so that carbon dioxide can be allowed to flow round the queen, so keeping her anaesthetised during insemination.

Insemination Technique

The queen is run into a plastic tube of the same diameter as the queen holder. This is fitted with a plastic stopper which can be pushed along inside it and used to coax the queen tail first into the queen holder. The queen is always arranged so that when she is anaethetised her upper surface is to the right of the operator.

The two holding hooks are then inserted, one at a time, into the sting chamber and the abdominal plates pulled apart, the operation being performed under the microscope. The syringe is then placed horizontally in its holder so that its tip is in focus, ready to be filled with semen.

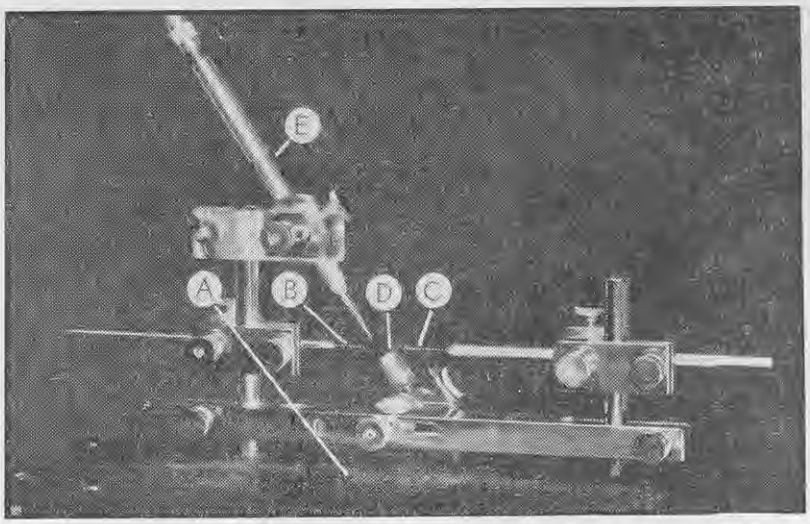

Fig. 6—The insemination apparatus. A: Stand. B: Sting hook. C: Ventral hook. D: Queen holder. E: Syringe.

The selected drones are anaesthetised by dropping them into a stoppered glass jar with a wad of cotton-wool soaked in chloroform covering the bottom. The penis of a sexually mature drone usually everts partially under this treatment, and more complete eversion is secured by squeezing the drone between the fingers. The semen is cream coloured and can be distinguished from the white and more viscous mucous. When the penis is at the right stage of eversion for withdrawal of semen it is brought in contact with the tip of the syringe and the semen skimmed off by withdrawing the plunger (Fig. 8). Inseminations at Wallaceville were usually made with the semen from three or four drones.

Immediately after being filled the syringe is placed in position above the queen, its tip having been moistened with water to act as a lubricant. The sting hook is pulled so that the sting chamber appears as in Fig. 1. Then the probe is inserted into the vagina and the valvefold pushed down so that the syringe can pass over it into the median oviduct (Fig. 9). When the syringe is in position (Fig. 10) the plunger is slowly screwed down so that the semen enters the oviduct. If semen begins to well out round where the syringe enters the vagina of the queen, it indicates that the tip of the syringe is not properly in place and the syringe must be withdrawn and reinserted.

Though at first some trouble was experienced at Wallaceville in mastering the insemination technique, it was found that after several weeks of practice the operation could be performed without much difficulty. At this stage of proficiency the time required to remove a queen from the adjoining apiary and inseminate and return her averaged about 30 minutes.

Inseminations, usually two, are made from the fourth to the tenth day after the queen emerges, and should be two days apart.

Conduct of Project

Artificial insemination of queen bees has provided a practical means of improving strains of bees but, though a satisfactory technique has been evolved, its application to the best advantage is still in the experimental stages. From work carried out in America it appears that the only practical method is first to inbreed strains of bees and then to cross the inbred strains to produce hybrids.

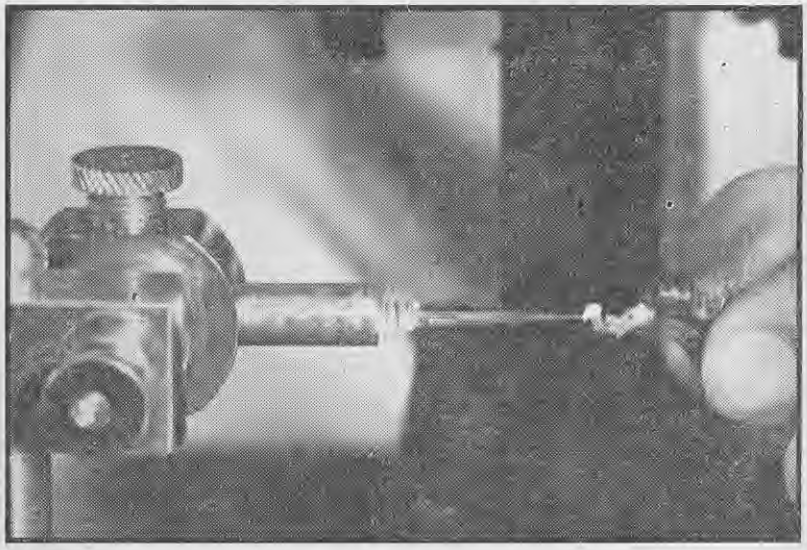

Fig. 8.

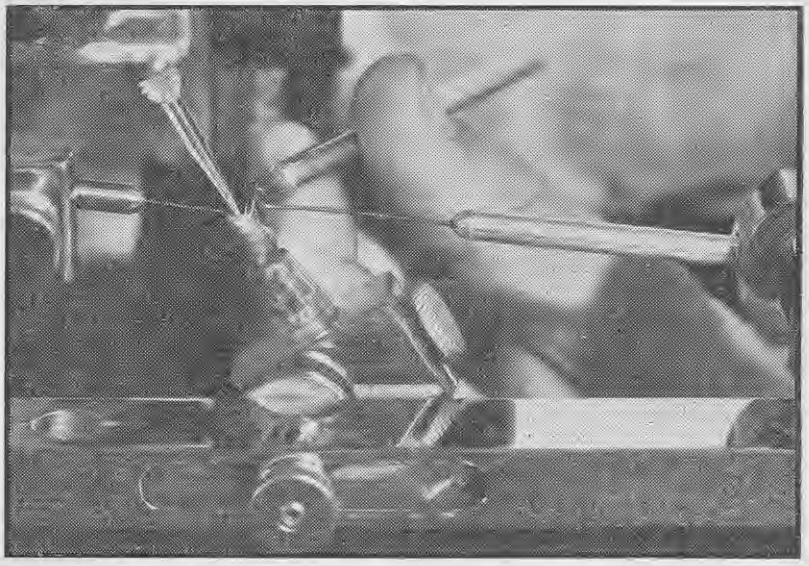

Fig. 9.

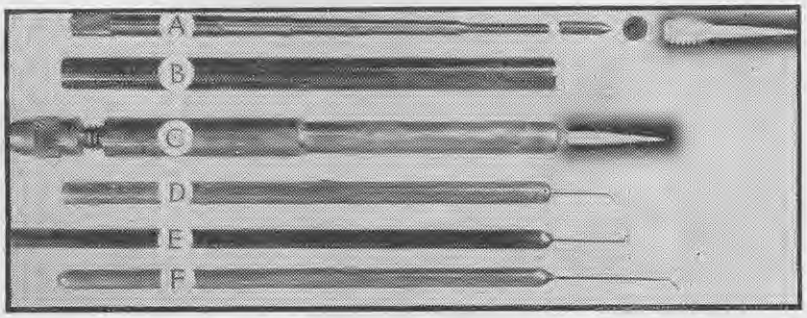

Fig. 7—A: The internal parts of a syringe. B: The barrel of the syringe. C: The syringe assembled. D: Probe. E: Ventral hook. F: Sting hook.

Fig. 10.

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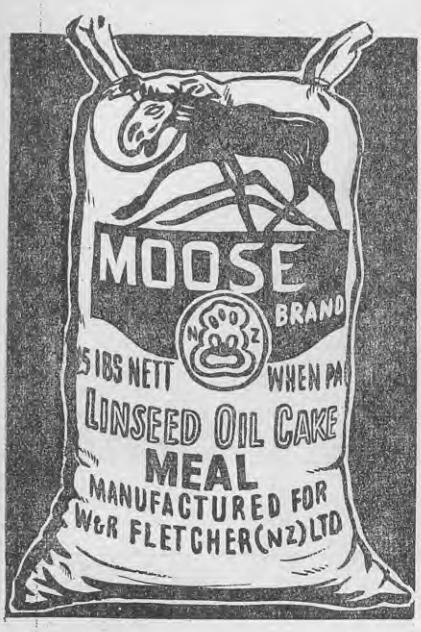

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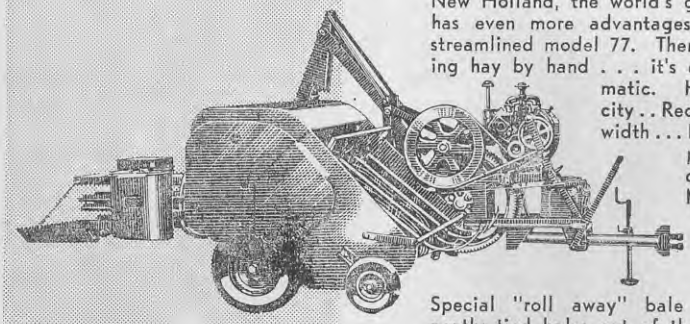

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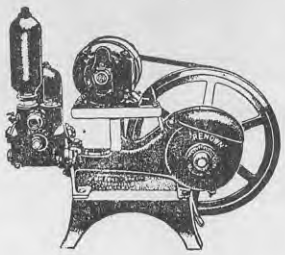

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The Wallaceville project entails first inbreeding selected queens, then crossing the inbred strains to produce hybrids, and finally testing the worth of these hybrids and their progeny by the criteria used in judging the value of queens raised commercially. Crossing of the inbred strains to produce hybrids is necessary because inbreeding reduces fertility, which this procedure restores. Inbreeding concentrates good and bad qualities, so that, though many hybrid queens will be much below the average in performance, others can be expected to be above the average. At this stage of the programme progeny testing will be carried out so that the best hybrid queens can be selected. These selected queens will be placed in isolated apiaries and young queens bred naturally from them tested further in these apiaries. Queens from the best hybrid strains will then be used for production of young queens by natural mating for further testing in commercial apiaries and at Wallaceville. Finally, suitable hybrid strains will be chosen for mass production of breeder queens, by natural mating, for supply to the industry. This programme will require at least 5 years for completion.

It is hoped in this way ultimately to supply the industry with queens better than those at present in use. As the desirable qualities of the selected queens become diluted by natural mating, it will be necessary to renew the strains from the laboratory apiary.

An association of breeders of queen bees has been formed to provide suitable stock on which to base the project and to furnish the necessary organisation for testing strains of queens produced in the course of the work. In October, 1949, 15 members of the association gave a total of 50 queens which are now established in nuclei in the laboratory apiary at Wallaceville and have provided all the stock at present being used in the insemination project.

Suppliers of queen bees were sent report sheets on which they noted the following particulars for each queen: Age of queen (month and year bred), longevity and stamina of strain, development and maintenance of brood nest, physical characteristics of progeny (males and females), temperament of progeny and quietness on combs when handled, swarming tendency, economy of winter stores, use of propolis, production of honey, seasonal conditions, main nectar sources worked by the colony, and general remarks. Thus a complete record of each queen bee was available for reference.

Recording System

Particulars of each queen were noted on numbered cards and discs bearing the same numbers were affixed to the appropriate nuclei. The number allotted the original queen remained constant for her and all queens bred from her, but this number was followed by a small 1 in the case of the original queen, by a 2 for her daughter, by a 3 for her granddaughter, and so on. By referring to numerals on nuclei in the apiary it was possible to tell how many generations the queens were removed from the original queen.

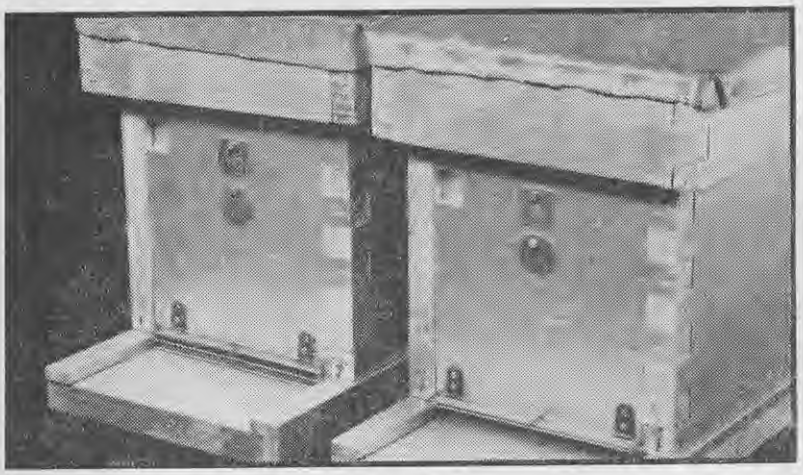

Fig. 11—Nuclei with hinged queen excluders across the entrances. The queen excluder on the right is raised.

The ages of the queens ranged from a few months to 2 years, the average being about a year. Judged by their performance at Wallaceville, which ranged from fair to good, these queens appeared a representative section of the breeders' stock.

Prevention of Natural Mating

On arrival at Wallaceville the queens given by breeders were placed in nuclei with strips of hinged queen excluder fitted across the entrances (Fig. 11). Throughout the work all descendants of these queens were placed in similarly treated nuclei, so that neither drones nor queens could enter or leave. Thus virgin queens were retained, without being able to leave the hive to mate naturally, until they were ready for insemination, and all drones in a nucleus were known to have come from its queen and not to have drifted in from other hives.

Type of Nucleus Hive Used

Nuclei were used throughout the insemination programme because of the ease and convenience with which they allowed bees to be handled. The most satisfactory type for much of the work was found to be a double nucleus formed by dividing a standard hive body with a division board and placing this on a flat bottom board. A hive mat was nailed down to the division board so that when bees were being handled on one side of the division board the mat could be folded back over those on the other side. Each nucleus had its own entrance hole and a ventilation hole covered with wire gauze, which were at opposite ends of the double nucleus above small projecting alighting boards. Such an arrangement allowed first and second generation queens to be established side by side, which was very convenient in apiary manipulation. Ordinary single nuclei were also used (Fig. 11).

Provision of Drone Comb

Large supplies of drone comb were required for insertion in nuclei so that drones could be raised from queens suitable for insemination. This comb was provided by inserting frames with small "starters" of foundation comb in strong hives, which were fed sugar syrup when the honey flow was insufficient to stimulate wax production.

Returning Queens after Insemination

Virgin queens were located as soon as possible after being hatched out and replaced in their nuclei inside queen cages closed with a removable cork plug. These queen cages were provided with small metal strips fastened at right angles to the tops so that the cages could hang between the frames and allow the bees easy access to the queens through the gauze. Queens were kept in the cages throughout the period during which they were being inseminated. Two days after the final insemination the cork plug was replaced with a plug of candy through which the bees could eat their way to liberate the queen. The use of this method reduced losses of queens caused by balling and maltreatment by the bees.

When she was removed for her first insemination each queen was marked with a white spot on the thorax and one of her wings was clipped (Fig. 12). This procedure ensured that subsequently queens could be found and observed easily.

Two Methods of Inbreeding

During the 1949-50 season inbreeding of queens at Wallaceville was carried out by two methods—brother-sister mating and mother-son mating.

Brother-sister Mating

The first system depends on mating a virgin queen with her brothers. A queen is removed from a nucleus and the virgin queen raised by the bees from one of her eggs inseminated with semen from her mother's drones. When this artificially inseminated queen is laying she is removed and the procedure repeated for two more generations, except that drones from the same source are used (back crossing). Then true brother-sister mating is used again. This is a slower method of inbreeding than the mother-son system, but it is much easier to carry out.

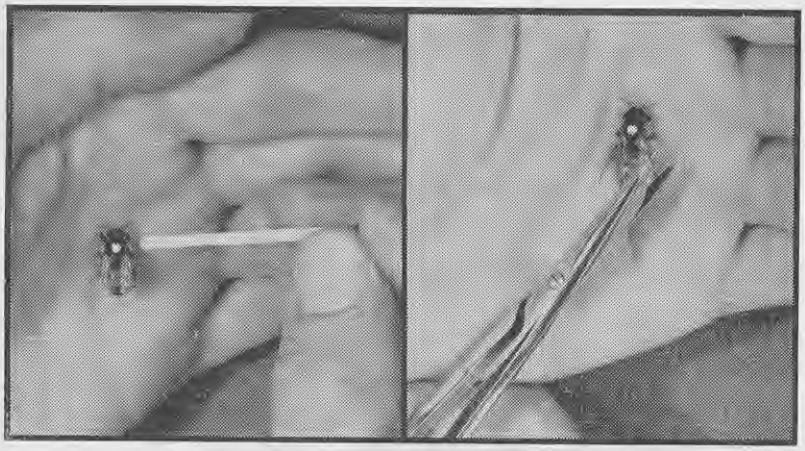

Fig. 12—Marking a queen and clipping her wing.

Mother-son Mating

It has been found that egg laying of virgin as well as inseminated queens can be stimulated by treatment with carbon dioxide. This causes the queens to begin laying almost as soon as naturally mated ones, whereas without it only about one in five starts earlier than 30 days after emergence. Two carbon dioxide anaesthetisations of 10 minutes, spaced a day apart, are used to start egg laying. The second treatment of the queen must be completed before the sixth day after emergence if she is to begin laying at the normal age (8 to 11 days after emergence). Thus drones can be obtained from virgin queens and later the virgin queens can be self-fertilised by inseminating them with semen from their own drones (2). According to Kalmus and Smith (3), mother-son mating is much the most efficient method of inbreeding bees to secure pure lines.

Comparison of Methods

The tables which follow compare the times required to complete one cycle of inbreeding with each method. The figures quoted are approximations.

Brother-sister Mating

In this method the nucleus must contain drone brood 14 days old before the queen is removed for the first inbreeding, so that the drones, which develop more slowly than queens, will be ready in time to provide semen for inseminating the virgin queen.

Time required for development of drone brood ..	14 days
Time required for bees to raise a virgin queen ..	10 days
Time between emergence of queen and completion of second insemination ..	7 days
Time required for queen to begin laying	6 days
Total time	37 days

In subsequent inbreedings the total time required would be either 23 or 37 days, depending on whether drones from the original hive (back crossing) or brother drones were used.

Mother-son Mating

In this method the queen is first removed from a nucleus.

Time required for bees in nucleus to raise a virgin queen	10 days
Time between emergence of virgin queen and completion of second carbon dioxide treatment ..	6 days
Time required for queen treated with carbon dioxide to begin laying in drone comb	10 days
Time required for drones to reach sexual maturity ..	30 days
Time required for queen inseminated with these drones to start laying ..	4 days
Total time	60 days

According to Kalmus and Smith (3), a complete cycle of mother-son mating (a double generation) is more than three times as effective as a complete cycle of the brother-sister method of inbreeding. However, 60 days are needed to complete a cycle of the first method, compared with 37 or 23 days for the second, so that if both were applied for the same period the mother-son method would be about one and a half times as effective for inbreeding as the other. The mother-son method, however, is the more difficult to apply.

The mother-son method depends on the bees tolerating a drone-laying queen for the period of some 30 days necessary for her eggs to develop into sexually mature drones which can provide semen for her insemination. It has been found that such a queen frequently is balled and finally killed by the bees in an attempt at supersedure.

The fates of 23 queens inbred by the mother-son method at Wallaceville during the 1949-50 season were:—

Total number of queens treated with carbon dioxide: 23		Total number of queens accepted after carbon dioxide treatment: 11	
Number found dead shortly after treatment: 12	Number accepted by bees: 11	Number of accepted queens inseminated with semen from own drones: 5	Number of inseminated queens accepted by bees: 1

Five queens accepted after the carbon dioxide treatment could not be inseminated, as their drones were not sufficiently mature.

Undoubtedly the losses shown were caused by balling and maltreatment of the queens by the bees, as these were noticed on many occasions when the nuclei were inspected. When balling of a queen was noticed the queen was smeared with honey and returned to the nucleus in a hanging queen cage closed with candy. Usually the method helps toward the acceptance of a queen by bees, but in this case it proved of little value, as did all other methods tried.

It was soon apparent that the mother-son method of inbreeding was not practicable, and it was abandoned and the brother-sister method alone employed.

The impractability of the mother-son system of inbreeding was confirmed by Dr. W. C. Roberts, of U.S.A., in a recent letter. He states that the degree of insemination of such queens is usually very low and frequently they become drone layers when overwintered. However, the brother-sister method allows 100 per cent. insemination and the queens can be overwintered satisfactorily.

Scope of Project

Forty-one queens were inbred by the brother-sister method at Wallaceville during the 1949-50 season. Thirty-eight of these were inbred for one generation and three were inbred for two generations. Twenty queens of those inbred for one generation were not accepted by the bees and were found dead after preliminary maltreatment. One queen of those inbred for two generations was lost. The extent to which inbreeding will be carried out will be governed to some degree by the hatchability of eggs of the inbred queen, but will extend for several generations wherever possible.

Throughout the work it has been found that the frequent handling of queens, the constant opening and closing of nuclei, and the use of queen excluders to bar the entry and exit of drones and queens all create highly artificial conditions which make the bees much less willing to accept queens than they would be if the queens had been allowed to mate naturally.

Though artificial insemination of queen bees offers great possibilities of improving strains of bees in New Zealand, its application is still in the experimental stage and a long period must elapse before the beekeeping industry can benefit from the work initiated at Wallaceville.

2. Mackensen, O. (1947): "Journal of Economic Entomology" (U.S.A.), volume 40, number 3, pages 344-349.

3. Kalmus, H., and Smith, C. A. B. (1948): "Journal of Genetics" (Cambridge, England), volume 49, part 2, pages 153-158.

Mercury Bay Weed as a Lawn Plant

THE perennial *Dichondra repens*, a member of the convolvulus family, has some merit as an alternative to the better-known lawn grasses. Under the common name of Mercury Bay weed the plant has become quite well known, especially in the northern districts of New Zealand, and numbers of attractive lawns have been established with it. Though lawn grasses are preferable under most conditions, Mercury Bay weed has proved satisfactory on some lawns, where it stands up better to dry conditions than grass. Because some difficulties have been encountered in establishing lawns of Mercury Bay weed, W. S. Kemp, Orchard Instructor, Department of Agriculture, Auckland, explains in this article the conditions under which the plant will grow and describes methods of planting and cultivation which have been found successful.

AS can be seen from the photographs Mercury Bay weed is not a grass but a small, low-growing, creeping plant which roots at the nodes and has small kidney-shaped leaves. The foliage is a dark grass green (lighter coloured if the ground is very dry or the plants are unthrifty), and occasionally it turns brownish green for a short time in autumn.

Two of the main advantages of Mercury Bay weed are that it remains green throughout comparatively dry summer seasons and that it needs mowing only occasionally. Nevertheless, it requires some water and the lawnmower cannot be dispensed with.

On the other hand the weed is unsuitable for tennis lawns because its growth is too slow in re-covering worn patches, the soft, succulent leaves are inclined to be slippery, and the plant juices quickly stain tennis balls a dark green.

After a few seasons the original plants sometimes tend to "run out" in patches, which must be replanted carefully to prevent establishment of strong-growing weeds against which Mercury Bay weed cannot compete.

Under moist conditions the rapidly extending runners will invade cultivated garden soils in which they quickly become established and where they can be as great a nuisance as many other weeds. However, normal cultivation along the edges of garden plots will deal with that problem.

The plants will not thrive in districts subject to severe frost. American reports indicate that minimum air temperatures of 25 to 26 degrees F. (6 to 7 degrees of frost) are sufficient to cause severe injury, resulting in browning of the leaves, while lower temperatures may kill the plants. Equivalent temperature readings taken at ground level would be several degrees lower.

Preparation of Land for Planting

Preparation of the section to be planted should be as thorough as for a grass seed-bed. To give the soil time to settle down before planting is done the land should be levelled and dug over at least 6 weeks before, making sure that all weeds are completely buried or that difficult ones like docks are removed. At intervals up to the time of planting light surface cultivations should be given to destroy weed seedlings as they appear above the ground.

A dressing of a fertiliser mixture of 3 parts of sulphate of ammonia and 1 part of superphosphate applied at the rate of 1oz. per square yard should be worked into the soil just before the final raking and rolling before planting. Except on very acid soils liming is not necessary. Before the plants are set out the land should be given a final light raking and levelling, and should be rolled to consolidate the surface.

"Plugs"

The lawn is planted up by the unusual method of setting out "plugs" of Mercury Bay weed. The plugs, as shown in the illustration on this page, are 1½in. in diameter and 1in. thick, and are planted in holes of the same dimensions.

A special tool is used to cut the plugs from a nursery bed or lawn, and the same instrument serves to make the planting holes. One type of cutter, illustrated on page 111, will take one plug at a time, another kind is made from a cylindrical tube, with the lower cutting end sharpened and an outer collar fitted to regulate the thickness of the plugs. As successive plugs are cut out they push each other up through the cylinder and emerge at the top. For planting a lawn, cutting tools may be hired from some retailers of Mercury Bay weed plants, which are usually sold as plugs. A smaller and less expensive cutter may be purchased, or could easily be made, for planting small areas.

Planting the Lawn

Mercury Bay weed may be planted at any time of the year, but the best months are from October to January.

The plugs are set at varying distances apart (see the illustration on page 111); the closer the planting the sooner will the area be covered by plants. The usual spacings are from 4in. to 8in. between plants, although sometimes plants are placed at 12in. intervals. The governing factor is the amount the planter is prepared to lay out for plants. If plugs are set 4in. apart, four times as many plugs are required than if 8in. spacings are made. At 8in. intervals 20 are needed for each square yard of lawn.

Under satisfactory growing conditions a lawn area set with plugs at 4in. intervals will be completely covered within 2 months of planting (see the illustration on page 111). The wider the spacing the longer is the time taken for the plants to cover the area. From a lawn closely planted in October it should be possible to cut plugs for a further area in January. Of course the holes in the lawn must be refilled with soil.

[Sparrow Industrial Pictures Ltd. photo.

A plug of Mercury Bay weed and a planting hole.

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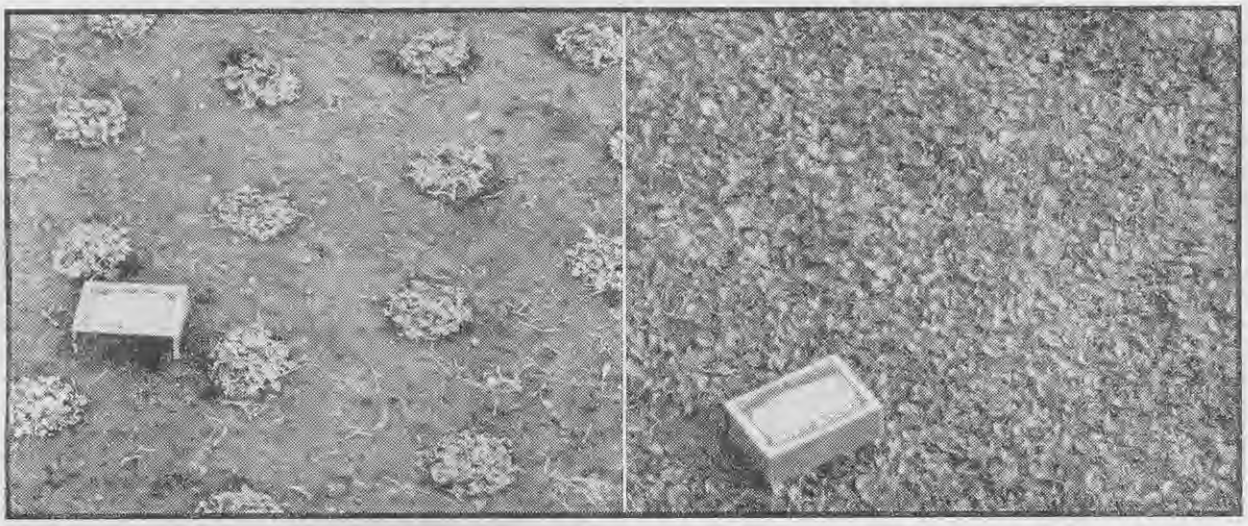
ESTABLISHING MERCURY BAY WEED IN A LAWN



[*Sparrow Industrial Pictures Ltd. photos.*

Left—A newly planted area of Mercury Bay weed. Right—Portion of a well-established lawn, showing the dense mat formed.

The actual planting is very simple. For the first row of plants a garden line is stretched along a few inches from one edge of the prepared land. The plug cutter is used to cut out planting holes at the chosen intervals along the line. Then the plugs are slipped into the neatly fitting holes and are pressed down with one foot. Planting is continued by moving the line across the area and setting out plugs in successive rows in the same manner.

When a section has been planted the new lawn should be carefully watered and should be rolled as soon as possible to consolidate the plugs and the surface of the soil.

Where it is desired to convert a large area of grass lawn to Mercury Bay weed the practice illustrated on page 112 has sometimes been adopted. Although it has the disadvantage that a longer period is required to make the desired change, it is a cheaper method.

The procedure adopted is as follows: After the number of plugs to be purchased has been decided the area which they will cover is prepared in the normal manner and the plugs set out. New sections are added as plugs become available from previously planted areas.

The small centre plot shown in the illustration on page 112 was planted first and the surrounding area was planted later.

Care of Lawn after Planting

During the period taken by the plants to cover the soil completely, systematic, ruthless suppression of weeds must be the first consideration. Weeds are sure to appear in the spaces between the growing plants, but they must not be allowed to remain there. The worst offenders are clovers, coarse grasses, and the ubiquitous flat or broad-leaved weeds. Mercury Bay weed cannot grow either over or under such intruders and therefore cannot grow into the compact and even lawn which is always the aim, unless the weeds are removed before they grow large.

For the first few weeks weeding can be done most quickly with a sharp narrow-bladed hoe, but when the lawn plants creep further over the bare spaces the hoe must be discarded and weeding of the reduced areas must be done with a smaller implement, such as a hand trowel or an old knife.

Once the Mercury Bay weed has grown into a compact mat over the whole plot weeds will have little chance of becoming established. However, odd ones will come through even the best-kept lawns and, as in grass lawns, they must be destroyed or they will eventually spoil the whole effect of neatness which is so much desired.

[*Sparrow Industrial Pictures Ltd. photo.*

A type of plugging tool which cuts one plug at a time.

Moss, which sometimes encroaches upon grass lawns, will also invade Mercury Bay weed lawns. It seldom gains a hold in a healthy lawn, but is inclined to appear in moist, shady places, especially if the lawn plants are weak. Careful weeding and an application of nitrogenous fertiliser will usually remedy this fault, but moss is rarely troublesome in a well-kept lawn which, with adequate supplies of fertiliser, is able to retain its supremacy over the slower-growing mosses.

Feeding the Lawn

In common with lawn grasses Mercury Bay weed needs applications of fertilisers to enable it to thrive and compete successfully against weed competition. Unfortunately there is no selective mixture which can be suggested to give this lawn plant an advantage over all undesirable plants, nor is it immune from a certain amount of foliage scorch due to applications of fertilisers, although it recovers its green appearance quickly.

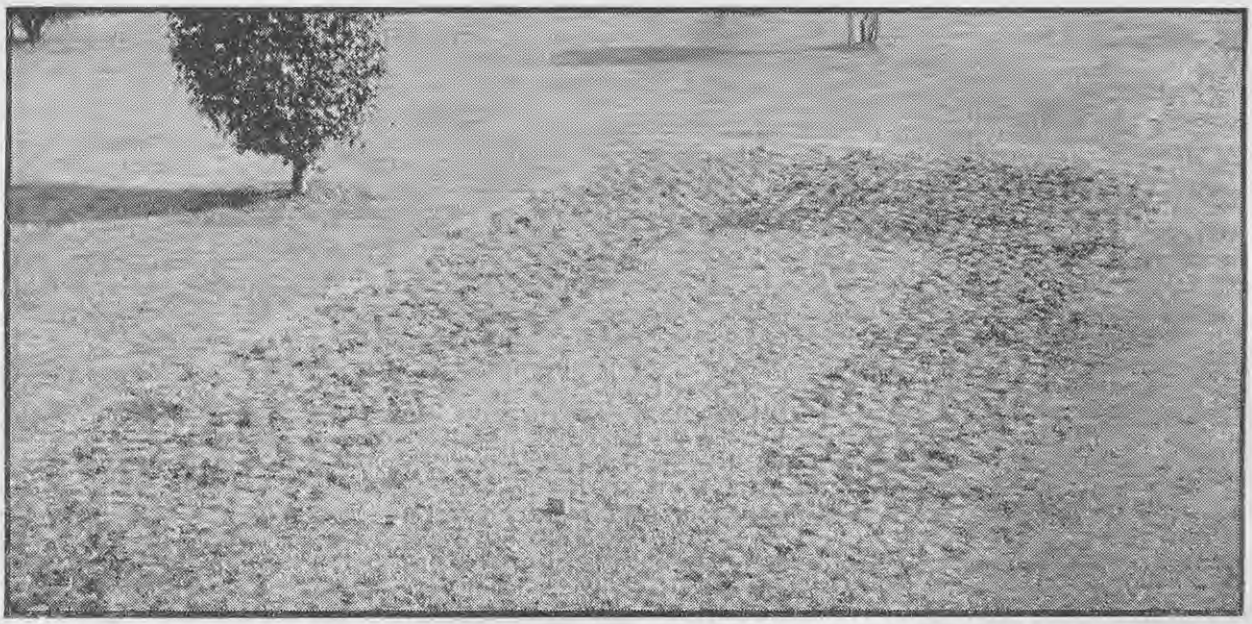
A recommended fertiliser mixture is 3 parts of sulphate of ammonia to 1 part of superphosphate, applied at intervals of 3 months (preferably in dull or showery weather to reduce scorching) at the rate of 1oz. to a square yard of lawn. The nitrogen content of this mixture, together with the fact that Mercury Bay weed needs little or no lime, tends to reduce competition from clovers.

