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Seed Certification Scheme

Summary of Operations for Season 1938-39

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THE seed certification returns for the 1938-1939 season indicate that for most crops an increased production of certified seed is recorded. Particularly is this so in the case of browntop, cocksfoot, and red clover seeds, but an actual decrease in production of certified seed of Italian ryegrass, potatoes, and rape is shown.

Extensions of the seed certification scheme have been made in the past season to cover broad red clover and subterranean clover.

Inquiries for certified "Government Stock" seeds have been greater than in past seasons, and many merchants and farmers have therefore been disappointed at the short supply of seed thus caused. The policy of the Department to produce more seeds of selected strains is being pursued, and to this end further contracts have been arranged for the production of "Govern. ment Stock" grass and clover seeds.

Perennial Ryegrass

A gratifying increase is recorded in the production of certified perennial ryegrass seed. It is indeed unfortunate that this increase has been largely offset by the reduced germinations of this seed experienced in practically all seed-growing districts. In this connection it is considered that the season just past has been the worst experienced since the introduction of certification. Certainly it has disorganised to a considerable extent the normal trading in certified perennial ryegrass seed.

The production of certified "Pedigree" seed has increased from 5,000 to nearly 10,000 bushels, while the produce of such seed certified in the "Mother" and "Permanent Pasture" classes totals a further 20,000 bushels. The total production of "Mother" seed has increased from 29,000 bushels to more than 54,000 bushels. Approximately 165,000 bushels were certified in the two classes, "Permanent Pasture" and "Commercial."

Cocksfoot

The production of certified cocksfoot seed (991,000lb.) was more than 30 per cent. greater than in any one previous season. This increase has been caused largely by an improved yield of 180lb. per acre.

The Akaroa district is still the main cocksfoot seed-producing area, although its supremacy is being seriously challenged by Mid-Canterbury. No other district approaches either of these in the production of certified seed.

White Clover

More than one ton of white clover seed received recognition in the "Pedigree" class during the 1938-39 season. The season's total in the "Mother" and "Permanent Pasture" classes was almost 200 tons. It is interesting to note that whereas in the 1936-37 and 1937-38 seasons "Mother" seed comprised approximately 14 per cent. of the total, this proportion increased to more than 30 per cent. during 1938-39. This trend is very suggestive that "Mother" seed is being utilised in the establishment of areas for seed production, with consequent good effect on the general quality of the white clover seed harvested.

It is estimated that probably 90 per cent. of the country's white clover crop

is now entered for certification, approximately two-thirds of this quantity being accepted as certified seed.

Browntop

An exceptionally good browntop harvest has resulted in the recognition as certified of more than 600,000lb. of seed, as compared with the previous highest season's production of 385,000lb. An increased area entered for certification has been a further factor in this phenomenal increase.

Red Clover

Consequent upon a very favourable harvest season for Montgomery red clover, production of certified seed has risen from 45,000lb. to 144,000lb. This increase has been followed by a welcome reduction in price. Yields of this seed have averaged out at 151lb. per acre.

The 1938-39 season has seen the introduction of a certification scheme to cover broad red clover also. A nucleus of 80 acres produced 16,168lb. of seed, which was certified as "N.Z.-grown Broad Red Clover."

Indications are that a rapid development in the certification of this type of seed can be expected.

Italian Ryegrass

Due largely to lower yields, the quantity of Italian ryegrass seed certified is less than in either of the two preceding seasons. This is unfortunate in view of the undoubted merit of this strain of seed, and of the generally inferior nature of much of the uncertified seed. An increase in the production of certified seed would be very welcome to all farmers who know the value of really good Italian ryegrass as a temporary pasture.

Phalaris Tuberosa

More than 100 acres of *phalaris tuberosa* were harvested for seed during the 1938-39 season, and with a more consistent yield than has been experienced in previous seasons, the total certified product amounted to more than 12,000lb. Germination of this seed has been rather unsatisfactory, although it is understood that this fault is not uncommon in seed harvested overseas.

Subterranean Clover

In order to give an assurance as to the type of locally-produced subterranean clover seed, a scheme of certification has been introduced. Nearly five tons of seed were obtained from the 70 acres harvested, all this seed being of the mid-season (Mt. Barker) strain.

Seed Wheat

The acreage of seed wheat accepted for certification in the 1938-39 season showed a slight increase over that certified in the previous season. A higher proportion than usual of the threshed grain was sealed and tagged after machine dressing, almost 60,000 bushels of seed being so treated. Nearly 40 per cent. of this quantity was of the Cross 7 variety, while the varieties Solid Straw Tuscan and Hunters II. each represented approximately 20 per cent. of the total certified.

Seed Potatoes

Although a reduction was recorded in the number of potato crops inspected, the acreage involved in the 1938-39 season was the highest on record. Similarly, the acreage accepted—3,284 acres—was also greater than in any previous season. Because of the general shortage of potato supplies during the season, much of the crop normally reserved for seed purposes was diverted to domestic use. As a result, a considerable reduction was recorded in the quantities of tubers finally tagged after grading.

No material alteration is shown in the relative importance of the varieties under certification. The five main varieties, Aucklander Short Top, Dakota, Arran Chief, Inverness Favourite, and King Edward, together account for 90 per cent. of the area inspected.

Brassica Crops

It has still been impossible, because of adverse seasonal conditions, to produce sufficient supplies of certified rape seed. Low yields averaging 3cwt. per acre were experienced from the 60 acres harvested, and there was finally sealed 275cwt. of the Broad Leaf Essex type and 350cwt. of the Giant type.

General

The accompanying table gives the quantities of the various seeds certified each season since 1931-32. It should be noted that this table includes only seed in a machine-dressed or graded condition, and does not include seed

harvested but not submitted for machine-dressing or (in the case of potatoes) tuber inspection.

Persons or firms interested in the complete tabulated results for the season should make application to the Director of the Fields Division, Department of Agriculture, Wellington.

TABLE GIVING QUANTITIES OF EACH SEED CERTIFIED AND ESTIMATE OF THE TOTAL VALUE OF SEED CERTIFIED IN EACH SEASON.

Seed.	Chief consideration upon which Certification is based.	Quantities of Seed finally certified.							
		1931–32	1932–33	1933–34	1934–35	1935–36	1936–37	1937–38	1938–39
Potatoes (tons)	Varietal purity, cropping-power, and freedom from virus disease	818	938	1,806	1,821	2,845	3,132	3,453	2,641
Wheat (bushels)	Varietal purity and freedom from loose and stinking smuts	*1,283	7,001	6,012	11,110	25,646	47,465	44,158	59,619
White Clover (lb)		*6,131	33,731	20,337	93,381	56,092	460,930	405,530	445,704
Perennial ryegrass (bushels)	Genuine perennial type	81,186	245,667	119,019	182,386	279,305	129,495	189,717	229,637
Browntop (lb.)	Freedom from red top (*Agrostis palustris*)	198,343	138,843	118,978	384,588	212,734	371,358	255,981	612,345
Cocksfoot (lb.)	Type as exemplified in the produce of Akaroa Peninsula	171,720	622,765	200,560	715,982	657,319	334,374	691,376	991,673
Red Clover (lb.)	Type conforming to that of English grown Montgomery red clover	1,550	3,763	17,263	32,193	23,620	28,140	45,275	143,499
Brassicas (lb.)	Varietal purity and freedom from disease			25,515	522	24,503	12,432	34,482	19,917
Italian ryegrass (bushels)	A rapid-growing high-producing type, showing recovery after cutting				5,121	6,669	12,549	13,632	10,380
Phalaris tuberosa (lb.)	Freedom from other species					2,701	1,533	4,542	12,746
Subterranean Clover (lb.)	Type purity								10,763
Estimate value of seeds finally certified		£57,358	£142,585	£79,018	£154,725	£184,501	£168,845	£200,630	£268,425

* Reductions accounted for by changes in regulations.

Total estimated value of seed certified (1927-39), £1,333,422.

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Do You Make Good Hay?

— By —

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The fork type of elevator with the wheeled sweep in action.

[C. S. Dalgliesh & C. R. Taylor photos

Hay is the mainstay of the farmer in the winter months, and every care should be taken to see that the hay harvested is of high nutritional value. Poor quality hay lowers production and brings about stock troubles. This article outlines the essential points which must be observed in successful haymaking.

HAY is the chief supplementary fodder of the New Zealand farmer. He relies on it to carry his stock through the winter. The importance of hay is illustrated by the following table, which shows the acreages cut for hay and silage in the 1937-38 season.

	Acres.
Pasture cut for hay	404,156
Pasture cut for silage	80,595
Lucerne cut for hay or silage	39,087
Total	523,838

By far the greater part of this area was utilised for hay.

The lucerne areas are fairly evenly spread in sheep and dairying districts, but the pasture cut for hay and silage is located chiefly in dairying districts. Hay yields average about 1¾ tons per acre. A good crop will yield between two and three tons per acre.

Closing of Fields

Fields for hay are usually closed up in September, or at the time when the spring growth of pastures commences. Nevertheless, fields are quite frequently closed for hay any time up till January. At times, a field may be allowed to produce two crops of hay in the one season, the first comprising early, and the second late grasses. Such treatment, however, may cause considerable damage to the sward.

The closing of a field from stock allows the pasture plants to grow vigorously, but it has a detrimental effect on the ultimate vigour of the bottom grasses and clovers, because the total growing species overshade them. Our most important grass (ryegrass) and our most important clover (white clover) are low-growing species which dislike shading. Thus the closing of fields for hay has a detrimental effect on subsequent production, particularly in winter, when we depend on the combination of ryegrass and white clover for feed for stock.

Recovery of Pasture

After the hay is cut the bare ground dries out quickly in the summer, to the further detriment of the short rooted white clover and ryegrass. The shorter the period in the spring during which the field is shut up and the earlier the cutting, the less will the ryegrass and white clover suffer from overshading and from drying out. If cutting takes place sufficiently early the pasture will recover somewhat before summer, the damage then done being much less severe.

In a dry season a field cut late for hay may not provide any feed until the autumn rains, and it may take a year or two of careful stocking and topdressing to bring back a good sward. The earliness of cutting is dependent on the weather. In some districts weather conditions suitable for haymaking begin in late November and early December, but in others haymaking is a very risky undertaking until late December.

To secure a good aftermath and less damage to the pasture the cutting should begin as soon as climatic conditions usually allow of fairly good harvesting conditions. Fields harvested for hay should receive an extra allowance of fertiliser and lime to stimulate the white clover so that the sward will recover. The topdressing should be given either just before closing the field, or, probably better still, immediately after cutting.

Fertilisers which improve the growth of clover are of the greatest value. Therefore, on soils which respond to them, lime, phosphate, and potash should be employed to reinvigorate the sward.

Importance of Clover

Good pasture hay is made from a balanced mixture of palatable grasses and clovers. The more fibrous a clover or a grass, the less valuable is it as a constituent of hay. It is generally recognised, therefore, that ryegrass makes better hay than Yorkshire fog, and it is probable that white clover is of better feeding value than the more fibrous clovers, such as red clover and lucerne.

Being a winter fodder, hay should have a high protein content. As clovers contain more protein than grasses, they are important constituents in the hay, and should be well represented. Pure clover hays, such as lucerne and red clover, are valued because of the high protein content of the leaves. By far most of the hay made in New Zealand is from permanent leas.

Time to Cut

The feeding value of hay depends largely on the stage of growth when mown. Cut in the flowering stage, with the stamens of the flowers protruding, grasses produce the greatest amount of feeding value per acre. Cut later in the seeding stage, heavier yields are obtained, but the material is by then so fibrous that the feeding value is very low per ton, and the total feeding value per acre is lower than when cut in the flowering stage.

Cut earlier than in the flowering stage, the yield and feeding value per acre is lower than in the flowering stage, but the feeding value per ton of fodder is higher. Except for second cut hay, cutting at this stage is seldom possible. Nevertheless, taking into consideration the effect on the pasture sward, the better aftermath secured, and the better quality of the hay, it appears that cutting should take place as early as weather conditions will permit, providing there is sufficient bulk to handle efficiently.

The aim should be to cut hay before, rather than after, the flowering stage of the chief grass present, which is usually ryegrass. If ryegrass reaches this stage in late November, then the attempt should be made to cut hay in late November. Clovers do not deteriorate after flowering nearly so rapidly as grasses, and unless they form the bulk in the hay crop their stage of growth is not given much consideration when determining the time to cut. A clover crop is best cut when the clover is in full bloom. At that stage a high quality high-yielding fodder can be secured.

Hay which is dried and cured so that nearly all the natural condition colour of the grasses and clovers is maintained is of good feeding value, is high in nutriments, reasonably low in fibre, and exceedingly palatable. A

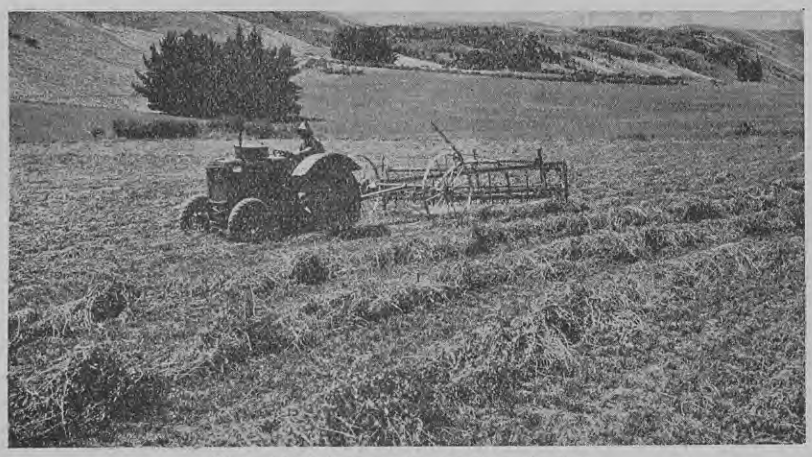
great amount of hay harvested in New Zealand is badly cured. It is either sun bleached or harvested damp, turning out of the stack musty, mouldy, fibrous, and without a vestige of green colour. Such hay is almost valueless as a fodder, and is dangerous to the health of stock forced to live almost entirely on it.

Machinery Required

The implement requirements of a dairy farmer for haymaking on a 100-acre dairy farm are one mower, a sweep, a hayrake or a side-delivery rake, and a stacking outfit.

Before a field is closed for hay it should be harrowed. During harrowing a watch should be kept to see that no rubbish of any kind which will afterwards interfere with the mower or haymaking machinery is lying on the field.

Cutting the lucerne crop for hay. [*H. Drake, photo.*



The side-delivery rake turning the hay. [*H. Drake, photo.*

All machinery should be overhauled before haymaking begins. If implements have been carefully greased, oiled, and housed or covered, little attention will be necessary, but on many farms they are badly abused and are left out in the weather to rust. Perhaps the best salesman the implement manufacturer possesses is the weather.

The most delicate and important machine used in harvesting hay is the mowing machine. Many mowers are neglected, and after a few years' work they cut very badly. The average life of a mowing machine is about seven years, but, properly cared for, it will last a lifetime. Some mowing machines are still going after 30 years of use.

Care of Cutter Bar

The cause of deterioration of the machine is almost invariably located in the cutter bar. The rest of the machine is, nowadays, practically foolproof, and, even if it is worn through insufficient oiling and greasing, the machine will function quite well if the cutter bar is in good working order.

The trouble is usually maladjustment of the cutter bar. First of all, the cutter bar should be properly aligned, so that when the machine is at work in a crop it is at right angles to a line drawn through the centre of the offside wheel of the machine. In setting this alignment allowance has to be made for lag, and, when at rest, the end of the cutter bar should be set about $\frac{3}{4}$in ahead of the right angle.

Next, the knife should work freely in its stroke, which is tested by putting the machine out of gear and working the pitman by hand. Although the knife should work freely, there should be very little lateral or up and down movement. The up and down movement is checked by caps, which should be hammered down so that they nearly touch the knife sections. In some modern machines the up and down movement is scarcely perceptible, but in older machines and in some modern ones the movement is easily discerned.

The lateral movement is checked by different methods. In some machines there are adjustable wearing plates

The pick-up baler at work. [*H. Drake, photo.*

which keep the knife up to its work. In others there are no wearing plates, and the knife is kept from moving sideways by adjusting a piece of metal behind the knife, which not only functions for this purpose, but has caps which prevent up and down movement.

Common Misapprehension

Many people are under the impression that the knife does all the cutting, and confine their attention to the grinding of the knife. For the knife to cut when the other parts of the mechanism are out of adjustment it is necessary that the horses be working at a very rapid pace, which is both tiring on the horses and on the driver.

The cutting is performed by the blade section and the ledger-plate of the finger bar, which act as a pair of shears. The finger bars divide the grass into bunches, and the knife section, moving from the centre of one finger to the centre of the next, presses the bunch of grass against the ledger-plates of the finger bars. The knife section, in sliding over the ledger-plate, cuts the bunch of grass from the rear forwards.

For efficient cutting it is obvious that both edges—the ledger-plate and knife section—must be both sharp and in close contact. As stated, it is usual to keep the knife sections sharp, but little attention is paid to the edges of the ledger-plates. After a time the edges of these plates become dull and worn. Before putting the mower away the ledger-plates should be greased to protect them from rust. If the plates are badly worn they should be removed.

Lack of Contact

Lack of contact between the knife section and the ledger-plates is a common source of bad cutting. The same thing is sometimes seen in a shearing hand piece, where, unless the comb and cutter are brought in close contact, the shears will not cut.

Lack of contact may be due to the knife lifting through improper adjustment of the caps, or by the non-alignment of the finger bars. Sometimes one or more finger bars have been knocked up by striking some object. This fault may be discovered by looking along the points to see that they are in line. Adjustment is usually made by the hammer.

Renewal of Wearing Blade

The inner wearing plate is sometimes worn and requires renewing. It is generally advisable to renew all the ledger plates and the inner wearing plate every three years, or after about 300 acres of cutting. When the knife is at the end of its outwards or inwards stroke each knife section should be in the centre of a finger. If the knife sections do not centre every other cut is not completed properly, and the draught is increased. This defect is usually due to the bad alignment of the cutter bar, or to incorrect length of the pitman, which can be adjusted.

A disaligned bar, besides causing ragged cutting, causes severe wear on the knife head. A mowing machine should always receive the careful attention that is due to any valuable machine. It is fairly easy to keep the machine in good order, but often extremely difficult to set an old machine that has been neglected.

Gate Sweep

The common hay sweep ten years ago—and quite a common sweep to-day—is the gate sweep, which consists of a gate-like structure placed on top of a heavy plank of wood. At each end of the gate are hinges to which is attached a small gate. Two horses

are hitched to the free end of each small gate, the implement being drawn along with the large gate at right angles to the line of travel and the small gates in front and parallel to the line of travel.

The gate sweep picks up from the windrow, the hay collecting in front of the large gate and kept from spreading sideways by the small gates. The gate sweep brings in a good load, but the hay becomes somewhat tangled and rolled, and the power required is great compared with other sweeps. It is simple and cheap to construct, but must be made of hard wood or iron if it is to last.

When the sweep arrives alongside the stack two horses are unhitched and the gate is turned so that it is in line with the large gate. The other horses are swung round so that the small gate to which they are attached is in line with the other two. They are driven forward pulling the gates free of the load. Then the other horses are re-hitched, and both teams are again turned facing forward in position for gathering more hay. The horses are usually driven out at the trot, and walk the gathered load in to the stack. The work is carried out very efficiently and quite speedily.