Removing Weeds

If a compact growth of Mercury Bay weed is maintained, very few flat weeds will grow in the lawn, but grasses are more difficult to keep out.

The coarser grasses and odd flat weeds which usually grow in tufts can be destroyed by hand weeding. Finer grasses cannot be eradicated, but are not strong enough to crowd out the Mercury Bay weed, and do not adversely affect the appearance of the

MERCURY BAY WEED AS A LAWN PLANT



[*Sparrow Industrial Pictures Ltd. photo.*

Showing the method of gradual conversion from ordinary grass to a Mercury Bay weed lawn.

lawn. They do, however, make more frequent mowing necessary if they become strongly established. Fortunately, the finer grasses do not have much chance of growing in a dense mat of Mercury Bay weeds, and will not be troublesome if the ground is carefully prepared before planting time.

Mowing

A well-kept lawn of Mercury Bay weed needs very little mowing, but should be cut occasionally to keep the surface neat and level. Growth is very slow between the end of March and early September and the lawn may require no mowing in those months. During the warmer months, especially if rainfall is plentiful, growth is comparatively rapid, with the inevitable result that the lawn-mower will have to be used five or six times during that period.

Although this plant thrives in rather dry, sunny situations, and remains green through fairly long dry spells, an occasional watering may be necessary to maintain its bright and fresh appearance.

Renovation of Old Lawns

After a few years there may be signs of the plants "running out" in patches. Usually these patches will show first where the original plugs were set, the younger growth remaining healthy. Replanting the weak patches with plugs from healthy parts of the lawn will remedy the fault.

Mixed Lawns

Some very successful mixed lawns of Mercury Bay weed and good lawn grasses are to be seen in the Auckland district. Most of these have been grass lawns in which plugs have been set without disturbing the grass.

If this type of lawn is desired, the best time to set the plugs is late spring or early summer as soon as spring growth of the lawn grasses slows down in the drier and hotter weather. The Mercury Bay weed then has several months in which to become firmly established before the autumn flush of growth gives the grasses another temporary period of supremacy before the semi-dormant winter period.

Mixed lawns need about the same amount of mowing as do grass lawns, but they remain much greener during the dry summer months. For those who value lawn clippings the mixed lawn has the advantage that it provides a supply of this material.

Mercury Bay weed will not dispose of all the problems and work associated with garden lawns, but, given the attention it merits, it will, in the warmer parts of New Zealand, give year-round greenness under conditions too dry for the usual lawn grasses.

Reference

"Construction, Renovation and Care of the Bowling Green," by E. Bruce Levy.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during June and for the 11 months ended June 30, 1950, with comparative figures for the same month and 11-monthly period of 1949, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

Period	Creamery	Tons Whey	Total	Percentage inc. or dec.	Tons Total in store at end of mth.
June, 1950	740	36	776	—	6,198
June, 1949	1,053	28	1,081	—	13,698
Increase or decrease	—313	+8	—305	—28.214	—7,500
For 11 months ended 30/6/50	141,175	2,900	144,075	—	—
For 11 months ended 30/6/49	142,182	2,633	144,815	—	—
Increase or decrease	—1,007	+267	—740	—0.510	—

CHEESE—

Period	White	Tons Coloured	Total	Percentage inc. or dec.	Tons Total in store at end of mth.
June, 1950	1,386	63	1,449	—	17,654
June, 1949	1,346	110	1,456	—	11,653
Increase or decrease	+40	—47	—7	—0.480	+6,001
For 11 months ended 30/6/50	78,656	21,572	100,228	—	—
For 11 months ended 30/6/49	89,438	5,163	94,601	—	—
Increase or decrease	—10,782	+16,409	+5,627	+5.948	—

If these figures are converted into butterfat equivalent, there is an increase of 0.879 per cent. in butterfat graded for the 11 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Seeding Rates for Pastures on Ploughable Land in Auckland Province

By J. E. BELL, Fields Superintendent, Department of Agriculture, Auckland.

[*National Publicity Studios photo.*

FARMERS sowing down pastures frequently consult officers of the Extension Division not only about the choice of species but about quantity to sow. The advice given has been based on general experience, and experiments laid down have indicated this to be a very reliable guide. The seeds mixtures recommended in this article are for the general type of ploughable soils in the Auckland Province after thorough cultivation has been done and where adequate lime and fertiliser have been applied.

THE trials on which mixtures are based have been laid down on varying soil types under different management and so give a fairly good cross-section of results which might be obtained on farms. The only objection which might be raised is that in the trials the palatable species often suffered by being more severely grazed than they would be normally if sown in a paddock on their own or in a mixture. The following outlines the results of the different rates of seeding of the various species the sowings of which were studied.

Perennial Ryegrass

Sowings of 10, 15, 25, and 45lb. per acre of perennial ryegrass were made with 1lb. and 3lb. of white clover with and without other species. Where conditions were poor for establishment up to 45lb. was needed, but where the seed-bed was properly prepared and weather conditions following sowing reasonable 25lb. produced a satisfactory cover. Fields Instructors of the Department of Agriculture have usually recommended about 25lb. of perennial ryegrass. In the early stages sowings of 10lb. and 15lb. were definitely unsatisfactory and the cover was in proportion to the amount sown. Thus in a trial where 25lb. produced a good cover, 10lb. produced about two-fifths, and 15lb. three-fifths of that cover during the first year. The estimated loss of grazing in the first year on the lightly seeded areas much more than covered the extra cost of seed where 25lb. per acre was used. In 2 or 3 years the lighter sowings catch up with the heavier sowings.

Perennial ryegrass, because it is a hardy plant under high fertility and stock grazing and because it establishes quickly, is the farmer's best weapon for preventing ingress to the sward of undesirable plants such as browntop and flat weeds. In one trial at Warkworth, sown down in the autumn of 1947 on land liable to browntop invasion, it was found that with seeds mixtures containing 10lb. and 20lb. of perennial ryegrass browntop invasion was rapid and fairly extensive. Where the mixture contained 40lb. of perennial ryegrass little browntop became established. Unfortunately this principle applies also in regard to desirable species, which may be paspalum, cocksfoot, or timothy. Trials show that ryegrass prevents these grasses from establishing, and with paspalum the amount sown affects the degree of establishment.

	Treatment		Density of	
Plot	Paspalum lb.	Perennial ryegrass lb.	Paspalum	Browntop
1	2	10	1	6
2	4	10	2	6
3	8	10	3	6
4	16	10	6	5
5	0	20	0	4
6	4	20	3	4
7	8	20	5	4
8	16	20	6	4
9	2	40	1	2
10	4	40	1	2
11	8	40	2	2
12	16	40	4	2
13	8	0	6	6

The table above, compiled from one of the trials with different sowings of ryegrass and paspalum, shows the effect on paspalum and volunteer browntop establishment. The figures relate to the density of paspalum and browntop 2 years after sowing, 0 showing none present and 10 a very high degree of cover of the particular species.

The only contradiction is plot 13 where the invasion of browntop was not as great as would be expected. There were many flat weeds in this plot, which may have inhibited browntop invasion to some extent. It will be noted that the paspalum strike was not inhibited until 40lb. of perennial ryegrass was sown. Later when paspalum becomes properly established the trial will reveal the effect of its establishment on volunteer browntop. It can be seen that the determining factors in the ultimate sward are complicated, species having different effects on each other. It is possible that in plots where the seeding rates of ryegrass were low and the ingress of paspalum consequently was earlier there may be less browntop, contrary to the early results from the trial.

Short-rotation Ryegrass

In trials varying rates per acre of short-rotation and perennial ryegrass were sown as follows, with 2lb. of white clover:—

Short-rotation ryegrass lb. per acre	Perennial ryegrass lb. per acre	Total ryegrass lb. per acre
10	0	10
15	0	15
25	0	25
35	0	35
45	0	45
0	30	30
5	25	30
10	20	30
20	10	30
25	5	30

SEEDING RATES FOR PASTURES ON PLOUGHABLE LAND IN AUCKLAND

[*Desgranges Studios Ltd. photos.*

Left—Pasture seeded with mixture which included ½lb. of subterranean clover per acre, 3 years after sowing. Right—Pasture seeded with mixture which included 3lb. of subterranean clover per acre, 3 years after sowing.

In most of the trials the area surrounding the trial was sown with perennial ryegrass as the predominant species; consequently, because of its palatability, the short-rotation ryegrass in the plots was punished by stock and its chance of recovery in the next season diminished. In the first year greatest production was obtained where short-rotation ryegrass was sown alone with white clover at 25lb. to 35lb. per acre. In the mixtures of perennial ryegrass and short-rotation ryegrass the proportions of each which it is advisable to use depend on the recovery of short-rotation ryegrass. If short-rotation ryegrass fails to recover, sowings of it should not exceed 10lb. per acre, and probably a mixture containing 25lb. of perennial ryegrass and 5lb. of short-rotation ryegrass will be most satisfactory. Where the short-rotation ryegrass recovers very well a sowing of 15lb. of short-rotation ryegrass and 15lb. of perennial ryegrass will be most satisfactory. Between the extremes a sowing of 20lb. of perennial ryegrass and 10lb. of short-rotation ryegrass would be advisable.

To be persistent and to last several years or to be permanent, short-rotation ryegrass requires a fertile soil which is moist in summer yet reasonably well drained in winter, and grazing should not be severe, particularly in late spring and early summer.

Cocksfoot

Cocksfoot at 5, 10, 15, and 20lb. per acre was sown with 15lb. of ryegrass and 2lb. of white clover per acre, and cocksfoot at 10lb. per acre was sown without perennial ryegrass and with perennial ryegrass at 5, 10, 20, and 40lb. per acre and with white clover at 2lb. per acre. Under ordinary pasture management cocksfoot sown without ryegrass does not produce a satisfactory sward owing to slowness of establishment, and even with small amounts of ryegrass it is suppressed where the soil is fertile or well topdressed. The heavier rates of sowing of cocksfoot had little effect on establishment because of the strong competition from ryegrass. More than 5lb. per acre in the mixture, certainly not more than 10lb., is not advised. Even these sowings may be difficult to justify except in poor country or where the soil dries out. On dry soil 15lb. of cocksfoot may not be too heavy. On poor soil where the moisture supply is reasonably adequate the wisest course would be to buy more fertiliser with the money which might be used on extra cocksfoot seed if a heavy sowing was made, or to take other steps to make conditions more suitable for ryegrass establishment.

Timothy

Timothy was sown at 2, 4, 6, and 8lb. per acre with ryegrass at 15lb. per acre, and timothy at 6lb. per acre was sown without perennial ryegrass and with perennial ryegrass at 5, 10, 20, and 40lb. per acre. All mixtures included 2lb. per acre of white clover. Although conditions on all the trials appeared suitable for timothy establishment, results were the same as with cocksfoot. The ryegrass overwhelmed the timothy, and a poor-producing pasture was obtained from sowing timothy alone. Reports did not indicate that timothy was more severely grazed by stock than other species. Often severe grazing is usual and has been put forward frequently as the cause of a low percentage of this grass found in pastures. A seeding of 4lb. of timothy per acre appeared to give as good establishment as higher rates, and the same remarks apply to the sowing of this grass as apply to cocksfoot. Even this seeding is hard to justify. Timothy is more suited to fairly damp situations and for wet climates, and differs from cocksfoot in this respect.

Red Clover

Red clover trials were carried out with perennial ryegrass and Italian ryegrass. Sowings of red clover at 2, 4, 6, and 8lb. per acre were made with 20lb. of perennial ryegrass per acre and sowings of 5lb. of red clover per acre with 5, 10, 20, and 40lb. of perennial ryegrass. Six pound per acre of red clover appeared to give as good results as 8lb. with the 20lb. of perennial ryegrass. Amounts less than 6lb. did not give as good a coverage with this plant.

With Italian ryegrass, sowings heavier than 35lb. per acre suppressed the red clover and prevented its development and 6lb. of red clover was required and was definitely superior to sowings of 3lb. For temporary pasture, therefore, 25 to 30lb. of Italian ryegrass plus 5lb. or 6lb. of red clover appear to give the best results. This is in line with recommendations made by Instructors.

White Clover

Sowings of 1, 3, and 5lb. of white clover per acre were made with 20lb. per acre of perennial ryegrass and 2lb. of white clover per acre with 15, 25, and 45lb. of perennial ryegrass per acre. In the 2 or 3 years after establishment the 1lb. seeding has not produced as good a sward as the 2lb. or 3lb. seeding and the 5lb. seeding is not warranted. At least 2lb., which is generally recommended, should be sown.

SEEDING RATES FOR PASTURES ON PLOUGHABLE LAND IN AUCKLAND

Subterranean Clover

Sowings of ½, 1, 3, and 6lb. per acre of subterranean clover were made with 15lb. per acre of ryegrass and a sowing of 3lb. per acre of subterranean clover was made with 2lb. of white clover and 15lb. of ryegrass. The 3lb. sowing was most satisfactory and the 5lb. sowing did not appear warranted. At least 2lb. should be sown. The combination of 2lb. of white clover and 3lb. of subterranean clover was strikingly superior to the sowings of subterranean clover only. In summer and early autumn, when the subterranean clover was dead or there were only small seedlings, the ryegrass obviously suffered because no white clover had been sown. Because of the bulk of leaf produced in spring, subterranean clover is worth including, particularly for pastures where sheep, especially lambs, are grazed.

Conclusions

The results of the trials and general information indicate that for dairying the following mixture is suited to country of reasonably good fertility where a good seed-bed is prepared and the seed sown at a suitable time for establishment in autumn.

	lb.
Perennial ryegrass	20
Short-rotation ryegrass	10
Cocksfoot	5
White clover	2
Red clover	4
	41

Where paspalum is required and can be grown, up to 8lb. of this grass should be included. On clay soils where red clover establishment may not be obtained unless the soil is extremely well treated the sowing of this clover may be reduced to 2 or 3lb.

Short-rotation ryegrass may be increased or diminished at the expense of the perennial ryegrass according to soil conditions and pasture management to be followed.

On pastures for sheep and cattle the following mixture can be advised for general conditions:—

	lb.
Perennial ryegrass	25
Short-rotation ryegrass	5
Cocksfoot	5
Crested dogstail	3
White clover	2
Red clover	3
Subterranean clover	3
	46

No attempt has been made to prescribe mixtures for special conditions such as peat soils, tidal flats, limestone country, or alluvial swampy land where other species, including *Lotus major*, Yorkshire fog, or strawberry clover, may play an important part.

A *GLYCERIA AQUATICA* STAND

ILLUSTRATED is portion of an 18-acre stand of *Glyceria aquatica* on the property of Mr. H. Brickland, Pio Pio. It is an area which is covered by water when the Mokau River rises to flood level.

THE area was originally a swamp covered with niggerhead and raupo. During the autumn of 1932, 5lb. of *Glyceria aquatica* seed was sown on the area, but germination was exceedingly poor, only a dozen or so plants establishing. From these plants cuttings were taken and transplanted during summer and autumn, and in about 5 years the stand had been established over the whole area.

In a few more years the swamp which had been virtually a death-trap for cattle was rapidly converted into a safe, summer grazing area. Run cattle or dairy cows graze the area from January until a flood comes, generally in May or June, and silt is deposited on the leaf, spoiling it for grazing.

Carrying Capacity

The 18-acre stand is bounded by 35 acres of good pasture and the 53 acres has maintained 110 cows in good production for 6 weeks during dry periods. In recent years the dairy herd has been reduced, but the area still maintains 75 cows in full production and in addition up to 40 bullocks depend on it for feed.

This experience illustrates an important point in the relationship between soil and plant. The common practice is to adjust soil conditions so that they will permit specific plants to grow. In this case the soil has not been changed, but a particular plant that is adapted to the existing soil conditions has been used to considerable advantage.

Glyceria aquatica is often a serious weed in drainage areas and should not be planted where there is danger of its blocking drains in any part of a drainage system. In this instance it is fulfilling a very useful purpose by turning an isolated swamp into valuable grazing land.

—K. M. MONTGOMERY,
Fields Instructor, Department of Agriculture, Te Kuiti.

Radio Broadcasts

THE following talks will be given to farmers from Station 1YA Auckland at 7.15 p.m.:—

September 6—"Current Farming Problems," by A. J. Kerse, Fields Instructor, Department of Agriculture, Auckland, and H. Woodyear-Smith.

September 13—"Mastitis in Dairy Cows," by I. G. Watt, Veterinarian, Department of Agriculture, Auckland.

September 20—"Results of Experimental Work on Peat," by F. B. Thompson, Agricultural Chemist, Rukuhia Soil Research Station, Hamilton.

September 27—"Young Farmers' Clubs," talk arranged by Hamilton District Committee, New Zealand Federation of Young Farmers' Clubs.

The following talk will be given from Station 1YZ Rotorua at 7.15 p.m.:—

September 14—"Young Farmers' Clubs," talk arranged by Matamata District Committee, New Zealand Federation of Young Farmers' Clubs.

Radio talks will be given to farmers from Station 4YA Dunedin at 7.30 p.m. as follows:—

September 6—"Management of Bees during Spring," by S. Line, Apiary Instructor, Department of Agriculture, Invercargill.

September 20—"Rearing and Management of Chickens," by H. G. Birnie, Poultry Instructor, Department of Agriculture, Dunedin.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YZ Napier on Tuesdays at 7.10 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

Pig Broadcasts

Under the auspices of District Pig Councils broadcasts will be delivered in September as follows:—

Rotorua—1YZ, on September 28, at 12.35 p.m., "Questions and Answers," conducted by A. F. Barwell, Supervisor, Bay of Plenty District Pig Council.

Wellington—2YA, on September 19, at 7.15 p.m., "Whey Feeding," by C. M. Bailey, Supervisor, Taranaki District Pig Council.

Electric Water Heaters in Milking Sheds

By R. GRICE, Special Inspector, Department of Agriculture, Whangarei.

BY virtue of the ease of operation of electric water heaters they are preferred to any other type by the great majority of dairy farmers. However, if they are to fulfil their function of providing boiling water for the cleaning and sterilising of milking machines and equipment, they must receive adequate attention and be correctly used.

WHERE electric reticulation of farming districts has been carried out dairy farmers have, as a matter of course, installed electric water heaters in their milking sheds until today it is unusual to see any other type in areas where electric power is available. Since electric water heaters are in such numbers, it is most important that they should be used correctly to safeguard the quality of milk or cream produced on the farms. Only by knowledge of their construction, care, and operation can this be achieved.

The dairy electric water heater consists of a copper cylinder, lagged with mill wool, the whole, except for necessary connections, being enclosed by a casing constructed from flat galvanised-iron sheeting. Unlike its counterpart the domestic water heater, the dairy type does not fill automatically from a supply tank and is not under pressure. Filling is in most cases done through a funnel on the top or side of the heater and water is drawn off by gravitation through a tap set near the bottom but above the element. The reason for this is that were the heater to fill automatically the ingoing cold water would soon cool the boiling water in the cylinder as it was being drawn off. But by non-automatic filling, the last gallon drawn off the heater will be of at least as high a temperature as the first and the benefits of this will be obvious.

The sizes of cylinders and elements to be installed are governed by a schedule in the Dairy Produce Regulations 1938, and are based on the size of the milking machine used. For bigger sheds slightly larger sizes of both are required where whole milk is produced for factory supply. The purpose of the regulations and the schedule it contains is to ensure that sizes of cylinders and elements will be sufficient for the boiling of water in sufficient quantity for the cleaning of the milking machine and dairy equipment at the times required. Before the gazetting of this regulation a number of cylinders of 12- or 15-gallons capacity were installed and were quite unsuitable for use in milking-machine sheds.

TABLE A: CREAM SUPPLY

Capacity of milking machine	Capacity of cylinder (gallons)	Rating of heating element: Continuous supply of electricity (watts)	Rating of heating element: Non-continuous supply of electricity (watts)
2-cow plant	20	600	700
3- or 4-cow plant	25	750	900
5- or 6-cow plant	30	1,000	1,200

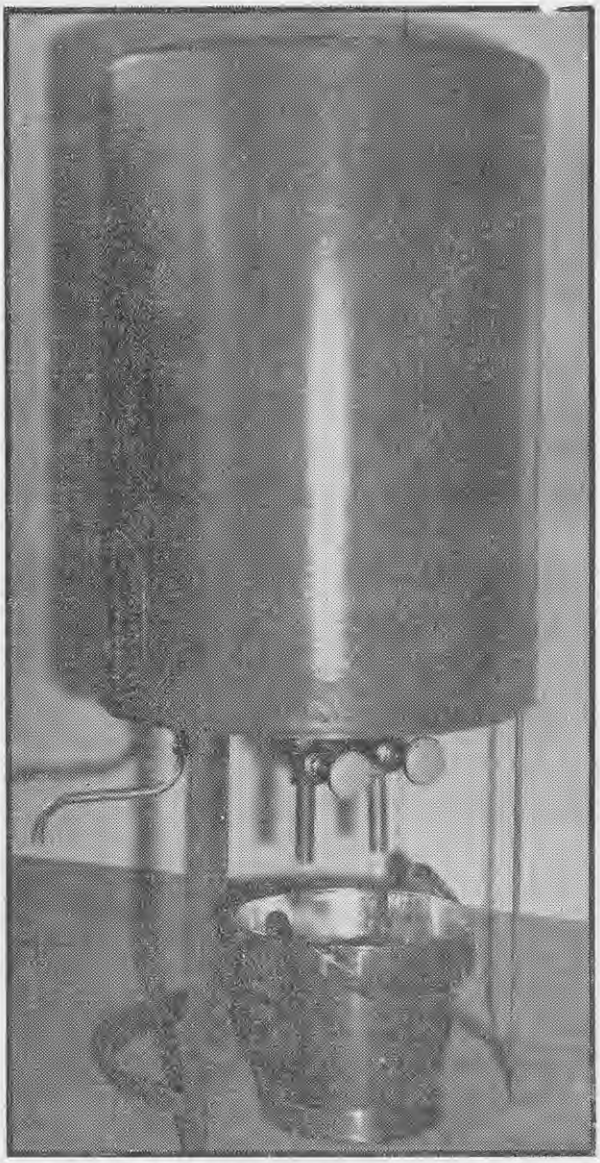
TABLE B: MILK SUPPLY

Capacity of milking machine	Capacity of cylinder (gallons)	Rating of heating element: Continuous supply of electricity (watts)	Rating of heating element: Non-continuous supply of electricity (watts)
2-cow plant	20	500	600
3- or 4-cow plant	25	750	900
5- or 6-cow plant	40	1,100	1,400

The schedule provides for the use of two sizes of elements to suit the provision of "continuous" or "non-continuous" supply of electric energy to the heater. In the non-continuous supply of current the heater is disconnected as soon as the milking-machine motor operates and this type of supply is usual in dairying districts. In a few areas the power boards give a continuous supply in which the electric cylinder is connected during the time of milking operations. Both systems are satisfactory if the cylinder is carefully used and the heated water conserved.

In 1939, as a measure to assist in the conservation of power, distributing boards were given authority to require the fitting of thermostats to dairy electric heaters and most did so. A condition of these installations was that the thermostat was so adjusted that the supply of current was cut off at a temperature of not less than 206 degrees F. and was renewed at a temperature of not less than 196 degrees F. While the installation of thermostats may not have saved a great deal of power in summer when farmers were making full use of the water in their heaters, they were very effective in doing this in winter. Contrary to a belief among some dairy farmers the installation of thermostats did not affect the heating capacity of the element until the temperature of the water in the heater reached at least 206 degrees.

The efficiency of an electric heater, judged on its capacity to provide boiling water at the times required, depends upon two factors—correct installation and judicious use in the shed.



Modern type of dairy water heater in which the cylinder is lagged with ½in. asbestos sheeting. Two draw-off pipes and the overflow discharge are under the cylinder. Power is cut off by thermostat control only when the water boils, and loss of heat between milkings is negligible.

ELECTRIC WATER HEATERS . . .

Correct Installation

The heater should be installed in a place where it is protected from wind and weather; preferably in a convenient corner of the separator or releaser room.

To prevent the casing from becoming rusty and perished an electric cylinder should not be installed on a flat surface of wood or concrete, as there is insufficient circulation of air to keep the base dry. Two very satisfactory methods which provide sufficient circulation of air are as follows:—

1. Set the cylinder on three suitable lengths of piping set across one corner of the room and fixed into the concrete walls.
2. Set the cylinder on two lengths of 4in. x 2in. timber, or on piping, set into a solid concrete base completely filling the corner of the room.

The height at which the cylinder is installed is most important. If the position is such that the draw-off tap is considerably higher than the receptacle to be filled, there is considerable loss of heat by radiation as the hot water is drawn off. The correct height of the installation should be governed by the size of bucket or receptacle to be used, and generally this should be so adjusted that the draw-off tap is about 14in. above floor level.

The schedule of sizes of cylinders and elements set out in the Dairy Produce Regulations has been suggested and approved by power-board engineers and authorities and is recognised as sufficient to provide boiling water at the times required, if the heaters are used carefully and correctly. Neither the sizes in the schedule nor any larger sizes which may be installed will be satisfactory for their purpose if they are abused. Some farmers get excellent results from a certain size of cylinder and element, while others, owing to lack of care and correct use, get very unsatisfactory results from the same capacities and sizes.

The careful and intelligent use of electric cylinders and elements is very necessary if they are to fulfil their functions properly. For efficient operation the following points should be watched:—

1. The casing and element should be kept as dry as possible during filling, water never being allowed to overflow except through the overflow outlet and then only for as long as it takes to turn off the filling tap. A dripping filling tap is very detrimental, particularly to those heaters with a short overflow pipe set in at the top of the cylinder, as water will run down the side of the casing and drip off underneath, quickly causing rust holes and wetting the lagging. To heaters with short overflow pipes a length of metal piping should be fitted so that the outlet is at a point below the heater.

Rubber tubing should not be used for this purpose. There have been cases where when old milk tubing was used it pinched during filling operations, with the result that a vacuum was created in the cylinder, causing the tubing to collapse.

2. It is essential to keep the lagging of the cylinder dry and in good order, as its purpose is to maintain in the cylinder the heat generated by the element. Where lagging becomes perished with age or wet by absorption or careless filling there will be a very considerable loss of heat. All possible care must be taken to protect the lagging from moisture, and where it is becoming perished it should be replaced.

3. Considerable loss of efficiency is caused by leaking draw-off taps. Such leaks can be prevented by grinding the taps into their sockets with grinding paste.

4. A very common and serious trouble in an electric water heater is that caused by mineral and sediment sludge in the water partly filling the cylinder or becoming attached to the element. Most water from underground sources contains mineral deposits and some of it is quite unsuitable for water heaters. Where minerals are very prevalent the element of the cylinder quickly becomes corroded with deposits to such a depth that it is more or less insulated and the quick passage of heat to the water is prevented. Wherever possible rainwater should be used in electric heaters to avoid such deposits and encrustations.

If electric water heaters and elements are to function efficiently, they should be examined periodically and attention given where necessary. The accumulation of sludge in the cylinder and encrustations of minerals on the element must be removed.

As boiling water is required for the efficient cleaning and sterilisation of dairy equipment, conservation of water in the cylinders is very necessary. Where boiling water is used lavishly and wastefully, causing the cylinders to be emptied after each milking, there is no prospect of boiling water being ready at the required times. Only quantities required for effective cleaning should be drawn off so that there is enough water left in the cylinder to raise the temperature of the intake of cold water.

If a cylinder is not producing boiling water and the element cannot be cleaned or increased in size, the quantity of hot water drawn off should be reduced and the intake of cold water reduced accordingly.

The electric heater was originally installed in milking sheds to provide water for washing the machines and utensils. Farmers, however, have found the hot water very useful in mixing calf meal and for washing the udders of cows. It is not suggested that these practices should be discontinued, but they should be done with the utmost economy of water from the heater.

The main points on the use of electric water heaters in milking sheds are:—

1. Correct installation, to prevent undue deterioration.
2. Draw-off tap to be at correct height; just above bucket.
3. Periodical attention to be given to cleaning of element to remove mineral deposits and to flushing of cylinder to remove sludge.
4. Conservation of water when washing up to leave as much as possible in the cylinder to assist in obtaining boiling water for the next milking.

Besides safeguarding the quality of dairy produce, an efficient water heater ensures that there is no wastage of power. This is also of particular importance to the dairy industry at this time.

Dairy water-heater manufacturers have made improvements to their products from time to time, but it is felt that more could be accomplished along the lines of stronger and less perishable casings, better-designed overflow outlets, taps which do not easily wear and drip, a sight glass for gauging the amount of water in the cylinder, and a socket and plug in the bottom of the cylinder to allow easy flushing.

With so much dependent on its efficiency, the dairy electric water heater is worthy of greater attention by both dairy farmers and manufacturers.

Horticultural Cadetships

THE Department of Agriculture is offering several bursaries for competition among boys of 17 to 19 years of age who are interested in careers as Horticultural or Apiary Instructors.

Successful applicants will be appointed as Horticultural Cadets and will undergo a 6-year training course which includes full-time university study for science or horticultural degrees, and several years' training in the field.

Bursaries while cadets are at university are worth £70 a year by way of allowance, plus £40 a year lodging allowance if a boy has to live away from home. They include also provision for payment of university tuition fees and the cost of standard textbooks.

Any boy who has the university entrance qualification or expects to have it this year may apply. The bursaries will be advertised in the Press in September, the closing date for applications being October 16, 1950.

Further details may be obtained from the Personnel Officer, Department of Agriculture, Box 3004, Wellington, C.1.

CHANGES OF ADDRESS OF "JOURNAL" SUBSCRIBERS

To ensure continuity of delivery of issues of "The New Zealand Journal of Agriculture," subscribers are required to give 4 weeks' notice of change of address. The old address and the new address, together with an address label clipped from a recent "Journal" envelope or wrapper, should be sent to the nearest office of the Department of Agriculture.

The Home Garden in September

By S. O. GILLARD, Vegetable Instructor, Department of Agriculture, Auckland.

SEPTEMBER is generally recognised to be a favourable time to begin the new season's gardening operations in earnest. With the advent of longer days and more sunshine the soil should have warmed up sufficiently to promote satisfactory germination of the hardier kinds of vegetable seeds. In northern districts where late frosts are unlikely seed of the more tender kinds of vegetables such as potatoes, cucumber, marrows, and pumpkins, and plants of egg fruit and tomatoes can be set out. Plant protection such as cloches and hot-caps will still be necessary for frost-tender subjects if they are grown in colder localities.

IN preparation for later cropping, areas in green crops should be dug over, and ground left fallow during winter can be broken down. The soil should be stirred up around planted crops. Cultivation of the soil, especially at this time of year when frequent rains consolidate the surface, is very important in the promotion of plant growth. The soil should be drawn up to established crops of cabbage, cauliflower, peas, and broad beans as they grow to provide support for the plant. When drawing the soil up to the plants a wide rather than a narrow ridge should be formed, as this provides better support and rooting area. Early potatoes should be kept well earthed up as a partial protection from frost. Seedling lettuce, onions, cabbage, and cauliflower can be set out.

Seeds of parsnips, carrots, spinach, onion, lettuce, radish, beetroot, silver beet, peas, and leeks can be sown in the warmer and better-drained parts of the garden provided the soil will break down to the required tilth. Clayey soils if sticky should be handled patiently and worked only when conditions will allow.

Established crops such as silver beet, cabbage, and cauliflower will benefit from weekly applications of liquid manure. This can be made from animal manure placed in a sack and suspended in a large container of water until the liquid is the colour of strong tea, or nitrate of soda, 2oz. to 4 gallons of water, can be applied at the rate of 1 pint to each plant. On wet soils the nitrate of soda may be applied direct to the soil at the rate of 1oz. to 12 plants, care being taken not to let the fertiliser touch the foliage.

Asparagus

Asparagus seed may be sown in September, but it is probably more satisfactory for the home gardener to procure 1-year-old crowns and plant them in June (later in southern districts). In northern districts established beds will now be sending up leaf stalks or spears. When they have made about 6in. of growth spears should be cut 2in. below the surface of the soil, using a sharp, long-bladed knife. A square-ended blade sharpened at the end like a chisel is very suitable for cutting the spears. Care should be taken when cutting asparagus not to damage young spears or crown buds. Weed growth should be kept down by hand weeding during the cutting period, as the hoe is liable to injure the young shoots that may be just under the soil surface. Applications of liquid manure every 14 days will increase the yield.

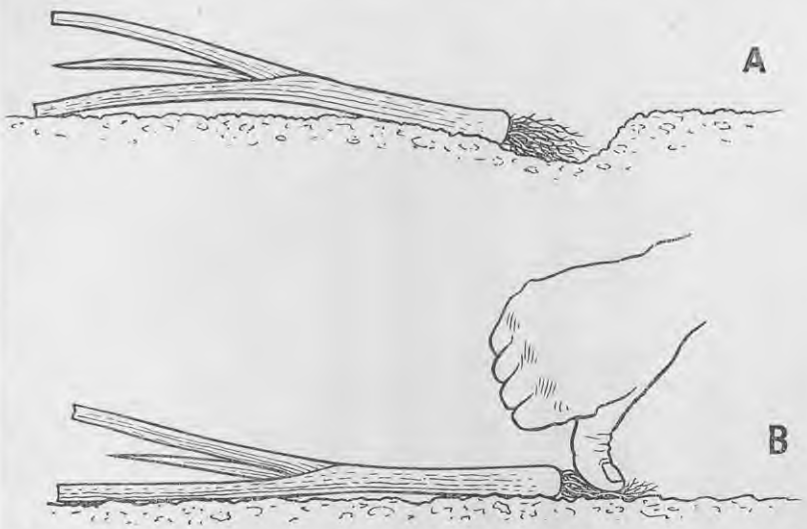
Good varieties are Mary Washington, Conover's Colossal, and Paradise. The last named is a recent introduction which is proving very satisfactory.

Artichokes

The globe artichoke is a vigorous perennial, the growth attaining a height of from 3 to 4ft. The large flowerheads when properly cooked make a very tasty dish. Plants may be propagated by suckers or seed may be sown in September or October and the seedlings transplanted to a permanent position during the following autumn. They require plenty of room to develop and plants should be set 4ft. apart each way. Suckers should be treated in the same way as seedlings. Flowerheads fit for use will develop the season after plants were set out and should be gathered before the scales open for flowering. Large Green and

HEADING PHOTOGRAPH: In September advantage should be taken of fine weather to do preparatory work such as placing stakes in position to support tomatoes and peas. Sparrow Industrial Pictures Ltd. photo.

TRANSPLANTING AUTUMN-SOWN ONIONS



Plants may be set in a shallow trench (A); if the roots are covered and the soil firmed, they will quickly pull the plant into an upright position. The same result may be obtained by pressing the roots into the soil with the thumb or finger (B).

Large Purple are the commonly grown varieties, the former being more popular.

The Jerusalem artichoke is really a tuberous-rooted sunflower, the tubers of which form the vegetable. It is propagated from tubers, which throw out annual stems to a height of 6ft. or more. As they are rather difficult to eradicate when established, it is advisable to grow them in an isolated piece of ground. Avoid over-manured soils, which are liable to promote excess top growth at the expense of the tubers. Tubers may be planted during August and September in rows 3ft. apart, allowing 2ft. between plants. A good system for the home garden is to keep the plants on the same plot for several years, simply lifting the tubers each autumn or winter and replanting them in the same place; sufficient plant food should be added to keep up the fertility. Cultivation between the plants to keep down weeds is necessary until they throw out the tuber-bearing runners; all hoe cultivation should then cease. Tubers may be dug in autumn or winter and stored in dry sand or sawdust in a cool place.

White Jerusalem, which has pure white tubers almost round and with few and very shallow eyes, is the best variety.

Carrots

In most districts an early sowing of carrots may be made now, but for the main crop sowing is best deferred for another month. Where the depredations of the carrot rust fly (*Psila rosae*) are severe, infestation may be minimised by sowing the seed in December as far as possible from the position of previous carrot crops or of other susceptible crops such as celery, parsnips, or parsley. The rust fly is a small, two-winged, shining black, yellow-legged fly about 1/6in. long. It lays its eggs in the soil close to the carrot root, and the legless maggots enter the taproot of the carrot and work upward. The maggots grow up to ⅓in. long and make small rust-coloured tunnels in the roots. Young plants wilt and die. This insect is very difficult to control, but horticultural naphthalene broadcast at the rate of 1oz. a square yard is an effective repellant; it does not damage the foliage and should be applied at intervals during growth but not later than 2 weeks before harvesting or there may be some residual taint of naphthalene after carrots are cooked. Another method found effective is to apply D.D.T. 50 per cent. wettable powder, ½oz. in 4 gallons of water, along the plant rows when plants are about 2in. high and directly after thinning. Applications should be repeated at monthly intervals and should be sufficient to penetrate the soil to a depth of 3 or 4in.

The rust fly should not be confused with aphides which commonly attack carrot foliage in all parts of New Zealand; for control of carrot aphis spray at regular intervals with nicotine sulphate 1:800 (1 fl. oz. of nicotine sulphate to 4 gallons of water plus 2oz. of soft soap). Best results are obtained if the application is made on a hot day and the foliage is completely covered.

Soil preparation and seed sowing instructions are similar to those given for parsnips in last month's notes. Drills should be 12in. apart and the plants should be thinned finally to 4 to 6in. spacings.

Carrots, being much in demand for culinary purposes and being easily grown, should be included in every selection of vegetables for the home garden. If used before they are fully grown they are very tender and tasty. To secure a succession of young carrots seed may be sown from September to January in most districts.

Varieties: Popular early varieties are Earlycrop and Early Scarlet Horn, while for the main crop Chantenay, Manchester Table, and Oxheart or Guerande are satisfactory.

Celery

Where the home garden has facilities for raising plants seed of celery may be sown now for December and January planting out. It should be sown fairly thickly—about a level teaspoon to a standard box (24in. x 14in. x 4in.) containing specially prepared soil. The seed should be covered very thinly and firmed with a piece of board. When the seedlings are large enough to handle they should be pricked out 2in. apart each way into boxes from which they can be cut out later with the soil attached and planted in the garden. The seedlings should receive plenty of ventilation and should be kept about 12in. from the glass so that they do not become drawn. Premature seed development of plants is a frequent cause of disappointment to home gardeners and this condition is usually the result of a sudden check to the growth of the plant. This is often brought about by spells of cold weather.

Varieties: Self-blanching varieties are most popular in the North Island and favourites are Gilt-edged Golden Self Blanching and White Plume. Some gardeners prefer those which require earthing up or wrapping for blanching; Crystal or Solid White is perhaps the best for this purpose and is the usual variety grown in southern districts.

Celeriac or Turnip-rooted Celery

Celeriac, a member of the celery family, has a large, turnip-like root, which is the portion of the plant that is eaten. Celeriac is a good vegetable for flavouring soups and can also be boiled and sliced and served with white sauce or used fresh in salads. Seed may be sown from September to January and plants set out from December to March; treatment is similar to that for celery. Transplanting of the young seedlings is essential. Plant seedlings in rows on the flat (not in a trench like celery) 18in. apart and allow 12in. between the plants.

Celeriac should not be earthed up like celery, but will develop better bulbs if the soil is carefully drawn away from the plants at frequent intervals. The lateral shoots and fibres should be carefully removed to keep the roots intact, but in doing so growth and development must not be interfered with. The enlarged roots may be dug after they attain sufficient size for good edible quality and stored in sand. Before storing roots the outer leaves should be removed, but the centre or heart leaves must be left to prevent further development.

Frost-tender Vegetables

In most districts it is still too early to sow seed of frost-tender vegetables such as cucumbers, tomatoes, marrows, and pumpkins except under glass or other protective covering. Tomatoes take approximately 6 weeks and the other vegetables mentioned about 3 weeks from seed sowing until they are ready for transplanting and this should be taken into account when deciding on the planting programme.

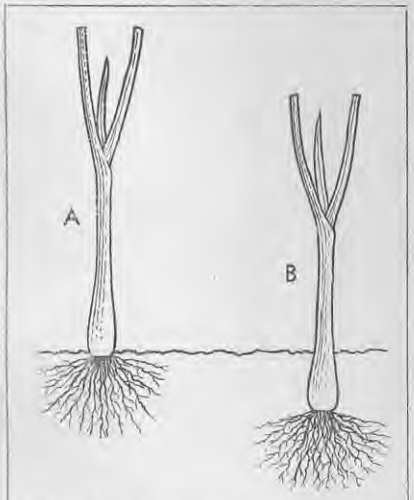
Leeks

The leek is a member of the onion family and is a most delicious vegetable cooked or raw. Raw it is more tender and milder in flavour than the ordinary spring onion. It is very hardy and can quite easily be grown from seed sown in September or October for planting out in December and January. These plantings should give a continuous supply from May to August. Select a warm position in well-drained soil and sow the seed in drills ¼in. deep and 6in. apart. As the seedlings take a long time to grow large enough for transplanting (lead-pencil thickness), frequent shallow cultivation is necessary to check weed growth and to aerate the soil.

Varieties: Of the three popular varieties London Flag, Lyon, and Musselburgh, the last named is best for general use.

Onions

In northern districts, where it is usual to sow seed in autumn and transplant onions in spring, September is a favourable month to do transplanting. Where transplanting is not practised seed should be sown now in the permanent rows. The ground should be well cultivated and manured some time in advance of sowing the seed. Although a firm bed is required, the surface of the soil should be of a fine tilth to a depth of 1in.; if it is too consolidated, a crust which may seriously affect the germination of the seed may be formed. The amount of firming required is dependent on whether the soil is light or heavy. Light soil can be firmed by treading it whereas raking is usually sufficient for heavier soils. The onion plant requires a liberal quantity of available plant food and does best in soils that have been under cultivation for some time. The heavier soil types generally produce better-keeping onions. If compost or farmyard or poultry manure is not available, equal parts of bonedust and superphosphate plus 10 per cent. of sulphate of potash, broadcast over the area at the rate of ½lb. to the square yard and worked into the top 3in. of soil, will suffice for most soil types. A good dressing of wood ashes may be used in place of potash. The onion is very sensitive to soil acidity, and where periodical liming has not been practised at least 3 to 4oz. of carbonate of lime to the square yard should be applied.



Transplanting autumn-sown onions. The leaves and roots of the seedlings have been trimmed for transplanting. A is set at the correct depth, though it may appear shallow. If seedlings are planted too deep, as in B, thick-necked or irregular-shaped bulbs will result.

[*Sparrow Industrial Pictures Ltd. photo.*

Early potatoes should be hoed frequently to promote growth, the soil being drawn up to form a ridge as they grow. Plants should be protected from frost damage by covering them at night. Straw or hay is very suitable for this.

Sow the seed thinly ¼in. deep in rows 12in. apart, cover it with fine soil, and firm the soil over the seed.

Where onions are to be transplanted soil preparation is similar to that for a seed-bed. Shallow drills 12in. apart and 1in. deep are drawn out and plants set out 4in. apart in the drill. The roots are covered and firmed by drawing soil over them; alternatively the area may be marked out and the roots of the plants pressed into the soil at the correct spacings. (See the diagram on this page.) Plants need not be set upright, as they will soon straighten up after planting. Good bulbs will not develop if the plants are set too deeply. If roots are trimmed and tops shortened, planting can be done more easily and plants are not so likely to topple over after being set out. Cultivation should be sufficient to keep the surface soil aerated and check weed growth. It should always be shallow, care being taken not to injure the sides of the bulbs, because if they are cut, further growth will increase the size of the wound, and the keeping quality of the onion will be impaired.

Varieties: Straw Spanish, Pukekohe Long Keeper, and Brown Spanish are good-keeping varieties. If onions are not required for long storage, there are several high-yielding sorts, such as Ailsa Craig, Giant Rocca, and Golden Globe.

Green or Spring Onions from Sets

Stored onions should be examined and those bulbs that are beginning to shoot should be used or may be planted out in the garden. Draw out furrows 4in. deep and 15in. apart and set the bulbs 6in. apart in the rows just covering them with soil. By this method spring onions can be produced quickly. As growth develops seed stalks may appear and should be broken off as soon as they become visible. However, unless they are used promptly, onions grown in this manner soon become pungent and tough.

Potato Onions

Potato onions, which are of mild and pleasant flavour, are increased by dividing the compact clusters at the bases of the plants. The small bulbs are transplanted and grow into large ones which if left form further compact clusters. Culture is similar to that for shallots, which was described in last month's notes.

Egyptian or Perennial Tree Onion

The Egyptian or perennial tree onion produces a cluster of little bulbs on the top of a stalk. The bottom also divides, but large bulbs are not produced. The bulblets are used for pickles and salads. The top sets or bottom divisions are planted in May or September, preferably the former month, in furrows 4in. deep and 15in. apart, with 6in. between sets in the row.

As soon as frosts are over in spring the tops start to grow. Those produced from the underground bulbs are soon ready for use and those from top sets shortly afterward. This type of onion becomes very coarse and strong as the season advances, but early in the season is quite palatable.

Garlic

Garlic, a vegetable which is often regarded with disfavour, is eaten, though usually unknowingly, by many people as a flavouring and seasoning

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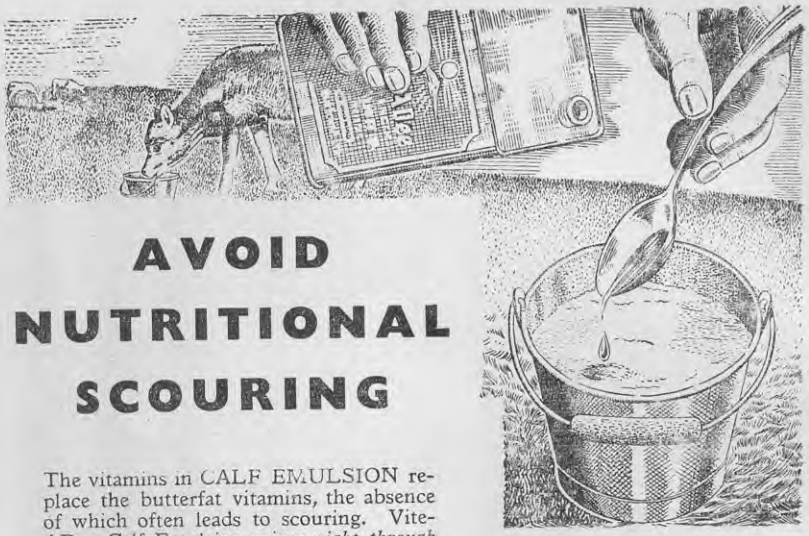

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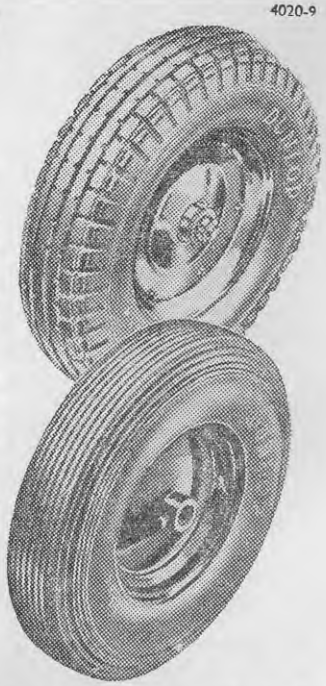

Above: *Pneumatic tyre and steel disc wheel with roller bearings.* Below: *Pneumatic tyre and steel disc wheel with plain bearings.*

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in prepared food products such as soups and pickles. Garlic produces a group of small bulbs called cloves. The whole bulb is broken up and the small cloves are planted, the best sets being those taken from the outside of the bulb.

Garlic does well in a rich, light, well-drained soil, which must be well trenched and brought to a fine tilth. Drainage is important, as garlic tends to rot in wet soil. The cloves may be planted from May to September. Draw drills 1in. deep and 12in. apart and press in the cloves from 4 to 6in. apart. If cloves are planted in May, do not cover them immediately; the soil can be replaced level as cultivation progresses. For spring planting replace the soil and level it over the cloves after setting them out.

Growing Perennial Crops from Seed

Asparagus: Seed may be sown in September or October provided soil conditions are favourable. The soil should be well drained and of a fine, firm tilth with good humus content. Sow seed thinly ½in. deep in rows 12in. apart and thin seedlings later to 4in. apart in the rows. If growth has been favourable plants should have reached sufficient size for planting out into a permanent bed the following August or September.

Rhubarb: Though most home gardeners prefer to divide up crowns from established beds, rhubarb can be grown easily from seed sown in September or October. Sow seed 1in. deep in rows 15in. apart in any fertile, well-drained soil. Seedlings should be thinned to about 6in. apart as soon as they are properly established and the young plants can be lifted and replanted in a permanent position the following spring.

No stalks should be pulled from newly planted beds until the second year and the plants should be well supplied with humus and plant food. Rhubarb does best when grown in a warm part of the garden where it is not overshadowed by hedges or trees.

In some districts rhubarb is forced by covering the crowns with boxes or straw and when this is done care should be taken to see that the covering is replaced each time stalks are pulled, because although rhubarb is not classed as frost-tender, when forced it is liable to severe damage if suddenly exposed.

Recommended varieties are Victoria Giant and Champion (for summer use) and the everbearing or winter sort Topp's Winter.

Potatoes

In districts free from late frosts potatoes may be planted this month, but in most southern districts it is safer to delay planting a little longer. Government Certified seed, though dearer than uncertified seed, will be found more profitable, as usually it produces more vigorous and disease-free growth and a higher yield. Potatoes should be procured some time in advance of planting and placed in shallow trays in full light to sprout. Care should be taken to see that the sprouts do not grow too long (¼ to ½in. is ideal), as sprouts tend to break off when tubers are being planted if they are too long. If tubers produce more than two strong shoots and the potato is not large enough to cut, the weakest shoots should be rubbed off, as it has been noted by commercial growers that plants with more than two or three stems produce a large number of small tubers. When tubers are large they may be cut into two or more pieces, according to size, before planting, each piece having at least one shoot. Tubers should be cut into thick chunky pieces rather than thin slices and the eyes should be centrally situated and not at the edges of the pieces. If the terminal eye is at the extreme edge of a piece, its sprout fails to obtain adequate nutriment and weak secondary buds develop. Tubers should be planted within 24 hours of being cut.

[*Sparrow Industrial Pictures Ltd. photo.*

Home seed testing is simple. The illustration shows two home-made germinators. That at left is made by inverting one saucer over another. Two layers of blotting paper are placed in the bottom saucer to ensure an even supply of moisture. The saucers must fit together neatly to prevent the blotting paper from drying. The germinator on the right is made by inverting a glass jar over two layers of blotting paper on a pane of glass. With this type the sprouting seeds can be seen without disturbing the germinator. It is usually necessary to damp the blotting paper with water each day.

Preparation of Soil

Adequate cultivation and good soil conditions are essential for potatoes, and land containing an abundance of humus is preferable. Organic matter such as stable or farmyard manure is suitable, but should be applied some time in advance of planting. Too much nitrogen is not advisable, as it tends to produce heavy top growth at the expense of the tubers. In the absence of organic matter a fertiliser mixture of 1½ parts of superphosphate, 1½ parts of bonedust, ½ part of sulphate of ammonia, and 3 per cent. of sulphate of potash gives satisfactory results; alternatively equal parts of blood and bone and superphosphate and 3 per cent. of sulphate of potash may be used. These mixtures should be applied at the rate of 8 to 12oz. to 12ft. of row.

Planting

The most practical method of planting is to open a trench 4in. deep and broadcast fertiliser along it, mixing it lightly in the soil. Tubers can be planted in rows 2ft. to 2ft. 6in. apart with 12 to 15in. between sets in the rows. Close planting is more suitable for early crops. For early planting the soil should be ridged up over the sets, when the trench is being filled in, as this allows for better drainage and the soil keeps warmer. As soon as plants are 2in. above the ground hoe around them and loosen up the soil between the rows to check weeds and aerate the soil. Repeat this operation every 2 or 3 weeks, as the soil must be kept well worked to grow good potatoes. When plants are about 9in. high draw the earth round the stems and repeat this operation a month or 6 weeks later.

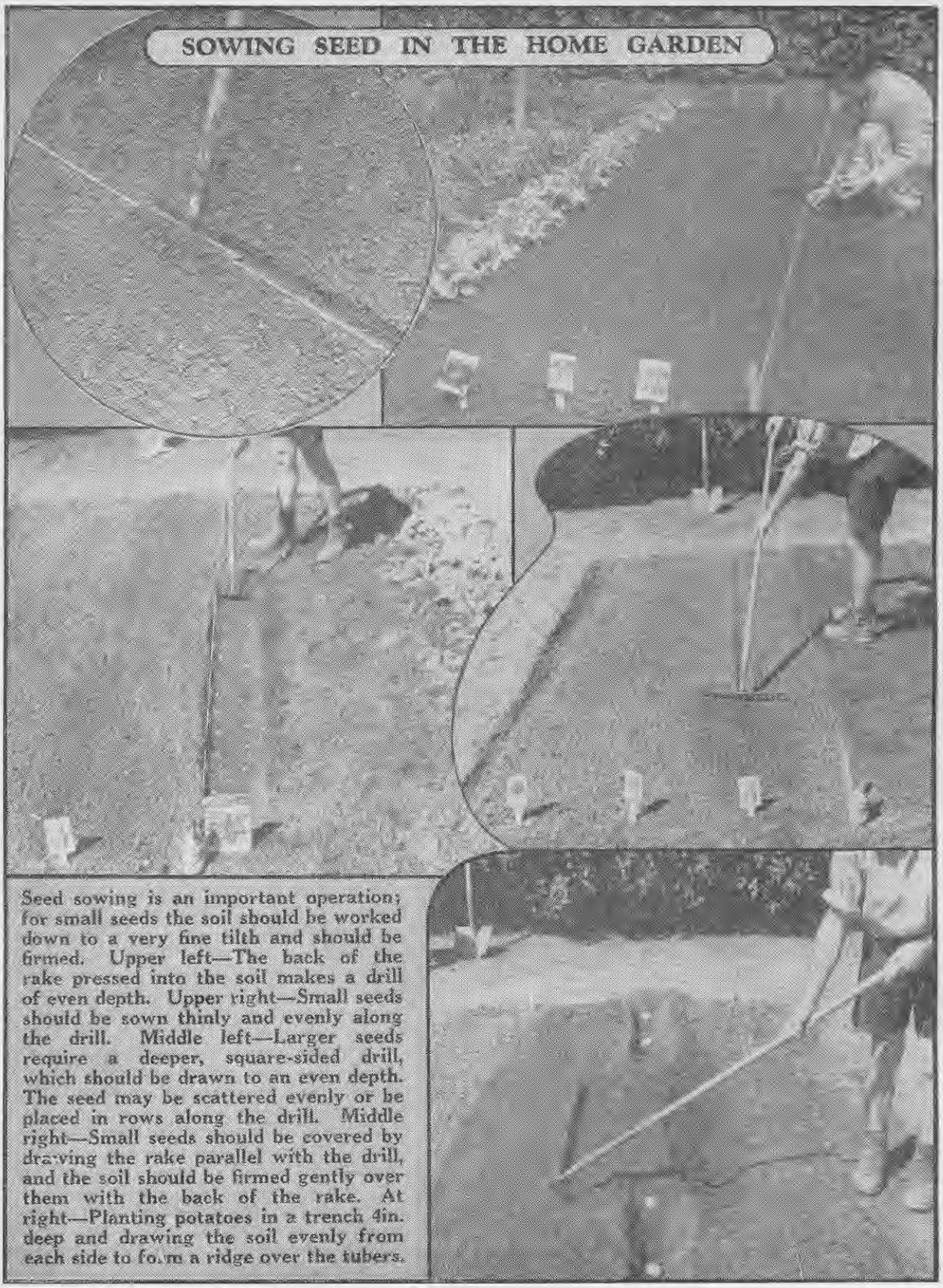
Harvesting

The amateur gardener generally has difficulty in judging when the crop is ready to harvest and often the quality of the potatoes is impaired by allowing them to remain too long in the ground. For early varieties digging should begin when the leaves of the plant begin to turn yellow and may continue until the crop is finished. Digging may extend over a month or more. Main-crop varieties take longer to mature, and if they are to be stored, they should be allowed to remain in the ground until the tops have died right down, as this improves the keeping qualities. When nearing maturity, especially when soil conditions are warm and a rainy period is experienced, they should be harvested promptly or the tubers will start growing and will become soft and unfit for use. When potatoes are ripe the skins are firm; if skins rub off, potatoes should be left to mature further if intended for storing.

Diseases

Potato blight caused by the fungus *Phytophtora infestans* is the most troublesome disease in some districts, but can be controlled satisfactorily by spraying plants with Bordeaux mixture, 4oz. of bluestone and 5½oz. of hydrated lime to 4 gallons of water. Applications may be necessary as often as every 10 to 14 days in districts where blight infection is prevalent. Prepared Bordeaux powders or one of

SOWING SEED IN THE HOME GARDEN



Seed sowing is an important operation; for small seeds the soil should be worked down to a very fine tilth and should be firmed. Upper left—The back of the rake pressed into the soil makes a drill of even depth. Upper right—Small seeds should be sown thinly and evenly along the drill. Middle left—Larger seeds require a deeper, square-sided drill, which should be drawn to an even depth. The seed may be scattered evenly or be placed in rows along the drill. Middle right—Small seeds should be covered by drawing the rake parallel with the drill, and the soil should be firmed gently over them with the back of the rake. At right—Planting potatoes in a trench 4in. deep and drawing the soil evenly from each side to form a ridge over the tubers.

[Sparrow Industrial Pictures Ltd. photos

the certified copper oxychloride mixtures are often preferred by home gardeners because of their ease of preparation compared with Bordeaux mixture.

Varieties: For early planting Epicure, Cliffs Kidney, and Arran Banner are recommended, for second early Arran Banner, Majestic, and Aucklander Short Top will be found satisfactory, and Arran Chief, Dakota Red, and Aucklander Short Top are popular as main-crop varieties. Dakota Red produces best in southern districts.

Salad Vegetables

As salad vegetables are best when young and fresh, frequent sowings are necessary. They should be grown rapidly and require a good, rich soil and a well-prepared seed-bed.

Lettuce

Seed of lettuce should be sown ¼in. deep in rows 9 to 12in. apart in well-drained and well-cultivated soil of high humus content. In cool weather lettuce do best when transplanted and are usually set out 9 to 12in. apart. In hot, dry weather they may be sown thinly in rows 12in. apart and later thinned to 9in. between the plants. Transplanting in hot weather often causes plants to bolt. In southern districts where frosts occur in spring early plants should be raised under glass or in boxes. When plants are large enough for setting out in the open care must be taken to see that they are well hardened off or their growth may be seriously retarded if a spell of cold weather is experienced following planting.

Varieties: For growing in winter especially adapted varieties such as Imperial 615 and Neapolitan (winter) are most suitable. For summer cultivation varieties such as Great Lakes and Imperial 847 are preferred, as they stand up better in warm weather.

Radish

Radishes are easy to grow, require little space, and are ready for use 3 to 6 weeks after sowing. They are adversely affected by hot, dry weather and remain in prime condition only a few days. To be mild, tender, and attractive they must be grown quickly and have plenty of moisture. Seed should be sown thinly every 3 or 4 weeks ½in. deep in rows 12in. apart in well-drained, free, deeply dug soil that contains plenty of humus.

Varieties: Of the long varieties Icicle and Long Scarlet are best. Of the turnip-shaped, round, and oval varieties the best are Red Turnip, White Turnip, and French Breakfast.

Spring Onions

Varieties of onions suitable for pulling young for salads are White Lisbon or Odourless. For best results successive sowings should be made. Sow seed ½in. deep in rows 12in. apart in a well-drained soil that has been worked down to a fine, firm tilth.

Endive

Endive, an excellent salad plant, is not grown to the extent that its usefulness justifies. It is particularly good for winter use, as it can be substituted for lettuce, which is sometimes difficult to produce in cold weather. For a winter and spring crop sow the seed as for lettuce in an outdoor seed-bed in February and March and keep it moist during dry weather. For the summer and early-autumn crop seed may be sown in September. When about 2 to 3in. high plants should be set in rows 2ft. apart with 12in. between plants in the rows. Cultivate with the hoe to keep weeds down and to loosen the soil. Endive must be grown quickly and must not receive a check or the leaves tend to develop a bitter flavour. Pick for salads or for boiling as greens any time after leaves are 4in. high; the early leaves can be cut and more allowed to grow.

Partial blanching usually improves the flavour of the leaves and renders them more crisp and tender. Successful blanching depends on excluding the light from the inner leaves and keeping them dry. A convenient method is to gather the leaves in a bunch when the heart is nearly mature and tie them near the top; this should be done when the leaves are dry. Blanching may also be done with two boards fastened together over the row in the shape of an inverted V, or each plant may be covered with a flowerpot with the hole stopped. Blanching is completed in about 14 days, when the plant should be used as soon as possible, as it is then liable to decay.

Varieties: Commonly grown varieties are Moss Curled and Fringe Leaved, the former being the more popular.

Horse Radish

Horse radish is grown for its pungent roots, which are grated, mixed with salt and vinegar, and eaten as a relish, condiment, or appetiser with meats or other food. Though there is little choice of variety, care should be taken to obtain good healthy planting stock of a strain that is giving good results where it is to be grown. Horse radish does best on deeply worked, well-drained, well-manured loam. No fresh manure must be mixed with the surface soil, as this causes the roots to fork. Horse radish seldom develops fertile seed and therefore is propagated from roots or root cuttings, which are very hardy and persistent. If it is not treated as an annual and carefully dug up each year, it tends to spread and become a pest. Horse radish may be planted in September from root cuttings preferably 6in. long and set in rows 2ft. apart between the sets in the rows. Plant the roots in a slanting position with the thick end facing upward and the top of the cutting about 2in. below the top of the soil.

The only cultivation necessary is keeping the surface soil free of weeds and occasional hoeing to conserve soil moisture. Since horse radish makes its greatest growth late in the season, harvesting should be delayed until as late in autumn as possible. When lifted, roots may be stored in dry sand and drawn on as required.

Seed Drills

Apart from wooden markers the most convenient tools for making the seed drills are the ordinary swan-necked hoe and garden rake. For forming a shallow drill the rake should be turned teeth uppermost and held at an angle of about 45 degrees and the back pressed into the soil to the desired depth. By moving the rake and keeping it parallel with the garden line and repeating this operation the entire drill is formed. In drawing the drill out with the hoe the blade should be tilted on its edge and only the corner used. By using short frequently repeated strokes the drill can be drawn straighter and a more regular depth kept than if long continuous strokes are used. The maintenance of correct even depth is important because variations are likely to cause irregularity or failure of germination, which will make thinning more difficult or cause blank spaces in the rows.

Spacing and Marking Rows

Various methods can be used for spacing rows. Some gardeners have the rake or hoe handle marked into 6in. spaces, which is quite a good method, but a 6 to 10ft. length of 1½in. x 1in. or similar light batten marked at the desired intervals or having 6in. spacings painted on it will be found very useful both for marking off the distance between the rows and the distance between the plants in the row. A good-quality garden line is essential and should be affixed to 12 to 15in. long pegs sharpened at one end.

Seed Sowing

Good seed is essential to success in vegetable growing. The most careful and efficient gardener cannot achieve success with poor seed even if he gives the closest attention to other factors of production.

As the seed is the basis of the crop and its cost is of little consequence in the total cost of production of most vegetable crops, the grower cannot afford to take chances. Only the best seeds or plants obtainable should be used.

Quantity of seed to sow: The rate of sowing should be just sufficient to produce a uniform stand without overcrowding the plants and so necessitating undue thinning. In estimating the rate of sowing it is necessary to take into account several factors.

Moulding established crops of cabbage, cauliflower, peas, and beans. A—The wrong way of drawing the soil up to plants; there is not sufficient room for root development and the soil is liable to dry out. B—Correct method of moulding. The wide flat-topped ridge can take in and retain moisture and there is ample room for roots to develop.

1. The date of sowing; the earlier sowing is done the greater the quantity of seed needed, because some of the seed will probably not germinate.

2. The physical character of the soil. Clayey soils require more seed than sandy loams, as the seedling is often injured when breaking through heavy, sticky, or lumpy ground; carrot, parsnip, and bean seedlings are especially liable to injury.

3. The size and vigour of the young plants; carrot and parsnip seedlings are weak and are not able to push through a compact, heavy soil.

4. The viability of the seed; the proportion of seed in a packet that will germinate may be ascertained by testing the seeds.

5. Insect pests, birds, and diseases; if insects and diseases are prevalent, more seed will be required. Even if seedlings are sprayed or protected from birds, some are sure to be lost.

6. Manner of sowing seed; if a crop is to mature where it is sown, seed should be used sparingly and the plants thinned to the required distance after germination. If plants are to be shifted, thicker sowing may be practised.

Sowing broadcast and in drills: Seed may be broadcast, that is, scattered evenly over a surface, or it may be distributed in straight and evenly spaced furrows or drills. Though broadcasting is quicker, the method is seldom advisable unless the soil is in exceptionally fine condition and free of weed seed. The advantages of the drill system over broadcasting are as follows:—

The seed may be sown at a uniform depth.

Seedlings grown in drills are easier to thin and weed.

It is possible to cultivate the soil, as there is a regular and definite space between plants.

Depth of sowing: Depth of sowing depends upon at least four factors, of which the first is size. The larger the seed, the deeper it should be planted. Beans may be planted to a depth of 1in. or 1½in.; celery or carrot seed should be barely covered. The texture of the soil is the second factor. If the soil is sandy, the seed may be planted at a greater depth than if the soil is clayey. The third factor is moisture. Seed must be sown deeper in dry soil than in moist or well-irrigated soil. The fourth factor, the season of the year, influences the third. There is more moisture in early spring and late autumn than in summer. Seed sown in spring and autumn should be nearer the surface than seed sown in summer, because lack of moisture in the topsoil makes deeper planting necessary.