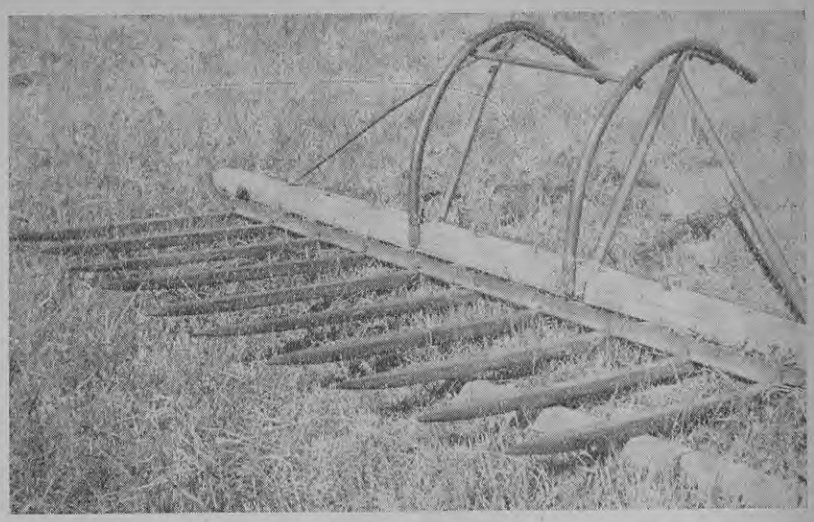
Pronged Sweeps

The gate sweep is being replaced to an increasing extent by pronged sweeps, which have a much lighter draught, and which do not damage and entangle the hay. On small farms the favourite pronged sweep is the tumbler, which is pulled by one horse. It has short teeth in front, parallel, and shod with sharp iron points. These teeth, or prongs, are attached to runners at the back with iron handles curved backwards.

As the sweep is pulled forwards, the teeth run along the ground gathering the hay which collects on top of them, being prevented from going further back by the handles and a low framework. This sweep collects a small load from the windrow and carries it to the stack, where it is tipped by lifting up the handles so that the sharp teeth dig into the ground. The handles strike the ground after the load is tipped and, the horse continuing on without a halt, the sweep completes a full somersault in readiness to collect a fresh load.

The timber for constructing the teeth and framework must be of hardwood to stand this rough treatment. This sweep is cheap and efficient for conveying hay short distances. In large fields, or where the carrying distances are long, larger sweeps are required. These run on wheels, and the inclination of the prongs, which are long, is adjusted by the position of the seat of the driver or by mechanical means. They gather very large loads, and are pulled by two horses. They are much wider than the tumbler. The wood for the prongs need not be as strong as for the tumbler.

The material is wheeled to the stack site, the tines are depressed, and the implement backed, leaving the load of hay behind. This type of sweep is more costly than the tumbler, being popular only on large farms.



A tumbler sweep. [*E. B. Glanville, photo.*

Advantage of Tractor

Of recent years sweeps fixed to the front of tractors have demonstrated their efficiency. For speed in gathering hay they are unequalled, for they can carry fairly large loads at a fast speed.

Because of its high price, the hay loader is not common in New Zealand. It is constructed on the same principle as the hay elevator. It is coupled behind a wagon, the top projecting well over on to it, and as the wagon is drawn along it pulls the hay loader behind it. The wheels of the hay loader work the elevator, which picks up the hay from the windrow or swathe, dropping it on the wagon, which must be driven so that it strides over a row or swathe of hay.

Two active men are required to build the wagon, and it is not advisable to elevate large rows of hay. When the hay is short the machine is at its best, for it will then pick up more cleanly than the hand fork. It is difficult to operate in windy weather because of the wind blowing the hay as it falls from the elevator on to the wagon.

Types of Rakes

The horse rake is a very common implement. Almost all dairy farmers possess one or have a share in one. It consists of a row of curved teeth mounted on a frame supported by wheels. On being drawn forward by one horse in shafts, the teeth are depressed to collect the hay. When sufficient is collected the teeth are raised by depressing a lever or pedal, and the load is dropped. The teeth are again lowered to gather more hay. The loads are dropped in rows to form windrows.

Horse rakes should be run as much as possible across the swathe, for they pick up better in this way, and the hay is less disturbed. The horse rake is being replaced on large farms by the more expensive side-delivery rake, which can be used to turn hay as well as to rake it into windrows. Side-delivery rakes prove particularly serviceable in hastening the haymaking. They enable the hay to be turned more often, thus resulting in a better and more evenly cured product.

Side-delivery Rake

The side-delivery rake has an action similar to a road grader. About three or four rows of rakes revolve on a shaft set at an angle to the direction in which the machine is drawn, and they sweep the hay into a continuous row. It works two swathes at a

time, these being just turned over or swept to one side to form a windrow.

By going in the opposite direction, two adjacent swathes can be swept on top of this windrow, thus making four swathes into one windrow. The action of the side-delivery rake is probably more gentle than the hay fork.

Stacking Equipment

A fair amount of hay is still stacked by hand, and where stacks are small it is probably the cheapest and speediest method. The transport and erection of a stacking outfit takes time, and in small fields the hay can often be half gathered by the time it would take to have the hoist in position. It is also uneconomical to have a hay lift which cannot be kept going because the sweeps available are inefficient or because there are not enough of them.

The mast and boom grab lift, taking its load from the gate sweep or wheeled sweep, is most general. The fork type of elevator which goes with the wheeled sweep is sometimes seen on large farms. The elevator built after the style of the threshing mill elevators and driven by an engine is extremely rare.

New type of mast and boom stacker at work. The finished stack on the right is covered with tarred sheets of tin fastened together with wire—a serviceable cover if looked after, and a relic of the days when benzine tins, from which they were made, were plentiful.

[*W. T. Brown, photo.*

The mast and boom stacker consists of a mast placed in the ground and held by guy ropes. Sliding up or down it is a boom, and up the mast and along to the free end of the boom runs a rope through pulleys. At the boom end the rope holds a grab, and at the other end it is hitched to a horse, which thus pulls the grab and its load of hay up. The boom is swung so that the load is over the stack, the grab is tripped, the load is dropped on the stack, and the horse is backed to allow the grab to descend. As the stack increases in height, so the boom is raised up the mast.

There are variations of the lift utilising the grab. Some stackers consist of two poles at each end of the stack with a wire rope between, along which the grab with its load may run to drop the hay in any part of the stack.

Curing

Hay cannot be considered a difficult crop to grow, but it certainly is the most difficult of all crops to secure without damage. The hay harvesting period in a fickle climate is a time of considerable anxiety and activity.

Farmers depend largely on their hay to winter their stock. Therefore it is very desirable to make good hay, neither over-dried nor under-dried. If it is under-dried it will heat too much or go mouldy in the stack; if over-dried, a considerable amount of nutriments is lost.

Good curing depends chiefly on the weather, and generally necessitates the employment of large numbers of men. The labour difficulties can be overcome to a large extent by the use of machinery, but this is often beyond

the means of the farmer. There are perfect methods of making hay, but it is almost impossible for many farmers to carry out these methods. However, the farmer should endeavour to cure his hay in the best possible way with the means at his disposal.

Drying

After cutting, the aim in haymaking is to get the material dried as quickly as possible, and, at the same time, to maintain the natural colour and aroma of the freshly-cut grass. The drying agencies are the air and the sun. The wind is a better drying agency than the sun, for the sun bleaches the grass and so dries and makes brittle the clover leaves—the most valuable part of the hay—that they fall off and are lost in the handling of the hay.

Newly-cut grass has a coating of waxy or oily matter on the epidermis which waterproofs it. This coating will remain intact as long as the grass is fresh and not bruised. With the drying out of the hay and rough handling, especially when the grass is wet, this covering is destroyed. Rain falling on freshly-cut grass does little harm, but on drier grass it washes out the soluble plant foods and spoils the colour and palatability of the hay. The more the grass is handled, the greater the loss of nutriments by rain washing.

Normal Harvesting Method

The normal method of harvesting is to cut, let the grass dry in the swathe (the swathe may or may not be turned), rake the swathes into windrows, and stack from the windrows. In dry, hot, sunny weather a good deal of sun bleaching occurs, and very little hay with a light green colour is harvested. In wet weather the whole of the hay may get wet once or twice, and the feeding value and the palatability are lowered.

How should good hay be made? Haymaking is a very old practice, and it may be of interest to go back and see how hay was made when labour was cheap and abundant. Hay was made for sale (when one has to sell a commodity quality is a very important attribute), and every endeavour was made to make good hay—hay of a good colour, high feeding value, and good aroma. Of course, bad hay was made as well and a writer 100 years ago comments as follows:—

"Haymaking, as usually performed, would induce one to believe that the period of conducting it had arrived unexpectedly and the time spent upon it was thrown away. The practice commented on delays the cutting down of the grass until it has passed its most succulent period—allows it to lie on the ground when cut till it is bleached by the rain and scorched by the sun or rotted by the growth of the aftermath penetrating through the swathes—puts the weather-beaten swathes together as fast as possible into as large ricks as will keep the hay without heating—and permits the ricks to stand on the ground till the grass under them is destroyed. The grass thus treated is expected to make **good** hay."

Historic Account

Arthur Young (1741 to 1820) describes in his "Farmers' Calendar" the practice of haymaking in Middlesex in 1809, more than 100 years ago. The grass mown before 9 a.m. is spread evenly over all the ground and turned at least once that morning. In the afternoon it is raked into windrows three or four feet apart and then cocked. Next morning the grass mown the previous day before 9 a.m. is tedded, and the grass cocks made the previous day are shaken out and then turned. After that, the grass tedded the first part of the morning is turned once or twice. In the afternoon the grass shaken out from the cocks is raked into windrows six to eight feet apart and the other lot into windrows three to four feet apart. Both lots are then cocked.

And so it goes on, the grass being turned frequently during the day to dry it without bleaching, put into windrows and cocked every evening to protect it from dews and rain. As time goes on the windrows and cocks are made larger, until the hay is finally stacked. Thus, the hay was not allowed to get wet or to bleach, and heating to high temperatures in the stack could not take place, because this process was finished slowly at low, harmless temperatures in the windrow and cock in the field.

Care was always taken to proportion the number of haymakers to that of mowers so that there was not more grass in hand at any one time than could be managed by the haymakers. It was particularly necessary to guard against the spreading of more hay than the number of hands could get into cock the same day or before rain.

This description of haymaking more than 100 years ago, when labour was abundant and cheap, shows how good hay should be made in the field. The aim was to dry the hay as quickly as possible without bleaching or allowing it to get wet. The passage of years has seen the introduction of labour-saving machinery. The mower has replaced the scythe, the hayrake and side-delivery rake the wooden, hand hay rake, the tedder the hand fork, and the hay-loaders, sweeps and mechanical stackers have lessened the cost and hastened the work of stacking.

Limits of Machinery

The full use of machinery allows of very quick handling of hay during periods of good haymaking weather. But the introduction of machinery has not entirely solved the problem of haymaking. So far, no machine to build cocks has been invented. Also, machinery costs money, both to purchase and to maintain, and an elaborate range of haymaking machinery is beyond the means of the average small farmer. Even with machinery haymaking still necessitates the employment of reliable casual labour, which is difficult to obtain in dairying districts.

The necessity for extra labour at haymaking has brought in the system of co-operative work among groups of farmers, but, as crops have to be harvested in rotation, the operation of the system usually results either in haymaking being rushed in or in the last crops being cut on the late side. The key to the making of good hay thus appears to be the provision of **labour** and **machinery**, and on the general run of small dairy farms hand labour still has to do much of the work which, on large farms, may be done by machinery.

A well-constructed stack covered with sheet iron nailed to wooden rails running along the crest and eaves of the stack. The more common and not so satisfactory method requires a steep-pitched roof, the iron lying lengthwise opposite to that shown in the illustration, and extending down the roof sides only a short distance. Note the excellent way the roof is weighted.

[C. S. Dalgliesh, photo.

Making the Stacks

The site for the stack should be level, well drained, and in a position suitable for easy transport of the material. The material should not be placed on the bare field, and a foundation of straw (or preferably of logs) should be constructed to check the absorption of moisture from the soil. The logs allow of bottom ventilation, which makes it safe to put material into the stack earlier than would be otherwise advisable.

Before stacking, make sure that the material is sufficiently cured. Only experience will give the judgment required to decide whether the material is fit to be stacked. If the hay is too moist before stacking it will heat, become mouldy, or go brown or black in colour, or it may even catch on fire. This commonly occurs when haymaking in hot weather; the hay appears to dry quickly, whereas actually it is still sappy.

The palatability is improved by the addition of about 15 to 20 lb. of salt to one ton of hay. A little salt should be sprinkled evenly over each layer of hay as it is stacked.

Round or Oblong

Stacks may be round or oblong in shape. Oblong stacks should be placed end on to the bad weather quarter. In building, keep the heart solid and high, and spread the material evenly. Building should be carried out so that the sides spring a certain amount. In topping oblong stacks keep building the ends perpendicular or, for preference, sprung somewhat, at the same time bringing in the sides very gradually so that a steep, pitched roof results. Where the stack is to be properly thatched or covered, steep pitched roofs are not so essential.

In building round stacks, a steep pitched roof is essential. Some trouble is experienced in finishing the topping of the round stack. The top cap of hay is best made on the ground and carried up and placed in position. The round stack is built about five yards in diameter at the base, with a very small butt. Because of its small size, less heating is liable to occur.

During and after the building is completed, rake well the sides of the stack so that the leaves and stalks of the grass are pointing downward and thus aid in shedding the rain. After the stack has settled it should be finished by applying more material to the top and down the sides. Newly-cut green material is best for this purpose. The stack should then be lightly raked.

Protection from Weather

After the stack is finished it should be given some protection from rain. Thousands of tons of hay are lost every year in New Zealand through bad building and improper covering. If the round stack is well built and raked all the covering that is necessary is a split sack placed and tied in position on the peak. The steep pitched and well raked roof will then shed all the rain, and, when opened, the hay will be unspoilt except for an inch or so of the exposed outside of the stack.

There are various means of covering the oblong stack. If the stack is well raked a wire-netting covering extending to the eaves and weighted to hold it in position is very efficient. It has a thatching effect, because it presses the outside straws into contact, and once these are wet the rain water will not penetrate but will run down and drop off at the eaves.

In the haymaking districts of New Zealand topdressing of the pastures is very common, and there is a large supply of fertiliser sacks annually available for coverings. These sacks are split open and a number sewn together, forming a fairly good sheet for covering stacks from rain. Sacks can be made to last longer by soaking them in a solution of 1 per cent. bluestone. An untreated sack cover will last only one season, and if the hay is not used the winter after it is made it is necessary to cover the stack again. Sack covers are held in position by weighting with bags of earth, old parts of implements, or benzine tins filled with earth.

Thatching

The thatching of hay stacks has not been a common practice in New Zealand, and nowadays a thatched stack is seldom seen. Rushes from swamps are generally used for thatching, but straw or raupo is sometimes used. The workman cuts the rushes about 12 to 18 inches long, placing a layer of these so that they jut over the eaves, and pegging them into place with twine wound around sticks forced into the stack. The next layer of rushes is placed above the bottom layer and overlapping it by about four inches.

Layer after layer is placed in this manner, until the whole of the roof is covered. It makes a very effective and tidy cover, but entails much work.

Corrugated galvanised roofing iron is frequently used for covering stacks. Generally, it is used to cover only the top of the stack, coming down the roof sides only a short distance. The iron, about 26in. wide and five to ten feet long, is placed in the opposite direction to the way it is placed on roofs of dwellings. Usually, only three sheets are used to cover each section of the stack—one on top and one on each side of the roof of the stack. The top sheet overlaps the other two.

The sheets or iron are held in position by wires which run over the stack from side to side, and to which are attached weights clear of the ground. The next section of the stack is then covered in the same way, and the sheets then overlap or underlap the sheets covering the first section, depending on the way the crest of the roof slopes. In placing the sheet iron, care must be taken so that it does not shed large amounts of water into one point of the stack.

If the stack settles unevenly the roof must be inspected to see if any of the water is being run by the iron into the stack. If this is occurring the iron should be removed and the hay underneath adjusted, or the matter may be simply righted by altering the overlapping or underlapping of the sheets of iron. The iron costs 2/- to 5/- per sheet, depending on the length. After the iron is put on the remainder of the roof of the stack must be well raked so that the water shed by the sheets of iron will run down to the ground and not penetrate the stack.

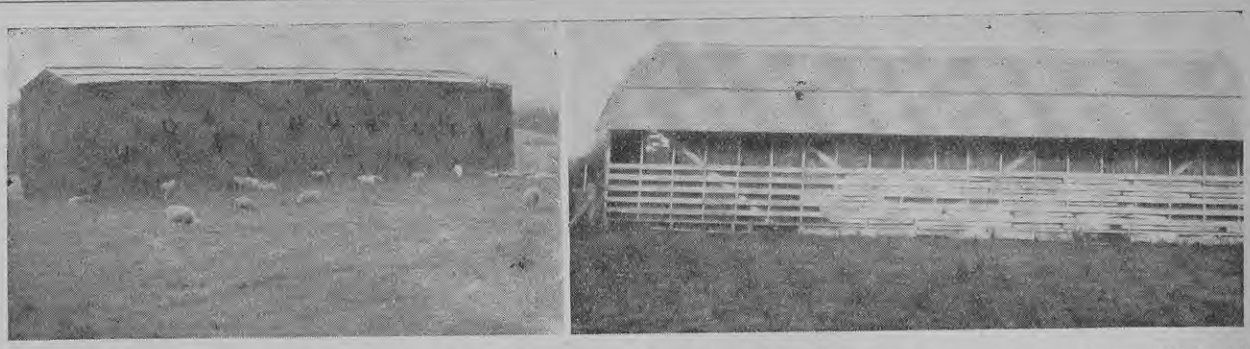
Canvas Covers Costly

Canvas covers are most efficient, but are costly. These are held in position by weights in the same way as the sack cover. The weights are attached to the four corners of the cover and along the sides, and should be numerous and heavy enough to ensure that the cover fits snugly down and will not be torn off by gales.

All stacks on which the covers are held in position by weights should be visited from time to time to adjust the weighting as the stack sinks so that they are kept clear of the ground. When covering stacks, ladders should always be used, and care should be taken not to tramp on the haystack and form holes in which water will later collect and cause considerable rotting as it works its way to ground through the material.

Dutch barns for hay are not common in New Zealand, although there is no doubt that they could be usefully employed to a greater extent. They should be erected in positions giving access to two or more fields, so that their constant utilisation does not necessitate the cutting of one field every year. A Dutch barn consists of a gable roof supported either by permanent studs without walls or by wire ropes running through pulleys supported by long poles so that the roof can be raised or lowered. The roof is usually constructed of galvanised corrugated roofing iron on a framework of wood.

The difficulty with the Dutch barn is that it interferes with the hoisting of hay by stackers, the extent de-



Left.—Well-covered stack of baled hay. The corrugated iron roof held down by old sodium chloride drums filled with earth. *Right.*—A hay barn.

[*K. M. Montgomery & C. S. Dalgliesh, photos.*

pending on the type of barn and stacker. Further, it is stationary, and often results in the harvesting of the one field for hay year after year. Care must be taken to harvest hay in the barn in a dry state, for if the hay catches fire there is danger of destruction of or damage to the barn.

Baling Machine

Hay for transporting long distances is invariably baled. The baling machine can be worked by horse-power, but generally the power is supplied by a petrol engine—usually the engine of a tractor, which also transports the baling machine from farm to farm or field to field. The hay is fed into the machine, which rams it into bales about 65lb in weight, which are tied with thin wire. Baling can be done from the windrow or cocks or from the stack, but it is safer to cock than to leave the hay in windrows ready for baling.

The baling of hay saves considerable time in feeding out the hay, and is sometimes undertaken for this reason alone. The bales are stacked in sheds or in the open under cover. They should be stacked so that air can circulate freely and prevent undue heating through fermentation in the bales. Contrary to a popular opinion, hay must be in as good condition for baling as for stacking. If hay is baled in too wet a condition it will open up very musty.

On some farms in this country where large areas of hay are saved and where hay is sold off the farm, pick-up balers are employed, as this greatly facilitates haymaking. The hay is cut, and 24 to 36 hours later it is turned with a side-delivery rake. Then, when ready for baling, it is picked up from the windrow, automatically fed into the baler, and delivered baled from the machine. For this process to be successful, the weather conditions of the district must be fairly stable at the period of the year when hay is saved, and the area of hay to be saved must be fairly extensive.

Size of Stacks

Round stacks are usually about 5yds. in diameter. It is rather difficult to build larger stacks, although they can be made any size smaller. The size of the butt is usually very small, being about 3ft. high, and the sides of the cone roof are very steep. When settled down, a round stack 4yds. in diameter should be 12 to 15 ft. high.

Oblong stacks should be made as narrow as possible. If made too narrow there is danger of the stack toppling over, and if too wide more likelihood of heating and spontaneous combustion. Generally, they are about twice as long as they are wide, and should be built with as steep a roof as possible. The distance from the ground to the eaves is usually about as high as from the eaves to the top of the roof. When the stack is settled it should be little higher than it is wide. This height is limited according to the efficiency of the stacker, from 15 to 20 ft.

Hay settled in the stack averages about 14 cubic yards to the ton, but it varies according to the compression of the hay and the material from 10 to 18 cubic yards to the ton.

Firing of Stacks

The heating of hay stacks causes much anxiety every season. If a hay stack begins to heat, drive an iron rod into the centre of the stack from the leeward side. Leave for a time, and then withdraw the rod to test the heat by hand. If the rod is not too hot to hold there is no immediate danger of firing. If the heat is over 140deg. F., action should be taken to stop firing. Firing takes place when the temperature reaches 300deg. to 400deg. F.

To stop firing, sections termed windows can be cut into the centre of the stack, or a piece can be cut right through the centre and removed. The safest plan is to turn the hay and rebuild it alongside. There is more danger of large stacks firing than of small ones.

Annual Crops for Hay

Probably only a fraction of a percentage of the hay in New Zealand is harvested from annual crops. Special crops for hay include the following:—

Algerian oats, 2 to 3 bushels plus 1 bushel of tares sown in the autumn.

Algerian oats, 2 to 3 bushels plus 2 bushels of peas sown in the early spring.

Algerian oats, 3 bushels sown in the autumn.

Italian ryegrass, 25lb. plus red clover 6lb. sown in the autumn.

The crops should be cut when the oats are in the milk stage, or the ryegrass begins to flower, or if the legumes dominate when they are in full bloom. The crops are generally heavy and difficult to cure. In wet districts heavy crops of red clover are almost impossible to harvest in good condition.

In districts where there is plenty of surplus pasture in the spring to harvest it is seldom necessary to grow annual crops for hay.

Feeding the Stock

Stacks should be opened on the leeward side of the bad weather quarter. After the cover is removed from the section to be cut a hay knife is used, and the material is forked into a sledge or cart. After the feeding out is finished the exposed hay should be

covered with sheet iron or other covering material to prevent damage by rain. The area exposed in one cut varies according to the size of the herd. Usually, about two square feet are exposed for each dairy cow being fed.

The daily allowance of the dairy cow is 14lb. of good hay. This amount will keep her bodily wants supplied. The dairy cow, however, at all stages of her lactation and between lactations requires more than a maintenance ration, and other foods, such as grass pasture, ensilage, and roots, supply this need. Between lactations she should be regaining the condition she has lost during her milking season in readiness for the demands made by early calving on her body fat.

If a cow receives 14lb. of good hay for three months in the winter she will consume nearly 12cwt. of hay. Actually, our dairy cows receive about half this amount. Hay is a dry fodder, and, except when newly made from young growth, is inclined to constipate, and should not be fed alone. A quantity of succulent fodder should be fed with it.

Hay feeding should begin early in the winter before the grass becomes insufficient for the cows' requirements so that the cows enter the winter in good condition. If a cow enters the winter in poor condition she cannot be built up on the coarse fodder then available, but if she enters the winter in good condition she can be easily maintained on them.

Cows should receive their hay ration in the morning soon after the morning milking is finished and before the supplementary roots are eaten. When succulent feed is not available it is important to see that the stock can obtain plenty of drinking water.

Food Values Vary

Hay of good quality is highly digestible and nutritious. Poorly-saved hay, on the other hand, has a low food value, and is liable to cause indigestion. When dry, stalky hay is fed to stock great care should be exercised to provide succulent food and ample water to prevent digestive troubles. The farmer who has a large supply of poor quality hay with little or no succulent fodder, such as grass ensilage, green feed or roots, is in a most unfortunate position.

A farmer in this position can improve the feeding value of the hay by adding to it molasses dissolved in hot water. The cow will then be able to satisfy her food requirements with a less quantity of dry stalky material, her digestive organs being subject to less strain and damage.

Hay feeding is mainly confined to cattle, which should be introduced to hay as calves a few weeks old. Calves at that age will eat a considerable amount daily, and at one year will eat several pounds. Hay has a tonic effect and improves the bone and muscle, and lessens the tendency to distend stomachs in calves.

A gathering of farmers around a stack opened for feeding out. This is an example of the typical steep-pitched stack, not particularly well covered, which depends largely on the steepness of the roof for the shedding of the rain. Such stacks are generally protected from rain by covers made from used fertiliser sacks. If well built, as the one shown in the illustration, very little of the material is spoiled.

[*C. R. Taylor, photo.*

Horses and Sheep

Working horses readily consume a little hay in addition to their chaff and oats or whatever ration they are being fed. Horses fed solely on hay will consume 10lb. daily. However, it is not concentrated enough for hard work. Do not feed horses with much new hay, because it may prove to be very laxative and cause colic.

Sheep should be fed hay if they will eat it. Sheep on roots should always be given some hay, and will consume 1lb. per head per day.

Hay is fed to horses and cattle by distributing it on the ground. A clean, short, pasture—well drained and dry—should be chosen, and a forkful of hay dropped about every three yards.

In feeding hay to sheep, wire-netting racks should be made if wooden ones are not available, to prevent much spoilage and to encourage them to eat it. The wire-netting rack is made by straining two lengths of wire-netting between two posts. The tops of the two lengths of wire-netting are then forced apart by hammering in stag-

Left.—A thatched hay stack with the thatch held down by ropes made of hay. *Right.*—Two round stacks, the near one with its cover off.

gered stakes at intervals inside them.

Horses take more readily to hay placed in racks. These can be made over the feed boxes in the stables or in the open in the field.

Composition of Hay

Hay is valuable as a fodder because it supplies bulk which not only nourishes the animal but fills its digestive organs and makes it feel comfortable. Green grass contains 70 to 75 per cent. of water, while hay contains 15 to 20 per cent. of water. Hay harvested with no rain to interfere with curing operations loses about 10 per cent. of its dry matter during curing and 16 per cent. in the stack, a total loss of 26 per cent. of dry matter.

Hay subjected to bleaching by rain will lose much more dry matter, and that which it loses will be the more easily digestible and therefore the more valuable food in the hay. Hay contains much indigestible fibre, much digestible carbohydrates, very little oil, and a fair proportion of ash, containing much silica. It contains a fair amount of protein.

The loss in hay made during good weather is due to the continued respiration of the grasses and clovers after cutting. The cells in these plants do not die immediately after cutting, but go on breathing for some time. This respiration results in the loss of plant food. The aim, then, in curing hay is to dry the grass and clover quickly so that respiration is stopped at an early stage. Unfortunately, loss of dry matter is continued after the death of the cells by enzymes and by bacteria, giving rise to fermentation and commonly causing loss of food in the stack.

Variation Factors

The composition of hay is affected by its botanical components. Broadly speaking, the more clover the hay contains the higher is its content of protein and the lower its content of indigestible fibre.

Secondly, the date of cutting affects the composition. After flowering time the leaf growth almost ceases, and the plants devote their attention to the transference of digestible materials from the leaves and stems to the seeds. The seeds are very liable to get lost in the process of making and saving hay, and the plants have robbed their stems and leaves in forming their seeds.

Consequently, hay which has gone to seed contains little digestible protein and carbohydrates, and has correspondingly much indigestible fibre and is poor in quality. Lastly, weather conditions affect the hay composition. Rain washes the soluble or digestible nutritive materials out of the hay, and thus diminishes its food value.

Analysis of Hay

The following table shows an analysis of well-made and spoilt hay:—

	Well-made Hay. Per Cent.	Spoilt Hay. Per Cent.
Water	16.6	20.45
Proteins	15.81	8.5
Carbohydrates and Fat	60.00	64.27
Ash	7.59	6.78

The chief loss is in protein, and the losses are greater than indicated because the soluble constituents are lost.

The following table shows the difference, not only the loss in composition, but also the loss in digestibility, between hay dried carefully under artificial conditions and that made in the field in the normal way:—

	Dried Artificially.		Made in the Field.	
	Composition. Per Cent.	Digestible. Per Cent.	Composition. Per Cent.	Digestible. Per Cent.
Protein	17.0	71	14.94	67
Carbohydrate and Fat	43.8	66	44.22	'62
Fibre	31.81	48	33.9	45
Ash	7.39	28	6.94	23
	100.00		100.00	

The analysing of hay to obtain the percentage composition is fairly easily carried out, but the work of arriving at the percentage of digestible nutriments, nutritive ration, and the starch equivalent is a somewhat costly and lengthy business, and even in Great Britain where accurate measurement of the feeding value of foodstuff is important it cannot be economically adopted to meet general requirements.

In consequence, attempts have been made to determine the approximate feeding value of hays from their chemical composition by utilising algebraical equations, but it has been found that a new equation is necessary for every different type of hay. Thus, one equation which gives good agreement with actual results when used for permanent pasture hay cut at an advanced stage of growth will not be suitable for hay cut from new pasture or lucerne or early-cut meadow hay.

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Feeding Pigs for Profit

Planning of Supplies Is Essential To Put Pigs On Paying Basis

M. J. SCOTT, Superintendent of the Pig Industry, Wellington.

MORE than any other class of animal, pigs are a real source of profit and satisfaction to those who have ability to organise and plan. Most of those who fail with pigs do so because they have not given thought to the peculiarities of the feed supply and the way it fits the normal requirements of pig production.

As distinct from other animals, pigs reproduce twice a year and therefore do not fit the natural boom of spring and summer feed production as do other animals which reproduce their kind only once a year. Feed is often wasted in summer, and pigs, more than other animals, are starved in winter.

Failure to appreciate the high quality of dairy by-products is the second source of loss. Although apparently costless, skim milk has no equal as a pig feed, but because it is costless it is often treated as though it were valueless. In fact, the whole pig industry to date has been built on the assumption that pigs are a necessary evil but still the cheapest way of using up skim milk.

Opportunity Lost

Failure to appreciate the opportunity made when Great Britain stabilised the price of pig-meats is the third mistake made by producers. This opportunity was used by many European countries which, recognising the stability and profits of pig-meats, rapidly developed their production. We in New Zealand, with prices for butterfat unsatisfactory, should have been the first to establish ourselves on the British market.

On an average, the production of pig-meat per cow in New Zealand is worth about £2, although many produce £4 worth of pig-meat per cow. If all produced £3 worth of pig-meat per cow, the feed supply would be used with reasonable efficiency.

Costly Prejudices

The prejudice against giving thought to the question of pig feed supply costs the average farmer of New Zealand just on £1 per week. While the farmer alone can remedy this state of affairs, he is not wholly to blame. Scientists, advisers, and those who should know better have confused the farmer with meaningless patter about balanced rations, proteins, carbohydrates, and other technicalities until he pays ridiculous prices for various kinds of minerals and special feed mixtures that can never be better than the ingredients in them. As a feeder he has got away from reality, and places more value on spoonfuls of fancy mixtures than he does on bellyfuls of every-day food.

Many inquiries are received about the feeding of pigs, but they always come from those who have no feed. Inquiries are seldom received from men with plenty of feed. When there is plenty of feed, whatever its kind, it is an easy matter to make the quality right.

Foundation Facts

To enable him to check up on his own production, every farmer should know:

First—That 6lb. of feed can produce, under average conditions, 1lb of pig-meat as dressed carcass. Under the best conditions, 1lb of meat can be produced for 4lb of feed; on the average of New Zealand farms, 8lb are used.

Second—That one gallon of milk, two gallons of whey, 1lb of good meal, maize, barley, peas, wheat, or pollard, 10lb of mangels, swedes, kumis, grass, or other green crop, 8lb of carrots, 6lb of sugar-beet, 5lb of potatoes, apples, or artichokes, are equivalent to 1lb of standard feed.

Third—That while the pig is ideally suited to consume high-quality feeds, it is economically unsound to feed him on these alone. The high-quality feeds —skim-milk, grain, and meals—give their best returns when diluted with at least 40 per cent. of home-grown roots or grazing.

If the three principles outlined above are accepted, it follows that a rational feed supply of 1000lb is made up of 500 gallons of milk, 100lb of meal or grain, and 400lb of roots or grazing, i.e., two tons of green weight. The production therefrom should be 160lb of carcass, equivalent to one heavy baconer or two average porkers. Thus, every cow producing skimmilk or every two producing whey should be the basis of half a ton of feed turned into £4 worth of pig-meat for an expenditure of 10s on bought meal and 10s on grown crops. This money check is the first and quickest way of sizing up the pig production on any place.

Things to Do

(1) Grow an acre of roots or greenstuff as pig-feed for every 10 to 20 cows kept, depending on the quality of the land.

(2) Buy 1 cwt. of meal as pig-feed for every cow kept.

(3) Keep one sow for every eight cows.

(4) Feed sows well for the first six weeks after service. Recent work at Ruakura shows that the accepted practice of feeding them well just before farrowing is like locking the door after the horse is stolen. It makes the best of a bad job, but feeding them well after service until they pick up lost weight ensures good litters and a longer life of production.

(5) Use a creep to feed litters after three weeks old, and keep on feeding weaned pigs well until they are at least 70lb liveweight or 3½ months old. This takes them over the baby period and ensures healthy pigs resistant to disease and infection, reduces condemnations and rejections, and guards against overfatness and absence of lean meat at slaughter.

(6) Good feed in this early stage, and to all pigs not fattening, consists of a foundation of 2lb of high-quality feed and as much other feed (roots or grazing) as the pigs will consume. Two gallons of milk or four gallons of whey, or (in the absence of milk) 2lb of meal, including ½lb of meat-meal, or one gallon of milk and 1lb of meal, supplies the foundation. Fattening pigs are always well fed. No recommendation about them is necessary.

(7) If meat-meal is not used, feed about two ounces of animal fat daily per pig. House refuse, rendered fat or dripping, is a cheap insurance against ill-health.

(8) Feed regularly to pigs in sties some green feed or vegetable matter, as well as one ounce daily of some

mineral mixture. A mixture of four parts of ordinary carbonate of lime and one part of salt is inexpensive and adequate. Where no grain is being used, four parts lime, four of super, and two of salt is better. Super or basic super is as good as steamed bone flour, and is less expensive.

(9) Watch the health of pigs carefully. Digestive troubles are the beginning of most complaints, and are often removed by 24 hours' starvation.

(10) When a change has to be made on to new feed, make the change gradually. Sudden changes cause unnecessary upsets.

(11) Watch the health and progress of pigs, and adjust the quantity and quality of feed accordingly. Tables of amounts to feed and growth rates expected are useful only when your observation has let you down and growth rates are unsatisfactory. Then, if quantities fed are up to table standards, the quality of the feed needs improving, or the conditions under which pigs are fed are unsatisfactory. They are also a check that good feeders should use often. Feed is often wasted by over-kindness.

TABLE A.

For Growing and Fattening Pigs.

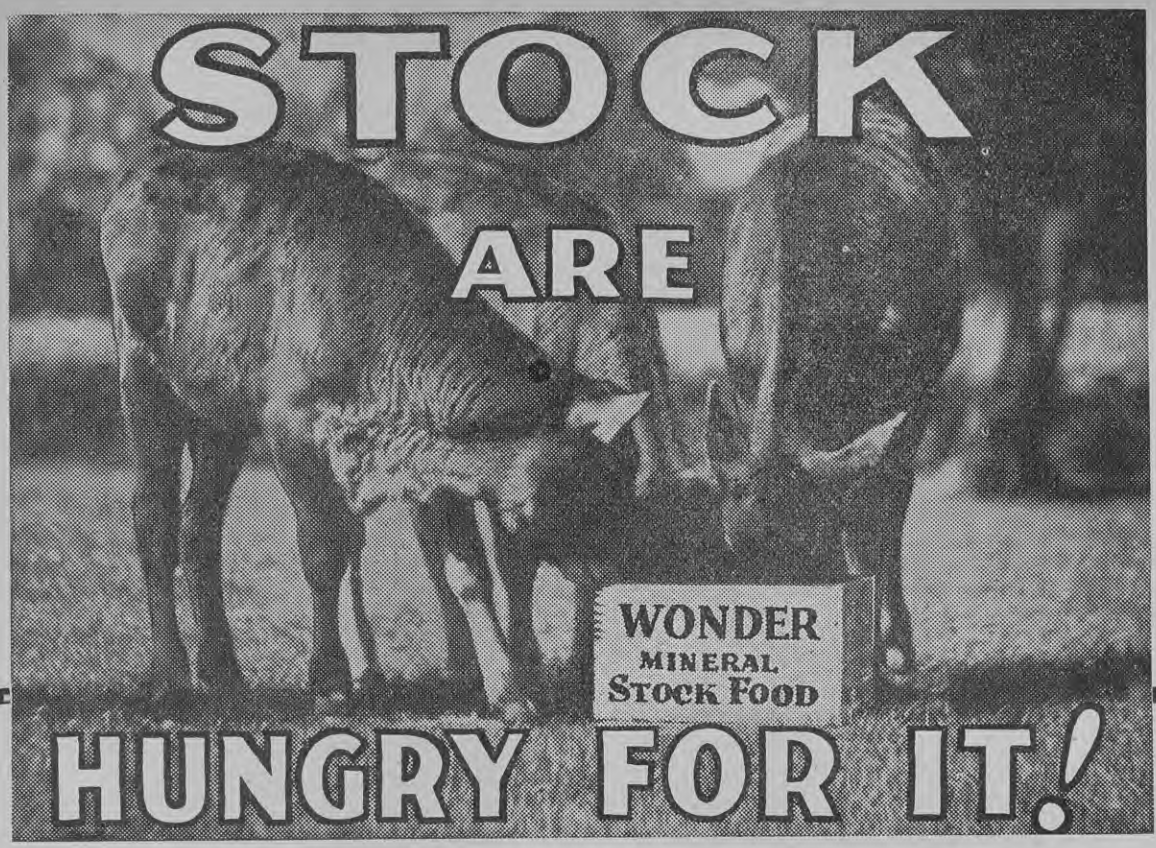
(Showing age, weight and daily feed required.)