Covering the seed: Experience has shown that the soil used to cover the seed should be as fine as possible and of free-running texture and should be firmly pressed down. It is often advisable to sieve some suitable soil when covering fine seeds. Very light soils should be firmed with even foot pressure, but the back of the rake is usually sufficient for heavy soils. Firming the soil is a most important operation for securing good germination, particularly of fine seeds.

Effect of Removal of Runners from Strawberry Plants

THE benefits to be derived from the elimination of runners from a strawberry bed intended for fruit production have often been stressed. This article by A. H. Eddie, Orchard Instructor, Department of Agriculture, Motueka, and the accompanying illustrations offer a striking example which should emphasise to growers the value of this practice.

IF runner production is required from strawberries, fruiting should be suppressed so that the energies of the plants will not be divided. For the same reason if fruit is the objective, the elimination of runners is most important, especially in the first season, when maximum crown development of the plants is necessary to ensure the production of berries in quantity in the following season.

An example of this latter point occurred on the property of Mr. B. McBrydie, of Lower Moutere, where a trial plot of virus-free plants was established. The soil type is Moutere clay loam and the strawberry variety is Huxley, the plants having been raised at the Department of Agriculture's Horticultural Research Station, Levin.

Two rows of 50 plants were set out in July, which is rather late for best results in this district. Manurial treatment was similar for both rows, but one row was deblossomed and left to produce runners without restriction, while the other was allowed to flower and fruit, but runners were periodically eliminated as they appeared.

Eight months after planting the accompanying photographs were taken. They illustrate clearly the considerable difference between the two rows. The marked advantage in crown development and the consequent promise of fruiting capability for the next season gained by the de-runnered row over that allowed to produce runners are most significant. The photograph of a single plant typical of the de-runnered row further emphasises this.

[J. R. Sharp photo.

A typical plant of the de-runnered row. Note the width of the leaves and the splendid establishment of the plant, which has a diameter of more than 23in.

[J. R. Sharp photo.

The trial plot of Huxley strawberries. On the left is the row which was deblossomed but where runner production was unrestricted; at right is the row which was allowed to fruit, and in which runners were eliminated.

BOOK REVIEW: "FARMING IN NEW ZEALAND"

Valuable Documentation of Primary Industry Reviewed by Mr. W. N. Perry, President, Federated Farmers of New Zealand

PROBABLY because their achievements are unspectacular and the evidence is difficult to document, the great farmers of the world have received scant recognition from historians. Signal work done by British livestock breeders and agronomists during the 18th and early 19th century went almost unheralded, and the remarkable contribution made by British farmers generally in better usage of land has received little recognition. It is unfortunately true that the greatest of them is less well known than contemporaries who were secondary figures in political, military, and other spheres. And though New Zealand's chief claim to distinction lies in her exceedingly efficient use of her farming lands, the record of achievement in that field has been dealt with only in piecemeal fashion. To expand the history a great deal of research and a pooling of contributions from experts in many fields is necessary. That the Department of Agriculture has undertaken this work is most gratifying. The result is the first volume of "Farming in New Zealand."

IN producing this well-illustrated book the Department has taken a step which was long overdue. It is well that the work has been undertaken before some of the early history becomes obscure and before the first-hand knowledge of men who had much to do with the accelerated development of the last half century is no longer available.

"Farming in New Zealand" is a not too technical history of our agriculture from the first days of European settlement and it should prove equally as interesting to the working farmer as to the student or the economist. It deals with all the main phases of the development of the various types of farming land and the ways in which an industry has been geared deliberately to meet the exacting demands of a principal market 12,000 miles away.

[*S. P. Andrew Ltd. photo.*
Mr. W. N. Perry.

Though the farmer's chief preoccupation is with the day-to-day management of his land and stock, experience has taught him that he must be informed on changing conditions. Organisations such as Federated Farmers of New Zealand have assisted the primary producer to broaden his sphere of activity and to influence the forces which affect his immediate livelihood and conditions within the industry as a whole. Farmers have always recognised the value of the work done at research establishments, and their outstanding success in the production of meat, wool, and dairy produce has in part been due to their willingness to accept technical assistance and to the practical approach of research workers to farm problems.

Two notable contributors to volume 1 of "Farming in New Zealand" are P. W. Smallfield, Director of the Extension Division of the Department of Agriculture, and S. H. Saxby, Agrostologist of the Department. The sound practical knowledge and the outstanding contributions made by these officers in guiding farming technique are well known. The several other contributors to the book are recognised authorities in their respective spheres.

A study of this type would be incomplete without detailed statistical information and there is a wealth of data in the volume. In fact, on this score alone it is a handy reference work.

As a chronicle of New Zealand's agricultural progress of interest to the general reader the book can be highly recommended. Its value will undoubtedly increase with the years and this permanent record of the Dominion's principal industry may well be most appreciated in the future by historians of our agricultural development.

I would recommend this book, too, to the student of our history. The tending of land, livestock, and crops has figured so prominently in the lives of New Zealanders—and will continue to do so despite the growth of secondary industries—that no useful study of events of the past 100 years can ignore the rise of our great farming industry. And it is by no means a dull page of our history; the record shows a host of difficulties surmounted, courage in accepting risks inevitably associated with radical change, and the building up of a reputation for products unsurpassed in the world's markets.

Most New Zealanders know something of the story; many have been authors of it, but it is important that the facts should be set down. That is what has been attempted in volume 1 of "Farming in New Zealand", and it is to the credit of the Department of Agriculture that it should have added this work to its already useful endeavours in the publication field.

PRIMARY PRODUCTION MONTHLY REVIEW

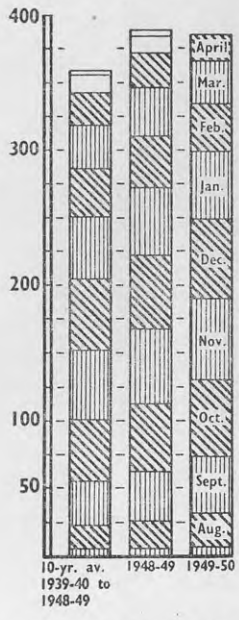
From data supplied by the Statistical Section, Extension Division, Department of Agriculture, Wellington

DAIRY PRODUCE (FACTORY PRODUCTION ONLY)

Season July 1 to June 30: Order of months July to June reading upward in each column

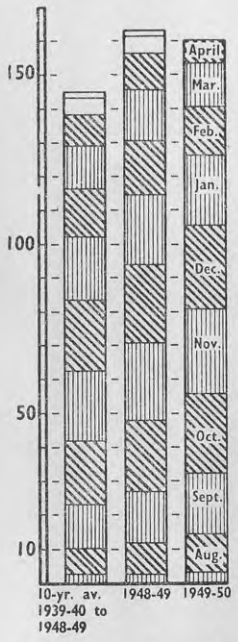
BUTTERFAT USED FOR BUTTER AND CHEESE

Millions of pounds



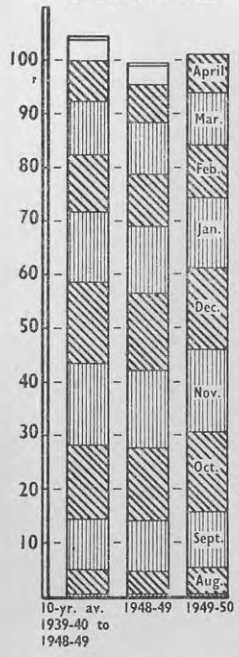
CREAMERY BUTTER

Thousands of tons



CHEESE

Thousands of tons

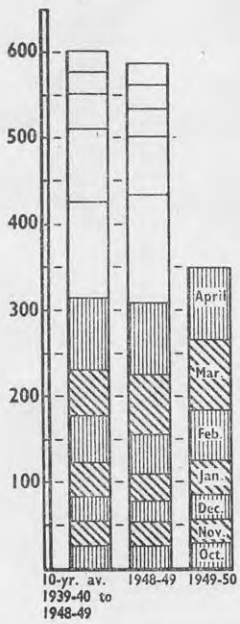


LIVESTOCK SLAUGHTERED AT MEAT EXPORT WORKS AND ABATTOIRS

Season Oct. 1 to Sept. 30: Order of months October to September reading upward in each column

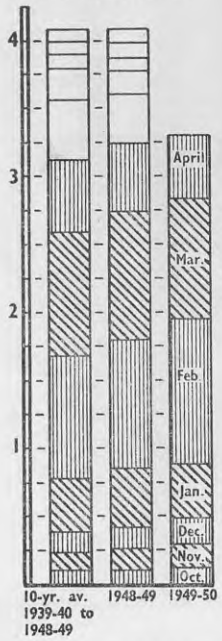
CATTLE

Thousands of carcasses



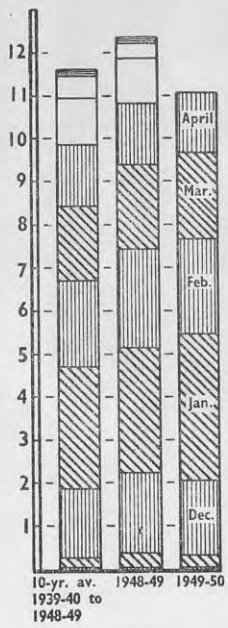
SHEEP

Millions of carcasses



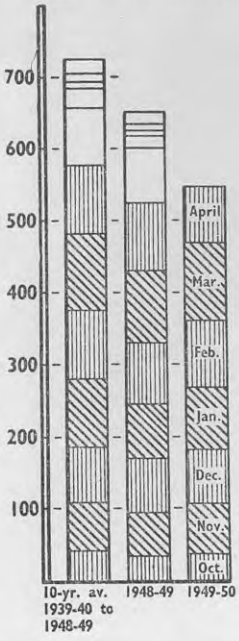
LAMBS

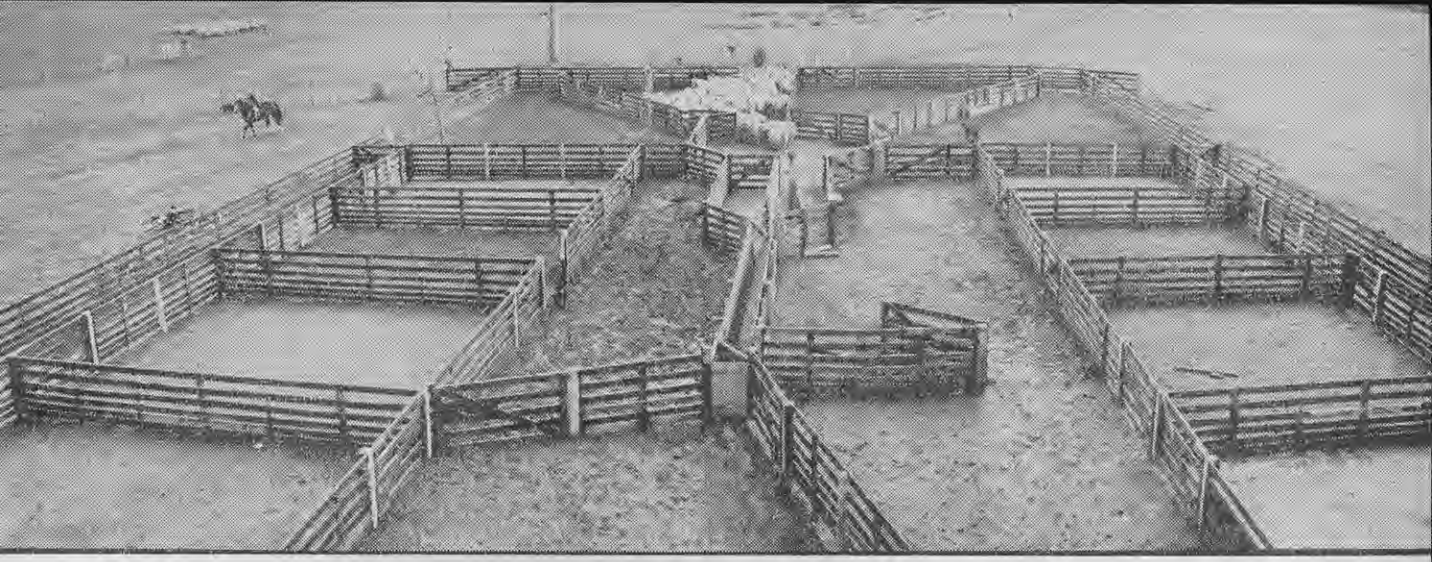
Millions of carcasses



PIGS

Thousands of carcasses





Design and Construction of Sheep-drafting Yards

By J. E. DUNCAN, Wool Supervisor, Department of Agriculture, Wellington.

THE use of concrete in the construction of sheep-drafting yards and the types of gates and races which may be employed are among the subjects dealt with in this, the second part of an article on sheep-drafting yards. The first part appeared in the July "Journal", and the final portion will appear in next month's issue.

CONCRETE fence posts and strainers have not yet been as widely used as their merits deserve. At present there is great scope for their use, and as the supplies of good durable timber decrease still further that scope will widen. Many still avoid them, because they have had, or have heard of, failures with such posts. When concrete posts crack through, the most probable cause is that the concrete has not been mixed properly in the first place, that the posts have not been allowed time to mature, or that the reinforcing has been wrongly placed.

Some farmers believe that a single ⅜in. rod through the middle of the post is as good as a ⅜in. rod in each corner. This is a fallacy.

Concrete has very great compressive strength, but will stand very little tensile stress. Steel reinforcing, which has a high tensile strength, is put in to overcome this weakness. The reinforcing should therefore always be in that part of the concrete likely to be subject to tensile stress. A post is liable to be pushed or pulled in any direction.

In Fig. 7 on page 131 the direction of the force applied to the posts is represented by arrows. The shaded sides of the posts are under compression, while the unshaded half is under tension. Post A, which is reinforced with a single thick steel bar, tends to crack off at or near ground level (C). The crack can go half way through the post before it meets with the resistance of the steel, which can quite easily become bent, allowing the crack to go right through. With post B, which is reinforced with a much lighter rod in each corner, the tensile strain, from whatever direction it is applied, is always offset by a steel rod just below the surface, and cracks do not develop. The steel must, however, be covered with ⅜in. of concrete to prevent its rusting, and the covering of concrete should be thicker at the top of the post to allow for weathering.

Advantages and Disadvantages

The value of concrete posts may be assessed from the following list of their advantages and disadvantages.

Advantages

1. Where suitable supplies of sand and shingle are available they are cheap to construct.

2. Skilled labour is not required to make them. Post construction provides useful and profitable employment for the farm staff during wet weather when they might otherwise be idle.

3. When properly made they are strong and practically everlasting. There are no upkeep costs and as posts get older they get stronger. This applies to no other type.

4. They are not destroyed by fire or the ravages of pests.

5. Large gateposts, etc., can be made of any desired shape for special jobs and can be cast directly on the site. Details relating to aggregates, types of moulds, etc., and to other constructional points connected with the use of concrete were dealt with in a series of articles by H. W. T. Eggers, Engineer, Department of Agriculture, Wellington, which appeared in the "Journal" in successive issues from November, 1949, to March, 1950. Technical literature is also available from cement companies.

Disadvantages

1. Their cost becomes prohibitive if material for making them has to be carted a long way.

2. They are heavy, so that with large strainers and gateposts transport may present difficulties, especially on hill country where they will have to be packed on horseback. However, ordinary posts are not too heavy for a man to carry.

3. They have to be allowed to mature before use, which takes time. (This is not always a disadvantage.)

4. Cement is still in short supply, but it is hoped this is only a passing phase.

In Fig. 8 on page 131 are given two of several alternative methods of attaching wires to concrete posts.

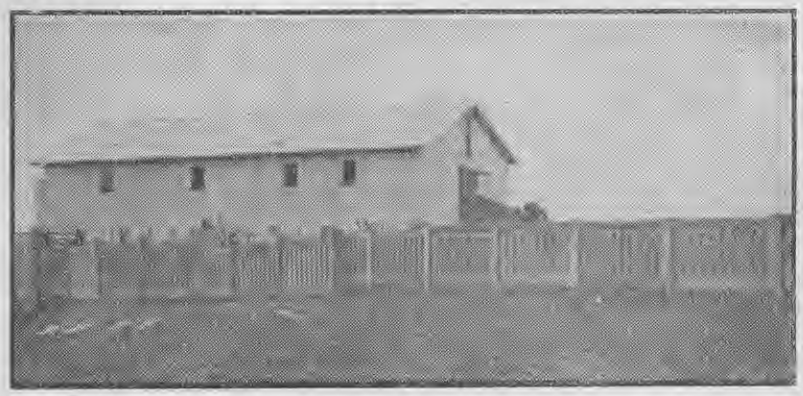


Fig. 6—An all-concrete fence is permanent and upkeep is low.

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Concrete and Pipes

Concrete posts used in conjunction with galvanised-steel pipes, though costly, make the strongest and most permanent type of fence. Such fences are sometimes used in Australian sheepyards where presumably other methods of construction would also be costly. Advantages of concrete post and pipe construction are that sheep are less likely to be bruised and that where there is an outbreak of blood poisoning the fences are very easy to disinfect thoroughly. They would also be fireproof and insect-proof. Similar remarks apply to the all-concrete fence

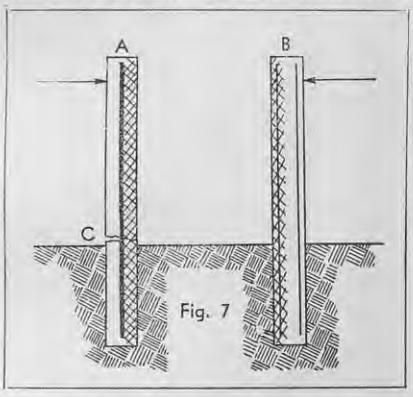

Fig. 7

built with concrete posts and reinforced, pre-cast concrete panels.

Concrete Posts and Wooden Rails

Concrete post and wooden rail construction is frequently used and many expedients for attaching the rails to the posts are found. These include tying with wire through holes in the post, nailing to a batten which is bolted to the post, bolting the rails directly to the post, nailing to a wooden strip which is placed in the mould when the post is being cast, and many other more or less ingenious methods. Fig. 9 illustrates one such method, where the posts have grooves cast in their sides into which the ends of the rails are fitted. Rails are kept at the correct spacing by being nailed to a batten.

Height of Fences

Height of fences may vary considerably. Provided a fence is high enough to keep in any sheep ever likely to be in the yards, it can be considered satisfactory. Sheep vary greatly in type and temperament. A wild Merino or a crossbred from the backblocks can jump like an antelope; a stud Southdown is its antithesis. As always, cost comes into the question. In the quest for economy it is possible to cut down the safety margin of height, but it is also possible to overdo the cutting down.

Again, with the yards on the flat, fences can be lower than where they are on a steep slope and a sheep can get a good take-off when jumping.

The external or "boundary" fence of the yards can be up to 4ft. or even 5ft. high. On the other hand the fences of the crush pens and other small pens do not need to be so high, because the sheep cannot get a run at them to jump, and because if they are higher than about 3ft. 3in. they are more difficult for men and dogs to get over.

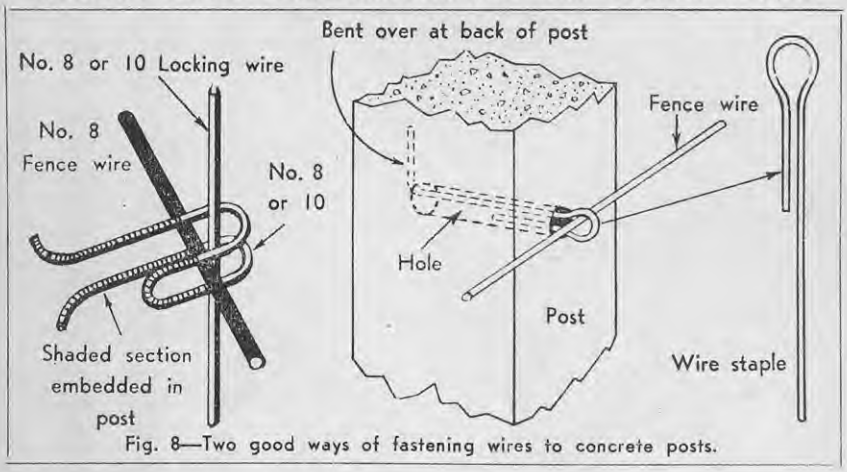

Fig. 8—Two good ways of fastening wires to concrete posts.

The height of a gate should be in keeping with the height of the fence in which it is placed.

GATES

Several types of gates are used in yards. They may be classified under five main headings:—

1. The ordinary swing gate.
2. Lift-up gates.
3. Slide-back gates.
4. Tip-up gates.
5. "Freak" or unusual gates.

The above types will be dealt with individually later in this article, but the following points apply to gates generally. It is an advantage, though of course more costly, to have gates bolted together rather than nailed, as this not only gives a stronger gate, but if the gate is smashed at any time, it is much simpler to replace the broken members.

In building gates the ordinary carriage bolt with a small square section below the rounded head should not be used, as when the thread gets rusty the square shoulder is quite insufficient to prevent the bolt from turning when an attempt is made to unscrew the nut. Use either square- or hexagon-head bolts.

Bolts and nuts should be well painted or they will soon rust away. Modern steels are not nearly so resistant to rust as the old-fashioned wrought iron. The painting or creosoting of gates is worth while, but even if they are not done all over, the joints at least should be done before assembly, as these are the first parts to rot if untreated.

The width of a gate is of course governed by the nature of the traffic it will have to handle. It is an advantage in many cases to be able to take a dray or a motor-truck into yards for carting in posts or clay or metal for the gateways, etc. The gates should be wide enough to allow passage of any such vehicles. Usually 10ft. gates should be ample for normal requirements.

Wherever possible avoid hanging gates from strainer-posts, since there is then an increased chance of the gate getting out of plumb. Separate gateposts should be used. However, in yards where post-and-rail fences are used, the gatepost can also serve as a fence post, because there is no strain on it as in a wire fence. In the case of gateways used frequently by vehicles it is a good policy to put in short, sturdy guide posts on the inside of the gateposts to protect them and prevent them from being knocked out of plumb.

The merits and disadvantages of the five main types of gates already enumerated may be summarised as follows:—

Common Swing Gate

The common swing gate is so well known that no description is needed.

Advantages

1. It is relatively cheap and easy to construct.

2. For wide openings it is the most practical type. Where openings are very wide double swing gates can be used.

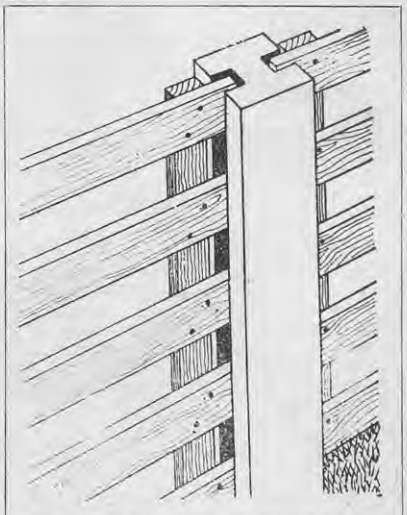
Fig. 9—One method of attaching rails to a concrete post.

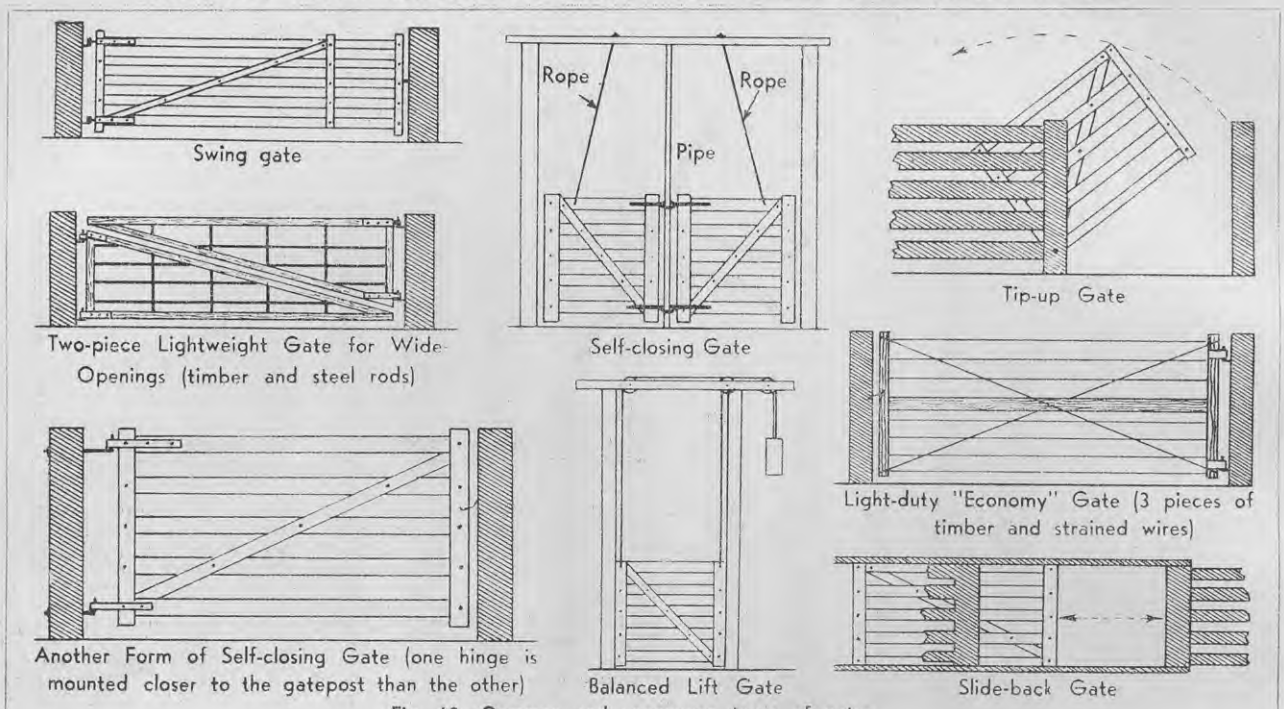

Fig. 10—Common and uncommon types of gates.

3. As there is not much to get out of order, maintenance is low.

4. It can be quickly taken off its hinges and used as a hurdle where necessary.

5. Two of these gates can be swung across and tied together to connect two pens while cutting off a third and/or fourth pen.

6. They are easy to open on horseback.

7. They provide unlimited head-room.

8. They can be used as a "sweep" to push sheep into a crush, provided care is taken to see that no undue force is used.

Disadvantages

1. Considerable space is necessary for their swing.

2. They are difficult to open or shut when animals are pressing against them.

3. They require to be fastened when shut and if left swinging in the wind may be broken.

Lift-up Gate

The lift-up gate opens by sliding up between guides fixed to uprights. In some cases a snib is used to keep the gate up when lifted, but the best type is provided with a chain or rope running over a pulley and a counterweight which just balances the weight of the gate.

Advantages

1. The gate takes up very little space laterally.

2. If properly constructed, it is very easy to work and can be opened or shut more quickly than any other type. It is not affected greatly by wind.

3. Of the types mentioned it is least likely to get jammed by sheep pressing against it.

4. It only needs to be fastened shut if it is to be left for a time, but for ordinary work is simply pulled up or down as necessary.

Disadvantages

1. It is a difficult type to construct and requires reasonably good workmanship. It also gets out of order more easily if abused than the common swing gate.

2. It is the most expensive of the common types for first cost.

3. Due to the "gallows" over this type of gate head-room is limited.

4. As well as the disadvantages enumerated above it does not possess the advantages 2, 4, 5, and 8 given for the common swing gate.

Slide-back Gate

The slide-back gate slides back from the opening it covers. The fence at this point is usually double with about a 6in. space between. The gate runs on wheels on a steel rail above and in a channel guide below, or vice versa. In a cheaper type, however, the wheels are omitted, the fence is single, and the gate is exposed on one side.

Advantages

1. It takes up very little room for working—less than any of the types mentioned.

2. When well constructed it is quick and easy to work, but is not as good as the lift-up gate in this respect.

3. When the gate slides back into a "sheath" it cannot get jammed in the open position by sheep pressing against it.

4. It does not need to be fastened shut when being left for a short time only. It is not affected by wind.

Disadvantages

1. Its construction demands skill and good workmanship, if it is to work well. It gets out of order probably more easily than any of the other types due to small stones and dirt getting in the guides and also through sheep jumping and hitting the crossbar on which it runs.

2. It is probably the next most expensive type after the lift-up gate for first cost.

3. Unless it runs back into a sheath it can be jammed open by sheep on one side and can easily become jammed in the shut position.

4. It has very limited head-room due to the crossbar. Where this is not provided the gate will have to be made longer and stiffer and will not work as easily.

5. As well as the above it does not possess the advantages 2, 3, 4, 5, 6, and 8 given for the common swing gate.

Tip-up Gate

The tip-up gate is not as common as the types already mentioned. It is usually hinged on a single bolt passing through one of the bottom corners and swings upward and backward alongside the fence.

Advantages

1. It is relatively cheap and easy to construct and will usually work fairly well even if roughly constructed.

2. It takes up less space than other gates except the slide-back type.

3. Head-room is unlimited.

4. It is easier to move the stock leaning against it than with the common swing gate or the slide-back gate.

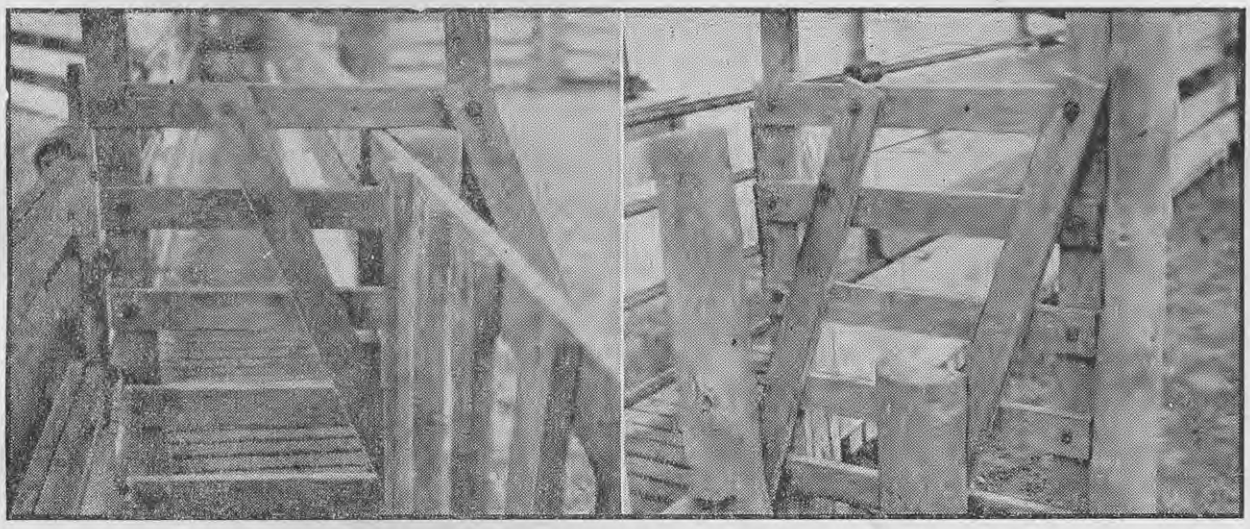

Fig. 11—"Disappearing" gate, shut (left) and open (right).

If it tips up into a sheath similar to that described for the lift-up gate, it will certainly not get jammed in the open position. It is not much affected by wind.

5. It scarcely requires a fastener, as its own weight holds it shut.

Disadvantages

1. It is cumbersome and slow to open or shut. It takes considerable manual labour, as some of the actual weight of the gate has to be lifted each time.

2. It tends to get broken, as it is hinged from one corner only.

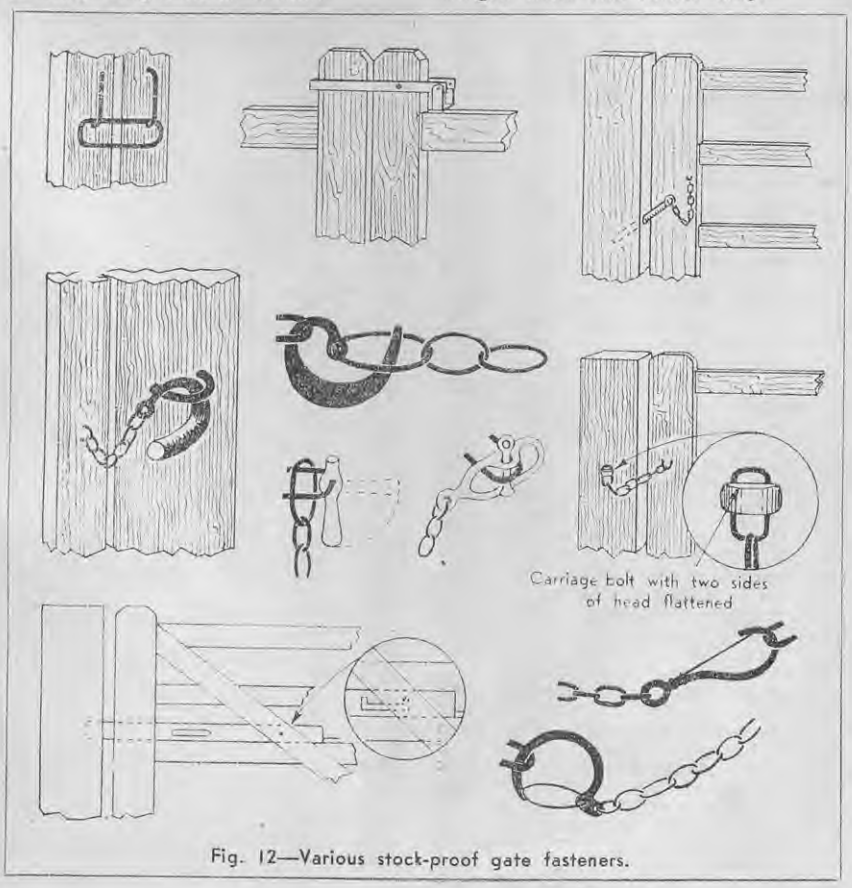

Fig. 12—Various stock-proof gate fasteners.