Age (Weeks)	Rapid Growth		Average Growth		Slow Growth	
	Weight (lb.)	Daily Feed	Weight (lb.)	Daily Feed	Weight (lb.)	Daily Feed
3	12	—	12	—	12	—
5	22	1¼	20	1¼	20	1¼
8	40	2½	35	1¾	35	1¾
10	55	3¼	47	2	44	1¾
12	70	3¾	60	2¾	53	2
14	90	4	75	3¼	62	2½
16	112	4½	90	3¾	70	2¾
18	126	5½	107	4¼	75	2¾
20	150	6	124	4½	82	3
22	174	7	142	5	90	3¼
24	200	7½	160	5½	98	3½
26	—	—	180	6	106	3½
28	—	—	200	6¼	114	3¾

TABLE B.

For Boars and Sows.

Boars and in-pig sows	Daily feed required: 4 to 8lb., according to condition.
Suckling sows ..	8lb. daily at farrowing, increasing by 1lb. each week thereafter until sow and litter get 6lb. for sow and 1lb. per head for each piglet. Litter fed in a creep from three weeks old.



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Parasitic Disease of Farm Animals

Practical Problems Which Confront The Farmer in Avoiding Losses

E. L. TAYLOR, Ministry of Agriculture and Fisheries, Waybridge, England.

THE close association between parasitic disease and animal nutrition will be more easily understood if we carry ourselves back in imagination to the beginnings of man's interference with the balance of Nature. Let us admit at the outset that throughout the stretches of evolutionary time everything ran comparatively smoothly until man made his appearance, and that the advent of his intelligence was of the nature of a calamity to all other zoological species.

We may suppose that early man was in some respects a gentleman, in that he spent his days in hunting and his nights in feasting. No doubt he sometimes returned from his hunting expeditions with young animals for his children to play with, and later, recognising the possibilities of providing through this means for his own comfort and security, he contrived to encourage the breeding of certain useful animals in captivity, and so set himself the task of protecting his tame animals from other beasts and providing for their food requirements. Through some such process as this primitive man came to exchange what must have been a very dashing if uncertain sportsman's life for the humdrum cares of the husbandman.

Where the Blame Lies

If we would lay the blame for the present prevalence of parasitic disease upon any particular individual it must be upon that early genius who was the first to think of husbanding the patches of grazing near his own home, fencing them round to keep his domesticated animals from wandering, and reserving the choice grass for them alone. That man may be regarded as the first agricultural sinner, who deranged the natural order of things in the Garden of Eden, where the grazing animals had hitherto lived in peaceful equilibrium with their parasites.

Written by an English veterinarian, this article will be of great interest to farmers, and especially sheep farmers, in that the subject is widely covered and is explained attractively in simple, everyday language. Most of his contentions are readily applicable to New Zealand conditions.

One might describe the change by saying that the primordial state was one of harmonious community of happy worms in happy sheep, but since man's interference upset the balance one only too frequently sees a threatened annihilation of both. A satisfactory readjustment, bringing the level of parasitic infestation within the tolerance of the host, still awaits discovery.

Normal Inhabitants

It is generally admitted among graziers that the diseases caused by parasitic worms are the most economically important of all with which they have to contend. Most of us have been brought up to think that parasites are nasty creatures and that their only product is disease, so that it may come as a surprise to many to know that the very parasites which may give rise to so much trouble by excessive multiplication are normal inhabitants of healthy animals, guests of their alimentary tract.

Disease is as harmful to the parasites as it is to their hosts, as it may lead to the death of the whole community. Parasitic disease is, therefore, to be regarded as a flaw in the environment and a departure from the primitive conditions to which the parasites had adapted themselves, rather than to a predaceous attack by small creatures upon a larger one.

So long as the number of worms in an animal remains reasonably and "naturally" small, the balance of the ecological unit is maintained (that is, the animal remains reasonably healthy) and a harmonious relationship continues, but disease follows where the numbers of the parasite community become excessively great. The increase of parasites, as we shall see, is essentially linked with progress in the improvement of pastures. Worm diseases are man-made, and the artificial readjustment of the balance between the grazing animal and its parasites looms very large in the practical problems of animal production.

This readjustment will come only through a detailed knowledge of the reactions of the parasites both during their free life in the pastures and during their parasitic life in the grazing animal.

Development

The outline of the life history of the parasites is comparatively straightforward. The adult female worms, situated in the lumen of the intestine, lay eggs which pass out of the grazing animal and on to the pastures. In the course of about 24 hours these hatch and give rise to minute larvae which, during the course of a week, cast their skin twice and reach the infective stage, at which they are ready to proceed with parasitic life as soon as they happen to be picked up by a suitable grazing animal.

For the proper understanding of the development of worm diseases there are three important points which require special consideration. **The first of these is the inability of parasitic worms to multiply in the body of the animal in which they are living.** This constitutes an important peculiarity in

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the propagation of worm diseases, distinguishing them from the kind of disease caused by bacterial or protozoan parasites, which are capable of multiplication within the body of the animal in which they are living.

Where parasites can multiply in this way there is some reason for supposing that the initial infection is a most important step in the disease-producing process. If, however, every individual parasite requires to be picked up from outside, as is the case with parasitic worms, the relative importance of the initial introduction of infection appears to be very little indeed, and is of no practical consequence at all where, as with the parasites under discussion, all communities of animals, both healthy as well as diseased, are invariably infected. In such an instance as this it must be concluded that the environment of the grazing animal, which so largely governs the increase of the parasites, is of paramount importance.

Egg-production Powers

The second important point to consider is **the remarkable egg-producing powers of the worms.** The egg-production of some parasitic worms is numbered in tens of thousands daily per individual female, and although most of the worms with which we are concerned probably produce less, the daily output of eggs by infected grazing animals is very great indeed. A healthy sheep carrying an infection of trichostrongyles (intestinal worms) may pass some 200,000 to 400,000 eggs daily, and a diseased sheep between 9,000,000 and 30,000,000; a healthy horse carrying only a light infestation of strongyloid worms passes 1,000,000 to 2,000,000 eggs daily, and a diseased horse more than 50,000,000.

There is thus seen to be ample opportunity for the transmission of large numbers of worms under crowded grazing conditions, and this enormous output of eggs, which earlier in evolutionary time was developed to ensure the continuity of the species, is quite unsuited to present agricultural conditions.

The third important point to consider is **the longevity of the infective larvae of the worms in the herbage.** In the infective stage the larvae are ensheathed in a second outer skin, the result of incomplete moulting, and in consequence are endowed with great powers of resistance against cold, dryness, or other adverse forces acting upon them. They are also able to survive for an inconveniently long time in the herbage. Patience may be said to to be one of their vices, for some of them can wait 12 months, or even two years in exceptional cases, for a passing host.

Evil Effects of Overcrowding

In view of the enormous output of eggs, even by healthy animals, and the longevity of the larvae on the pasture, it is clear that under agricultural grazing conditions there is liable to be a more or less rapid accumulation of infective material during the whole of the time that a pasture is occupied by grazing animals.

The evil effects of overcrowding may now be more fully appreciated. It is obvious that the more animals that are put on to a field the more eggs will be disseminated, and the more infective larvae picked up. But the rate of increase is actually even greater than it

appears, as it has been shown that there is a tendency for the parasites to increase as the square of the number of animals per unit area.

With all these forces in favour of numerical increase of parasites, one may well ask by what miracle the animals in our fields ever escape parasitic disease. The logical explanation of miracles has always been a stiff proposition, and much of the research work which is being carried on at the present time into the helminthiases (worm infestation) of grazing animals may be regarded as an endeavour to explain this one.

Proceeding along the mathematical line, as in the analysis of the effects of overcrowding, we might consider some such unit as "sheep-per-acre week" with a view to easy comparison of the amount of grazing sustained by various pastures. The influence of factors other than the grazing animal and its particular kind of parasites upon an increase of parasite population is so great, however, that a unit such as this would be quite useless for estimating the amount of infection in a field. Indeed, these third factors are of such dominating importance that it is hoped that a thorough understanding of their influence may enable us, some day, to bring the worm disease of grazing animals under our control.

"Third Factors"

Now let us consider the "third factors" governing the increase of parasitic worms.

(a) **Immunity.**—First of all there is the question of immunity—that is, the resistance of the grazing animal to the development of the infective larvae which it acquires while grazing on infected herbage.

The study of the immunity reactions to worm-infection has attracted much attention among workers in parasitology during the past decade, and many interesting points have been revealed. In general, it may be stated that adult animals are much more resistant both to the results of worm-infestation and to the actual development of the worms than are immature animals.

Although adults are never entirely immune and usually carry a few parasitic worms throughout their lives, their resistance to new infection is very considerable, so that they may be able to graze with impunity under conditions that would lead to fatal disease among susceptible young animals.

This resistance is not absolute, however, and poor feeding or a deficient diet, combined with a high rate of intake or infective larvae, will break down the resistance, and severe disease frequently occurs among adult stock under those circumstances.

Regular Dosing

(b) Regular Anthelmintic Medication for the Destruction of Adult Worms.—Since we are dealing first with the inhabiting influences upon the parasitic stages of the worms, it will be convenient to make a short mention here of the use of the medicaments known as anthelmintics (worm medicines).

The control of parasitic worms by the use of cheap, safe, easily administered and effective drugs is the means of control most favoured by the farmer, who finds the restrictions imposed on him for the control of the parasites by other means most irksome and difficult to fit in with the management of his stock. At the end of the last century, upon the advice of a South African veterinary surgeon, the farmers there began to use copper sulphate for the control of the "twisted wireworm," and so saved the South African sheep farming industry, which was threatened with ruin as a result of the enormous numerical increase of that parasite.

Were it not for regular dosings with copper sulphate, which is now used all over the world for the limitation of the increase of the twisted wireworm, it would be impossible in many parts to rear sheep. This medicament is the only one yet known for use in grazing animals that answers the requirements of being cheap, safe, easily administered, and effective, but, unfortunately, it serves only against this one species of parasitic worm.

Our knowledge of anthelmintic medication as a means of controlling the worm population and preventing disease is therefore very limited at the present time and, with the exception of the twisted wireworm and one or

two other species, we must depend upon other measures for preventing the excessive multiplication of the worms.

Larvae in Pastures

(c) **Factors Acting upon the Larvae in the Pastures.**—The factors influencing the increase of the parasites next to be considered are those concerning the development of their free-living stages on the ground. These may conveniently be considered under four headings:—

(1) Factors affecting the development of larvae in the pastures.

(2) Factors affecting the longevity of the larvae.

(3) Factors affecting the relative concentration of larvae in the pastures and their accessibility to the grazing animal.

(4) Factors affecting the disappearance of larvae from the pastures.

Moisture and Drought

(1) Soil moisture is popularly supposed to have a marked influence, and "wet" pastures are usually thought to be "wormy" pastures. There appears to be no valid reason for this supposition, however, and it may reasonably be argued that "moist" pastures are just as dangerous as "wet" ones for the development of diseases caused by nematode worms, the only real difference being between "moist" pastures and "very dry" pastures such as occur in arid countries.

Drought produces rather an interesting result in that it hinders the development of some species of larvae without destroying them, the embryonated eggs remaining viable but not hatching until moister conditions recur. This sometimes leads to the accumulation of a large amount of potential infective material on the pastures during times of drought and a mass release of infective larvae when wet weather appears. This sequence of weather conditions occasionally leads to the widespread appearance of worm disease in apparently epidemic form.

Rain assists larval development by supplying abundant moisture, and although heavy rain washes many larvae off the herbage, they soon climb on to it again.

Frost has no action whatever in destroying the infective larvae, but through hindering their development its effects are similar to those of drought in that the accumulation of potential infection is followed by a mass development of infective larvae as soon as warmer weather conditions recur—rather like the sudden invasion of our roads by week-end motorists as soon as the weather decides to be warm.

Trampling of faeces into the soil, such as occurs where sheep are penned together, is distinctly favourable to larval development.

Most Lethal Force

(2) As the most lethal of the natural forces acting upon the ensheathed resistant larvae is dryness, the relative moisture of the soil and of the atmosphere doubtless plays a part. Observations made at Weybridge have shown that the larvae which climb high into the herbage may die within 24 hours in dry weather, but that those which remain close to the ground retain their vitality for months. The nature of the herbage is also of some importance, the longevity of the larvae probably being greater in thick, matted herbage which keeps them near to the ground than in a first or second year's grass ley, or in clover where they are able to climb away from the soil and come into contact with the drying influence of the air.

(3) The amount of herbage in a field has a marked influence on the number of infective worm larvae picked up by a grazing animal, an important point which had not been recognised until some observations on the larval-content of pastures were carried out at Weybridge necessitating the employment of the unit "larvae per pound of herbage." It was then realised that the herbage may be regarded as a diluent to the larvae. Where herbage is long and plentiful, there tends to be a comparatively small larval-content in a rumen full of grass, but where herbage is scarce, as during times of drought and on many farms during ordinary weather towards the end of the summer, a high concentration of larvae is likely to be contained.

Kind of Herbage

The kind of herbage has an interesting influence upon the accessibility of larvae to the grazing animal, larvae being able to climb more easily on to some kinds of herbage than on to others. The structure of a shoot of grass, for instance, is such that the greater part of the infective larvae tend to remain near to the soil, being turned off the stem and along the under side of the lower leaves. In clover, however, there is nothing to prevent a venturesome larva from climbing up the petiole and on to the trifoliate lamella of the leaf, and it is there that the great majority are actually found.

This factor is of particular significance where sheep are concerned. The highly selective grazing of these animals is now generally recognised, and it is probable that while picking the better part of the young growth of the grass plants they tend to leave the bulk of the worm larvae behind on the coarse under-leaves, but while in clover, and selecting the green upper part of the leaf, they are taking the part which carries most of the worm larvae.

It is suggested that this may be the mechanism which has led to the increased incidence of parasitic gastritis in Northumberland, following the extensive use of basic slag and the consequent increase of wild white clover in the pastures.

Patchiness of pasture and time of day also have an influence upon the rate of intake of infection.

Rest from Grazing

(4) The duration of a rest from grazing by infected animals has an obvious influence upon the amount of infective material remaining in a pasture. Observations made at Weybridge have shown, however, that the natural death of the larvae begins almost as soon as they have reached the infective stage, some of those which climb high into the grass being killed within a few hours by the drying action of sun and wind.

A more important consideration, however, is the effect of a rest upon the "number of larvae per pound of herbage." This effect may be very great, particularly at a time of the year when the grass is making a rapid growth, and it is probably on account of the growth of grass as much as the death of the larvae that benefit is derived through a rest from grazing.

Manuring with nitrates by forcing a rapid growth of grass to dilute the larvae may produce a similar reduction in the number of larvae per pound of herbage.

Eating-off Process

Of all the methods employed for the destruction of infective larvae in a pasture, however, doubtless the best is the eating-off of the infective herbage by animals which are unsuitable for the development of the particular parasites concerned. Larvae which are picked up by the wrong host animal in this way are destroyed, and, as an illustration of the effectiveness of the procedure, reference might be made to a certain paddock attached to a public thoroughbred stud which was found to carry some 6000 "redworm" larvae per pound of herbage. Each of the several sheep placed there to clear up the infection would therefore collect and destroy some 90,000 larvae daily which might otherwise remain to infect the horses.

Haymaking is doubtless very effective for the removal of larvae from an infected field.

Ploughing is probably not nearly so effective as is generally supposed, as the plough does not completely invert the soil surface, and leaves a space between the furrows through which it is both easy and natural for the larvae to migrate.

Harrowing can have little effect, and burning of the grass can only be carried out in particularly rough herbage where trouble from helminths (worms) is unlikely to arise.

Destruction of larvae through the application of lime, salt, kainit, or other substances to the pasture has little or no effect.

Conclusions

To say that parasitic worms constitute the principal controlling factor in achievement of maximum animal population through grassland farming is stating a truth that there can be no denying. On looking into sheep farming practices—for it is the sheep farmers who bear the brunt of the

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loss from parasitic worms—it is surprising to find how many of the age-old procedures of penning sheep, feeding them, and moving them have their origin in the control of parasitic worms. This reason is, of course, generally unknown to the farmer, who has developed the methods through a long and costly period of trial and error.

The oft-repeated adage that "sheep should never hear the church bells ring twice in the same field" doubtless refers to the period of six or seven days required for the development of the infective larvae on the grass. The closed system of folding sheep over arable land with the movement of the pens every three days, and the farmers' belief that sheep which are being folded should never be allowed to "run back" on to land grazed some days previously, refer to the same factor. The removal of young sheep from rich, crowded pasture on to clean land at the end of the summer refers to the accumulation of worm-infection on those pastures, as also does the restriction of the number of sheep to the acre, which is so forward a question in every farmer's mind, and sets a very definite limit to the profit that can be made out of an acre of sheep land.

Number of Sheep Carried

It is no exaggeration to say that every good farmer knows almost to a sheep how many his land will carry, and that if he exceeds that number in a normal year they will cease to thrive and may even become diseased and die. It seems quite clear that the evil effects of overstocking and the parasitic disease that is brought on through keeping too many sheep is representative of some flaw in the adjustment of the parasites to the grazing animals, which may be described in popular terms as an upset of the "balance of Nature."

Fortunately for the farmer, the powerful resistance to the development of parasites which the grazing animals ultimately acquire (provided that they do not die in the process) gives this balance a considerable amount of elasticity, without which it would be impossible to crowd sheep together, even with the limited success we now attain. The farmer, however, stretches the elasticity of this ecological (health limit) balance to the very limit in order to make a profit out of his land, and trouble frequently results.

Lowering of Resistance

The number of sheep per acre is only one of the variable factors in the ecological unit of parasite, pasture, and grazing animal. With one or two rare exceptions, a variation in the virulence of the parasitic worms (apart from differences which are peculiar to the various species) is not known to occur, but a lowering of the resistance of the grazing animal as may be brought about through deficient food, or resulting from the increased susceptibility of a group of animals containing too many immature individuals, are common causes of increased worm-burden.

This same result can just as easily be brought about by the derangement of a wise rotation of grazing, or the shortage of pasture and the poverty of its nutritive qualities that often occur towards the end of the summer. What may justly be regarded as reasonable stocking during an ordinary year may constitute overcrowding during a drought. Indeed, the variable factors are very numerous, and there are many small alterations, unknown to the farmer's rule of thumb, which favour an increase of the parasites beyond the broad limits of the natural balance, and disease results.

Loss from Parasites

The loss to the country from these parasites is very great indeed, both from outbreaks of obvious disease and from bad thriving. Figures are difficult to obtain, but I am aware of one farmer who lost between £4000 and £5000 as a result of parasitic gastritis during the course of five years' arable sheep farming, and of 43 sheep farmers in Kent who, on inquiry, were clearly shown to have lost more than £10,000 between them during an epidemic of the disease in the drought of 1933-34.

So long as the farmer stocks his land to the maximum and remains ignorant of the factors which influence the increase of parasitic worms, these losses will continue. Eradication of the parasites is quite out of the question at the present time, so that we must do what we can to control their increase.

Recent observations on the factors which lead to this end are distinctly helpful, but the struggle to keep the numbers of parasites down is likely to be a long one, and the danger of worm disease will dog the progress of greater stock production through grassland improvement until practical methods of eradicating the parasites have ultimately been found.