3. It does not possess the advantages 2, 4, 5, 6, and 8 given for the common swing gate.

"Freak" or Unusual Gates

The number of "freak" gates is legion and some display remarkable ingenuity and inventiveness. As a rule, however, they have not the all-round efficiency of the more orthodox gates, although sometimes they are specially built to function under conditions for which the usual types of gates are quite unsuited. It is not proposed to discuss any of these unusual gates in detail, but the illustrations in Fig. 10 on page 132 give a selection to choose from.

Considering all things, it seems therefore that the ordinary swing gate and the lift-up gate have the greatest number of good points. In many instances either of these could be used, but in a few cases they are not interchangeable. The swing gate certainly has a wider sphere of usefulness than any of the others, yet it is the lift-up type which figures prominently where expense is a minor consideration.

Stock-proof Fastenings

Although sheep are not as likely to undo gate fastenings as larger stock, such as cattle and horses, some of these latter are occasionally shut in different parts of a sheepyard. Some stock-proof fastenings are, therefore, shown in Fig. 12 on this page; the diagrams are largely self explanatory.

THE CRUSH

The function of the crush, which may consist of one, two, or even more separate pens, is to make it easier to force the sheep through into the race.

Shape

The pen or pens are usually not very large, holding not more than about 50 sheep altogether, and they are invariably long and narrow so that it is easy for one man to keep behind the

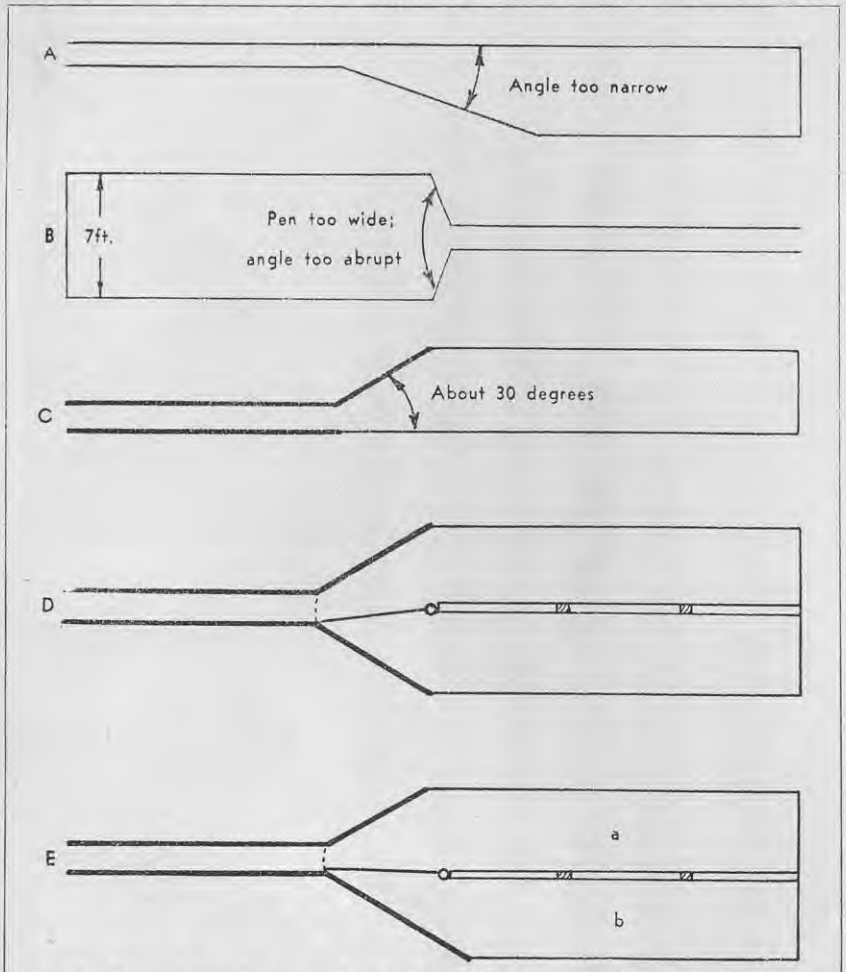

Fig. 13—Types of crush pens. Avoid A and B. For a single pen C is a good shape; it has a 30-degree angle and one fence forming a continuation of one side of the race. D is the usual type of double crush pen and has a double-railed central fence and a 2-way gate 5 or 6ft. long. E is a variation sometimes preferred; the central fence is lined up with one side of the race. Note: The sections shown by heavy lines represent parts of the fence which should be close boarded.

sheep and force them forward. The end of the crush pen should taper off into the mouth of the race. The junction between pen and race should not be an abrupt narrowing as in Fig. 13 (B) on this page or sheep will not move steadily into the race. On the other hand, a very long gradual taper as shown in Fig. 13 (A) will lead to trouble due to the tendency for the sheep to try to enter the race two abreast. Therefore an intermediate taper with an included angle of about 30 degrees should be used. Where possible one side of the crush should be straight, that is, a parallel continuation of one wall of the race in the case of a single pen (Fig. 13 (C)).

In the case of a double pen the usual arrangement is to have the dividing fence opposite the centre line of the race and to employ a fairly long gate to lead the sheep from either pen into the race. If this gate is less than about 4ft. long it will give a bad entrance —crooked and narrow. A longer gate (5 or 6ft.) will give a straighter run for the sheep. Some builders of yards deliberately line up the dividing fence with one side of the race as shown in Fig. 13 (E) on the principle that one crush pen is often used more than the other, particularly when handling small mobs, and pen a, with the straight side, is always filled first to start the sheep running well into the the race. As against this the entrance from the other pen (b) will not be as good, so personal preference and the particular circumstances of the case must decide the issue.

Size

Opinions differ as to how wide the crush pen should be, but it should never be wider than about 5ft. Even that is too wide where one man is on the job, as sheep will tend to duck back past him. For one man 3ft. 6in. is a suitable width; a crush of this width is also very useful as a dosing pen. However, it is more usual to compromise with a width of 4ft. or 4ft. 6in. Occasionally one crush pen may be made this width and the other 3ft. to 3ft. 6in. so that a choice is available for different jobs.

The reason for having two crush pens is to save time; as soon as one is emptied the other one is brought into use and there is no delay in waiting for filling. This applies particularly when picking fat lambs. The sheep in the full pen also act as a decoy to lure the second lot in. There is no particular advantage in having more than two crush pens.

The dividing fence in a double crush pen should be railed on both sides to prevent sheep, particularly fat lambs, being bruised against the posts. The height of this and the other crush-pen fences is a somewhat controversial topic; 2ft. 9in. seems to be about the minimum, though 3ft. is very common. With high-country sheep which are seldom handled or yarded it may be necessary to have higher crush-pen fences, but they should be kept as low as practicable to allow men and dogs to get over them quickly and easily.

A feature which should be included in all types of crush pens is the close boarding of the tapering section adjoining the entrance to the race. This prevents sheep seeing the man at the drafting gates or other distracting activities likely to cause them to balk before entering the race.

DRAFTING RACE

The drafting race is a most important component and a bad type of race is always a bugbear. Sheep will not work well through it and a great amount of energy, on the part of both men and dogs, is wasted through it.

There are several special types of races such as double races and races with by-passes which will be mentioned later. The simplest sort of race is merely two close-boarded wooden walls with the smooth sides facing each other. Races are always close boarded to prevent the sheep seeing anything but what is straight ahead. Width between the sides should be just sufficient to allow a sheep to walk along in comfort without being able to turn round. A single gate is hung opposite the end of the race and by swinging this gate in contact with one or other wall of the race sheep can be drafted two ways.

The dimensions of drafting races vary, and cannot be set down exactly, as they depend on so many points, such as the size of sheep to be dealt with, personal preferences, etc. The usual maximum and minimum limits for these dimensions are somewhat as follows:—

Length, 10 to 30ft. The more ways sheep are being drafted at once the longer should be the race, to give sufficient time for the hand to react to the visual message.

Width, 13 to 20in. Frequently the race is slightly wider at the top than at ground level, but this point will be dealt with later.

Height, 2ft. 9in. to 3ft. 6in., according to the type of sheep handled. This is really a compromise, since it is desirable to have the sides reasonably high to prevent the sheep passing through from seeing men and dogs near the race, while on the other hand, if the sides are too high, it is difficult to reach over and help the sheep along if a blockage occurs.

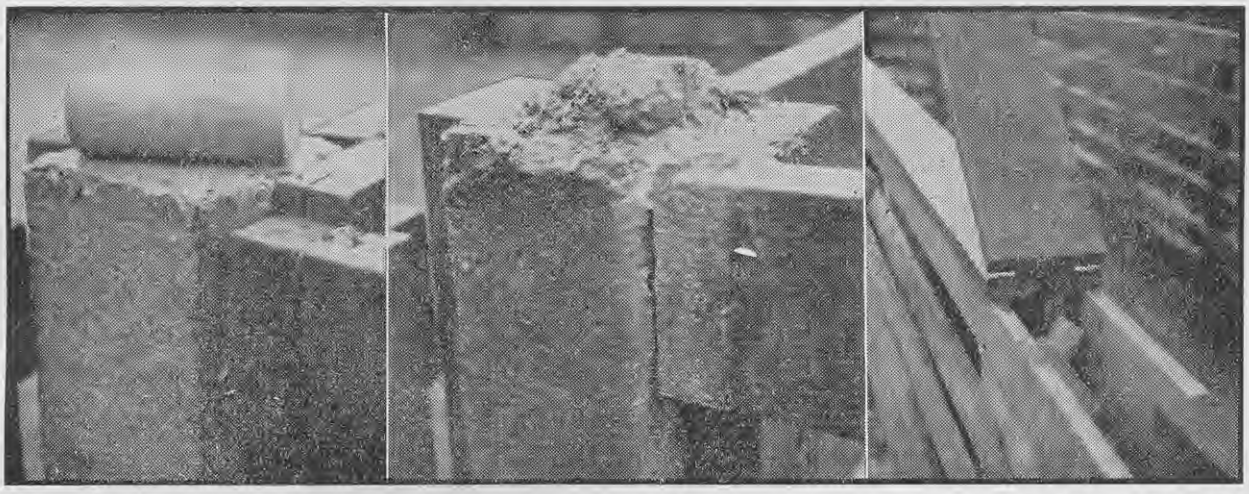

Fig. 14—Raddle exposed to the weather soon disintegrates. A simple remedy is to build a cupboard (right) into the double dividing fence of the crush pens.

It is desirable to have the floor of the race of something more durable than earth, as owing to the heavy traffic, earth very soon wears hollow. Concrete is excellent, but it must be left rough to give a good foothold. It is also a good plan to continue the concrete in a fan shape beyond the race at each end, because if it ends abruptly it leads to the earth wearing away and a sharp drop being formed. If timber is used, small hardwood cleats can be nailed across at intervals of a foot or so to prevent slipping. Cleats should not be more than ½in. high or they will do more harm than good by tripping the sheep. Whatever material is used for the floor it is a good plan to finish the boards of the race sides an inch or so above the floor, leaving a gap which lets the dirt out and helps to prevent it accumulating.

The above is a description of the race in its simplest form. The following are some modifications and refinements:—

Adjustable Races

In the case of the orthodox type of race the sides and the width between them are fixed at the time of building. The best width to use depends on the size of sheep which usually are put through the race; widths of 15 to 18in. are usual. In any case it will be somewhat of a compromise, since frequently sheep of all sizes from large rams and wethers down to lambs will be passing through it at different times and often in mixed mobs. Of course on a property running Merinos the race could be considerably narrower than where a large-framed line of Romneys were run.

The shortcomings of a race of the wrong width are obvious. If it is too narrow, the sheep will have difficulty in getting through at all, especially if carrying a heavy fleece, while if it is too wide, they will be able to turn round and there will be a strong tendency for them to try to get two abreast and so get jammed.

Worth Consideration

A race adjustable for width has, therefore, much to recommend it, provided of course that its efficiency is not sacrificed in any other way. Adjustable races have been used in Australia and Argentina and appear to have given satisfaction. Probably the reason that they have not been more widely used is that most farmers think the extra difficulty involved in construction outweighs the benefits to be derived from such a race. This is a matter for personal decision, but a few extra hours spent in building a first-class race will be repaid a hundredfold in time saved.

There are, broadly, two classes of adjustable races. The first type could be described as an elongated funnel, the neck or narrow part of which can be altered in width to suit different sizes of sheep. In other words one whole side of the race is hinged at one end and swings in or out at the other end in relation to the second fixed side of the race. This type is not particularly recommended, as there is a tendency for sheep to enter the wide end two abreast and to jam as they approach the narrow end. The second type also has one movable and one fixed side, but the movable side is hinged along the bottom, and at any given setting the sides are parallel.

The width on the floor of the race remains constant, which does not matter, since its width is ample for any sheep's feet; but higher up, opposite the spring of the animal's ribs, the width can be adjusted to suit any particular line of sheep being run through. Of course when a mixed line of sheep such as ewes and lambs is being drafted an adjustable race will not be very greatly superior to an ordinary one, but wherever large mobs of sheep have to be dealt with there will be sufficient "straight" lines of sheep to be drafted to make an adjustable race well worth while. The variation between the individual animals of any line will not be as

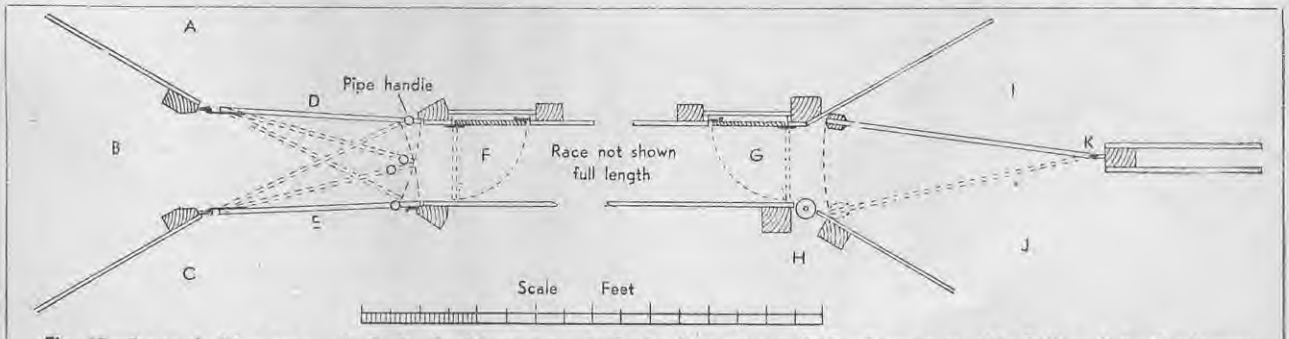

Fig. 15—3-way drafting race. A, B, C—Drafting pens. D, E—Drafting gates. F, G—Stop-gates. H—Roller. I, J—Crush pens. K—2-way gate feeding race.

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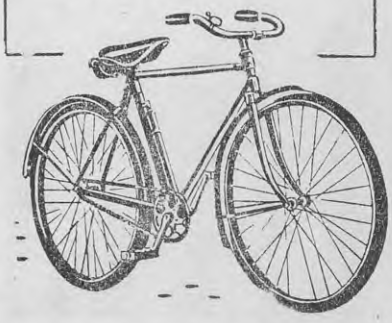

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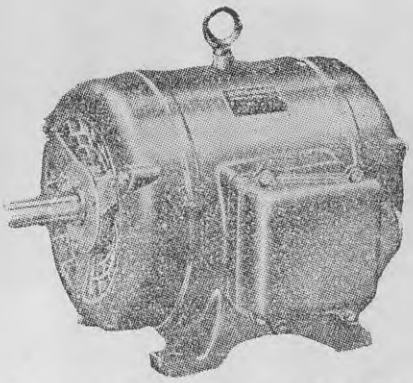

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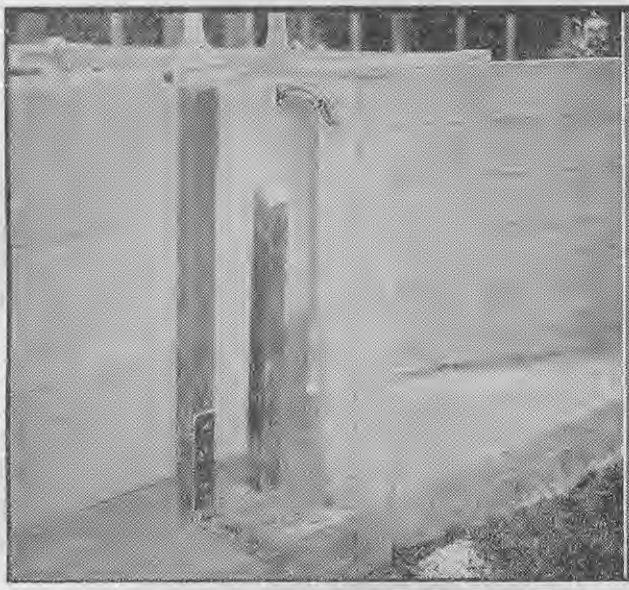


Fig. 16 (left)—An experimental race with adjustable sides. The width at top and bottom and degree of taper are all adjustable.
Fig. 17 (right)—A large Romney ram in full fleece going through the race.

great as the variation between the average sizes of any two lines, so that for each line being run through there will be a definite width of race which will give the best results. Another point to be considered is that freshly shorn sheep will need much less room than they will 12 months later with a full fleece.

A refinement which assists in getting the sheep through any race with a minimum of trouble and jamming is to have a roller 3 to 4in. in diameter at the mouth of the race; and a pair of rollers at the exit are an extra refinement which also helps. They project very little beyond the actual wall of the race and are situated right on the corners (Fig. 15, page 135). The reason for having only a single roller at the entrance is that where two sheep try to enter the race together the roller assists only one, usually enabling it to force its way through and thus prevent a bad jam.

Tapered Races

Although an adjustable race involves extra work in building, the same cannot be said of a tapered race with fixed sides, which is very little more trouble to build than the usual type and has sufficient advantages to warrant its inclusion in any set of yards.

To find the taper which would give the best results some experiments were recently carried out on a specially constructed race having both sides hinged and movable in and out. The special hinges and fasteners of this race are shown in Fig. 16 on this page. Sheep of all ages, sexes, and sizes were run through this race and numerous adjustments were tried. The experiments showed that even the largest ram required no more than 8in. width at the bottom of the race for its feet. This width was impractical, however, because it meant opening the race too wide at the top to give sufficient width half way down to allow for the spring of the animal's ribs. It was also found that a width of 11in. at the bottom and 22in. at the top (with a vertical height of 2ft. 9in.) gave the best results and accommodated the largest Romney rams and wethers carrying almost full fleeces. At the same time it was narrow enough low down to suit the hoggets as well. A tapered race built to approximately these dimensions should give general satisfaction in most parts of New Zealand.

Fig. 18—The common 3-way drafting system employing 2 gates.

Curved Races

Some sheepmen maintain that sheep will run better through a curved race, where they cannot see far ahead of them, than they will through a straight race with a clear view ahead. There is still considerable controversy about this point and finality has not been reached on the question and probably will not be until someone carries out an experiment with proper controls and on a sufficiently large scale to give definite results. Where a curved race is used a straight section must be provided at the end long enough to see the sheep in time to draft them correctly.

By-pass

A by-pass consists of a passage about 3 to 5ft. wide on one side of the race and running parallel with it. One end of this by-pass communicates with the crush pen by a gate, and the other end opens into one of the check pens.

The by-pass is useful as a short cut and a more rapid means of transferring sheep than via the narrow race.

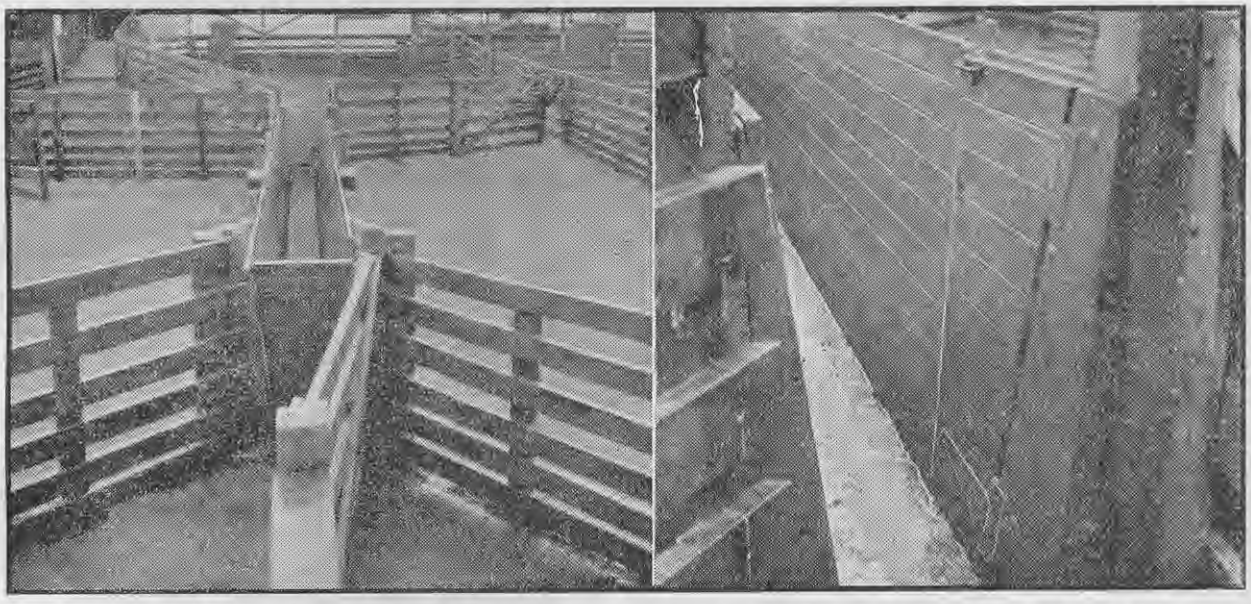


Fig. 19 (left)—Tapered race fitted with a stop-gate at either end. Fig. 20 (right)—The stop-gate is shaped and hung to suit the tapered race.

For example, it is used for filling the shed. Similarly mobs of sheep can be returned quickly by this means from the check pens to the crush for re-drafting when this is necessary.

Gate Systems for Drafting

With the simplest form of race having only a single drafting gate sheep can be drafted into two separate mobs and for a small set of yards this is usually all that is required. If the mobs require further subdivision, they are simply run through the race a second time.

The next logical step is the double drafting gate, by which sheep can be drafted three ways at once. In any but the smallest yards this is probably the most common arrangement.

Fig. 15 on page 135 is almost self explanatory, but there are one or two points which, though seemingly minor ones, contribute toward the smooth working of the race.

The small stop-gate shown at G is an improvement on the old method of using a narrow hurdle to block the race when it is not in use. It will be noted that the stop-gate must fit flush with the sides of the race when the gate is open. When closed it is secured with a bolt into the side of the race. In the case of a tapered race this gate is made accordingly—wider at the top and narrower at the bottom of the race (Figs. 19 and 20).

At times drafting gates have been made of unequal lengths so that the handles are separated by a few inches and not likely to pinch the user's fingers. The same object can be achieved equally well and with less trouble simply by having one handle at the extreme end of one gate and that on the other gate set back a few inches. Sometimes handles are omitted, but this is not a good idea, as gates are not easy to control without them. Water pipes flattened and bolted to the gates make good handles.

Drafting gates should always be close boarded and must swing freely on their hinges and be hung level so that they will remain in whatever position they are left, as when the operator is temporarily single handed he can then leave the gates in the proper position and go along the race to shift sheep when there is a blockage. Ample clearance must be provided between the bottom of the gate and the ground. Naturally these gates must be strong, but they must not be unduly heavy or their inertia will prevent very rapid moving, and a heavy gate will be more liable to bruise a sheep when it is swung over suddenly in an attempt to stop the animal going the wrong way. A good safeguard is to pad the leading edges of these gates with rubber from an old tyre. Drafting gates must be a reasonable length —not less than about 3ft. 6in.—or they will form a sharp angle with the wall of the race and sheep will have difficulty in getting round such a sharp bend quickly.

Nothing is worse on a drafting gate than projecting nails, nuts, or the ragged ends of bolts. These can cut and scratch nearly every sheep passing through and possibly lead to subsequent losses from blood poisoning. All bolt heads, nuts, etc., should be recessed into the wood to give a smooth, flush surface. A good drafting gate can be made on the laminated principle by nailing together two or three layers of ¼in. or 7/16in. dressed planks, running one layer vertically and the other one or two layers

Fig. 21—Three gates are needed for 4-way drafting.

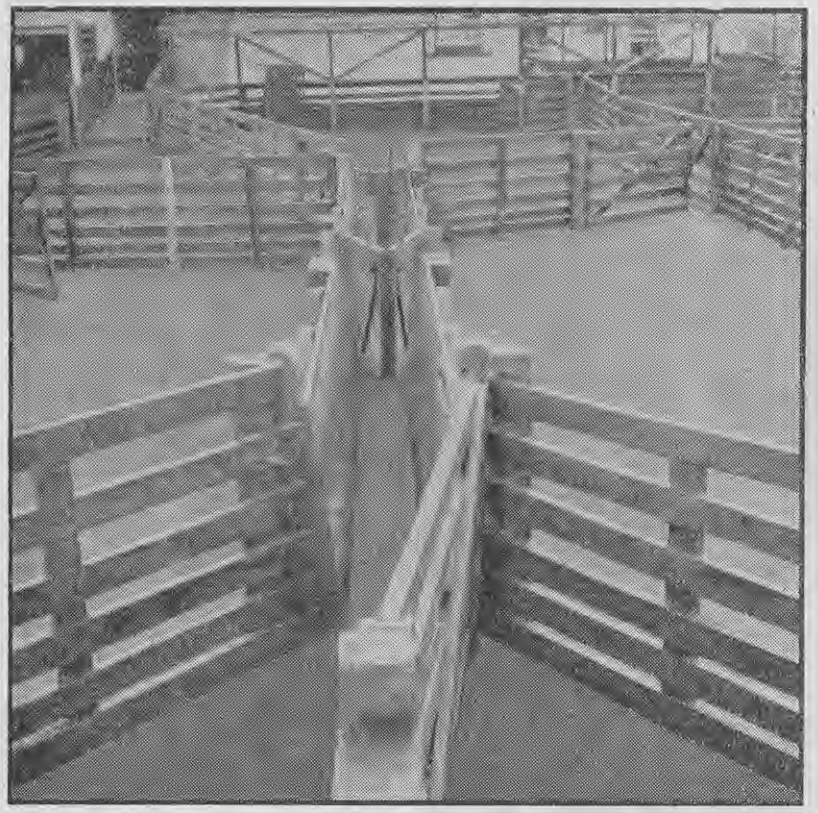


Fig. 22—Here 4 gates and 2 men working them allow 5-way drafting if necessary.

horizontally, as in plywood. This will give a light, strong, smooth gate, provided all nails are well hammered in and clinched over.

The gates D and E in Fig. 15 (page 135) should be provided with bolts or other fasteners by which they can be fixed back to the sides of the race, giving a straight run through. An additional stop-gate, fitting in flush with the boarding, can be provided at F to close off the drafting pen B, but it is not essential because when G is closed sheep in B cannot get out. Nevertheless such a gate is handy when a jam occurs and the drafter has to leave his position to rectify it. He can then close F to hold the sheep in the race until he gets back to his drafting gates.

4-, 5-, and 6-way Drafting

A number of the larger sheep stations in New Zealand are equipped with 4-way drafting races; that is, instead of the usual one or two drafting gates three are fitted, and this allows sheep to be drafted four ways. This arrangement works quite satisfactorily and at times when 4-way drafting is not required one or more of the gates may be fastened, leaving 2- or 3-way drafting with the other one or two gates in action. Attempts have been made at times to devise 5- or 6-way drafting systems, but these as a rule are not practical with only one man on the job. With a long race, however, quite a good practice is to fit two additional drafting gates about half way along; then when an extra man is available and the necessity exists sheep can be drafted two extra ways as they pass along the race. These two extra gates can be used to supplement the normal drafting gate or gates and will thus allow drafting 4, 5, or 6 ways at a time. Their inclusion also makes the yards more versatile and is worth consideration when a large new set of yards is being built. Their use is illustrated in Fig. 22.

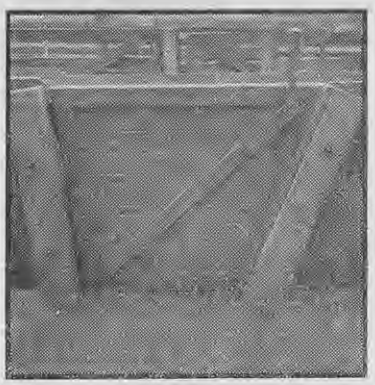


Fig. 23—When a tapered drafting race is used intermediate gates must be shaped and hung appropriately.

DRAFTING PENS

Drafting pens are sometimes omitted, or rather, where they open direct into the holding yards, they take on the functions and name of check pens. The number of drafting pens will vary according to how many ways drafting can be done. The reason for having both drafting pens and check pens is that while the sheep are issuing into the drafting pens another man can be at work on those in the check pens raddling, counting out, etc., without interference with fresh sheep continually coming in from the race. By the time he empties the check pen the drafting pen (which has the same capacity) will be full, and he lets these sheep through into the check pen, and so the process goes on.

CHECK PENS

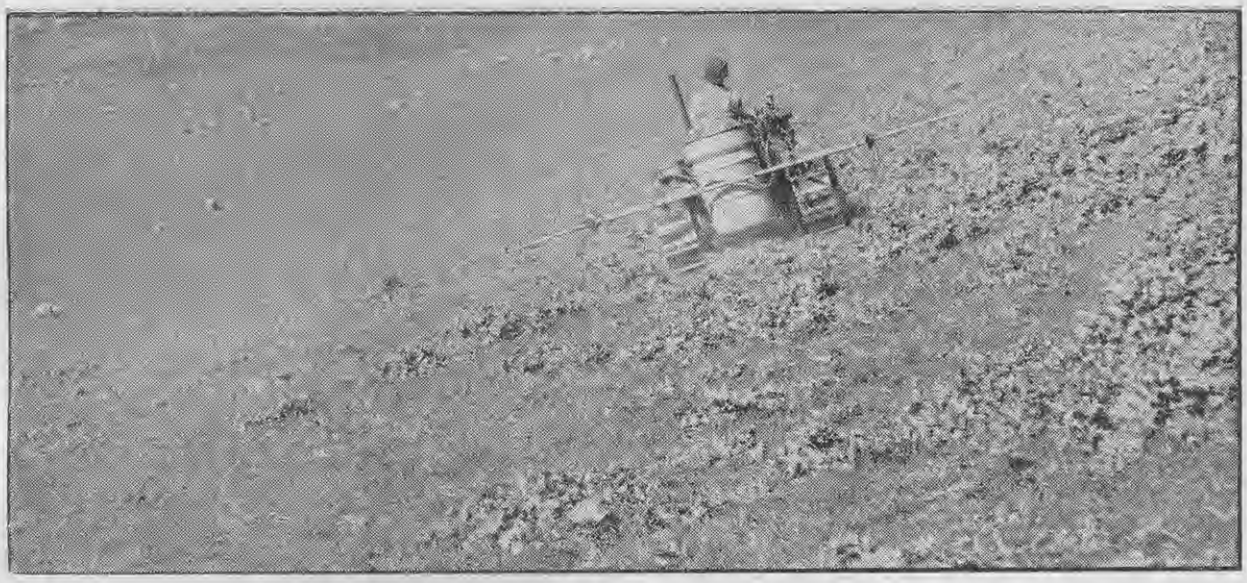
Check pens are those into which the drafted sheep issue from the drafting pens in the case of a large yard, so their number will correspond with the number of drafting pens. Check pens may be of almost any shape, but they should not be too large or it will be much more difficult to pick out sheep which have accidentally got into the wrong pens. A capacity of about 100 sheep per pen is a good upper limit to their size to facilitate catching sheep and removing them. They may be smaller than this, but if they are made too small, any gain from easier catching of sheep will be nullified by more frequent filling and emptying and the time and labour involved.

BRANDING RACE

In New Zealand a branding race is not always included in a set of yards because the counting-out pens frequently open into a narrow alleyway which serves the purpose quite well. However, branding races are sometimes installed, usually on large properties, and in such cases take the form of a long narrow race holding a number of sheep in single file. One or both sides of this race are kept low to give easy access to sheep. They are, of course, filled from a crush pen, usually triangular, which communicates with all the counting-out pens. Such races enable branding to be done quickly and neatly, but it is doubtful whether they are worth the extra expense. A branding race might, however, serve a dual purpose and have a foot-rot trough installed in the bottom of it, in which case there would be more justification for its existence. Cases are also on record of such a trough, but deeper, being used for eradicating leg lice.

If a swing gate is placed at the end of the branding race, it will then act as a drafting race and will be found very useful as an adjunct to the normal drafting race.

This concludes the description of the drafting yards. It is beyond the scope of this article to go into yard work and the actual handling of the sheep. Such a description is hardly worth while, as the finer points which simplify this part of the work can be learnt only by practical experience.



[*R. W. Orr photo.*
Variegated thistle can be effectively controlled by the use of hormone weedkillers.

Variegated Thistle and its Control

By A. R. DINGWALL, Assistant Fields Superintendent, Department of Agriculture, Christchurch.

VARIEGATED or milk thistle (*Silybum marianum*) is an annual or biennial weed occurring extensively in several North Island areas, particularly in Hawkes Bay and Wanganui (coastal) districts, and less extensively in isolated parts of the South Island. The plant forms a broad rosette of large, shining, variegated green and white leaves with thorn-tipped segments. The tall, robust, branching flower stalks, which attain a height of 7 to 8ft. on fertile soils, bear large, spiny, purple flower heads up to 3in. in diameter. The thistle grows usually in isolated but very dense communities that can completely suppress pasture species and form an almost impenetrable barrier to man and beast.

FAVOURED by free-textured, warm soils, variegated thistle gains ingress to thin, open swards on dry, sunny hill slopes; to ground bared by stock camped around trees and along ridge crests; to spoil from newly excavated drains; to roadsides, stream banks, and waste places, or to ploughed or cleared ground subject to infestation from nearby established stands. With some variation due to district, location, and seasonal influences, seedlings develop strongly with February and March rains, and plants grow to moderately sized rosettes—up to 18in. in diameter—at which they remain throughout the winter. Rapid growth restarts with the advent of warmer spring weather (early September) and flower stalks begin to appear by mid-October. Flowering begins early in November and continues through December and seed is set and ripens prolifically in the new year. Spring-germinating seedlings flower and set seed later in the autumn.

Control Measures

Control measures for variegated thistle, in addition to the elimination of existing plants, must include the suppression of the crop of seedlings arising from dormant seed in the normally bare ground that remains.

Ploughing or Grubbing

Where ploughing followed by cropping or summer fallow or both and sowing down to a vigorous pasture sward are possible, control is not very difficult. Variegated thistle can prove a serious weed and will continue to propagate in summer-sown winter forage crops, especially of non-intercultivated roots. However chou moellier, rape, and greenfeed cereals—especially the last when autumn sown—have a more favourable smothering effect.

On non-ploughable hill country control is much more difficult and costly. In the past it has been largely confined to hand grubbing, usually in October, when most of the thistles are in the large rosette stage, and before the development of flower stalks. As many small rosettes are missed in grubbing and as weather conditions

Variegated thistle established on a stock camp site under a tree.

CONTROL OF VARIEGATED THISTLE

Autumn establishment of variegated thistle on land cleared of gorse.

about this time are not always favourable for successful oversowing, reinfestation quickly occurs. Consequently systematic grubbing over a period of years, often with twice-yearly grubbing (early summer and autumn), is needed to gain a reasonable measure of control. This method has become increasingly more difficult and costly with increasing shortages and costs of both permanent and casual farm labour. The 5 per cent. sodium chlorate-lime mixture, as for ragwort, has been used to some extent as a chemical control. It has not proved very satisfactory mainly because sodium chlorate is not fully effective on variegated thistle and it can also cause severe injury to any pasture species present.

Hormone Weedkillers

Trials conducted by the Department of Agriculture using hormone-type weedicides as a basis for chemical control of variegated thistle have shown promising results in comparison with hand-grubbing and sodium chlorate methods. Both 2, 4-D and M.C.P. compounds have been successfully used in both spray and powder forms, though dusting offers the more practical means of control on hill country where access and the use of large volumes of water, as in spraying, are difficult problems. Hormones can give complete kills when carefully applied and are less injurious to pasture swards than sodium chlorate, though they retard clover species for a time. Applications as low as 2½cwt. of 1 per cent. dust or 56lb. per acre of 5 per cent. dusts give satisfactory results if evenly distributed, preferably during fine weather but when foliage is damp after heavy dews or recent rain. The smaller quantity of 5 per cent. dust used can be evenly applied if bulked up to about 2cwt. per acre with lime, superphosphate, or serpentine superphosphate. Using the phosphates as the spreading agent has the added advantage of encouraging competition from pasture species without detriment to the weedicide properties of the hormones.

Time of Application

Hormone treatments should be applied in August-September and again in the following February together with surface sowing of pasture species and topdressing (if topdressing is not applied as a spreader) 4 to 6 weeks after final weed-control treatment. Where long-established, dense stands of thistles exist it may prove more advisable to give two main treatments in consecutive springs, followed by a lighter application or "spot" treatment of individual plants in the second autumn before surface sowing.

Whichever method is adopted, isolated plants will continue to appear and will have to be dealt with systematically in the rosette stage either by grubbing or "spot" treatment with hormones.

Seeds Mixture and Grazing

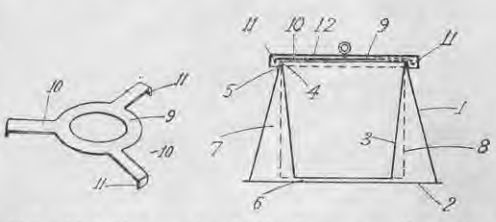
The surface-sown seeds mixture should contain at least 2lb. of white clover and 2lb. of subterranean clover in addition to 12 to 15lb. of perennial ryegrass, 5lb. of Italian or short-rotation ryegrass, 2lb. of crested dogstail, and 1 to 2lb. of browntop.

If a mob of sheep can be used to trample in the seed after sowing, so much the better. Instances have been recorded of stock poisoning where cattle have eaten variegated thistles during dry periods of feed shortage. Cattle will readily consume the wilted foliage of treated thistles and should be kept off any extensively treated area for at least 4 weeks after treatment. Treated areas should be leniently grazed throughout the period of treatment and until a reasonably dense sward has been established on affected areas.

Recent Patent Specifications for Farming Inventions

The following particulars of recent patent specifications of interest to farmers have been selected from the Patent Office Journal, issued on May 23, 1950, and are published by permission of the Commissioner of Patents, Wellington. Photostat copies of any specifications will be supplied for a small fee on application to the Patent Office.

No.	Description.	Applicant.
97293	Smoke Pot for Frost Protection,	T. A. McDowell and L. Manuel.



[Only those references which are necessary to an understanding of the specification are quoted in the abridgment below.]

An oil-burning smoke pot as used in orchards to minimise frost damage consists of a container 1, wider at the base 2 than at the mouth 5, and of a furnace portion 3 depending into container 1 so as to leave a reservoir 7 around the furnace portion which will hold a supply of oil. Furnace portion 3 does not reach right down to base 2, but leaves a space 6 free for passage of oil from the reservoir 7 into the lower part of the furnace. A damper 9 equipped with spider legs 10/11 may be carried by top rim 5 of the container, which may also be shielded against rain or extraneous matter entering the pot by a lid 12. Furnace portion 3 prevents exposure of the whole surface of burning oil, and this can be reduced further by using damper 9, thus affecting a saving of oil while at the same time obviating frequent refilling of the smoke pot during operation.

88596	Separator for Liquids,	Cherry-Burrell Corp.
93665	Cheese Treatment against Fermentation,	A. I. Virtanen and Voinvientiosuus-liike Valio.
95946	Control Means for Pasteurising Apparatus,	The Aluminium Plant and Vessel Co., Ltd. and United Dairies Ltd.
97105	Seed Separating Device,	C. H. Wornall and P. A. Anderson.
97266	Cattle-feed Production,	C. W. H. Kleine and M. R. S. Kleine.
98205	Crusher for Limestone,	W. J. Taylor.
98351	Seed Dressing,	I. C. I. of Australia and New Zealand Ltd.
98437	Bulldozer Attachment for Tractor Conversion,	R. A. Gagle.
98599	Weighing Device for Seed,	A. B. Lauxein-Casco.
99145	Lawnmower Attachment for Tall Growth,	C. V. Wardrop.
99637	Rotating Water Sprayer,	Sigmund Pumps Ltd.
99638	Coupling for Water Sprinkler,	Sigmund Pumps Ltd.

Upkeep of Housing for Domestic Poultry

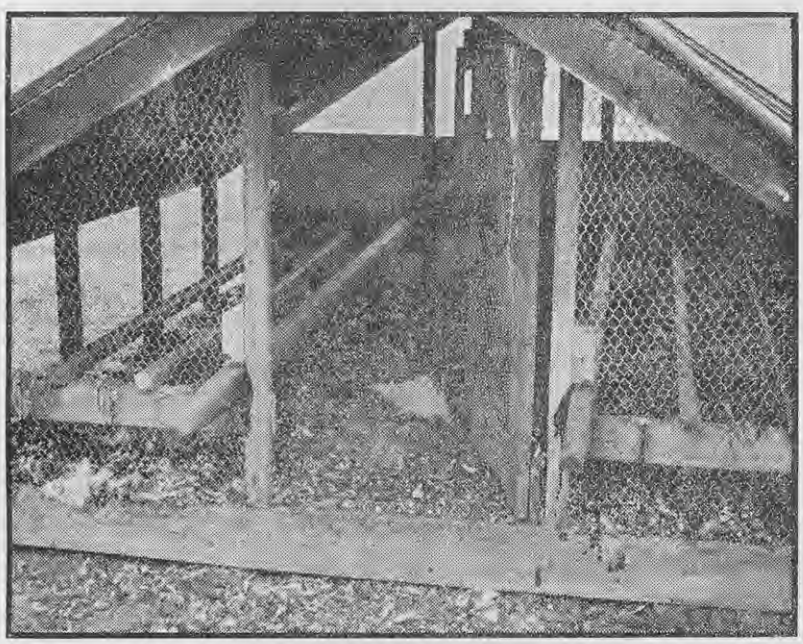
ON some commercial poultry farms fowls are housed in such style that many household poultry keepers would contend the birds are given even more consideration than some farmers adopt toward the comfort and convenience of their families. Poultry kept in "sideline" lots of 200 or 300 are usually well housed, but many household units can only be classed as deplorable. In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, stresses the importance of providing comfortable housing for the birds and keeping it in repair.

[*Fraser Niederer photo.*

A single pine tree gives adequate shade for a household poultry run.

FEW backyard henhouses appear to be planned for the number of birds they ultimately hold. Perhaps a householder was unexpectedly presented with a couple of hens in the first place, but that is insufficient excuse for allowing an inadequate temporary structure to continue in use for years unaltered. Other houses perhaps were fairly well planned for 6 pullets, but are expected to accommodate 12 or more now. Some might have been ideal many years ago when built by someone who understood and liked poultry, but successive owners, who felt it a pity not to use the housing because it was there, have neglected to restore depreciated portions and to keep repairs up to date. Some poultry housing was never suitable, mainly because of poor planning, lack of knowledge of what was needed for the birds, the use of inadequate materials, bad drainage, poor ventilation, or improper siting on the section.

Now is the time for the householder to take stock of his henhouse—its state of repair, its cleanliness, whether the roof is waterproof and the walls are draughtproof, the condition of perches, nests, troughs, hoppers, and droppings board, the adequacy of the floor litter, the ease with which the door can be opened and the latches operated, the state of the runs and fencing, and finally the convenience of the site.



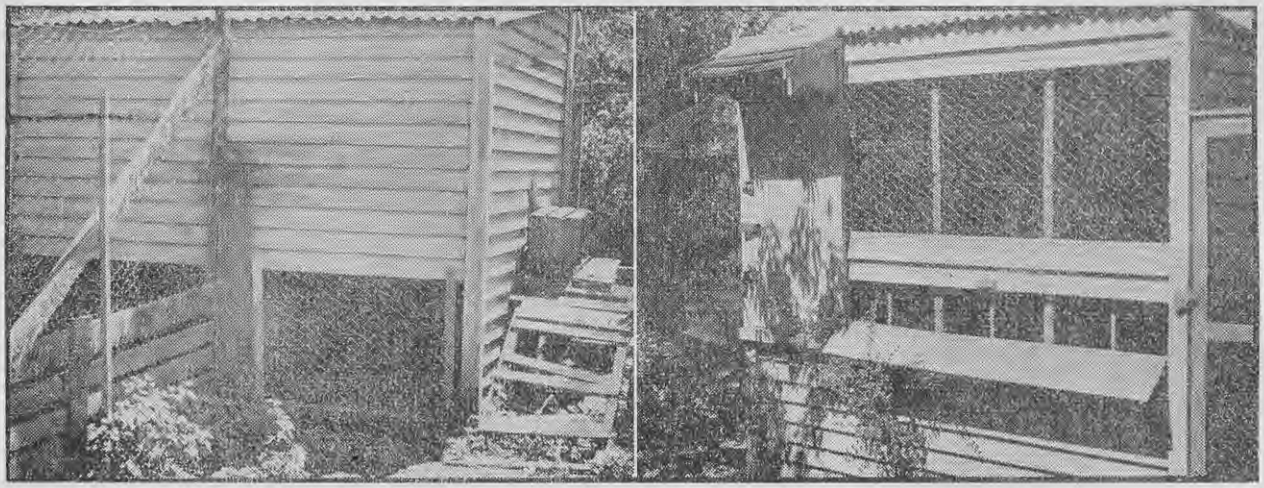
[*Fraser Niederer photo.*

This colony house for rearing growing pullets should have been cleaned out at the end of the previous season. Even a corpse has not been removed, and the droppings should not have been allowed to rise above the netting floor.

Factors to be Considered

If the conclusion is reached that the housing does not give reasonable comfort to the fowls and is inconvenient for the person responsible for looking after them, repairs and modifications should not be delayed on the ground that the worst of the winter is past. If the house is considered past repair, a new one should be planned as quickly as possible. The most suitable situation on the section, not the poorest spot down the garden, is the correct site. On a flat section the henhouse may be built in the middle of the garden and a different quarter allocated as a run each year for 4 years, the other three quarters being cultivated under a 3-year crop-rotation system. A henhouse built with good materials will last for years and be an asset adding to the value of the property if it must be sold. The general principles of poultry keeping must be understood so that the house is built the proper size for the number of birds and provides comfort, ventilation, and convenience of feeding while reserving adequate space and suitable positions for the equipment necessary for running fowls with a minimum of labour.

Points to be borne in mind when planning poultry housing are: Separate housing for pullets and hens; ventilation without draughts; the feeding system, including provision of green-feed; ingress of sunshine; flooring and litter; runs and shade; equipment



[*Fraser Niederer photos.*

Front and back views of the backyard henhouse referred to on this page. The high floor level is excellent in many respects, enabling the eggs to be gathered readily from outside the house, but it also has disadvantages. Proper provision was made to prevent the fowls getting underneath the house, but the entrance, staging, and ramp are in a sorry state of disrepair.

which can be cleaned readily; hoppers and drinkers; and ensuring control of red mites, lice, and ailments.

The birds may be considered to be producing quite well in their present housing, even though rain leaks through the roof, winds whistle through cracks between the boards, and the run is a sea of mud after rain and almost bare of grass at the best of times. That fowls can lay heavily even in such circumstances and the extent to which they can withstand cold and miserable conditions are remarkable, but their body heat and maintenance come first, so only the surplus food goes to produce eggs, and their digestive capacity is limited. One obvious way to improve egg production is to decrease losses of body heat and leave more of their food after body maintenance for manufacturing eggs.

Mistakes in Construction

The laying house illustrated on this page obviously was built by somebody who wanted to treat the birds well. First-class timber went into its construction and a good-sized run with trees for shade was supplied. The wooden flooring was built high above the ground, partly to permit the soil beneath to dry out quickly after rain, but mainly so that the nests would be at a convenient height for the eggs to be gathered. That could have been achieved with a lower floor level, at the same time leaving sufficient height inside for a person to stand upright instead of having to stoop to avoid hitting the head against the rafters. The worst mistake the builder made was to board in the front completely; no sunshine could enter the house when the door was closed. The present owner of the property sought advice about the housing, and the photographs were taken soon after portion of the front boards had been removed and replaced by wire netting but before the staging and ramp had been repaired. The perches and other fittings inside the house had not been made properly but could be altered easily.

The fact that a friend or neighbour has a henhouse of a certain design or adopts a special feeding system does not mean that the design is the best or that no other system is suitable. A text-book may give a house design for the average situation in New Zealand and it may be left to the common sense of the reader to realise that amendments can be made to suit other districts. For example, in the laying house illustrated the nests could be placed on a side wall and the front wire netting carried down to floor level in a warm, sheltered area protected by hedges and trees.

As important as building a henhouse properly is keeping it in repair and maintaining the equipment and fittings in working order. Doors, gates, and latches too often are left in disrepair, causing loss of time in attending to the poultry, apart from the nuisance and temper-wearing aspect of opening and shutting refractory gates. Labour is lessened if proper equipment is supplied and kept in condition. Equipment must be bought or made only once.

METEOROLOGICAL RECORDS FOR JUNE

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	54.8	+ 2.9	69.0	34.3	7.46	17		1.70	25	121.9
Auckland	160	54.6	+ 1.3	66.4	38.9	7.09	19	+ 1.67	1.27	8	106.3
Tauranga	10	51.4	+ 1.7	65.0	31.0	5.69	14	+ 0.35	1.30	26	128.4
Ruakura	131	49.0	+ 1.1	64.0	24.8	5.89	16	+ 1.08	1.17	27	93.3
Rotorua	980	48.0	+ 2.2	61.0	28.0	8.37	15	+ 3.06	2.50	30	111.6
Gisborne	12	49.9	+ 0.9	68.8	29.8	4.38	15	+ 0.37	1.16	30	134.0
New Plymouth	160	51.6	+ 1.6	62.0	33.0	9.34	16	+ 3.24	1.72	30	114.1
Napier	5	49.7	+ 1.3	66.8	31.4	4.15	12	+ 1.11	1.23	26	145.0
Taihape	2157	43.6	+ 0.8	56.3	28.3	3.30	19	+ 0.02	0.55	27	
Wanganui	72	49.2	+ 0.9	61.9	33.0	3.80	18	+ 0.50	0.67	27	122.0
Palmerston North	110	47.4	+ 0.7	61.0	27.6	7.20	19	+ 3.70	1.65	6	95.3
Waingawa	350	45.2	— 0.4	62.0	25.1	5.13	17	+ 1.52	1.15	26	106.0
Wellington	415	47.6	— 0.3	59.9	34.0	4.35	14	+ 0.02	1.48	27	112.2
Nelson	24	47.0	+ 0.8	63.7	30.3	1.86	14	— 1.63	0.53	2	150.7
Blenheim	12	45.6	+ 0.2	62.5	27.3	5.64	11	+ 3.23	2.17	30	161.1
Hokitika	12	44.9	+ 0.3	59.4	27.7	5.67	15	— 3.48	1.27	6	102.3
Hanmer Springs	1225	38.0	— 1.8	58.0	16.0	4.88	13	+ 1.43	0.96	4	94.1
Christchurch	22	42.2	— 1.0	60.7	25.9	2.86	12	+ 0.32	0.75	27	133.0
Ashburton	323	41.6	+ 0.4	60.0	22.4	2.02	9	— 0.45	0.67	27	134.3
Timaru	56	42.7	+ 0.3	59.8	26.4	2.24	9	+ 0.45	0.71	27	137.2
Alexandra	520	37.8	+ 0.0	54.2	19.9	0.48	9	— 0.28	0.16	29	118.3
Taieri	80	42.0	+ 0.2	54.6	21.8	1.10	15	— 1.14	0.19	8	101.7
Invercargill	32	42.4	+ 0.2	54.0	27.0	8.20	24	+ 4.45	1.40	7	57.0

Pasture Management and Crop Production

SEASONAL NOTES Contributed by the EXTENSION DIVISION

IN arable farming districts many spring-sown pastures are established with a cover crop, usually by undersowing the grass mixture on land which is carrying an autumn- or winter-sown cereal. Though the best results in pasture establishment are usually obtained when grass and clover seed are sown alone in autumn after a summer fallow, this is not always possible and a portion of each year's new grass on arable farms must often be sown with a cereal.

* * *

RYEGRASS SEEDING Ryegrass is the main species affected by shading and competition of a cover crop, and where the normal seeding of ryegrass is 25 to 30lb. per acre without a cover crop, the seeding of this species should be increased to 35 to 40lb. when it is sown under a cover crop.

* * *

CLOVER BLOAT Bloat is a common hazard on dairy farms. It may occur at any time and with varying types of feed, although it is usually associated with a heavy spring clover growth. Certain feeding management methods help to reduce bloat; for example, full provision of hay and other supplementary feed in early spring so that dairy cows are not unduly hungry when grazing, the saving of late-autumn and early-winter grass for spring feeding, and the mowing and wilting of luxuriant clover before grazing it.

* * *

EARLY SPRING Pastures which have been hard grazed over the winter are usually very clovery in spring. The approved practice of saving late-autumn and early-winter growth of grass on certain fields provides early-spring feed which is dominantly grass. If this saved grass is rationed out for feeding each day in small breaks (with an electric fence) after the herd has consumed its ration of hay or silage, the incidence of bloat is usually greatly reduced.

* * *

LATE SPRING In mid- and late spring when clover and grass are making rapid growth dairy cows do not consume hay and silage readily and it is often at this period that clover bloat causes severe losses. The risk of bloat may be largely overcome if the clovery pasture growth is mown and wilted before feeding. The daily mowing of a break of clovery pasture does not take up much time and does not entail as much work as that necessary to watch the herd and attend to blown cows, which has to be done often when dairy cows are grazing clovery fields.

* * *

LINSEED PRODUCTION Linseed production could well be expanded in South Island arable districts and the crop incorporated in the regular rotation programme so that seedbed preparation might receive the attention it deserves. In the past the crop has often been sown on land intended for some other crop which was not sown because of the lateness of the season and the linseed crop has suffered in yield accordingly. Linseed should be sown not later than the middle of October at the rate of 35 to 60lb. per acre (the smaller-seeded varieties being sown more lightly than the larger-seeded) with 1cwt. of superphosphate per acre.

* * *

LINSEED VARIETIES When a crop becomes as widely grown as has linseed in recent years the matter of the most suitable varieties for varying soil types and different climatic conditions becomes of extreme importance. For many years the only variety grown in New Zealand was known as "N.Z. Commercial". Though this variety has been discarded from Department of Agriculture trials, it is still being grown by some farmers. In recent years a number of new varieties have been imported mainly from the U.S.A. and India. These new varieties have undergone trials throughout the linseed-growing districts and the following notes are based on the behaviour of the varieties in those trials. The main features of a good variety are yield, freedom from disease of a serious nature, early maturity, and ease of harvesting.

[*Kingham photo.*

Linseed production could well be expanded in South Island arable farming districts.

Golden Viking, which usually grows 16 to 20in. high, has proved an excellent variety in all trials. It is only slightly susceptible to rust, matures fairly early, and is a satisfactory variety to harvest. Compared with other varieties its yields have been good. It is the principal variety grown in Canterbury today.

Bison is taller growing than Golden Viking and matures earlier. It is grown more extensively in Southland, because lateness of maturity is a disadvantage there. The variety is, however, susceptible to rust attack.

Walsh has been slightly more susceptible to rust and slightly later in maturing than Golden Viking in trials so far. Yields of seed generally have been below that of Golden Viking, which usually grows 2 to 3in. taller. It appears to be preferred on the lighter lands of North Canterbury.

Koto appears to be a promising variety. It is early maturing, is not susceptible to rust, and is easy to harvest. In trials it has yielded slightly less (on an average) than Golden Viking, but appreciably more than Walsh. It was tried commercially for the first time last season and sufficient seed is now available for wider sowings.

Victory is of similar height to Walsh, is not susceptible to rust, and can be harvested satisfactorily. It is a good yielding variety, but is late in maturing, which may be a disadvantage in some districts. Seed supplies of this variety are at present limited.

Cheyenne is tall growing and resistant to rust, but details of the variety are available from one trial only. It was the earliest-maturing variety in the trial, a factor which may be of great importance in a district such as Southland. Seed is now available for sowing commercial areas.

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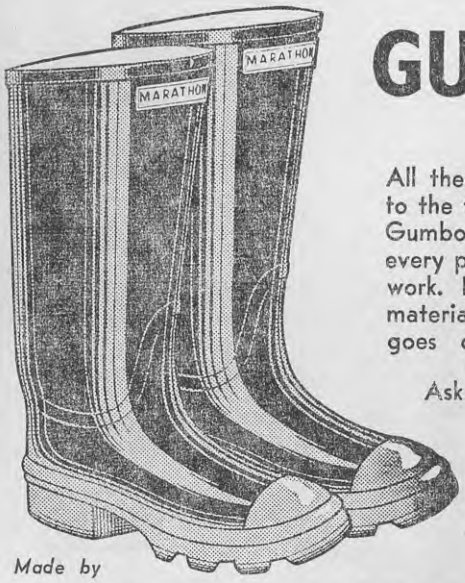

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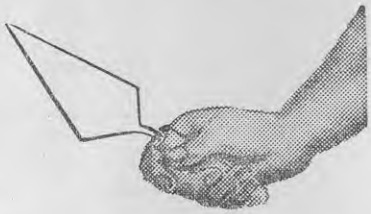

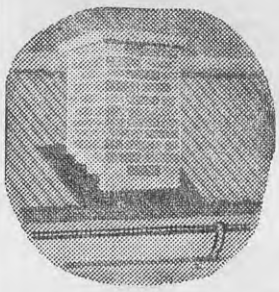

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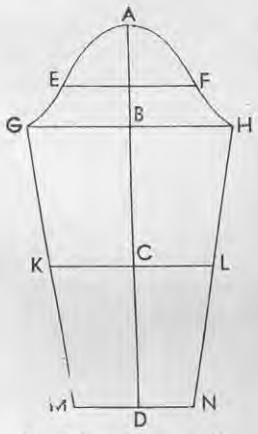
MAKING SLEEVES

THE less experienced home dressmaker often finds difficulty in making the sleeves of garments. This article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Timaru, and its illustrations are intended to help women to handle the problems of sleeve making successfully.

TO avoid difficulties in fitting, the measurements of a sleeve pattern should be checked before the pattern is used for the first time. The measurements used in producing sleeve patterns differ from one pattern company to another, and individual measurements vary so much that the pattern selected may not prove a good fit. If any seams are allowed on the pattern, such allowances must be deducted when the size is being tested.



A plain sleeve pattern showing where measurements should be checked.

The diagram on the left shows a plain long sleeve. The line AD represents the outer arm measurement, taken from the shoulder bone round the bent elbow to the wrist at the little finger line. The length from shoulder to elbow (AC) and elbow to wrist (CD) should be checked at the same time. Alterations in size may be made by slashing and spreading the pattern to enlarge it or overlapping to decrease the size, as described in the article "Preparing and Adapting Dressmaking Patterns" on page 403 of the "Journal" for April, 1948. Taking measurements was described under the heading "Measuring and Fitting for the Home Dressmaker" on page 633 of the June, 1949, issue.

The inner arm measurement from the tendon at the front of the shoulder to the wrist at the thumb line corresponds to the lines GM and HN on the diagram. Width measurements should be checked at wrist (MN), adding ½in. extra for ease, and elbow (KL), using the measurement round the bent elbow and allowing 1in. for ease.

An important width measurement is the base of the cap line (GH). The sleeve cap is the portion above this line. This measurement is taken with the tape horizontally round the arm, high up under the armpit, and 1½in. for ease should be added to it on the pattern. If the tape is left pinned round the arm here, the height of the cap may be taken using another tape, measuring from the shoulder bone to the bottom of the tape round the arm (AB). The width of the cap should be checked again at the level of the tendons joining the arms to the body (EF) 1½ to 2in. above the base of the cap line.

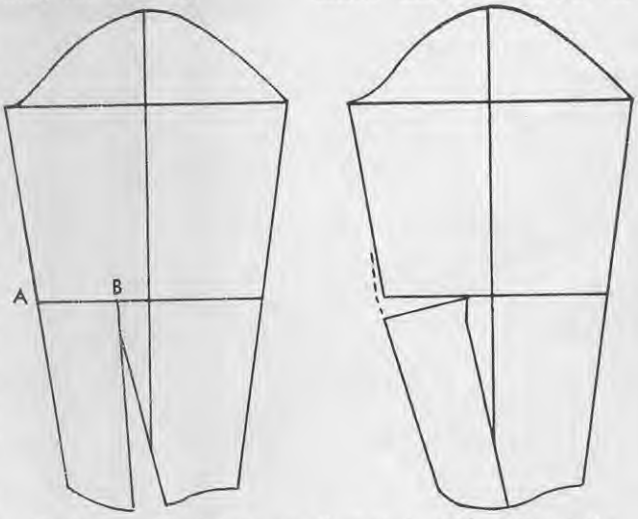
On the pattern these points are where the outward curve over the top of the sleeve changes to the inward curve under the arm. Notches are usually marked at this point. The measurement from tendon to tendon should be increased by 1½in. for ease.

On the pattern the back part of this line measuring from the centre line (AD) should be ¼in. longer than the front; that often provides a means of deciding which is the back and which the front of a badly marked pattern. When a sleeve is folded in halves lengthwise the wider portion at this level may be seen readily and that is the back. Sleeves which are full at the top are likely to have a greater height-of-cap measurement, and those full at the wrist may have a longer elbow-to-wrist line measurement. Even a plain sleeve may have ½in. added to the length just back from the centre line, and the wristline curved. Full sleeves may have all or only some of the width measurements increased, depending on style.

Plain, Fitting Sleeve

The pattern for a plain, fitting sleeve will appear much as in the first diagram, but probably will have a wrist or elbow dart to fit the lower sleeve to the arm. If desired the dart may be moved from one position to the other as shown in the diagrams below. The wrist dart should not take out more than 3in. of material; if more requires to be fitted out at the wrist the fitting may be done at the seam.

Sometimes two or three small elbow darts are used in place of one larger dart. Elbow darts are limited in



Altering a wrist dart to an elbow dart. Left—Cut out the dart and slash the pattern almost to the line at elbow level. Slash from A to B. Right—Swing the lower left piece of pattern round to close the wrist dart. This leaves a dart at the elbow. The dotted line is the new cutting line.

[New Zealand Wool Board photo.

[*Campbell Photography photo.*

Pinning in a sleeve. The right sides of the garment and sleeve are together. The garment is wrong side out, with the wrong side of the sleeve showing through the armhole. Distribution of gathers or ease can best be controlled by holding the parts to be joined in the left hand with the sleeve uppermost. The double row of gathering stitches round the top of the sleeve and the vertical straight-grain line can be seen. The notch (cut outward, never into the seam allowance) at the left is one of the marks between which the gathers are to be arranged.

size, for they must be short. Some patterns of plain dress sleeves have one seam eased on to the other at the elbow instead of darts. When darts are provided for they should be made before the lengthwise seam. In many factory-made garments the sleeve is joined to the garment before the sleeve is made so that sleeve and underarm garment seams are sewn in one operation. Though that saves time in the making of overalls or pyjamas, in which fit is not important, it is not a good practice for dresses and other outer garments in which the fit needs to be good. Best results are obtained by setting in the sleeve after the shoulder and underarm garment seams have been made and the long sleeve seams sewn. All seams should be pressed as they are finished and before they are crossed by another seam.

When the top of the sleeve is eased or gathered, a double row of gathering stitches ¼in. from the edge of the material and ¼in. apart gives best results. Either hand running stitches may be made using double thread and a knot and a backstitch to start, or the stitches may be gathered by machine, using a very large stitchand loosening the tension; both threads are pulled together. In some designs darts instead of gathers are used to fit the sleeve over the shoulder; these darts should be fitted, sewn, and pressed toward the top of the shoulder before the sleeve is set in.

To pin in the sleeve have the garment inside out and the sleeve turned right side out. Slip the sleeve into the garment, matching the underarm seam of the sleeve with the underarm seam of the garment, and pin them. Match and pin the two pieces at the back and front notches, and match the mark at the top of the sleeve with the shoulder seam. Make sure the back of the sleeve is pinned to the back of the garment; that should not be difficult if the pattern carried distinctive marks for matching and if those marks were transferred to the material. If the sleeve had no marks, the back can be found as described earlier. Pin sleeve and garment together all round the armhole, using plenty of pins, and pinning at right angles to the seam line. Pull up the gathering threads to fit the sleeve to the garment and distribute the gathers as directed by the pattern. Usually most of the gathers are arranged over the top and slightly toward the back of the shoulder. Easing or gathering is more readily controlled when the garment and sleeve are turned back over the left hand so that the gathers or eased part are on top.