Topdressing in Auckland Province

Procedure Adopted in Laying Down Experiments to Measure Responses

Contributed by the FIELDS DIVISION, AUCKLAND.

FOR more than forty years pasture topdressing in the Auckland Province has been so well established as a practice that it would be extremely difficult to visualise what the position would be without this aid to higher production.

Manures are undoubtedly a potent factor in this direction. In fact, it could be claimed with a great deal of truth that the manuring of grassland is by far the most important single factor in the maintenance of primary production. It is true that other activities, such as the breeding of livestock, the use of better pasture strains, the practice of advanced ideas in farm management, and the employment of modern farm machinery are also very important.

However, without adequate topdressing, none of these will function to the fullest extent. Good herds will not milk well on poor pastures; high-yielding pasture strains languish without adequate supplies of fertiliser; and advanced ideas in other directions are of little value without a plentiful supply of stock food, which depends almost entirely upon the efficiency of the manuring of the sward.

Importance of Topdressing

As an indication of the importance of topdressing in the Auckland Province one might cite the fact that of the 3,326,279 acres of grassland topdressed in New Zealand no fewer than 1,707,371 acres (or 51 per cent. of the area) are in the Northern Province.

History of Topdressing

In the very early days of grassland farming very little fertiliser was used on pastures. Generally speaking, manures were reserved for crops, and pastures were ploughed up when they showed signs of weakening. At a later stage manuring of grassland was practised to a slight extent, but with conspicuous success. At this stage the fertilisers used were principally bonedust and basic slag. Gradually the practice increased in popularity, until a fair acreage of grassland in the Waikato was receiving moderate and fairly regular dressings.

When war broke out in 1914 the cost of bonedust became prohibitive, while supplies of basic slag were greatly restricted. Therefore, attention had to be turned to other sources of fertiliser supplies which would enable pasture efficiency to be maintained with consequent improvement in production. This was achieved by employing supplies of rock phosphate, which subsequently gave way to superphosphate.

Undoubtedly, superphosphate owes much of its early popularity to the fact that other sources of fertiliser supplies were removed. However, it has proved by its suitability for many northern soils that it is a highly efficient manure. Production has increased enormously, and it has been employed quite freely for cropping as well as for pasture topdressing.

This is the first of a series of articles on topdressing practice in various parts of the Auckland Province. The articles will be written by the Instructors in Agriculture for the districts, and will contain definite recommendations for the various soil types. At the conclusion of the series the findings will be summarised so that the information may be on hand in concise form.

It is not intended, however, to dwell on the merits of any particular fertilisers in this article, but rather to indicate the procedure that has been adopted in laying down experiments with a view to measuring responses to fertilisers.

Need for Experiments

One is very often asked by farmers, "What manure should I use?" It would be very pleasant if, through having the soil analysed, one could immediately name the manure and the quantity that would give maximum returns, but unfortunately soil analysis is practically useless as a guide to topdressing.

The most satisfactory way, and, to the farmer, the most conclusive way, of answering this question is actually to use a series of manures and manure mixtures under the conditions of soil, climate and pasture that the farmer will be placed, and to study the results carefully. Realising this, the Department of Agriculture has carried out extensive trial work with topdressing during past years, and in the Auckland Province alone has 185 topdressing trials at the present time. These are in addition to those connected with pasture mixtures, fodder crops, root crops, etc.

Selection of Areas

In the Auckland Province there is a wide range of soil types. Heavy clays, light sandy soils, old volcanic areas, river silts, and young pumice soils are but a few of the variations met with in a survey of the province. Just as the soil type varies, so do we find that the responses to fertilisers show a wide diversity of results.

Consequently, great care is necessary in choosing sites for trials in order to make certain, firstly, that a trial is

Fig. 1.—Horotiu sandy loam: No manure. Fig. 2.—Superphosphate + potash + lime. Fig. 3.—Kaipahi peat: No manure. Fig. 4.—Superphosphate + potash.

situated on a single soil type, and secondly, that it is on a particular soil which is fairly well represented in that locality. For instance, if the main soil type was a heavy clay it would be quite inadvisable to select a light sandy type for the experiment.

Technique in Laying Down Trials

Notwithstanding the fact that considerable care is exercised in choosing areas for manurial experiments, there is always a possibility that some lack of uniformity might lead to a false result being obtained. For this reason all experimendts are laid down in duplicate.

Results on one area may then be confirmed on the corresponding second area, while, if there is any marked variation between the two series, steps can be taken to ascertain what the cause might be. Normally this will be a variation in soil type that was not detected at the outset.

After selection of an area the two trial blocks are pegged according to the number and types of fertiliser under trial. While the general plan will vary according to these factors, a common layout is as follows:—

Slag + Lime	Super + Lime	Slag + Potash + Lime	Super + Potash + Lime	Potash + Lime
Slag	Super	Slag + Potash	Super + Potash	Potash

Each of these areas is surrounded by a "control" strip, which is not manured. Thus, in addition to comparing dressings with one another, it is possible to assess the response that has been obtained over pasture that has not been topdressed.

Applications of Fertilisers

When each trial is laid down it receives dressings of fertiliser in the following quantities:—

Carbonate of lime .. 20 cwt per acre
Phosphate ..... 3 cwt per acre
30% potash salts .... 2cwt per acre

In succeeding years—and each trial is conducted for at least three or four years—the dressing of lime is reduced to 5cwt per acre. Dressings of phosphate and potash are continued at the same rates as for the initial dressings.

Recording Results

At regular quarterly intervals every trial is visited, when observations are made on the general management of the field, the type of sward and stage of growth, climatic conditions, and the individual responses of plots to the various treatments given. For the purpose of obtaining some uniformity in reports the following scale of pointing has been adopted for all manurial trials:—

No response over no manure ..	0
Doubtful response over no manure	?
Slight response over no manure	1
Fair response over no manure ..	2
Good response over no manure ..	3
Very good response over no manure	4
Excellent response over no manure	5

Where responses appear to lie between any two of these limits, half-points are used to indicate the fact. Thus, 2½ would indicate that the response was between fair and good.

In all reports the standard plot is the "no-manure" strip. This may be open and weedy, or it may be a fair to good ryegrass-cocksfoot-white clover sward. Differences between this strip and the manured plot, however, are the features that are pointed and not the general inferiority or superiority of the sward for production of stock feed. Figs. 1 and 2 show an example of improvement to the "V. Good" stage on a poor sward, while Figs. 3 and 4 show the same improvement on a better sward.

In a series of succeeding articles the findings from topdressing trials in various parts of the province will be dealt with in some detail. These articles will be written by the Instructors in Agriculture for the districts, and will contain definite recommendations for the various soil types in their respective districts. When all the articles have been published a summary of the findings will be written so that the information may be on hand in concise form.

(To be continued)

Grass Seed Mixture for Area Being Cleared of Manuka.

"SCRUBCUTTER" (MARTON):—

I am now cutting a patch of approximately 30 acres of heavy manuka varying up to 30 ft. high and 4 to 5 inches in diameter.

The gully is not steep, and had slipped fairly considerably before the scrub got away at least 25 years ago. It lies partly to the sun and partly away. It was originally heavy bush, hinau, rata, maire, rimu, and supplejacks.

What grass seed mixture would you recommend me to sow and at what rate per acre?

I intend to burn the scrub and topdress the area with 3 cwt. 44/46 super in early March.

FIELDS DIVISION:—

I note that it is your intention to topdress the area at the time of seeding, and recommend the following mixture:—

Government certified perennial ryegrass, 12 lb.; Government certified cocksfoot, 8 lb.; crested dogstail, 3 lb.; browntop, 1 lb; Government certified white clover, 1 lb.; subterranean clover (Mount Barker), 2 lb.; Italian ryegrass, 3 lb. Total per acre, 30 lb.

For the shady faces (if these are at all extensive), the addition of ½ lb. of *lotus major* in place of up to 1 lb. of the subterranean clover is recommended, as the *lotus major* does particularly well on damp and shady slopes, while the subterranean clover will do better on the sunny faces.

New Zealand's requirements of subterranean clover will, it is anticipated, be met without difficulty by importations and the expanding local seed production.

An internal race shed. Note the separator room with the electric heater in an insulated box on the right.

The Home Separator Dairy

Correct Use of Separator a Vital Point in Dairy Farm Practice

Contributed by the DAIRY DIVISION

THERE are two small points in connection with the delivery of milk and cream to a manufacturing dairy with which all dairy farmers should be familiar. Regulation 11, for instance, requires that no cream, skimmed, or partly-skimmed milk shall be added to the milk delivered to a factory. Clause (1), Regulation 22, requires delivery of milk to a cheese factory at or prior to 9 a.m. each morning.

The reason for the second will be obvious, but in view of the fact that milk is generally paid for on a butterfat basis, the reason for the first may not be understood. Where casein is being made, the addition of cream will obviously upset the equity of the payment for the former, and in the case of a cheese factory paying on yield, the ratio of casein to fat will be upset by the addition of skim milk or cream.

As these articles up to the present have dealt with dairies supplying milk, we now pass on to those in which the milk is separated and cream only is delivered. Points already dealt with apply equally to this class of dairy, but the separator adds further responsibilities to those already mentioned.

First Step

The separation of milk on the farm is the first step in the manufacturing process. Experience has shown that milk which is drawn under clean conditions, either by hand or machine, and run through a separator as milking is proceeding produces better cream than does milk which is delivered once daily and requires re-heating before separation, provided always that the cream is given proper attention after it is separated, and is delivered daily. Further, if proper care is taken with the separation, the fat losses in the skim milk should be lower, as the milk is at that stage at the best temperature for separation.

It is doubtful, however, whether under the varying conditions obtaining on dairy farms this actually happens in practice. A loss of 2 per cent. of the fat credited is not unusual in creamery practice, so that it is probable that in farm practice the average is not less than 2 per cent. based on the fat lost in the skim milk only. If this is correct, the supplier of cream is therefore paid for at least 2½ per cent. less fat than if he delivered the whole milk.

Care of Separator

The care of the separator is consequently a vital point in dairy farm practice under home separation conditions. If the size of the separator is such that the milking and separating proceeds simultaneously, the temperature of the milk and regularity of the feed to the separator will be automatic during the flush months, and an even speed of the bowl will ensure the highest efficiency in separation.

This efficiency will not be so high during the slack months of the year, when separating cannot be started until there is an accumulation of milk in the vat and the temperature is not maintained. The same position will also arise if the separator is too large, as efficiency in separation depends on even feed to the separator, even speed of the bowl, and even temperature.

If the speed of the bowl is too high, the feed not sufficient, or the milk cold, the test of the cream will rise and the weight of cream will fall. These will cause loss of fat through the accumulation of thick cream in the discs, covers, etc., and the third will reduce the skimming efficiency by increasing the viscosity of the milk.

Low speed and over-feeding will cause the test to drop, will increase the weight of cream, and will reduce the

skimming efficiency. In the case of either an increase or a decrease in the test it may be found that if the test is multiplied by the weight of cream and divided by 100 the pounds of butterfat will be the same as it was before the alteration.

Variations

Apart from the separator, the test of the cream will vary in sympathy with any rise or fall in the test of the milk, whether due to weather conditions, seasonal changes, change of feed, and many other causes. A separator is designed to deliver at the cream spout a certain percentage of the weight of milk which passes through it. If it happens to be 10lb of cream from 100lbs. of 3.6 per cent. milk, the test of the cream will be approximately 36 per cent.

If 100lb. of 4 per cent. milk is put through the same separator it will deliver approximately 10lb. of 40 per cent. cream, providing the cream regulating screw has not been altered in the meanwhile. If the cream regulating screw is fitted on the cream outlet and you wish to raise the test of your cream, screw it in. To reduce the test, screw it out. If it is on the skim milk outlet, screw it out to raise the test and in to reduce it.

If the feed tank is too high, altering the cream screw may not affect the test, because the amount of milk passing through the bowl is in excess of its skimming capacity. In this case, reduce the height of the tank stand or raise the separator. Set the screw to deliver cream testing about 40 per cent. Nothing is gained by skimming too thin, and there is a definite loss by skimming too thick.

If the separator is not running well, the Farm Dairy Instructor will be able to help you to avoid the loss which is sustained every time you use it. All that is wrong in most cases is that some small part wants renewing. It may be quite unnecessary to buy a new machine, and the Farm Dairy Instructor will be able to advise you on this point.

Cleaning Important

It should not be necessary to state that a separator should be dismantled every time it is used, and thoroughly washed and scalded immediately separating is finished. A separator which has not been washed since the time it was last used does not skim efficiently, and, if too small for the size of the herd, may even require washing after half the herd has been milked. If left unwashed after the evening's milking, the deposit in the bowl will become detached and cause a bad flavour in the cream, so that there may be two causes of loss as the result of this neglect—loss of fat and a lower grade of cream.

The washing is a simple process, as each part can be reached with suitable brushes, and washing soda and warm water is all that is needed to remove the milk and prepare the whole of the parts for scalding. If a copper is used for boiling the necessary water, they can then be dipped into it, and in a few moments they will be dry. They should then be hung up in the sun, but protected from rain, and should not be re-assembled until wanted for use. A separator treated in this way will have a much longer life than one that is neglected, and will do more efficient work while in use.

When separating is finished a small quantity of skim milk should be run through the bowl to remove the cream. This skim milk should be caught under the skim milk spout before separating is finished. A case of second-grade cream has been traced to skim milk which was taken for this purpose from an unclean milk barrel.

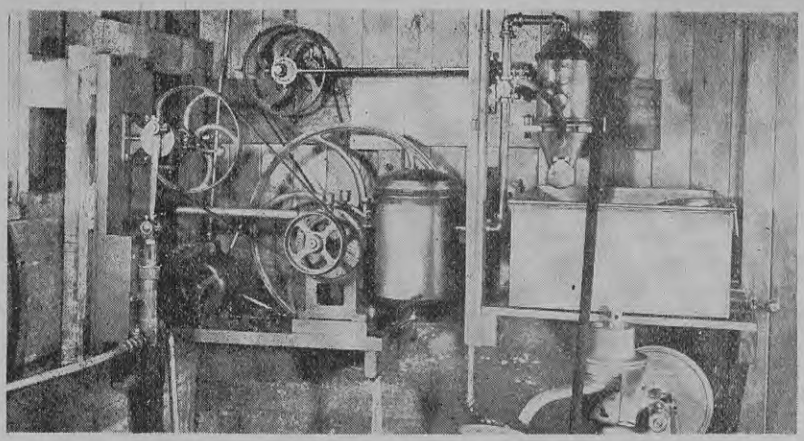
Do Not Use Water

Water, and especially hot water, should never be used, as it may remove

some of the deposit from the bowl, and too much of any liquid will cause a drop in the test of the cream. Careless handling of skim milk causes a most offensive smell in a separator room, and this smell is frequently absorbed by the cream. For this reason, skim milk pumps must be fitted with detachable tinned brass suction pipes.

As already stated, the cream should be thoroughly cooled as it leaves the separator, as this will check the growth of any germs which it may contain, and will also reduce any feed flavours which are present. Each skimming should be kept in a separate vessel at least until just before dispatch to the creamery. Even in the best-kept dairy it is a wise precaution to remove it from the separator room to a shelter at some distance from the shed where it is not exposed to the sun's rays and is protected from the entry of insects and vermin of all kinds. If a cold spring is available the can should be placed in it.

A sun-proof cream stand must be provided at the roadside if the cream is to be collected by a cream lorry. Should this stand encroach on the road, the county council or other local authority should be approached for permission to erect it. Otherwise, the owner of the stand can be held responsible for any accident which may be caused by it.



The releaser room in a home separator dairy.

Up to this point the owner of the cream is responsible for the care which is required by the various regulations, but as soon as the carrier takes delivery he or his employer is responsible until the cream reaches the creamery.

CORRECTION.

The opening sentence in the article "Cleaning of Dairy Equipment" in last month's "Journal" began with the words: "The annual procedure to be followed in cleaning a milking machine." The sentence should have read: "The **general** procedure. . . ."

Pig Census Returns

Figures Show Value of Meat-meal When Used Judiciously

Contributed by the LIVESTOCK DIVISION.

IN last month's issue the returns collected in 1938-39 from 267 farms showed that those who used up to 20 per cent. of their total pig feed as meals—i.e., at the rate of 1 cwt. per cow milked—made at least 5s per cow more for pigs than those who bought meal for pigs at the rate of only 16 lb. per cow milked. A further analysis of these same returns has been made to see whether the kind of purchased meal has any influence on these returns.

The farms have been grouped accordingly into the following four classes:—

A.—Those that use no meat-meal. (102 farms.)

B.—Those that use up to 25 per cent. of their bought meal as meat-meal. (91 farms.)

C.—Those that use up to 50 per cent. (70 farms.)

D.—Those that use more than 50 per cent. of their bought meals as meat-meal. (74 farms.)

Nett Returns

After making allowances for the cost of meal at £14 per ton and other feed used at £2 10s per ton, the nett returns per cow (500 gallons) for skim-milk are as follows:—

A.—Using no meat-meal, and 10 per cent. grain meal, 32s 6d per cow.

B.—Using 2 per cent. meat-meat, and 15 per cent. grain meal, 39s per cow.

C.—Using 4 per cent. meat-meal, and 6 per cent. grain meal, 37s per cow.

D.—Using 7 per cent. meat-meal, and 5 per cent. grain meal, 43s per cow.

Those who use over half their bought feed as meat-meal get a return of approximately 10s 6d per cow better than those who use no meat-meal at all. This is in keeping with the evidence obtained ten years ago by the Waikato Pig Recording Society, who proclaimed that meat-meal at its price at that time of £16 to £17 per ton was the cheapest and most profitable supplement that could be used along with skim-milk or whey.

At that time it was recommended that meat-meal should be used with skim-milk at a rate not exceeding half-a-pound per pig daily, and with whey at a rate not exceeding 1¼ lb. daily, whatever the weight of the pig. This advice is still the soundest that can be offered.

Those who do not want to believe this will think of many reasons for disagreeing with these findings. It might so happen that the lower returns of those who use no meat-meal could be due to the use of either excessive or minimum quantities of total meal. A glance at the previous table disproves this contention. There is evidence, however, that those who use no meat-meal do use too large a quantity of grown crops which, in the absence of meat-meal, are not as satisfactory as they might be.

There is approximately 8,000 tons of meat-meal produced annually in New Zealand, and the amount used locally is approximately 5,000 tons. The remainder is exported. We could with advantage increase consumption till there is no surplus for export.

When Are Bought Meals Used Most Profitably?

A good deal of meal is used along with skim-milk just for the satisfaction of seeing pigs grow rapidly. The greater part of it, however, is used more intelligently in the off-season along with roots, when no milk is available. In order to compare the profitability of different practices, the farm returns for 1938-39 were grouped according to the number of pigs carried at the end of the season:—

A.—Those with three stores for every 40 cows. (95 farms.)

B.—Those with 20 stores for every 40 cows. (106 farms.)

C.—Those with 70 stores for every 40 cows. (82 farms.)

The nett returns on a per cow basis for pigs, after paying for meals used and other crops grown, were as follows:—

A. group, 34s 2d.
B. group, 37s 6d.
C. group, 51s 8d.

Meal used for pig feed was 50 lb., 68 lb., and 162 lb.; "other" feeds used were 1/7th of a ton, ½ of a ton, and 1½ tons per cow milked for A, B, and C. respectively in both cases.