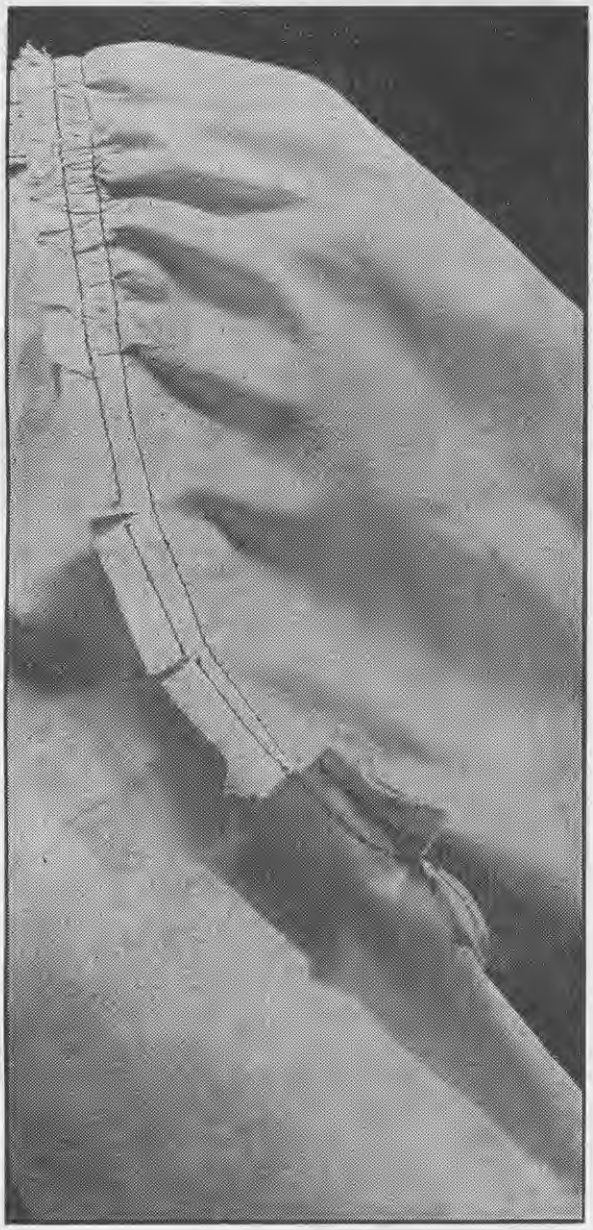
After pinning the sleeve use fairly small stitches to baste it in position. When both sleeves have been done, remove the pins and try the garment on. The lengthwise straight grain, marked on the material by a line of basting thread before the pattern is removed, should appear as a vertical line from the end of the shoulder seam when the arm is hanging relaxed at the side. The base of the cap line should be on the crosswise straight grain and should be horizontal when the garment is on the figure. If the lengthwise straight grain is not vertical, the top of the sleeve must be ripped out and refitted. Also check the armhole seam for position, ease of movement, and neatness of fit. If all is satisfactory, the sleeve may be sewn in by machine, the eased or gathered sleeve being kept on the bottom and the garment on top.

When the basting stitches have been removed the seam allowance should be clipped almost to the machine stitching at the notches at either side; above these points the

[*Campbell Photography photos.*

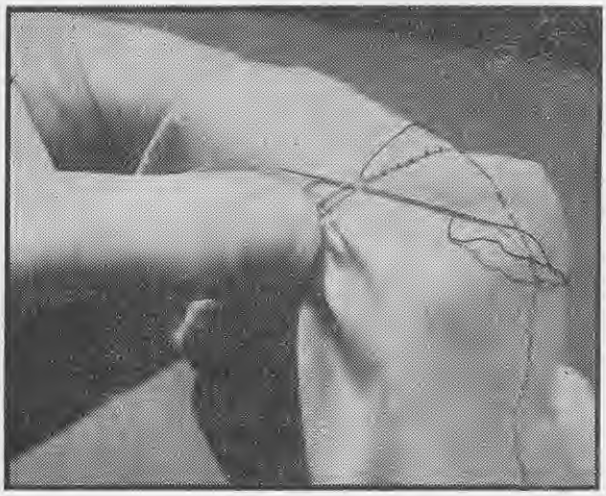
Above—Lines of basting stitches mark the vertical straight grain lengthwise down the sleeve and the horizontal straight grain at the base of the cap. Right—The vertical and horizontal straight-grain lines after the sleeve has been attached to the garment.

seam allowances should be turned over on to the body of the garment. If necessary, clip the seam allowances at intervals all round the armhole to allow them to lie flat against the garment. Do not clip quite to the machine stitching. The seam allowances may be caught at the shoulder seam with a few hand stitches to ensure that they remain turned over against the garment. The part of the seam which lies under the arm when the garment is worn is not turned over but is allowed to stand up or fall over during wearing. The seam may be finished by a second row of machine stitching about ⅛in. from the first and the raw edges trimmed and overcast if necessary. If shoulder pads are used, they are attached after the seams are made and pressed.



[*Campbell Photography photo.*

The sleeve stitched in. The seam is turned over on to the garment down to the notches and clipped so that it will lie flat.

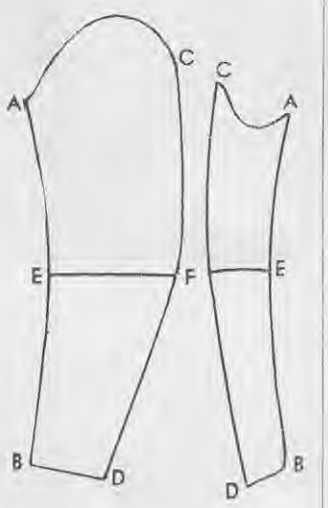


[*Campbell Photography photo.*

The needle in position for making the next stitch in attaching a cuff. The needle is slipped under one of the machine stitches and into the folded edge of the cuff. No stitches are visible on the right side of the cuff. Usually the thread would match the fabric, but dark cotton has been used to show up the stitches.

Two-piece Sleeve

The pattern pieces for a two-piece sleeve are shown in the diagram on the right. This sleeve is used for tailored garments. The two lengthwise seams are sewn first. The upper arm piece is usually eased on to the lower arm piece at the elbow on the little finger seam line. Elbow level is at the lines **EF** in the diagram. Neither of the two seams is matched to the underarm garment seam when the sleeve is set in; they are joined to the garment at or about the points where the back and front tendons join the arm to the body. Any reliable pattern will have those points marked by notches, or they can be located by fitting the sleeve on the figure. The sleeve cap should fit smoothly and snugly, and the lengthwise straight grain should be vertical as for the one-piece plain sleeve.



Pattern pieces for a two-piece sleeve. AB is the inner arm measurement and CD the outer arm. The elbow line is marked by horizontal lines.

When a two-piece sleeve is used for woollen or worsted garments any excess fullness at the top of the sleeve is usually shrunken out by judicious pressing under a damp cloth to mould the sleeve over the curve of the arm and shoulder.

Short Sleeves

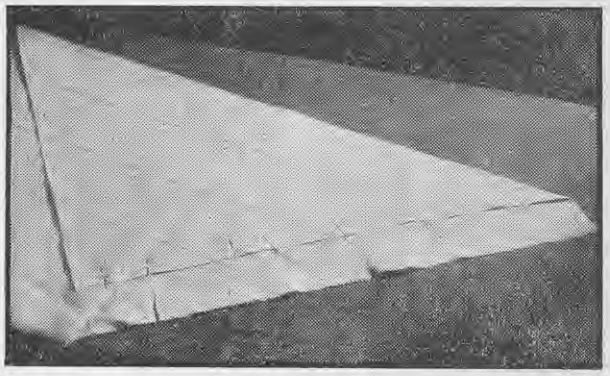
The long-sleeve pattern may be shortened as desired to make short sleeves or three-quarter-length sleeves. Usually the sleeve is cut straight across at the appropriate place, but special designs may be shaped. A commercial short-sleeve pattern should have its measurements checked as for the upper part of a long sleeve.

FINISHING SLEEVE EDGES . . .

If the lower edge is straight, it may be turned in and hemmed, using very inconspicuous stitches. If the edge is curved or the sleeve fits closely, a bias facing may be used. The facing is stitched on by machine, right sides of the material together, and turned to the wrong side, ensuring that no part of the facing is visible from the right side. The raw edge is turned in and hemmed.

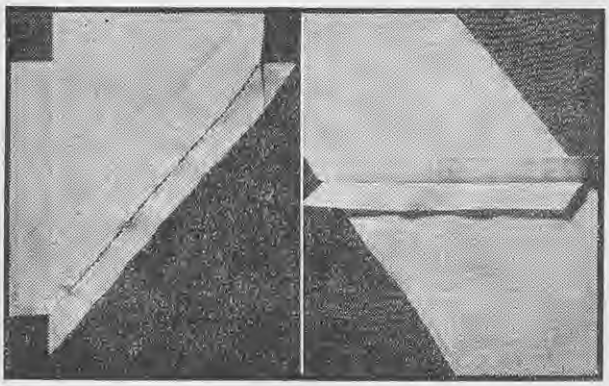
Sometimes the design of the sleeve calls for a fitted facing. The facing is cut exactly the same as the lower part of the sleeve and of a suitable width; it should not be too narrow. Especially if the fabric is thick, an inside facing may be cut very slightly smaller than the lower edge of the sleeve and an outside facing a little larger. The seam joining the ends of a fitted facing should be made before the facing is attached to the sleeve. This seam should lie over the sleeve seam when the facing is in position. If a contrast or trimming is desired, the facing may be stitched inside the sleeve, right side of the facing to the wrong side of the sleeve, and turned to the outside, the raw edge being folded under and stitched down to the sleeve; otherwise the facing is attached as described for a bias facing.

Cuffs may be used to finish sleeves. They may be cut on the straight or bias, the width, length, and shape depending on the style desired. Sleeves are usually gathered or pleated into wrist cuffs. The fullness may be used in this way instead of being fitted out in a dart, or extra fullness may be added. Usually a placket is required if a cuff is used to finish a long sleeve. Making plackets will be described in a separate article.



[*Campbell Photography photos.*

Cutting and joining bias strips. Above—The fabric folded and marked. The selvedge is pinned parallel to the straight edge obtained by tearing the material across. Cutting lines for strips of suitable width have been ruled parallel to the diagonal fold. Below—Left: The position in which two bias strips are joined. Right: The strip with the joining seam pressed open. Before it was used the projecting ends of the seam allowance (lower left and upper right) would be trimmed off.



[*Campbell Photography photo.*

Some of the fullness of the seam allowance is clipped out to make the finished seam less bulky. Clipping should stop short of the line of stitching.

A plain, straight, blouse cuff is made by cutting on the straight grain a piece of material double the finished width plus seam allowances and the length of the wrist measurement plus ease, overlap for closing, and seam allowances. The amount of overlap depends on the style of the placket and the method of fastening. The cuffs are folded in halves lengthwise, right sides together, joined across the ends, and turned to the right side before being attached to the sleeve. If all stitching is to be invisible, the cuff is machined to the sleeve, which is gathered or pleated to fit, right sides together. The remaining raw edge of the cuff is turned in and hand stitched to the sleeve, each stitch being taken under a stitch of the machined row and into the seam allowances, so that the end of the sleeve is fixed between the two layers of the cuff. If decorative stitching is to be used on the outside of the garment, the cuff is attached to the wrong side of the sleeve first, the second edge of the cuff being turned in and stitched in position on the right side to hide the first row of machine stitching. If the sleeve has been gathered heavily, the join will be flatter if some of the fullness is trimmed out of the seam allowance as shown in the illustration above.

Cutting Fabric on the Bias

Material to be cut on the bias should either have a selvedge (woven edge) or be cut along a drawn thread exactly on the straight lengthwise grain. Fold the material so that this straight lengthwise edge lies parallel to the crosswise grain or weft. The selvedge will form a right angle when the fabric is correctly folded. The diagonal fold is the true bias, and strips for facing or binding may be cut parallel to this fold as illustrated on the left. If joining is necessary, place the strips together so that the seam comes on the straight grain; the strips are in the correct position to be joined when they are at right angles.

Saving Electricity in the Home

AS the greatest consumption of electricity in New Zealand occurs in the household, the largest saving of electrical power can be made by domestic users. In this article Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch, discusses economies which can be effected by the housewife and how consumption can be regulated by reading the electric meter every few days.

[*National Publicity Studios photo.*

IT has been truly said that all domestic progress will take an electrically lit path. Electricity came first as a new source of lighting in the home, superseding oil, gas, and candles. In efficiency and in the saving of labour its use marked a great advance. But there is a world of difference between a house that is lit by electricity and the home that is run by electricity. Its full use affects even the foundation design of the house. A comparison between a modern house built to be run by electricity and any of the 19th or early 20th century houses that are in use today shows that electricity is not just a fuel capable of providing light and warmth without the dirt and drudgery associated with oil lamps and the making and clearing away of solid fuel fires, but is also a force, a form of energy that can be used to replace human energy in a multitude of household tasks.

Where electric energy is used with intelligence in the home, comfort and efficiency are achieved with the minimum expenditure of human energy, and the housewife has more time to devote to the art of homemaking in its subtler and less tangible aspects and to play a part in the welfare of the community in which she lives.

However, this electrically lit path of domestic progress does not seem to be a smooth one. To homes that are geared to the electrical standard of living there come for various reasons periods of restricted supply, necessitating the reduced use of some form of apparatus and a reorganisation at some inconvenience of the carefully planned work routines of the home specially devised by country women to fit in with the work of the farm. The crises in electrical supply in New Zealand are due to a natural cause—insufficient rainfall to fill the lakes the water of which is harnessed to provide the electrical energy. This affects the North and South Islands at different times. However, work is proceeding to increase the number and size of the hydro-electric generating plants so that ultimately the supply will meet all possible needs.

[*National Publicity Studios photo.*

Lifting heavy iron pots and kettles and lighting and tending an open fire made hard physical labour of daily household chores for pioneer women. A modern housewife who has the benefits of electricity turns a switch to obtain hot water or ice cubes, to cook a meal, or to clean the house, and she may listen to the radio for entertainment as she works. The electrically powered kitchen in the illustration at the top of this page contrasts sharply with this pioneer kitchen.

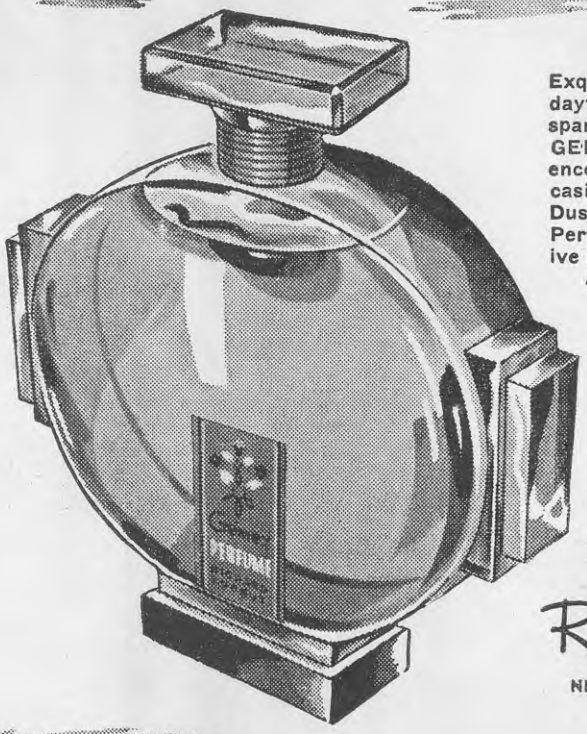
The graph on page 183 shows that the household is the greatest consumer of electricity. Over the 5 years shown well over half of the electricity used was taken by the consumer in the home. Of total electricity used in 1942 little less than 52 per cent. was taken by the domestic consumer, but by 1949 this proportion had risen to just more than 57 per cent. Therefore it is the domestic users who need to contribute the most to the saving of electrical power. The graph clearly indicates that of the total used in the home a little less than half was used by water heaters, which must be the greatest single use in which economies can be made.

Right Use of Electrical Power

The housewife has to be prepared for periods of power economy, some more stringent than others, which modify the enjoyment of the full electrical standard of life. Therefore, it would be an advantage to look more closely at the purposes for which electricity is used in the home. In England this need has been felt to be of sufficient importance to warrant the formation and action of an Electrical

Gemey

PERFUME



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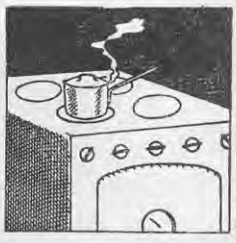
Association for Women. The Director, Dame Caroline Haslett, D.B.E., considers that her work is, and has been for about 25 years, the education of the public in the right use of electricity in the home, and her various published works have been used as references by the writer of this article. In America investigation has been proceeding along similar lines, and a number of conclusions have been reached which will also be of interest to rural consumers in New Zealand.

It is necessary to differentiate clearly between the use of electric current to fulfil the normal function of a fuel, when it is used as an alternative to gas, oil, or solid fuel, and its use as a force to operate motor-driven appliances, when it is used as an alternative to human energy.

This differentiation is of great significance for householders, as the current consumption of electrical motor-driven apparatus in the home is relatively small. This means that in times of shortages the housewife can still have electricity as a domestic servant if she studies how and at what rate electrical current is consumed in space heaters (radiators), cookers, vacuum cleaners, refrigerators, cake mixers, water heaters, sewing machines, irons, washing machines, etc. She may find that if she plans alternative means of heating rooms and water by solid fuel, and studies her cooking techniques to make full and economical use of the heat of the electric stove when in use, she can still have electrical energy to do her washing and ironing, to protect perishable food, to clean the house, to make clothes, and to mix the cakes. It may interest housewives to know that domestic water heaters consume more than one quarter of the electricity used for all industrial, commercial, and domestic purposes (see the accompanying graph). There may have to be reduced use of these amenities according to the degree of shortage.

In England the rationing of electricity is general and families find themselves without light or heat for several hours, days, or weeks, according to the skill they use to control consumption of power over the rationing period. The situation there puts a premium on the ability to read a meter and to know what a unit of electricity is and what it can do through the various domestic appliances. In New Zealand in the present shortages there is an increasing tendency among power boards to adopt rationing too; about half now use the quota system.



SERVICES GIVEN BY 1 UNIT OF ELECTRICITY

Appliance	Loading in watts	Time to consume one unit (hours)
Electric clock ..	1½	666⅔ (more than 27 days)
Lamp	25	40
Lamp	40	25
Lamp	60	16⅔
Lamp	100	10
Mixer beaters ..	25 to 120	40 to 8⅓
Sewing machines ..	40 to 50	25 to 20
Fans	40 to 100	25 to 10
Vacuum cleaners ..	130 to 400	8 to 2½
Immersion heaters .	250 to 500	4 to 2
Coffee percolators .	250 to 400	4 to 2½
Toaster	600	1⅔
Waffle irons ..	500 to 600	2 to 1⅔
Iron	600	1⅔
Kettles	500 to 2000	2 to ½
Refrigerators (large motor)	250 to 300	4 to 3⅓
Water heater ..	600	1⅔
Water heater ..	750	1⅓
Water heater ..	1000	1
Water heater ..	2000	½
Washing machines .	200 to 400	5 to 2½
Boiling plates on stove	1000 to 2000	1 to ½
Oven element ..	1500	⅔
Radiators	1000 to 3000	1 to ⅓
Tubular space heater	60 watts per foot of tube	According to length of tube

The Unit of Electricity

The unit is naturally a specified quantity of electricity, like the pound in weight, yard in length, or pint in measuring volume.

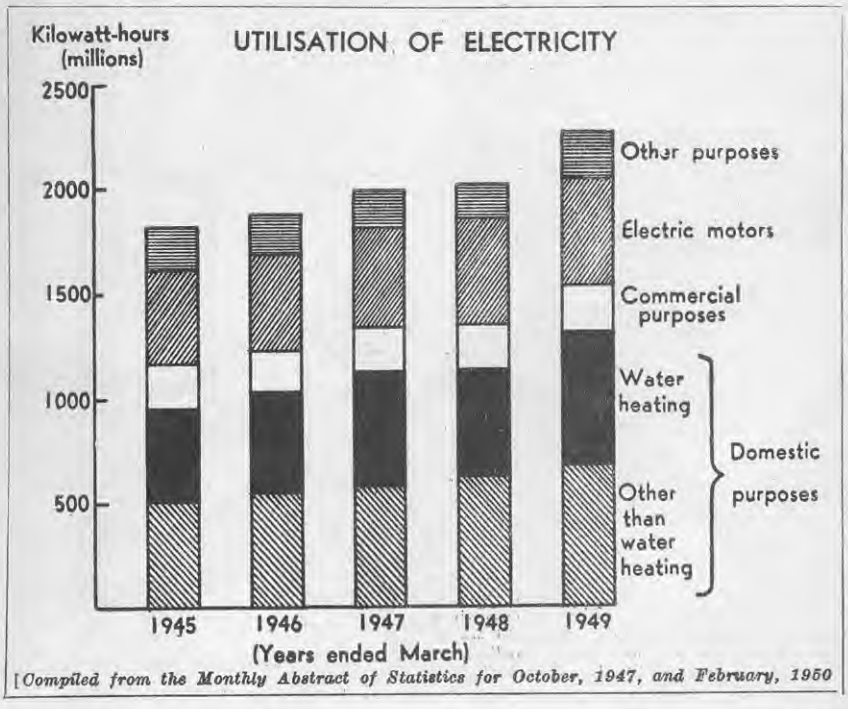
One unit of electricity has been consumed when a piece of apparatus marked 1000 watts has been connected to the main for 1 hour.

The unit is most often referred to as the kilowatt-hour, shortened to kWH. A pound of peas when shelled gives a variable quantity of edible peas, but a unit of electricity is always of the same value and bears a fixed relation to the loading in watts of an appliance. More electrical energy will be used by an appliance of 1000 watts than one of 100 watts for the same period, exactly ten times as much. Conversely, the same amount of electrical energy will keep a 100-watt appliance going ten times as long as it will a 1000-watt appliance.

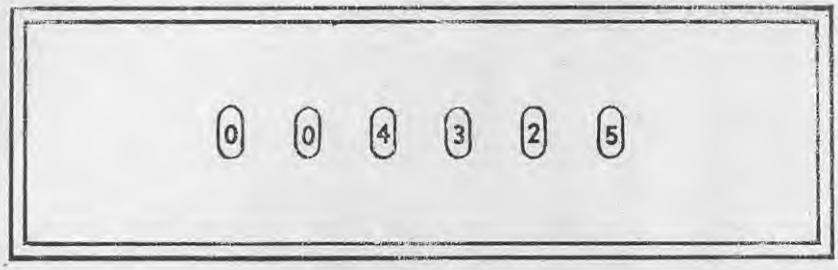
This point is worth illustrating more fully, for it is the key to the solution of the housewife's problem in controlling her consumption of electricity. Every piece of electrical apparatus she buys should have the wattage or loading marked on it and she should know what that loading is. With the definition of a unit of electricity she can calculate her consumption. The table in the previous column sets out the wattage of different household appliances and the time for which they can be run by 1 unit of electricity.

Dame Haslett notes:—

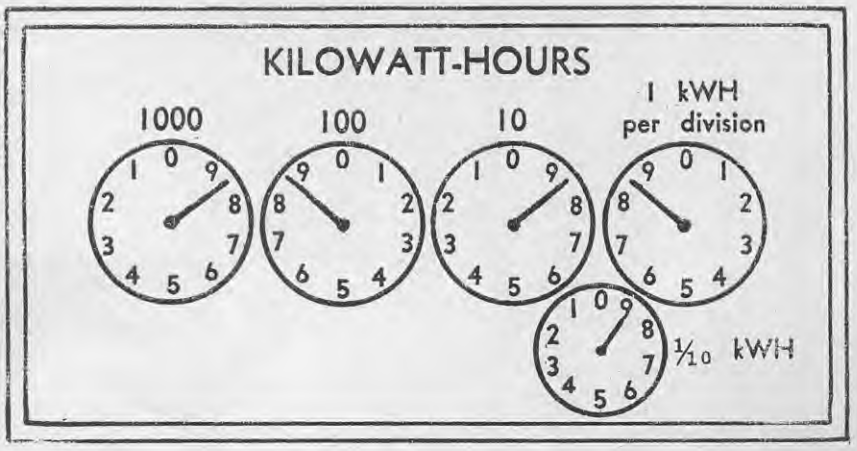
It is an interesting fact that when the question of economising in the use of electric current is mentioned the first reaction of most people is to switch off the electric light, or to reduce the power of the lights in the house by substituting lamps of a lower wattage. The proportion of the domestic load which is accounted for by lighting is relatively small. If 100-watt electric lights were left burning in every room of a 10-roomed house they could consume in 1 hour only the same amount of current as a 1-bar electric fire would use in the same period. Bearing this principle in mind, it is necessary to consider what are the real needs of the household with regard to



[Compiled from the Monthly Abstract of Statistics for October, 1947, and February, 1950



The two types of electric meters. Above—Direct-reading type. Below—Dial meter.



lighting from the point of view of safety, efficiency, and comfort. Industry has in the past few years paid special attention to the relation of efficient lighting in factories to health and production and the same principles may well be considered with regard to domestic lighting. A wartime social survey [in England] revealed how poorly lighted is the average home for even the most simple household task. Only one-third of the housewives thought that they could see well by artificial light. Over half the people had less than half the light they should have had in their kitchen, living room, or sitting room for sewing or reading.

This is bad economy, both from their own and the national point of view, for there is no doubt that the morale and ability of people to work is a reflection of their home life and the comforts available in their home. There is no reason today why in the home, in schools, or at work eyes should be strained for lack of light.

In times of power shortages the chief aim should be the maintenance of adequate standards of lighting. The use of power can certainly be drastically curtailed for advertisement and decoration.

Where a small electric motor used to drive an appliance is rated in horsepower the wattage can be found by simple conversion. A 1-h.p. motor is equivalent to an appliance with a loading of 746 watts. A sewing machine uses a motor of 1/20 h.p., which is equivalent to a loading of less than 40 watts. It can therefore be run for more than 25 hours to use 1 unit of electricity. Few housewives run their sewing machines more than 25 hours in a month, so the consumption of electricity to do the family sewing is negligible.

Meter Reading

Meters, of which there are two types, are marked in kilowatt-hours. The first type gives direct readings like the mileage indicator of a motor-car and the second type gives dial meter readings (see the illustration above). On the dial meter there are usually four dials to record units, tens, hundreds, and thousands of kilowatt-hours. In addition, there are either one or two smaller dials which register 1/10 kilowatt-hour and 1/100 kilowatt-hour per division on the dial respectively. The pointers revolve alternately in a clockwise and an anti-clockwise direction.

To take the reading begin at the dial at the extreme left, which registers thousands of kilowatt-hours. Take down the last figure at which the pointer has rested and read each dial in turn. The meter reading shown in the illustration above is 8888.9 units, made up as follows:—

			Units
Dial on left	8 × 1000	=	8000
Second dial	8 × 100	=	800
Third dial	8 × 10	=	80
Fourth dial	8 × 1	=	8
Fifth dial	9 × 0.1	=	0.9
Total			8888.9

Note: The pointers of the large dials are not on figure 8, but nearly on figure 9. In the small dial the pointer is on figure 9.

Practical Application

All the factors affecting the consumer in times of unavoidable shortages can be condensed in a few rules for practical application by the individual housewife. Where quota rationing is the means adopted for saving, the most effective economy is obtained by limiting the use of radiators and water-heating appliances. Not only is their loading high, leading to a high consumption of electricity per hour, but in practice they are in use for long periods of time compared with irons, sewing machines, etc. Therefore the use of fires should be started earlier in the year for space heating and the electric radiator put away. Moreover, the electric heating of water should be cut off entirely if there is an alternative method available, or it should be limited to reduced periods for essential purposes and the water used at a lower temperature.

This is surely not too heavy a price to pay to keep the country's essential work in running order. It is a less costly price than cutting down all industry to a 4-day week as was attempted in one country. That method leads to many troubles. The housewife should become accustomed to reading the meter every few days, tightening or releasing the restrictions as the meter indicates a consumption above or below the quota to be rationed.

Those without electric water heating need to save electric power in other ways. The electric oven is an efficient piece of equipment, and much can be accomplished for the expenditure of 1 unit of electricity per person per day, which is the quantity the average electric oven consumes.

These suggestions should enable all consumers to make their reductions in the way best suited to their requirements and habits of life. That is their right.

Reversible Pullovers

As small boys, and some men too, seem to have difficulty in telling right from wrong sides of knitted pullovers, it is worth while when knitting for them to choose patterns which turn out the same on both sides or in which there is no obvious right or wrong side. Then, if a little extra care is taken in finishing off and sewing up, the garment may be worn either side out, its life is lengthened by distributing wear more evenly, and there are no more cries of "Which way does this go?" This recommendation is especially suitable for sleeveless pullovers.

When knitting, splice the wool, as knots would make the joins conspicuous. To join the seams, instead of holding the sections side by side and sewing over and over, have them flat, edge to edge, and join with a darning-type stitch, backward and forward. Shoulders may also be joined this way or by grafting. For the bands round neck or armhole pick up the stitches alternatively plain and purl and from the front and back of the edge, as this prevents the formation of a ridge or one side, and cast off plain and purl.

—NORMA K. METSON,
Rural Sociologist, Department of Agriculture, Wellington.

THE MUSEUMS OF NEW ZEALAND

THE nine previous articles in this series by Enid B. V. Phillips have described different museums from Whangarei to Invercargill which range in size from the impressive metropolitan museum to the small-town museum of parochial interest. In this article she deals with the museum of the place with the greatest historical significance in New Zealand—Waitangi.

The Waitangi Museum

WHEN the chiefs at Kerikeri petitioned William IV, praying that he should extend his protection to these islands, the King responded by appointing James Busby, an Australian colonist then visiting England and a man whose pen revealed him to be thoroughly au fait with Antipodean affairs, as British Resident in the Bay of Islands. (Busby, who had been thoroughly educated in the classics during his student days in Edinburgh and who was equally well versed in botany and geology, had supplemented his course of studies by travelling through France and Spain to acquaint himself with the most up-to-date methods of viticulture. The result was not only a most pleasingly written technical "Treatise on the Vine", a Sydney publication dated 1825, but three collections of vines totalling more than 1200 plants and including specimens from the Montpelier Botanic Gardens and the national garden at Luxembourg, which completely filled two cabins aboard the Matilda, the vessel that transported them to Australia.)

Busby's house requirements in New Zealand were extremely modest, considering that the proposed residence had to be of a style sufficiently impressive to uphold the prestige of the Crown and at the same time conform to the needs of a young man contemplating matrimony. Nevertheless, though the plans prepared by the Sydney architect J. Verge estimated the entire cost at a mere £592 15s. 4d. for "a house in a frame", the technical term was misconstrued to mean "the frame of a house", and there was much altercation before the plans, considerably modified by a Mr. Hallen (presumably the Colonial Architect), were eventually approved.

Help from Missionaries

In the meantime Busby, who had arrived in New Zealand in May, 1833, was pleased to avail himself of the hospitality of the missionaries, who, being as proficient in practical matters as they were in theology, gave him much help with the building of his house. The timber sections arrived from Australia for two rooms and a vestibule, all that the authorities would allow him. Commenting on this, the Waitangi historian T. Lindsay Buick says: "At no stage in his career was Mr. Busby embarrassed by official generosity!" The framing was of jarrah, the hall flooring of Australian ironbark, the windows and doors of cedar, and the weather boards of jarrah and cedar. The foundations of the house were of boulders, and Sydney sandstone was used for the fireplace hearths and the flagstones paving the wide veranda.

Busby was soon comfortably settled in his new abode and it is recorded that on March 20 the next year, after taking part in the presentation of a national flag to the principal northern chiefs, he invited the officers of H.M.S. Alligator to the Residency, where they were regaled with "a cold collation". (Incidentally, Busby had received high praise from Australian quarters the previous month. The Chief Justice and the Colonial Secretary, having completed their examination of the vines in the New South Wales Botanic Garden which Busby had collected in France, advised His Excellency Major-General Richard Bourke that "the inhabitants of Australia are under great obligations to Mr. Busby for having transferred to these shores a national collection of vines such as was acquired in France after the Napoleonic Wars by the Minister of the Interior, having at his command the means and resources of the French Empire".) Apparently naval nomenclature of the period favoured the more deadly species of reptiles as being symbolic of their death-dealing propensities in battle, for the vessel which brought Captain William Hobson, R.N., to these shores 3 years later was called H.M.S. Rattlesnake.

Hobson's Delicate Mission

As a result of his report to the Marquis of Normanby, the Colonial Secretary, Hobson was sent out again to New Zealand, this time as British Consul, and entrusted with the delicate mission of persuading the Maoris to cede the sovereignty of the country to the British Queen. At Waitangi (Weeping Waters) on February 5, 1840, he met the chiefs in a large marquee made from a framework of spars covered with sailcloth which had been erected on the sloping lawn of the Residency. Here, with the invaluable help of the Rev. Henry Williams, head of the Anglican Mission, as interpreter, he discussed the terms of the Treaty, being greatly aided in his negotiations by Busby.

[National Publicity Studios photo.

The Treaty House, Waitangi, the residence of James Busby. The anchor under the giant pohutakawa came from the brig Pioneer.

Next day, the signing of the Maori Magna Carta, as the venerable Arawa leader Mita Taupopoki termed it, took place, many of the chiefs attaching their moko (face tattoo mark) to the document in lieu of signature. And as the Union Jack was unfurled from the flagstaff at Waitangi and a salute of 21 guns sounded from the frigate which brought him to the Bay of Islands from Sydney Hobson summed up the true significance of the event in the historic phrase: "He iwi tahi tatou—we are now one people."

In accordance with Lord Normanby's instructions Captain Hobson was now entitled to become Lieutenant-Governor of the colony, thus superseding Busby. However, this did not necessitate the former Resident's leaving his home; as his family responsibilities increased the Residency had to be correspondingly enlarged and so a wing built of New Zealand timbers was added to the south side of the original building and another to the northwest.

Busby had also purchased additional land from the Maoris and he continued to look after his estate with the utmost efficiency. The slopes of Waitangi are reputed to have been "festooned in vines" which produced grapes par excellence. He died while on a visit to England in 1871 and was buried in London. (Mrs. Busby's grave and those of two of her children are in the old churchyard at Paihia.)