Summary

By translating these figures into words, the situation can be summed up as follows:—

Those who carry many pigs through the winter use as pig feed about two acres of roots or grazing for every 40 cows milked; they use three tons of meal, and get a return of 51s 8d per cow after paying for the extra feed used. Those who carry few pigs through the winter use as pig feed 1/10th of an acre of roots or grazing; they use one ton of meal, and get a return of 34s per cow after paying for the feed used.

Tobacco Notes

Cultivation of the Ground

TOBACCO growers should maintain a thorough cultivation with the horse hoe once every ten days for at least three passages. By that time the plants will be almost covering the land between the rows. Horse work should cease as soon as there is danger of damaging the leaves with the machine or the traces.

Hand cultivation should be kept going so that the seedling weeds do not become strong and deep rooted. Care should be taken that the hoeing is not deeper than two inches, otherwise the hoe will damage the tender roots of the tobacco plant. Cuts or abrasions on the roots will allow of the entry of the germs or spores of the mosaic disease when it is present in the soil.

A careful watch should be kept for the first signs of the tobacco miner grub. It attacks the small lower sand leaves first, and lives in the cell tissue between the upper and lower skins of the leaf. It can feed only in an almost ripe leaf, and these small sand leaves are ripe and fit food for the miner at a very early date.

Whenever an infected leaf is seen it should be picked and the spot crushed between the fingers before throwing on the ground. There are three cycles in the summer of this pest, and the grubs present at this time are the grandparents of those which can cause immense damage to the crop in February just before harvesting tobacco. If these early miners are destroyed, very little will be seen of the pest later on.

The miner hibernates in sow thistle and other weeds that live under hedges and on the headlands of tobacco plantations, and is also found extensively on the wild cinerarias.

—*CHARLES LOWE, Tobacco Instructor, Motueka.*

At Coal Creek, near Roxburgh, Central Otago, a serious amount of damage was caused to a number of stone-fruit orchards by a heavy cloudburst last year, the rush of water uprooting trees and leaving an accumulation of boulders and other debris. Government assistance was promptly made available to the growers affected, and men were engaged clearing away the rocks, etc., and otherwise restoring the damage as far as it was considered economical to do so.

Lambing Estimates for 1939

Slight Increase Probable In Dominion Totals

Contributed by the LIVESTOCK DIVISION.

Estimates of the current year's lambing in the Dominion are as follow:—

County.	Breeding Ewes.	Estimated Percentage of Lambs.	Estimated Number of Lambs.
Auckland District.			
Mangonui	32,036	85.00	27,231
Whangaroa	13,492	79.60	10,740
Bay of Islands	58,946	75.80	44,681
Hokianga	55,246	78.35	43,285
Whangarei	104,223	77.00	80,252
Otamatea	72,575	76.54	55,549
Hobson	72,867	78.69	57,339
Rodney	75,493	75.20	57,109
Great Barrier	7,328	56.40	4,133
Waitemata	65,983	83.90	55,360
Eden	2,545	87.93	2,236
Manukau	58,148	87.00	50,589
Franklin	85,027	89.00	75,674
Coromandel	43,798	64.26	28,145
Thames	9,576	69.27	6,633
Hauraki Plains	7,375	72.72	5,363
Ohinemuri	11,398	83.59	9,528
Waikato	90,416	90.00	81,374
Raglan	276,406	82.00	226,653
Waipa	135,164	96.15	129,960
Piako	90,277	91.13	82,269
Matamata	150,159	90.00	135,143
Rotorua	54,599	87.00	47,501
Taupo	12,107	91.00	11,017
Taumarunui	90,814	75.25	68,338
Kawhai	57,111	71.65	40,920
Otorohanga	95,857	84.80	81,287
Waitomo	280,361	85.00	238,256
Ohura	99,906	82.20	82,123
Kaitieke	56,734	71.83	40,752
Tauranga	57,089	87.17	49,764
Whakatane	33,823	84.75	28,665
Opotiki	52,050	72.30	37,632
Totals	2,408,929	82.84	1,995,501
East Coast-Hawke's Bay District.			
Matakaoa	62,365	70.60	44,030
Waiapu	259,530	79.60	206,586
Uawa	121,927	84.40	102,906
Cook	448,569	85.70	384,424
Waikohu	373,653	80.90	302,285
Wairoa	395,456	81.73	323,206
Hawkes Bay	909,011	82.00	745,389
Waipawa	363,858	88.00	320,195
Waipukurau	128,567	90.00	115,710
Patangata	486,159	85.00	413,235
Weber	57,196	77.00	44,041
Dannevirke	252,274	86.00	216,956
Woodville	77,618	88.00	88,304
Pahiatua	155,252	84.00	130,412
Akitio	154,911	84.00	130,125
Totals	4,246,346	84.02	3,567,804
West Coast-Wellington District.			
Clifton	63,788	83.40	53,199
Taranaki	19,389	93.89	18,204
Inglewood	38,983	91.63	35,720
Egmont	19,457	86.50	16,830
Whangamomona	50,142	77.10	38,659
Stratford	76,909	81.70	62,835
Eltham	48,712	93.27	45,434
Hawera	73,847	90.06	66,507
Waimate West	7,642	94.13	7,193
Patea	200,566	88.80	178,103
Waitotara	144,881	87.30	126,481
Waimarino	172,494	79.00	136,270
Wanganui	285,599	81.30	232,192
Rangitikei	949,359	86.20	818,347
Oroua	203,045	94.36	191,593
Kairanga	103,586	98.90	102,447
Kiwitea	226,458	96.29	218,056
Pohangina	115,164	99.62	114,726
Manawatu	138,367	96.80	133,939
Horowhenua	110,858	84.10	93,232
Hutt	75,876	77.50	58,804
Makara	46,889	86.60	40,606
Featherston	330,740	72.00	238,133
Wairarapa South	161,189	84.90	136,849
Masterton	319,331	82.73	264,183
Castlepoint	93,657	81.04	75,900
Eketahuna	115,160	79.42	91,460
Mauriceville	42,439	74.43	31,587
Totals	4,234,527	85.66	3,627,489
District Totals.			
Auckland	2,408,829	82.84	1,995,501
East Coast-Hawkes Bay	4,246,346	84.02	3,567,804
Wellington	4,234,527	85.66	3,627,489
North Island Totals	10,889,802	84.40	9,190,794

County.	Breeding Ewes.	Estimated Percentage of Lambs.	Estimated Number of Lambs.
Marlborough-Nelson-Westland District.			
Waimea	170,393	59.08	100,668
Takaka	25,943	61.20	15,877
Collingwood	12,637	79.21	10,010
Buller	2,651	83.00	2,200
Inangahua	12,824	90.00	11,542
Murchison	36,596	63.00	23,055
Grey	25,722	94.00	24,177
Westland	38,209	100.00	38,209
Sounds	110,367	66.43	73,317
Marlborough	213,632	65.84	140,655
Awatere	210,745	80.06	168,722
Totals	859,719	70.77	608,432
Canterbury-Kaikoura District.			
Kaikoura	117,014	78.00	91,271
Amuri	237,751	78.00	185,446
Cheviot	145,759	86.00	125,353
Waipara	294,343	80.00	235,474
Ashley	69,018	75.00	51,764
Kowai	70,058	92.00	64,453
Oxford	73,883	72.00	53,196
Rangiora	35,086	90.00	31,577
Eyre	55,190	92.00	50,775
Tawera	55,006	81.00	44,555
Malvern	127,014	90.00	114,313
Paparua	32,243	92.00	29,664
Waimairi	4,564	92.00	4,199
Heathcote	9,604	73.00	7,011
Akaroa	93,566	96.00	89,823
Mt. Herbert	43,554	75.00	32,666
Wairewa	75,763	81.00	61,368
Halswell	14,907	87.00	12,969
Springs	28,749	78.00	22,424
Ellesmere	86,143	108.00	93,034
Selwyn	154,200	86.00	132,612
Ashburton	732,122	84.00	614,982
Geraldine	253,521	84.00	212,958
Levels	168,774	100.00	168,774
Mackenzie	322,704	82.00	264,617
Waimate	469,873	89.50	420,536
Chatham Islands	43,551	73.00	31,792
Totals	3,813,960	85.15	3,247,606
Otago-Southland District.			
Waitaki	464,368	84.00	390,069
Maniototo	254,732	81.00	206,333
Vincent	260,160	75.00	195,120
Waihemo	105,973	81.00	85,838
Waikouaiti	69,621	93.00	64,748
Taieri	202,103	76.00	153,598
Peninsula	14,798	96.00	14,206
Clutha	369,030	96.00	354,269
Tuapeka	322,422	88.00	283,731
Bruce	210,488	92.00	193,649
Lake	137,325	69.00	94,754
Southland	1,440,041	104.00	1,497,643
Wallace	544,239	80.00	435,391
Stewart Island	1,518	80.00	1,214
Totals	4,396,818	90.31	3,970,563

County.	Breeding Ewes.	Estimated Percentage of Lambs.	Estimated Number of Lambs.
District Totals.			
Marlborough	859,719	70.77	608,432
Canterbury	3,813,960	85.15	3,247,606
Otago	4,396,818	90.31	3,970,563
South Island	9,070,497	86.29	7,826,601
North Island	10,889,802	84.40	9,190,794
Dominion	19,960,299	85.26	17,017,395

District Estimates

The following table gives the estimates of the current (1939) season's lambing for the several sheep districts:—

District.	Number of Breeding Ewes.	Estimated Percentage of Lambs.	Estimated Number of Lambs.
Auckland	2,408,929	82.84	1,995,501
East Coast-Hawkes Bay	4,246,346	84.02	3,567,804
West Coast-Wellington	4,234,527	85.66	3,627,489
Marlborough-Nelson-Westland	859,719	70.77	608,432
Canterbury-Kaikoura	3,813,960	85.15	3,247,606
Otago-Southland	4,396,818	90.31	3,970,563
Dominion	19,960,299	85.26	17,017,395

Year.	Number Breeding	Estimated Percentage of Lambs.	Estimated Number of Lambs.	Actual No. of Lambs Tailed.
North Island.				
1939	10,889,802	84.40	9,190,794	—
1938	10,735,829	80.11	8,600,625	9,068,701
1937	10,570,388	86.52	9,145,849	9,401,496
1936	10,300,826	90.50	9,322,476	9,423,240
1935	9,697,231	83.68	8,114,361	8,500,075
1934	9,524,065	88.70	8,447,643	8,555,477
South Island.				
1939	9,070,497	86.29	7,826,601	—
1938	8,928,037	90.10	8,044,540	7,880,278
1937	8,761,689	91.35	8,003,668	7,939,418
1936	8,368,135	90.10	7,539,576	7,442,781
1935	8,115,186	89.45	7,259,281	7,196,542
1934	8,047,361	89.88	7,232,750	7,134,015
Dominion.				
1939	19,960,299	85.26	17,017,395	—
1938	19,663,866	84.64	16,645,165	16,948,979
1937	19,332,077	88.71	17,149,517	17,340,914
1936	18,668,961	90.32	16,862,052	16,866,021
1935	17,812,417	86.31	15,373,642	15,696,617
1934	17,571,426	89.24	15,680,398	15,689,492

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CIGARETTE TOBACCO

"Many Happy Rollings"

Grasses and Clovers of New Zealand

Ryegrass Species and their Characteristics

— By —

S. H. SAXBY,

Instructor in Agriculture, Dunedin.

(Continued from the November Issue)

Fig. 29.—A large number of grasses, both useful and harmful, thrive on high fertility country that is well drained. Of these grasses, the most important is perennial ryegrass.

[*S. H. Saxby, photo.*

PERENNIAL Ryegrass *(Lolium Perenne)*.—This is one of the most useful and most popular grasses for soils of high fertility. Its useful habitat range is very wide, being limited at one extreme by excessive moisture and at the other extreme by low fertility and excessive dryness.

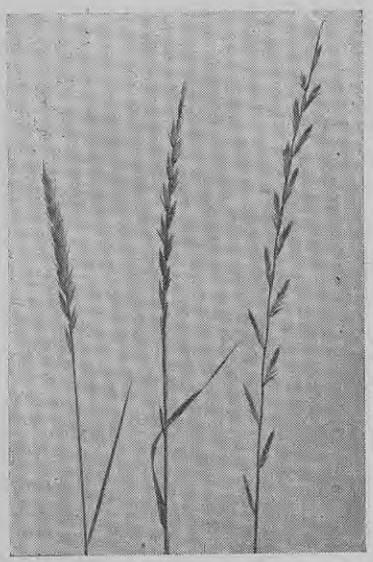


Fig. 30.—Three somewhat similar panicles. *Left,* old man twitch; *centre,* perennial ryegrass; *right,* Italian ryegrass.

[*H. Drake, photo.*

This month's article on the grasses and clovers of New Zealand deals with grasses which thrive on well-drained country of high fertility which has a good supply of moisture. The different varieties and strains of ryegrass are discussed, and reference is also made to some of the undesirable types of grasses which lower the production of feed on this type of country.

Between these two extremes there is a wide range of country on which ryegrass can be profitably grown. Of the factors responsible for its popularity, the following are the most important:—

(1) It is an excellent seed-producer, thus making its distribution both easy and profitable.

(2) It is one of the easiest and quickest of the grasses to establish from seed, thus enabling it to compete with quick-growing weeds and to be grazed much sooner after sowing than many other grasses.

(3) It is highly productive under close grazing and high fertility, and is of good milk-producing and fattening value.

(4) Its maximum production is in the spring, when feed is at a premium.

(5) It will stand and thrive on comparatively hard grazing.

(6) It is permanent provided that the soil fertility is kept high and that a permanent strain is sown.

A Disadvantage

With all these advantages, it has the disadvantage of being dormant in the hottest part of the summer, especially when the fertility is low or when clovers are absent. This may be remedied in the pasture by including in the mixture summer-growing grasses such as cocksfoot, *paspalum,* or timothy, all of which produce well during the time that ryegrass is dormant.

Ryegrass has been sown in New Zealand for many years and on a wide range of country, much of which has been quite unsuitable for this grass. For ryegrass to thrive a fertile, moist but well-drained soil is required. It will grow quite well on drier soils provided that the fertility is maintained in a high state by the encouragement of legumes, such as white clover and subterranean clover.

Of all the common grasses, none benefits to the same extent from the association with clovers as does ryegrass, and one of the most important

aspects of the management of ryegrass dominant pastures is the encouragement of the clovers.

Because of its quick establishing nature and its consequent ability to be fed off early, ryegrass dominance has too often been regarded as the ultimate objective on much country that is unsuited to it. On soils of low fertility ryegrass cannot be expected to produce well or to remain permanent, and should be regarded as a temporary grass only, the main reliance being placed on lower-fertility-demanding but permanent grasses, such as cocksfoot, browntop, or danthonia.

Reasons for Failing

One frequently sees country which has been spoiled by the sowing of almost pure ryegrass. When this dies out it is replaced not by the good low-fertility-demanding grasses, but by weeds and undesirable plants. It would have been preferable to eliminate the ryegrass altogether in the beginning rather than to rely on it completely.

Fig. 31.—Perennial ryegrass is the most dominant grass on much of the better class dairying and lamb fattening country throughout New Zealand.
[*S. H. Saxby, photo.*

For the foregoing reasons ryegrass has fallen into disrepute among some farmers. It has been a failure not because it is a poor grass, but because too much has been expected from it. Another factor which has been responsible for varying opinions regarding the value of ryegrass as a permanent plant is the fact that in many cases short-lived strains of ryegrass have

Fig. 32.—**In the sowing out of country such as this, too much reliance should not be placed on perennial ryegrass. Lower fertility-demanding grasses should be used as well.**

[*S. H. Saxby, photo.*

been sown. For many years there was a general but unproved opinion that ryegrass harvested from certain districts produced plants of a much more permanent nature than that harvested from other districts.

Some ten years ago a critical examination was made of the performance of a large number of lines of ryegrass secured from all the major seed-producing districts in New Zealand and abroad. As a result of this work it was found that there were on the world's markets several distinct strains or varieties of ryegrass. These varied greatly with regard to speed of establishment, time of maturity, palatability, and permanence. This, in itself, was a sufficient explanation of farmers' varied experience with ryegrass.

The Four Strains

Broadly speaking, four well-defined strains were recognised. These were as follows:—

(1) A permanent, low-producing and late-maturing strain coming from the oldest pastures in England and termed British indigenous ryegrass. This strain has been tried out in experimental plots throughout New Zealand.

Fig. 33.—**The various strains of ryegrass vary considerably in many respects. In this illustration are shown *(left)* certified perennial ryegrass, and *(right)* British indigenous ryegrass. The latter is closely grazed largely on account of its late maturity and slower growth. Both of these types are highly persistent when the fertility is high.**

[*S. H. Saxby, photo.*

Fig. 34.—**Two contrasting types of ryegrass shown as single plants. On the left is a persistent and leafy type, while on the right is a stemmy short-lived type.** [*S. H. Saxby, photo.*

Its greatest disadvantage is that it is late to begin growth in the spring, one of the greatest assets of ryegrass, as a whole, being its early spring growth. It, however, continues growth later in the summer than does ordinary ryegrass. This experience is general wherever ryegrass will grow. Because of its late maturity it appears to be more palatable than any other strain.

Fig. 35.—**Italian ryegrass in association with red clover is valuable for short-rotation grazing or hay pastures.**

[*S. H. Saxby, photo.*

(2) A permanent, high-producing, early-growing strain, coming from the oldest pastures in New Zealand. These were located chiefly in the Hawke's Bay, Poverty Bay, and Sandon districts, although some were found in Canterbury, Otago, and Southland. Because of its general good performance this type was regarded as being the most suitable strain for New Zealand conditions, with the result that the strain was finally certified by the Department of Agriculture as "Certified New Zealand Perennial Ryegrass."

Plant Selection

Since certification of perennial ryegrass was begun a considerable amount of plant selection and breeding has been carried out by the Grassland Division of the Plant Research Bureau, with the result that there is now on the market a large quantity of this bred or selected perennial ryegrass which is certified and sold under the name of Government stock seed, pedigree seed, and mother seed.

A change recently made in the certification of perennial ryegrass has resulted in several of the familiar classes being discontinued. All certified seed, with the exception of that certified in the above-mentioned classes, is now being grouped into one class, namely "permanent pasture."

Fairly Permanent

(3) A fairly permanent type, the best lines of which closely approach the certified type in value. It is, however, less persistent and lower in production over a period of years. An additional disadvantage is that under similar conditions it is attacked earlier and more severely by leaf rust than is the certified type. By some it is regarded as being more palatable than the certified type. The best lines are no more palatable, and any line that is more palatable is not as permanent. As only a very small amount of this type is harvested annually, and as the demand for it is negligible, no special recognition has been given to it, although the best lines may be certified in the commercial class.

(4) A short-lived strain which, under ordinary conditions, will last for only two to four years in a pasture. It makes very vigorous initial growth, but goes off rapidly in production after the first year. This type is representative of the bulk of the world's ryegrass seed. For permanent pastures this type is quite unsuitable, but is fairly satisfactory for pastures of two years' duration.

Palatability

The less permanent strains of ryegrass are more palatable than the permanent ones. This is very noticeable when they are grown side by side.

Palatability is dependent on many factors, the most important being the strain sown, the stage of growth at which the pasture is fed off, and the health of the ryegrass itself. The two last-named conditions can be adjusted fairly readily, and little trouble is experienced when the ryegrass is made to produce short, succulent growth as the result of close grazing and an ample supply of nitrogen, which is supplied by a vigorously growing clover.