Ultimately the whole property passed into the hands of strangers, and its prosperity gradually diminished with the passing of the years until 1932, when the Governor-General, Viscount Bledisloe, and his wife, who were touring the Bay of Islands at the time, decided to acquire the Treaty House and surrounding lands to the extent of about 1000 acres and present them to the people of New Zealand.

Restoration of Residence

Under the direction of the Waitangi National Trust Board's honorary architects, W. H. Gummer, of Auckland, and W. M. Page, of Wellington, the work of restoring this gem of Georgian architecture, with its simple white-columned veranda and moss-grown grey roof of kauri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shingles in the colonial style, was faithfully carried out even to the furnishings. The grounds were likewise laid out in harmony with the period.

At the express wish of Their Excellencies a museum was established in the southern wing, which was reconditioned and made fireproof for this purpose, and there was intense excitement when Busby's diary was discovered in the attic by some workmen. A memorial tablet to Busby in the museum is inscribed: "He built this house and lived in it. Under difficult conditions he served both Pakeha and Maori with courage, impartiality and fidelity."

The brass tablet in the hall commemorates the Maori chiefs who signed the Treaty. The Trust Board much appreciated the advice and help of Dr. Gilbert Archey, Director of the Auckland War Memorial Museum, Johannes C. Andersen, late Librarian of the Alexander Turnbull Library, Wellington, and Vernon H. Reed, Honorary Secretary and Administrator, in setting up this museum.

The front of the museum faces the 112ft.-high flagstaff, erected by the Royal New Zealand Navy. At the top of the masthead is the treasured crown from the ensign staff of New Zealand's first warship, H.M.N.Z.S. Philomel, and at the foot is a commemoration stone which reads:—

On this spot on the sixth day
of February 1840 was signed
the Treaty of Waitangi
under which New Zealand became
part of the British Empire

Pieces of the original flagstaff of Baltic pine, which was cut down time and again by Hone Heke, have been fashioned into an inkstand which is displayed in the museum.

[*National Publicity Studios photo.*

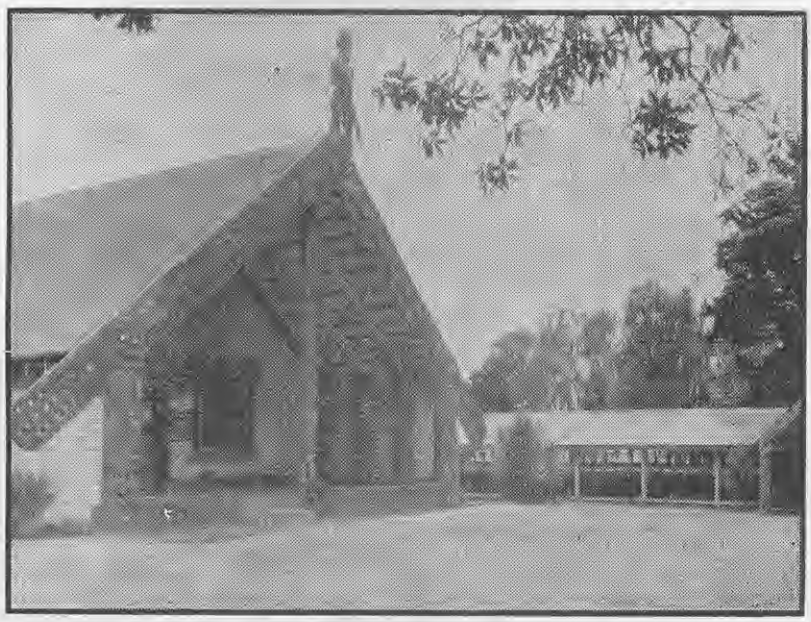
The war canoe presented by the Tokerau tribes. It is 117ft. long and holds 140 people.

Colourful Setting

From the museum windows you look out upon the blue waters of the bay, dotted with tiny islands and encircled by green hills over which hover snowy drifts of cumulus clouds, and across to the township of Kororareka (Russell) in the distance. Hydrangeas thrust their rosy florets close to the white-walled house, and hibiscus blaze with a myriad coral flames against the sombre background of the native bush. The Norfolk Island pines which Busby grew from seed sent him by his brother, a surgeon stationed at the island's convict settlement, are tall trees now and the oaks and other English trees are picturesquely gnarled with age.

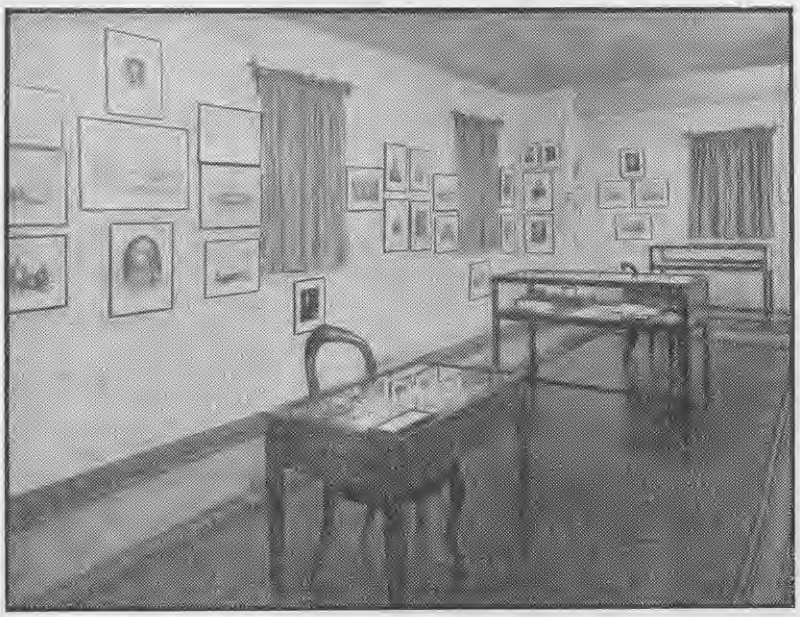
There are numerous stories concerning the giant pohutukawa on the lawn. It shelters a large anchor which was lost in the Kawakawa River by the brig Pioneer in 1809, when the trader slipped anchor after word was received of the Boyd massacre, and sought safer waters. The cannon balls by the veranda came from Ruapekapeka Pa, Kawiti's stronghold, which was the scene of the final battle between the British forces and the opposing Maoris in the Northern war, terminating on January 10, 1846.

A dais was erected under an enormous elm for Lord and Lady Bledisloe when His Excellency laid the foundation stone of the whare-runanga, the carved house, presented by the Ngapuhi tribe. This national Maori centennial memorial has been built near the Treaty House of the pakeha, thereby symbolising the friendly relations of the two races. The opening ceremony was held on February 6, 1940, on the 100th anniversary of the signing of the Treaty of Waitangi. The tuhu tuhu or kowhaiwhai (coloured scroll work) and the tukutuku (decorative reed panels) are admirable examples of Maori art, and the carvings, every piece of which has its particular meaning, are representative of all the tribes throughout New Zealand. The 117ft.-long waka taua, the war canoe used in the centennial celebrations, was made from kauri trees



[*National Publicity Studios photo.*

The whare-runanga, carved house, with the war canoe house in the background.



[*National Publicity Studios photo.*

The muniment room in the Treaty House at Waitangi.

from Puketi Bush and presented by the Tokerau tribes. It is now housed alongside the whare-runanga, and its 80 paddles, the blades pointing upward, are placed in groups of four between the uprights of the railing enclosing the shelter. The canoe holds 140 people.

Gifts from Maori Tribes

The puriri fence marking the boundary of the Waitangi estate for 4 miles was the gift of the Ngapuhi. The South Island Maoris sent a "coronation" chair carved from totara and having a woven reed back and a crimson leather seat, the chair resting on a block of tangiwai greenstone, and the Taranaki tribes contributed a painting of the signing of the Treaty—"This Treaty has been rained upon by the rain, it has been exposed to the blast of the storm, but the words are still clear, they cannot be obliterated". Other valuable pictures were received from the Royal Society of Tasmania, Lady Pomare, and C. F. Goldie, the last named presenting his newly painted portrait of Tamata Waaka Nene, one of the principal supporters of the Treaty.

In accordance with the museum's policy of building up a pictorial record of New Zealand history up to 1842 the walls are panelled with portraits of persons who influenced the course of events leading to the founding of the colony and its cession to the Crown. Pictures of historic scenes are grouped in sequence and intermingle with those of the Empire builders. In most cases the elaborate gowns and coiffures of the womenfolk are the epitome of elegance. Miss Agnes Busby, of Gisborne, one of the surviving granddaughters of the ex-Resident, recently presented the museum with copies of miniatures of her grandparents painted in Sydney in the 30's of last century.

Showcases contain relics of the early days along with many documents and letters, including Captain Hobson's affectionately phrased letters to his wife. These have a particular poignancy in view of the fact that he was seriously ailing at the time, and his death occurred only 2 years after the signing of the Treaty. One epistle dated March 24, 1840, comments: "Thank God I am progressing just as fast as I could expect. I slept well last night and awoke ready for my breakfast. The weather is very fine and that serves me in two ways, first in thinking of you who may be at sea and second in being enabled to take exercise in the open air." Another memento of the gallant captain is a beautiful green and gold plate belonging to his Spode dinner set.

Feminine Foible

There is a picture of Mrs. Hobson and her children among the portraits in the museum, likewise one of Mrs. Henry Williams, wife of the founder of the Paihia Mission station. Their first house is also pictured. Mrs. Williams is said to have dressed her children in the most modish manner possible to prevent them from becoming "perfect little savages"—a very feminine foible, yet surely more than counterbalanced by her characteristic unhesitancy in bundling all her family into a boat and, with only a young Maori girl to help her row, going to Mrs. Busby's assistance when the need arose.

Marianne Williams was also a superb cook, and the mountains of pies and plum puddings, the savoury boiled pork and potatoes, and the jams, jellies, and crisp-baked bread which she turned out in her tiny portable kitchen were miracles of culinary perfection and must have had an appreciable effect on the morale of the little missionary community, whose menfolk often walked many miles a day in the course of their duties. Visitors, whether Maori or pakeha, were always made welcome and only a few weeks before the birth of her fourth baby she recorded in her journal the entertaining of the Rev. S. Marsden, the Rev. King, and the celebrated chief Hongi, who arrived unexpectedly at teatime one evening. Beds were made up in the sitting-room for the three guests, four Maori members of the ship's crew were accommodated in the adjacent room belonging to the other missionary family who shared the four-roomed hut with the Williamses, and five native girls slept in the entrance porch—"all these, in addition to the Fairburns, ourselves, and the children, in a rush dwelling 40ft. long x 15ft. broad. My company ate up my batch of bread, which happily held out; and the ship's crew had enough also. . . ."

Among the Waitangi relics connected with Royalty are the musket and sword bayonet bestowed on the chief Waikato by William IV during Waikato's visit to England with Hongi Hika in 1820 and a Coronation plate and an embroidered handkerchief which belonged to Queen Victoria, the touches of black in the very fine needlework being indicative of mourning. There is also a portrait of the Queen painted at the time of the Treaty.

Popular Lectures

The former curator, Miss Katherine V. Lloyd (an ex-schoolteacher and daughter of a historian), spent much of her time conducting visitors over the Treaty House, her explanatory lectures being a most popular feature of the tour. Within 6 years the number of visitors to Waitangi has increased from 6000 to 35,000 a year and it has now been found more practicable to present each one with a printed guide giving a brief history of Waitangi and listing in chronological order the pictures and portraits in the muniment room (a collection that has been considerably augmented of late and re-arranged accordingly), together with a short note concerning each exhibit. This interesting little booklet, which also explains the significance of the carvings and other ornamental work in the whare-runanga, has been compiled by the Honorary Administrator of the Waitangi National Trust, Vernon H. Reed.

Parties of scholars from schools between Kaitaia and Taranaki have been in residence at Waitangi, the Education Department considering these visits of such benefit that they are permitted in term time and financial assistance is granted for travelling expenses; accommodation at Waitangi is free. Each visit lasts a week and arrangements are made for the conveyance of the school party by bus or launch to outlying places of historical interest. It is hoped that when the facilities for accommodation and board can be extended schools from more distant parts of New Zealand will be able to make the pilgrimage to this important national museum.

LUNCHES to be PACKED and CARRIED

THE making of varied and interesting lunches which also have a high nutritive value seems to present a perennial problem if the number of children whose luncheon invariably consists of pies, fish and chips, or perhaps a cafeteria meal of tea, sandwiches, and cakes is any criterion. Many adults, forced to eat away from home at lunch time, prefer any sort of cafeteria meal rather than a carried lunch consisting always of slightly squashed sandwiches, varying only in their degree of staleness. Any attempt to provide variety in fillings is often spoiled by the admixture of flavours alien to each other, as occurs in the enforced intimacy of paper bags—oranges, cheese, chocolate cake, onion, vanilla biscuits, or other irreconcilable flavours cohabiting for several hours in a tightly closed lunch box, and perhaps aggravated by the lingering flavours of the previous day's lunch. On the other hand, the housewife faced with the daily task of planning and preparing lunches while cooking the family's breakfast and getting everyone ready for work or school cannot be blamed for becoming impatient with their demands and complaints. Consequently, to avoid monotony for both eater and packer lunches must be planned beforehand and as much of them as possible prepared during the previous day.

By

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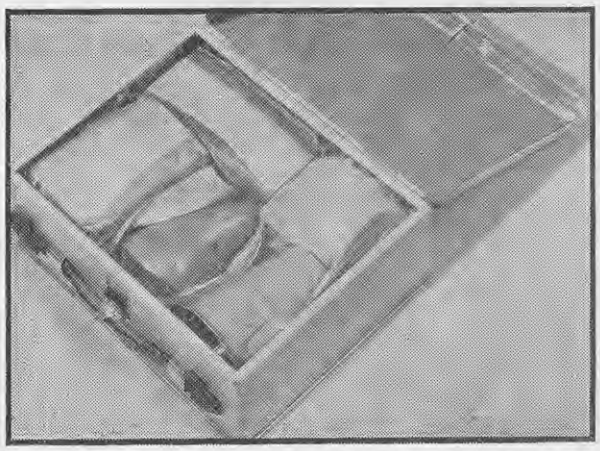
AMONG points to be considered are the nutritive value of the lunch—it is one of the three main meals of the day and therefore should be as nutritious as breakfast or dinner—and the type of lunch preferred; lunches are frequently eaten in crowded school lunch rooms, or alone, or in unattractive surroundings, so it is important to whet the appetite by packing attractively a lunch its owner really likes.

Ensuring Nutritive Value

A lunch should be substantial enough to provide about a third of the daily need for energy and other nutrients. It should contain not fewer than three substantial sandwiches or their equivalent, and two sandwiches should have generous fillings of rich protein foods, such as egg, cheese, fish, liver, cottage cheese, meat, peas, beans, or peanut butter. At least two-thirds of the sandwiches should be made with wholemeal or wheat germ bread, though "two-tone sandwiches" (one slice of wholemeal and one slice of white bread together) add variety and may persuade otherwise reluctant lunch carriers to eat wholemeal bread. This improves the vitamin B content of the lunch—particularly the vitamin B_1 content—and fillings of egg, cheese, or liver provide valuable amounts of vitamin A, others of the B group of vitamins, and iron or calcium.



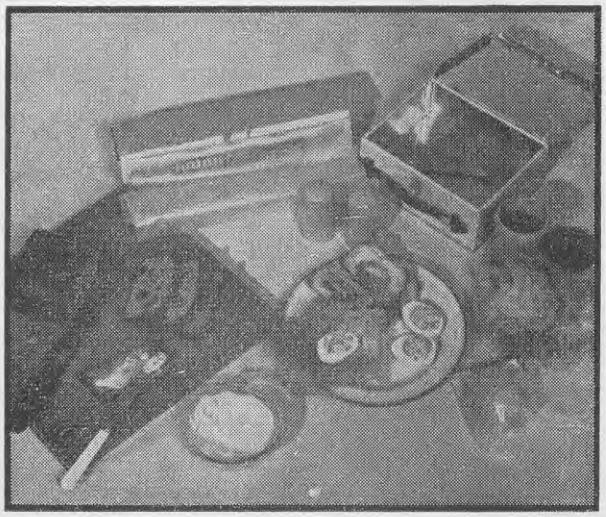
A well-packed lunch tin. Differently flavoured foods are wrapped separately and the meal looks attractive.

[*Upper photograph by Sparrow Industrial Pictures Ltd.*

SUGGESTIONS

FOR

LUNCH MENUS



LUNCHES THAT GO TO TOWN

MONDAY

Stuffed egg in lettuce leaf.
*Cheese and bacon savouries.
*Buttered nut-bread and date sandwiches.
Orange sections in small plastic screw-top jar.
Coffee.

TUESDAY

*Wholemeal-bread and cheese-paste sandwiches.
Celery sticks.
Pear.
Coffee.

WEDNESDAY

Thinly sliced wholemeal bread and butter.
*Lettuce roll-up.
Ham, tongue, or luncheon-sausage sandwich.
Apple.
Milk.

THURSDAY

Sandwiches filled with cheese paste and chopped bacon, lettuce, sliced tomato, or cress.
Apple turnover or fruit jelly in screw-top jar.
Raw carrot sticks.
Coffee.

FRIDAY

Two-tone sandwiches (1 slice of white bread and 1 slice of wholemeal bread) with smoked-fish filling (smoked fish cooked in milk, flaked and mashed to a paste with white sauce and a small quantity of lemon juice).
Buttered oatcakes or crackers, spread with cheese paste, peanut butter, or vegetable extract.
Milk or coffee.

LUNCHES THAT GO TO SCHOOL

MONDAY

Cheese scones, buttered, with filling of mashed egg and parsley or cooked vegetable and salad dressing.
*Buttered home-made raisin bread.
Apple.

TUESDAY

Wholemeal-bread and butter sandwiches.
Piece of cheese or, for variety, cubes of cheese and celery, pineapple, pickled onion, sliced cold saveloy, sausage, or cooked bacon on toothpicks.
Grated apple and raisin sandwiches.
Lettuce leaves or carrot sticks (salt in paper twist).

WEDNESDAY

*Liver-savoury sandwiches.
Sliced yellow tree tomato sandwiches (seasoned with salt, sprinkled lightly with brown sugar, or spread with honey).
Stick of celery.

THURSDAY

Liver-savoury and chopped pickles, celery, hard-boiled egg, scrambled egg, or bacon sandwiches.
Buttered bran and raisin gems.
Apple.

FRIDAY

Wholemeal-bread sandwiches with filling of peas (from previous day's dinner) mashed with finely chopped mint and salad dressing or mint sauce, or wholemeal-bread rolls with mashed peas, lettuce, grated raw carrot, and salad dressing filling.
Date and lemon-juice sandwiches.
Drained stewed tree tomatoes in screw-top jar, peeled tree tomatoes well wrapped in waxed or grease-proof paper, or orange.

LUNCHES THAT GO TO A HEAVY JOB

MONDAY

*Aberdeen sausage sandwich with pickles or chutney and lettuce (from previous day's dinner).
Buttered cheese scones.
Apple and raisin turnover.
Apple
Vacuum flask of soup.

TUESDAY

Wholemeal sandwiches filled with cold sliced or minced meat moistened with salad dressing and minced celery.
Oatmeal biscuits.
Buttered rolls with salad filling (lettuce or cabbage, grated raw carrot, sliced hard-boiled egg, and salad dressing).
Vacuum flask of coffee.

WEDNESDAY

Wholemeal-bread and butter sandwiches.
Piece of cheese.
Sandwiches filled with peanut butter and chopped grilled bacon.
Buttered gingerbread slices (from previous day's dinner).
Pear.
Vacuum flask of soup.

THURSDAY

Buttered rolls stuffed with grated cheese or cottage cheese, salad dressing, and chopped onion.
Honey and lemon wholemeal sandwiches.
Vacuum flask of coffee.
Apple.

FRIDAY

Chopped-bacon and scrambled-egg sandwiches.
Vegetable-extract and lettuce, cress, or parsley sandwiches.
Buttered raisin bread.
Vacuum flask of coffee.
Celery sticks.

Items for which recipes are given at the end of this article are marked with an asterisk.

Crisp raw fruits and vegetables not only carry well but are sources of vitamin C and other nutrients, and they help to clean the teeth at the end of the meal. Those which are good sources of vitamin C include oranges, tomatoes, sturmer apples, lettuce, swede or white turnips, radish, cress, and parsley; less valuable as sources of vitamin C are carrots, celery, other varieties of apples, and pears, but as they add variety and help to clean the teeth they are useful alternatives to the first group.

Adults need a pint of milk daily and school children 1¾ pints, but sometimes it is difficult to consume sufficient unless a milk drink is taken at lunch time. Children receive milk at school, so milk need not be included in their lunches, but adult lunch carriers should ensure that a milk drink is a regular feature.

Sweets, iced cakes, sweet pastries, and other foods high in energy value but deficient in minerals and vitamins should be avoided, as their excessive consumption is a predisposing factor in tooth decay, as well as tending to lower the consumption of minerals and vitamins below the level essential for good health.

Packing the Lunch Tin

Paper bags and cardboard boxes are not suitable for carried lunches. To put a paper bag of food in a suitcase or school bag with heavy books is to invite disaster; cardboard boxes cannot be washed and soon become stained and redolent of the flavours of past lunches. Lunch tins which can be painted attractive colours are easily washed, inexpensive, and light and convenient to carry.

Differently flavoured foods and sandwiches should be wrapped carefully and separately in waxed or greaseproof paper to prevent flavours mingling and help to keep food fresh. Newspaper should never be used.

Plastic bags and sheets of plastic specially treated for using with food are now available and represent a considerable saving because they can be used repeatedly, are simply washed, and are better than waxed or greaseproof paper for keeping sandwiches and other foods fresh.

For carrying stewed fruits, fruit jellies, custards, orange sections, vegetable aspics, or other soft foods which may be included as an occasional surprise, small, light, plastic, screw-top jars and plastic spoons are available. They are more durable and of a more useful size than glass ones.

Choice of Fillings

A good supply of sandwich fillings which keep well is a useful adjunct to the lunch packer's provisions. Stored in a separate cupboard and replenished when necessary, they ensure against the occasional appearance of a "scratch" lunch.

Sandwich fillings should be easily spread, sufficiently moist to prevent the sandwiches coming apart, and well seasoned. Fillings which stain the bread or soak into it and make it soggy should not be used unless they are special favourites of the lunch carrier. Peanut butter, pickles and relishes, mustard (for adults' lunches), nuts, cheese and home-made cheese spreads, small tins of fish, meat, peas, or beans, salad dressing, meat or vegetable extract, and dried fruits are fillings which keep reasonably well and ensure plenty of variety. In families where they are popular as sandwich fillings, jams — especially varieties which jelly firmly and do not soak through the bread—and honey are useful.

Preparation of Foods

Leaving the preparation of lunches until the last moment before the children leave for school or the family for work is unwise. Sufficient amounts for 2 or 3 days of such sandwich spreads as liver or cheese paste can be prepared at a convenient time, covered, and stored in a refrigerator or cool safe. That does not necessarily mean that the lunches will be monotonous: A cheese spread may be sprinkled with chopped celery one day, with lettuce the next, and grilled bacon or a whole tomato may be used as an accompaniment on the following day.

For people who like to prepare sandwiches on the previous evening plastic lunch bags are most useful, as they keep sandwiches fresh overnight. However, sweet and savoury sandwiches, fruits, and biscuits must all be wrapped separately to prevent the flavours from mingling.

Time is saved and lunches arrive at work or school with a fresher flavour if lunch boxes and vacuum flasks are unpacked immediately they arrive home, washed, and left open to the air until the lunch is ready to be packed.

For children who do not receive school milk, or for adults who cannot easily obtain a hot or cold drink at work, a vacuum flask in which to carry hot soup and hot drinks in winter and chilled milk or fruit drinks in summer is almost a necessity, as it ensures that beverages are kept in the best possible condition.

Planning the Menu

On the opposite page are some suggested lunch menus for school children, for outdoor workers, and for office workers, who, though they may not develop such hearty appetites, have just as great a need of an attractive, nutritious lunch.

Something they can eat quickly and easily is probably the first requirement of younger school children, who do not want to spend their precious playtime arranging things for themselves. Anything in sandwich form is therefore popular, especially with boys. They like something which can be traded or shared with a friend, and they do not like to be bothered with jars, spoons, or mugs which must be carried home. On the other hand, older children, and particularly secondary-school girls like an occasional little surprise packed in with the everyday sandwiches, and savoury eggs, fruit salad, aspic or fruit jellies, custards, stuffed baked apples or pears, and other gelatine desserts, which are easily carried in small screw-top jars, are popular.

The menus given are for sample winter lunches, with some alternative suggestions where ingredients may be unobtainable. Because bread is often stale and unpalatable on Mondays, lunches which make use of other foods are included. However, bread may be freshened quite easily by brushing the crust lightly with water, standing it on a rack in the oven over a baking dish of hot water, and baking it in a cool oven (250 degrees F.) for about half an hour.

Lunches that can be packed into a small space are preferred by office workers; a small flat tin which fits into a shopping basket or brief-case is often more popular than the ordinary lunch box or tin. They like interesting foods, satisfying but not too high in energy value, and sticky or sweet sandwich fillings are usually less popular than savoury fillings.

Where there are school children and office workers in the same family, lunch menus can, of course, be adapted to reduce preparation times.

Other Sandwich Fillings

Here are some sandwich fillings which can be used as alternatives to those in the suggested menus:—

For Summer Lunches

Tomato with cheese, tinned fish and lemon, hard-boiled egg and parsley, or cucumber.

Cucumber with lettuce and salad dressing or with cottage cheese.

Creamed sweet corn.

Asparagus.

Sliced radish with lettuce and salad dressing or with cottage cheese.

For Winter Lunches

Peanut butter with relish, chopped celery, currant jelly, raisins, or shredded carrots.

Tinned fish, mashed with lemon juice or vinegar, salt, and pepper to taste.

Cottage cheese with dates or other dried fruits, celery, onion, salad dressing, or grated raw carrot or chives.

Baked beans mashed, alone or with sliced sausages or meat loaf, tomato sauce, bacon, or lettuce and salad dressing.

Cheese and chopped chives.

Sweet sandwiches

Mashed banana, alone or with raspberry jam, a tart fruit jelly, lemon juice, raisins, figs, or prunes.

Chopped dried fruits and grated apple.

Mincemeat (equal quantities of minced dried fruits moistened with lemon juice and stewed apple, and flavoured to taste with ground mixed spices and ginger).

Breadless Sandwich

Cut two thick slices of cold meat loaf or Aberdeen sausage. Fill them with 2 tablespoons of left-over potato salad and lettuce leaves or pickle, and wrap the sandwich firmly in greaseproof paper.

Recipes

The recipes which follow are for items marked with an asterisk in the suggested menus.

Raisin or Nut Bread

4oz. of white flour
4oz. of wholemeal flour
1 egg
2 to 3oz. of golden syrup or honey
1oz. of melted butter
½ to ¾ cup of milk
½ teaspoon of salt
3 level teaspoons of baking powder
¾ cup of chopped raisins

Sift the dry ingredients together and gradually add the beaten egg mixed with the melted butter, golden syrup, and most of the milk. Mix them to a soft dough with the remainder of the milk. The mixture should drop from a raised spoon. Pour it into a greased tin and bake it at 375 degrees F. (a moderate oven) for 1 hour.

A third to half a cup of chopped nuts or dates may be substituted for raisins.

Aberdeen Sausage

1lb. of minced steak
½lb. of minced bacon
½lb. of minced liver
2 sheep's kidneys, minced
1 tablespoon of minced onion
2 beaten eggs
1 teaspoon of mixed herbs
1 tablespoon of chopped parsley
2 cups (8oz.) of soft breadcrumbs
¼ teaspoon of pepper

Combine the ingredients, shape the mixture into a roll, and tie it in a well-floured cloth. Plunge it into boiling water, boil it for 5 minutes, simmer it for 2½ to 3 hours, and press it until it until it is cold.

Liver-savoury Sandwich Filling

½lb. of minced cooked liver
2 tablespoons of chopped or minced celery
1 tablespoon of minced onion
¼ teaspoon of salt
3 tablespoons of salad dressing

Combine the ingredients thoroughly; 2 tablespoons of minced cooked bacon may be added if desired.

Cheese-paste Sandwich Filling

4oz. of grated cheese
1 beaten egg
2 tablespoons of milk
2 level teaspoons of flour
Salt and pepper

Mix the milk and flour to a paste. Combine the ingredients and stir the mixtures over a very gentle heat or in a double boiler until it thickens.

This may be varied by adding tomatoes. Cook ½lb. of sliced skinned tomatoes or 1 cup of strained preserved tomatoes in a saucepan until they are soft. Add the grated cheese and continue cooking the mixture over hot water until it is blended. Add it to the remaining ingredients and stir the mixture until it thickens.

Cheese or Bacon Savouries

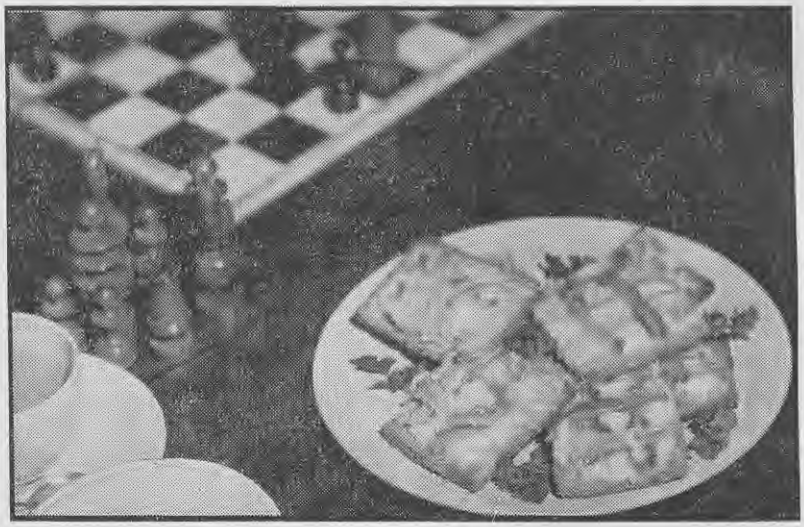
Cut bread thinly, spread it with butter, a slice of cheese and bacon, and bake it in the oven until it is crisp.

Lettuce Roll-ups

2 tablespoons of seedless raisins
¼ cup of cottage cheese or cheese paste
1 tablespoon of chopped nuts
1 tablespoon of grated raw carrot
½ teaspoon of salt
Salad dressing
About 3 crisp lettuce leaves

Pour boiling water over the raisins, let them stand for 2 or 3 minutes, drain them, and combine them with the cheese, nuts, carrots, and salt. Add sufficient salad dressing to hold the mixture together. Store the mixture covered in a safe or refrigerator until just before packing the lunch. Spread it on the lettuce leaves, roll them up, and fasten them with wooden toothpicks.

TOAST THAT IS DIFFERENT



THE New Zealander's liking for toast, not only as a mainstay of the breakfast menu but for lunch, tea, and supper as well, is unquestioned. Whether it is a result of the infrequent bread deliveries common in many country districts, or of the long weekend, or of a natural preference for toasted bread may remain a subject for controversy. However, probably few people would not welcome an occasional change from plain buttered toast, or toast and marmalade, honey, or cheese, especially at holiday time when the housewife, no more willing than the rest of the family to spend unnecessary time inside baking, finds toast the simplest answer to the problem of providing her family with a quick and satisfying meal when the bread is stale and unpalatable.

THE following suggestions for "toast that is different" can be put into effect easily and quickly when a griller or electric oven is available.

Savoury Suggestions

Cheese dreams (illustrated above): Toast the bread on one side. Spread the untoasted side with mayonnaise, sliced tomato, seasoning, a layer of grated or sliced cheese, and finally a slice of bacon or a lattice of bacon strips. Grill it under a hot element for about 5 minutes and serve it hot.

Peanut-butter toast: Toast one side of the bread. Spread the untoasted side with peanut butter blended with chopped bacon and a small amount of dripping, place a slice of tomato on top, and return it to the oven or griller to be toasted.

Baked-bean toast: Toast the bread on one side and butter the untoasted side. Mash 1 cup of canned beans or beans in tomato sauce with 2 tablespoons of chopped onion or celery and spread some of the mixture on the buttered toast. Place a thin slice of bacon on top, return the toast to the oven, grill it for about 5 minutes, and serve it hot. Peanut butter may be used instead of butter as the basic spread, and sliced seasoned tomato may replace bacon as a "topper".

Sardine toast: Mash 1 tin of sardines with ½ cup of chopped celery, 3 tablespoons of salad dressing, 2 teaspoons of lemon juice, and seasoning. Toast bread on one side. Butter the untoasted side if desired, spread it with the sardine mixture, top it with a slice of cheese, and toast it in the oven or under a griller.

For the "Sweet-tooth"

Cinnamon toast: Butter the toast and sprinkle it with a mixture of sugar and cinnamon in equal quantities. Brown it lightly in the oven or under a griller.

Orange tea toast: Mix together 1 dessertspoon of grated orange rind, 2 tablespoons of orange juice, and ¼ cup of the sugar and cinnamon mixture used for cinnamon toast. Spread the mixture on slices of buttered, toasted raisin or sultana bread and toast the bread for 2 or 3 minutes under the griller or in the top of the oven.

Sugar nut toast: Blend 2oz. of butter and 2oz. of brown sugar. Spread the mixture on toast, sprinkle it with chopped nuts, and brown it lightly in the oven or under a griller.

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