A definitely unpalatable paddock of ryegrass indicates one of two things—unsatisfactory management or unsatisfactory soil conditions of moisture and fertility.

Fig. 36.—**Prairie grass is a good producing grass, and is suited to rich, warm country.**
[*S. H. Saxby, photo.*

Summarised, the position of ryegrass in our pastures is as follows:—

Ryegrass may be profitably sown on a wide range of country provided that the clovers form a good proportion of the sward. Where vigorous clovers can be grown, so can perennial ryegrass be grown.

Perennial ryegrass is distinguished from Italian ryegrass in the vegetative state by the fact that the leaf shoot is folded and not rolled as in Italian ryegrass. The ligule is small and the ears, although variable, are seldom as large as in Italian ryegrass. In the flower heads they may be readily distinguished by the presence or absence of awns. Awns are frequently known as "whiskers" or "tails," and are pointed extensions of what is commonly regarded as the seed. These are well developed in Italian ryegrass, and absent in perennial ryegrass. In some of the poorer types of ryegrass a small number of poorly-developed awns may be found on some parts of the seed head.

Italian Ryegrass

Italian Ryegrass (*Lolium multiflorum*) is the most useful and the highest producing of our short-lived grasses. Its habitat range is similar to that of perennial ryegrass, although it will not thrive under such hard conditions. For its maximum development a deep, rich, and well-drained soil is required. Like perennial ryegrass, it becomes very low in production when at all waterlogged or when the supply of nitrogen is low.

The nitrogen essential for the growth of Italian ryegrass is, in the first instance, generally made available by the various operations of cultivation, but after six months or so this is frequently all used, and unless a further supply is available production of vigorous herbage ceases. This nitrogen may be best supplied through clovers, such as white clover, red clover, or subterranean clover.

Red clover, because of its rapid establishment and good, high-yielding hay qualities, is usually associated with Italian ryegrass, but provided a good establishment is secured white clover is quite satisfactory. Where Italian ryegrass is being grown on subterranean clover country a considerable degree of success may be secured by drilling in the Italian ryegrass on an established subterranean clover pasture in the early autumn.

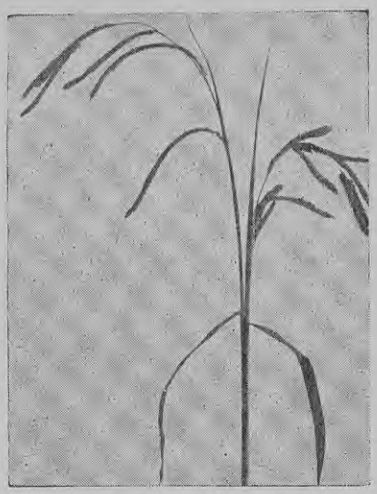


Fig. 37.—*Paspalum dilatatum* **thrives in districts experiencing a warm summer and a fairly high rainfall. Most of its leaf-production is during the summer and autumn.**
[*S. H. Saxby, photo.*

Further Value

Although Italian ryegrass is used chiefly as the main ingredient in temporary pasture mixtures, it is also valuable as an additional species in a general pasture mixture, when the addition of 5 lb. per acre will provide earlier feed than a mixture without Italian ryegrass. Up to 10 lb. per acre may be sown, but care should be taken that the pasture is fed off sufficiently early to prevent smothering of the slower-establishing grasses and clovers.

When sowing pastures from which it is intended to harvest perennial ryegrass seed, Italian ryegrass should not be sown, as the practice of sowing and harvesting the two together has been responsible for the deterioration in type of much of the South Island perennial ryegrass.

The identification of this grass is discussed under perennial ryegrass, where the differences between the two are pointed out. The main difference is in the rounded sheath and the rolled leaf shoot of the Italian ryegrass.

Questionable Value

Western Wolths Ryegrass is a variety of Italian ryegrass and was originated in Holland. Its useful life is restricted to one year at the most, and on this account its value, even for temporary pastures, is very questionable.

Up to the time of its first grazing it will produce more feed than Italian ryegrass, but after this its production becomes less and less in comparison.

There is no way of distinguishing western wolths from Italian ryegrass unless the two are growing side by side. The seeds are also indistinguishable, and the length of the awns on various samples indicates nothing. When the awns have been removed by hard threshing or dressing it is not possible to decide whether the seed is perennial, Italian, or western wolths ryegrass. Consequently, this has resulted in all three grasses being unconsciously sold and harvested under any one of the three names, the ultimate naming of the line of seed depending not on the type of plant but on the size and frequency of occurrence of awned seed.

No Guarantee

The result of this has been that many lines of, say, Italian ryegrass contain

a mixture of both perennial, Italian, and western wolths ryegrass. Sometimes one finds lines of seed which are bought or sold as, say, western wolths turning out to be a form of perennial or a line sold as perennial turning out to be a line of Italian. From this it can be seen that a farmer ordering any one of these three on the open market has absolutely no guarantee that he is getting what he specified.

Results of Tests

Some years ago a large number of commercial samples of Italian ryegrass and western wolths were collected and tested. Of those sold as Italian ryegrass, one-quarter were chiefly Italian ryegrass, two-thirds were chiefly western wolths, and the remainder were perennial. Of those sold as western wolths, less than one-quarter were chiefly western wolths, two-thirds were chiefly Italian, and the remainder were perennial. Of the whole lot tested, very few lines were found to be purely of one type. Genuine western wolths is practically non-existent on the New Zealand market.

The position with Italian ryegrass was much the same. The purest and most vigorous lines of this have been increased under the Department's certification scheme, and any farmer requiring genuine Italian ryegrass is strongly advised to procure certified seed. The questionable value of western wolths has not warranted the certification of it.

Prairie Grass (*Bromus Unioloides*).—Although this grass will grow on fairly dry soils, it will thrive only on rich, warm country. It is an erect, tall-growing perennial plant that is eaten readily by all classes of stock.

The most important feature regarding prairie grass is that in the warmer districts of New Zealand it produces a large amount of feed during the late autumn, winter, and spring. This feature alone makes this grass of great value in special circumstances, such as the winter production of milk in districts where winter growth is possible.

As prairie grass is eaten so readily by stock it is useles to sow it in a general mixture of other grasses, as it dies out very rapidly under close and selective grazing. In sowing down prairie grass pastures it should always be the dominant grass so that the pasture can be managed accordingly. Provided that it is dominant and that it is not eaten too closely, prairie grass will remain in a pasture for many years because of its tussock habit and vigorous growth smothering out other competing grasses.

Grazing Practice

Grazing should never be severe on these pastures. Growth should be allowed to reach a height of a foot or more before grazing, which should seldom be closer than three to four inches from the ground.

On second-class soils of low fertility, prairie grass makes little growth, but on good soils (and where there is an abundant supply of nitrogen) it will thrive. On this account the sowing of clover is essential for the production of a large quantity of nutritious feed.

Prairie grass, like other grasses of a similar habit of growth, will remain dominant in a pasture and smother out lower-growing grasses if it is allowed to reach its maximum development occasionally. For this reason

occasional hay crops will benefit a prairie grass pasture.

Prairie grass is sometimes confused with cocksfoot, as both have flattened sheaths, long ligules, and under some conditions a very similar bright green colour. Prairie grass, however, is always somewhat hairy, more especially on the sheath. Cocksfoot is hairless.

Meadow Fescue

Meadow Fescue (*Festuca Pratensis*).—Although used to a considerable extent in America and European countries, this grass has not given satisfactory results in New Zealand. Except when the flower heads are showing, it is very difficult to distinguish it from Italian ryegrass, and in many instances this difficulty of recognition has almost certainly been responsible for its apparently poor behaviour.

Meadow fescue is a fairly tall-growing and vigorous grass, and requires a rich soil in order to thrive. The herbage it produces is coarse, but is eaten quite readily. Meadow fescue is slow to become established, taking some three years to reach full development. Quite good pastures of meadow fescue are occasionally seen in this country, but when grown under similar conditions to perennial ryegrass it does not make as good a sward or produce as much feed under close-grazing.

Further investigations are required regarding this grass in New Zealand because of its reputation in other countries, where it is regarded as being a high-yielding permanent grass well suited for permanent pastures on moist, fertile soils.

Fig. 38.—Because of its "twitchy" habit Kentucky bluegrass is of use as a soil-binding plant on loose texture soils and partly-consolidated sand.

[*S. H. Saxby, photo.*

Identification

The identification of meadow fescue is rather difficult, as it is similar to Italian ryegrass in most vegetative characters. The chief difference is in the shape of the small bud at the base of the plant. This bud is very small, and is only about one-fifth of an inch long. In Italian ryegrass it is long and narrow, whereas in meadow fescue it is short and stumpy. This is a fine difference, but is the only reliable method of differentiating these two grasses in the vegetative state. When in flower, however, they are considerably different. The flower head of Italian ryegrass is a single unbranched spike, whereas that of meadow fescue is branched.

For Warmer Climates

Paspalum Dilatatum.—This grass belongs to a group, the majority of which are natives of tropical or semi-tropical climates. It thrives only in districts which experience a warm summer and have a fairly high annual rainfall. On this account it is of most value on the North Auckland peninsula and on the coastal districts of the Auckland Province, although it can be grown with a fair measure of success in Hawke's Bay and Taranaki. It has also been grown as far south as Hokitika.

Paspalum is a high-producing perennial and twitchy grass, the herbage of which is relished by all classes of stock. It is essentially a summer grass, as its production period spreads from December to March, during which time a large amount of feed is produced. The value of this grass has been debated for many years, but it is now generally agreed that, with correct management, it is giving satisfactory results and will combine quite well with other species, such as ryegrass, white clover, and subterranean clover.

The essential features in the management of *paspalum* are topdressing to encourage the clovers and the control of surplus growth with the mower.

No Spring Growth

Pure *paspalum* pastures are not as satisfactory as mixed pastures because of the absence of spring growth in *paspalum*. A mixed ryegrass and *paspalum* pasture is quite satisfactory, as the ryegrass gives a good quantity of winter and spring feed when the pasture is dormant, leaving the latter to take up the running when the ryegrass is at its low production period in the heat of the summer.

Paspalum pastures are very liable to become sod-bound, with a consequent falling-off in production. This was one of the main objections to *paspalum* for many years. Sod-bound pastures may be greatly increased in production by the surface sowing of ryegrass, white clover, or subterranean clover on the pasture after the sod has been broken. This may be carried out by heavy winter stocking, ploughing in narrow lands, discing, or by heavy harrowing.

When sowing *paspalum* in a general mixture, autumn sowing is preferable as the other species, together with a small proportion of the *paspalum* seed.

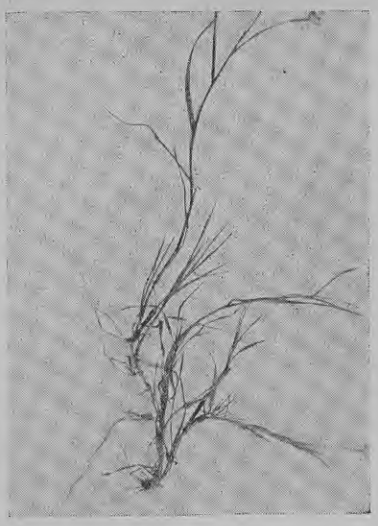


Fig. 39. — **Redtop is a worthless twitchy grass, and is somewhat similar to browntop in general appearance and when growing.**

[*S. H. Saxby, photo.*

will germinate rapidly and afford a cover for the slower germinating *paspalum*, which will come through when the warmer weather comes in the following spring. The *paspalum* pasture may be thickened up considerably by allowing it to run to seed the following summer.

Paspalum dilatatum may be recognised by its fattened sheath and large ligule, around which are a number of hairs, and its long rhizomes.

Nuisance in Crops

Kentucky Bluegrass (*Poa Pratensis*)—Although this is an important grass in parts of America, its sphere of usefulness in New Zealand is very limited. It is a perennial grass that is slow and difficult to establish, but when once growing well, it will spread rapidly by means of strong-growing underground runners, thus making it a twitch grass.

In common with other twitches, it will thrive on loose, friable soils, and reaches its maximum development where there is an ample supply of moisture and where the summers are warm. Under warm, dry conditions its production is very low. The districts in which it thrives are therefore very limited, and are confined mainly to irrigated areas where the important moisture supply can be regulated. Here it is a very useful pasture grass, but as a farm grass it is a nuisance because of its competition with lucerne and annual crops.

The only other conditions under which Kentucky bluegrass is of much value is on hill or sand country where a binding agent is required on loose, exposed faces. Once established here, it will make a firm sward, and although its production is not high, it will at least prepare the ground for the establishment of better grasses, such as cocksfoot.

Hard to Eradicate

Kentucky blue grass should not be sown on country which is likely to be brought into cultivation at any time because of the difficulty experienced in eradicating it.

The other grasses with which this may be confused have been discussed under rough-stalked meadow grass. The main characteristics of Kentucky bluegrass are a twitchy nature and dark green leaves of a typical *poa* shape. The ligule is small, and the sheath and leaf shoot are flattened. There are no ears.

Another Twitch

Red Top (*Agrostis Stolonifera, var. Major*).—This grass is very closely allied to browntop and creeping bent, and is to be found in scattered localities throughout New Zealand. It is

Fig. 40.—In stockyards, and very often pastures on rich country, *poa annua* is frequently the dominant grass. Here, *poa annua* is dominant, with a few odd plants of ryegrass near the rails.

[*S. H. Saxby, photo.*

a true twitch—that is, it spreads by means of rhizomes or underground creeping stems. Under fertile conditions it produces a fair quantity of second-rate feed. Being of a twitchy nature, it will thrive only in loose textured soils.

It has been tried out on hill country to a considerable extent, but has never been found to produce as satisfactory or permanent a sward as browntop, as consolidation prevents its spreading. A certain amount of redtop was at one time imported for the sowing down of lawns and playing areas, but because of its coarse nature and poor turf-forming qualities it has given place to the much better grasses, browntop and Chewings fescue.

As a pasture plant redtop is useless. On good country where it will thrive it is an undesirable twitch of lower production and poorer quality than ryegrass. On poor country it will persist as a stunted, spindly plant which produces very little feed. The sowing of redtop is not justified under any conditions.

Redtop is distinguished from browntop by its much longer ligule, its twitchy habit, and coarser leaf. It differs from creeping bent in that it has underground creeping stems, whereas those of creeping bent are overground creeping. It is also a much coarser type of plant. The sheath and leaf shoot are round in section. Ears are absent.

Because of the shortage of paper supplies caused by the war it has been necessary to use a different type of paper in this issue of the "Journal."

It is hoped that further supplies of the paper usually used will be on hand for the January issue.

Heavy Winter Stocking

Annual Poa (*Poa Annua*).—This is an annual volunteer grass which is frequently found throughout New Zealand in open pastures and waste places. Although it is relished by stock, its short life and its low production cause it to be regarded as of little value. In most parts it may be seen flowering and reseeding during practically any month in the year.

It is frequently prominent in pastures that have been heavily stocked and poached in the winter. This opening up permits the growth and rapid spread of this grass.

It also comes into pastures on heavy soils which are sown with short-lived strains of pasture plants. As it will not stand competition, *poa annua* in these pastures is usually replaced by the more permanent grasses and weeds which are aggressive but slow-establishing.

Generally speaking, the presence of *poa annua* indicates heavy winter stocking or a transitional stage in a pasture life, this stage being between the time that the temporary sown elements die out and the time that the final permanent elements are thoroughly established.

For identification purposes, *poa annua* has a useful and characteristic feature in an obvious waving or crinkling half-way along the leaf, which is dull on both surfaces. It is very shallow rooted and non-creeping. Ears are absent. Both surfaces of the leaf are dull in contrast to *poa trivalis*, in which the lower surface is shiny. The ligule is long and white, and the sheath and leaf shoot are flat in section.

(To be continued)

Outstanding Results From Irrigation

The irrigating of swede crops on the Levels plain was very successful last season with the result that this light stony land produced crops unseen before on this area. The failure of the majority of the crops in the rest of the district due to dry conditions further added to the value of the crops which sold at up to £10 per acre for feeding purposes.

Certificate-of-Record Testing of Purebred Dairy Cows

Contributed by the DAIRY DIVISION.

The following list includes details of the production of cows which have been awarded certificates during the period January 1 to October 31, 1939:—

YEARLY DIVISION—FIRST CLASS.

Jerseys.

Name of Cow and Class	Tested By	Age at Start of Test: Yrs. Dys.	Fat required for Certificate.	Yield for Season: Days	Milk	Fat
Junior Two-year-old						
Willowmere Rosalind	P. R. Catley, Ohau	1 302	275.5	345	9,513.9	618.43
Havenlea Dainty	A. L. Cooper, Papakura	1 339	275.5	365	8,062.3	470.33
Havenlea Lois	A. L. Cooper, Papakura	1 352	275.5	365	8,603.0	436.16
Royton Dainty Queen	H. Moreland, Hamilton	1 343	275.5	365	7,658.8	396.11
Wellfield Dora	S. G. Ker, Whakatane	2 32	278.7	298	7,063.9	355.71
Irtrigg Honey Bud	E. M. Cook, Waiuku	2 34	278.9	270	5,523.0	308.86
Senior Two-year-old						
H. O. Swan's Pet	J. G. Holmes, Te Awamutu	2 350	310.5	344	6,863.5	411.56
Puriri Glen Pearl	W. J. Phillips, Pukeoware	2 364	311.9	353	7,526.9	395.39
Three-year-old						
Te Konae Hope	C. H. Mai, Rongotea, R.D.	3 345	346.5	365	10,900.5	618.54
Tauwhare Mona	M. T. Hastie, Mangatawhiri	3 268	338.8	365	9,012.0	550.21
Design Standard Sybil	E. R. Bull, Manutuke, Gisborne	3 5	312.5	305	7,413.5	466.88
Tyrone Majorie	R. J. Johnston, Runciman	3 298	341.8	365	8,682.2	455.86
Heatherlea Margaret	Renall & Son, Carterton	3 319	343.9	282	6,932.6	357.65
Four-year-old						
Royton Coronation Violin	H. Moreland, Hamilton	4 64	354.9	365	9,836.9	506.89
Derry's Patricia	S. J. Robinson, Matamata	4 16	350.1	357	10,569.4	472.88
Birkenella Fairy	A. W. Clow & Sons, Birkenhead, Auck.	4 107	359.2	365	9,999.4	469.66
Ashburn Dream Girl	J. & G. W. Dobson, Lepperton	4 325	381.0	355	8,053.3	452.51
Ascalon Darkie	C. I. Harkness, Waiuku	4 348	383.3	309	6,912.4	388.52
Mature						
Te Konae Cosy	C. H. Mai, Rongotea, R.D.	5 331	385.0	365	11,191.7	643.67
Derrys Sweet Briar	S. J. Robinson, Matamata	6 2	385.0	365	11,723.4	630.53
Pinedale Bessie	H. Lewis, Waharoa	6 17	385.0	365	9,429.4	587.48
Birkenella Jill	A. W. Clow & Sons, Birkenhead, Auck.	7 76	385.0	365	10,878.5	493.35
Meon Mysia	J. & G. W. Dobson, Lepperton	5 168	385.0	365	7,715.9	470.68
Braemar Stonycroft Briar	S. Unwin, Winchester	5 261	385.0	308	7,373.3	466.43
Perfect Mixture	C. Hazelton, Matamata	5 362	385.0	340	7,590.7	456.91
Jersey Brae Sheila	J. F. M. Wanhill, Frankton Junction	5 2	385.0	365	8,919.9	450.73
Royal Oak Jane	E. M. Cook, Waiuku	5 263	385.0	317	7,421.1	439.51
Fairlands Bonny Lass	C. Hazelton, Matamata	5 218	385.0	349	8,523.4	437.90

YEARLY DIVISION—SECOND CLASS.

Jerseys.

Junior Two-year-old						
Ivry Paquito	H. W. Le Bailly, Buckland	2 52	280.7	365	6,870.5	319.16
Senior Two-year-old						
Tyrone Sybil's Nell	R. J. Johnston, Runciman	2 137	289.2	365	8,604.0	455.38
Three-year-old						
Pinedale Katie	H. Lewis, Waharoa	3 303	342.3	365	8,964.3	532.37
Mature						
La Badir	E. D. Johnson, Doyleston, Canterbury	7 29	385.0	365	13,415.3	706.36

305-DAY DIVISION—FIRST CLASS.

Jerseys.

Junior Two-year-old						
Topsy's Gem	J. Tattersall, Kaponga	1 335	250.5	294	7,616.2	438.81
Santa Rosa Springtime	M. Short, Feilding	2 49	255.4	305	6,127.2	363.35
Alven Jena	Hamilton Allen, Kihikihi	1 360	250.5	305	6,183.2	361.32
Alven Charm	Hamilton Allen, Kihikihi	2 7	251.2	305	5,371.8	322.99
Three-year-old						
Ebors Meg	R. J. Wilson, Putaruru	3 327	319.7	305	11,978.9	663.23
Ebors Dene	R. J. Wilson, Putaruru	3 269	338.9	304	10,109.4	554.09
Compte's Starlight	J. Houlahan, New Plymouth	3 335	320.5	305	9,054.8	513.12
Four-year-old						
Ebors Sonja	R. J. Wilson, Putaruru	4 72	330.7	304	10,169.2	552.31
Ebors Pam	R. J. Wilson, Putaruru	4 15	327.0	290	9,821.4	469.68
Havenlea June	A. L. Cooper, Papakura	4 55	329.0	305	7,631.8	395.70
Mature						
Ebors Lady Lois	H. Waldon, Putaruru	6 38	360.0	305	11,675.4	654.88
Winsford Dulcie	R. J. Tabor, Hunterville	5 352	360.0	119	7,434.0	401.74

Friesians.

Senior Four-year-old						
Fairburn Lady Taureau	W. C. Miller, Motukarara, Canterbury	4 246	348.1	305	14,846.1	592.17

305-DAY DIVISION—SECOND CLASS.

Jerseys.

Four-year-old						
Ebors Esme	R. J. Wilson, Putaruru	4 26	326.1	291	10,979.4	481.98

Veterinary Notes for the Farmer

Discussions on First-Aid Measures

Contributed by the Livestock Division

Veterinary Notes for the Pig Farmer

Castration of Pigs

THE pig farmer is faced with castration of his male pigs in a similar manner to the sheep farmer who requires to deal with his lambs. The difference between these two classes is a difference mainly between the nature of the scrotal sac. In the pig the testicles are caught up and there is no apparent sac, whereas in the lamb the testicles are supported in a pendulous sac with a distinct neck. In the latter case several methods of castration are open to the operator, including the use of instruments for crushing the cord without causing a skin wound. This is considered advantageous by many operators, as it prevents infection of wounds, suppuration, and subsequent abscesses.

Strict Cleanliness

If the same method of operation could be adopted in the case of the pig it would probably reduce or eliminate the large number of pigs found affected with post-operation abscesses. Abscess formation at the seat of castration should not occur if strict cleanliness is observed at the time of operation and for a few days following.

A clean knife which has been sterilised by boiling should be used for the castration of pigs. The skin over the scrotum should be thoroughly washed with soap and water or a weak antiseptic lotion before the incision is made. The incision over each testicle should be large enough to enable the testicle to be enucleated without any pressure and to provide adequate drainage of the wound afterwards. No pockets should be left at the lower part of the wound (the pig being in the upright position), as pockets are liable to become infected and form abscesses.

A clean operation with a clean instrument should not require any antiseptic treatment after the operation. In practice, however, it is advisable to apply a protective dressing of tar, as the surroundings may contaminate the wound. As clean surroundings as possible should be provided, the pigs being placed in a paddock with a good covering of grass.

Suitable Age

Healing of the wound takes place quickly in young pigs, and it is advisable to castrate the pigs at an early age, about three or four weeks being a good age.

Care in the castration of pigs and the elimination of abscesses will enable more pigs to be exported. A suppurating wound may become infected further and become the site of a necrotic ulcer or sore.

Necrotic Ulcers Or Sores

UNDER this heading may be described the formation of sores or ulcers on any part of the skin of the pig. The origin of the sore is a wound or break in the skin which allows infection to gain entrance. This may occur in any part of the body, but most commonly the sores are seen about the mouth, jaw, and nose in young pigs, whereas in older pigs the sores are commonly seen on the foot, the point of the hock or knee, at the seat of castration, or on the shoulder or hip.

The sores follow infection of a wound with specific organisms which cause such a destruction of the tissues that the ulcer soon becomes covered with a thick crust of debris, the organisms appearing to spread and eat deeper and deeper into the skin and tissues. Many owners have described the condition as cancer of the skin, and many pigs have been killed when this erroneous view has been taken. Although prevention is better than treatment, it must be remembered that many affected pigs can be treated and successfully cured, and that the fattened pigs will then be passed when sent forward for slaughter.

Treatment

The treatment consists of cleaning up the sore by removing the thick

crust or scab with brush, soap, and water. When dry, the affected sore should be dusted lightly with tartar emetic, known and obtainable from the chemist as potassium antimony tartrate. This is a poisonous powder, and must be handled with care on the farm and in the treatment of affected animals.

Naturally, animals affected about the mouth will be difficult to treat because of the danger of poisoning the animal. In this case, finely powdered bluestone may be dusted on to the affected sore. In all other cases better results will be obtained from using the powdered tartar emetic.

Prevention

Prevention comprises mainly the isolation and treatment of the affected animals. If a large number of pigs are found affected on one property it is apparent that the pig sections are infected with the organisms responsible for the disease. Consideration would then need to be given to a change of site for the piggery or to the gradual evacuation of infected pig sections, which may then be ploughed up, limed, and cropped before being sown down again. Particular attention should be paid to the drainage of sections and the general sanitation of houses and feeding places and troughs.

The prevention of wounds on pigs of all ages will cover several aspects of pig management, and include the removal of teeth from young pigs, the prevention of fighting among pigs of different ages and litters, attention to sties and fencing, and the general dressing of wounds occurring accidentally.

The "Stag" Pig

CASES are seen at some of the killing centres where a "stag" pig has been loaded in a truck with other pigs being sent forward for slaughter. The damage such an animal may do to the other pigs in the truck is appalling at times. Otherwise sound, healthy pigs may be gored and gashed to such an extent that the carcasses have either to be rejected for export or graded down.

It is suggested that a young "stag" pig may be overlooked at the time of sale or loading, but there is no excuse for loading up a large "stag" pig with prominent tusks in a truck with porkers or baconers.

In a recent case under notice the entire truck load of baconer pigs was gashed and gored by an aged "stag" with prominent tusks. The damage caused was more than the "stag" animal was worth. In such a case it would appear advisable either to detusk the "stag" on the farm prior to railing, to load the animal in a separate truck or in a crate, or to destroy the animal on the farm.

The vendor who insists on a buyer taking an aged "stag" with the other pigs purchased on the farm should realise the serious damage such an animal may do. Likewise, there is a responsibility on the buyer to see that such an animal is crated or trucked separately.

Answers to Correspondents

Meat Which Went Bad

"SUNDAY PIE" (EAST COAST):—

One Friday recently the cowboy killed a wether for the house. The body was left hanging in the slaughterhouse overnight, and was then taken to the butcher's shop, where it was cut to requirements. At 10 o'clock on Saturday morning the leg was cooked for Sunday's dinner, and when served, the meat was bad.

The slaughterhouse is an open-air one, and very clean. The butcher's shop is enclosed, but is also clean. The weather was overcast, with a few scattered showers.

I would deem it a great favour if you would furnish me with full particulars as to what might have been the cause of the meat turning bad so soon.

LIVESTOCK DIVISION:—

In reply to a problem of this nature it will be quite clear that under normal circumstances the meat obtained from the wether should have been perfectly fresh and wholesome, even though the weather was overcast and probably muggy.

A possible explanation lies in the fact that the wether was suffering from some fevered condition at the time of slaughter, and as a consequence did not bleed out as thoroughly as a perfectly normal animal. In such a case the carcass does not set properly, and decomposition sets in quickly. An improperly-bled carcass does not keep well.

It is possible that the animal was hurriedly brought in from the paddock for slaughter, and in such a case thorough bleeding does not always take place. All animals should be thoroughly rested in the yard overnight before slaughter.

Advisory Service on Veterinary Matters.

Farmers are invited to submit inquiries connected with the health of their stock, and the replies will be published under this heading.

Farm Practice and Management

Contributed by Officers of the Fields Division

It Pays To Make Farm-yard Manure

FARM-YARD manure is a valuable fertiliser made from the litter, dung, and urine of animals. It contains nitrogen, phosphoric acid, and potash in various degrees of availability to the plant, and also supplies humus to the soil. Urine contains most of the nitrogen and potash of the food in a water-soluble and available form. The nitrogen and potash are, moreover, comparable in their effect with quick-acting, synthetic fertilisers.

The litter is poor in the three fertilising constituents, but it supplies most of the humus, and acts as a retainer for much of the urine in the manure. The dung consists of indigestible residue of the food ingested, and contains nitrogen, phosphates, and potash, usually in an insoluble and comparatively resistant state. Together with the litter or bedding, it supplies humus to the soil.

Essential Foods

Surprisingly large quantities of the three essential plant foods—nitrogen, phosphate, and potash—pass through the animal system, and it has been calculated that although only one-half of the solid matter of the food reappears in the manure, about three-quarters of the nitrogen and nine-tenths of the phosphate are voided. These proportions will, of course, be reduced for growing animals and increased for full-grown stock.

There is considerable variation in the quality and character of farm-yard manure, depending on the kind of food and animal and the manner of storage. Thus, horses produce dry "hot" dung, which ferments and acts quickly, whereas that of cattle and pigs is "cold," slow-acting and more durable.

The quality of the manure is largely determined by the manner in which it is stored. In New Zealand very large quantities of cow and pig excreta are wasted annually solely because proper steps are not taken to conserve this valuable fertiliser.

Saving Manure

Some farmers have recognised this fact, and have devised means of saving both solid and liquid manure with the least amount of wastage. A certain amount of the nitrogen cannot be prevented from escaping in the form of ammonia. Where dung is exposed to sun, wind, rain, and seepage, the loss may be as high as 30 per cent. of the total ingredients.

Farm-yard manure is best made if kept wet enough to rot and sufficiently consolidated to rot slowly. These two ends can be well achieved by depositing new dung over the old in a pit, preferably constructed of concrete to hold the moisture.

The making of farm-yard manure involves a certain amount of work, but is it beyond doubt that this is amply offset by the subsequent value and return from crops by the applications of this fertiliser. Whether used for cropping or on pasture, it is best applied in the autumn so that it holds winter rains and is well rotted in spring or early summer.

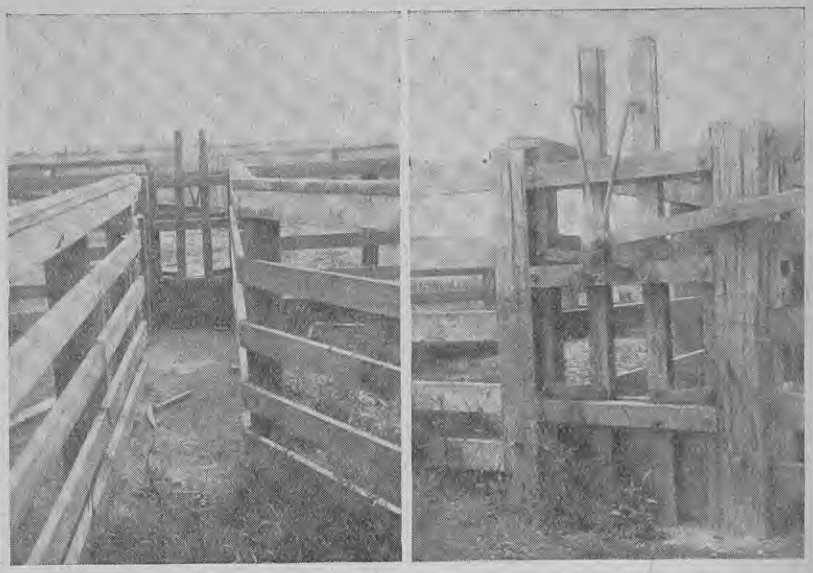
—A. M. LEE, Fields Instructor, Whangarei.

The following stock were imported during the year ended 31st March last: Cattle, 33; sheep, 839; pigs, 24; horses, 18. Of the above animals, the following were placed in quarantine for the respective periods required: Cattle, 33; sheep, 14; pigs, 24; horses, 12 (trotters from the United States of America). During the year under review the following animals were exported: Sheep, 10,742; cattle, 97; pigs, 22; horses, 6. There was the usual movement of thoroughbred horses to and from Australia.

Useful Dehorning Bail

IN these days, when every care is necessary that fat cattle should arrive at the killing works without blemish through bruising, it becomes more and more essential either to breed hornless cattle or to see that the horns are removed as early as possible.

Dehorning the calves with caustic soda, while practicable on dairy farms, is not possible with run cattle or fat stock generally, and a good dehorning race and bail is still required on many farms where horned cattle are raised or fattened.



Left.—A view of the bail from the drafting race. *Right.*—Front view of the bail when closed.

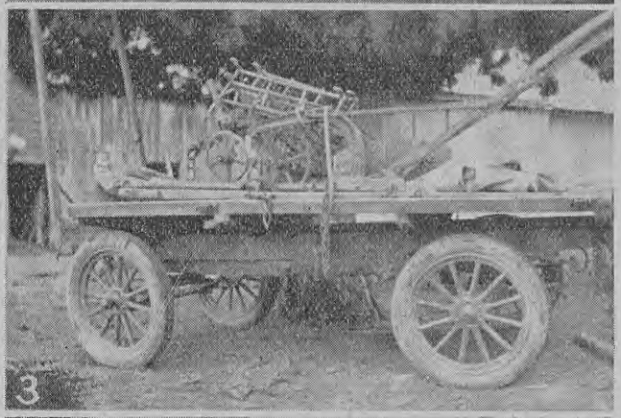
The photographs are of a dehorning race and bail as used in Hawke's Bay. This bail has much to recommend it. One man can operate it with ease, the bail remaining closed without any fixture. Such dehorning race and bail can be constructed to open out of any cattle drafting yards. In operation, the bail illustrated has also proved its efficiency in reducing to a minimum the danger of injury to grown cattle during dehorning.

—R. P. HILL, Fields Instructor, Hastings.

Useful Farm Vehicles Built From Dismantled Cars


1


2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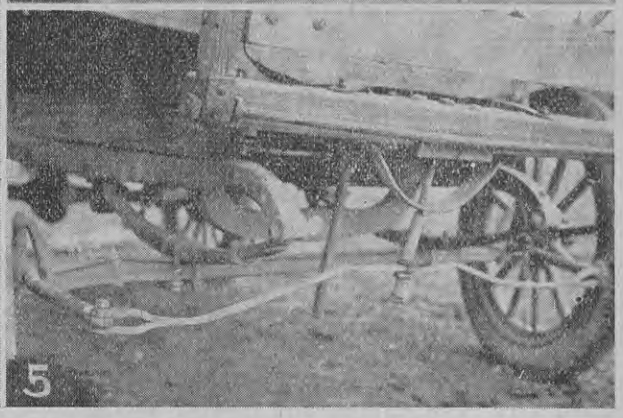
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FOR general farm work there is perhaps no equipment in such everyday use as the common horse-drawn cart. Low, easily-drawn vehicles of the type illustrated, which are capable of being readily loaded and unloaded, and are suitable for a multitude of farm purposes, can be constructed at no great cost from old car or light truck chassis.

These complete units, together with springs and pneumatic-tyred wheels, are available from car dismantling agencies, or often from garages. When fitted with a decking and shafts, cheap, useful two- or four-wheeled carts and lorries can be built which are easily drawn and are capable of bearing considerable weight.

Fig. 1 shows the construction of a general purpose two-wheeled model, while the vehicle shown in Fig. 2 is suitable for cream or milk delivery.

The horse-drawn lorry illustrated in Fig. 3 has the shafts coupled to a movable central-pivoted beam, of which a close-up is shown in Fig. 4. The underside of this beam is shown in Fig. 5, which also shows the coupling mechanism to the shafts. These replace the original steering gear, and allow the front wheels to turn in the direction in which the horse is driven.

This type of vehicle is often seen in use in Nelson orchards, and is also eminently suitable for much other farm work.

—D. M. E. MERRY, Instructor, in Agriculture, Nelson.

The Orchard and Vineyard

Contributed by the Horticulture Division

Orchard Notes

Harvesting the Fruit Crop

DURING the coming month fruit harvesting will occupy the attention of many orchardists who produce stone fruit and early varieties of apples and pears, and time will be required in preparing for harvesting the main crop of pip fruits.

Although this important work must receive attention, a continuation of spraying, particularly for the control of insect pests, is very important, as January may be regarded as a critical month, and nothing should be left to chance through pressure of work in other directions; otherwise severe losses in the main crop may occur. Hot, dry days, and especially warm nights, favour codlin-moth activity, and much infection could occur if a satisfactory coverage is not maintained.

Pests and Diseases

Spraying of apples and pears should follow along the lines indicated in previous notes. The general recommendation is for the continued use of a fungicide, preferably lime-sulphur plus colloidal-sulphur, but to reduce the strength of lime-sulphur as the season progresses. The maximum strength for the remainder of the season should be 1-200, with colloidal-sulphur 2lb. to 100 gallons. Trees showing any signs of a weakening in foliage or a suspicion of spray injury are better sprayed with colloidal-sulphur as the only fungicide, leaving out lime-sulphur altogether.

Arsenate of lead must be added to all general spray applications, using not less than 1½lb. to 100 gallons. Hydrated lime should be added to the arsenate of lead before combining it with the sulphur spray. The quantity of hydrated lime used should be 2lb to every pound of arsenate.

In more humid districts, and where bitter rot (*Glomerella*) occurs, it may become necessary (and is advisable) to replace sulphur sprays with a weak Bordeaux mixture, strength 1½-3-50. No danger of russetting from the use of Bordeaux can accrue if used at the strength recommended at this time of the year.

Timing the Spraying

It is necessary to anticipate possible picking dates for apples and pears, and thus to time the last spray application of arsenate of lead on any particular variety to avoid having an excessive spray deposit on the fruit when harvested. Especially is this necessary on early and mid-season varieties, as in some districts it is necessary to continue spraying right into the harvesting season to secure control of codlin-moth. In most cases, spraying of late varieties ceases some time before the time for harvesting, and little trouble occurs.

As already indicated, January may be regarded as a month for greater insect activity. In addition to increased danger of codlin-moth infection, trees may suffer from foliage pests, including red mite and apple leaf-hopper, and their activity may extend up to the end of March.

The most effective summer control for red mite is to spray with summer-oil at 1 per cent. dilution. Summer-oil used at that strength will destroy not only adult mite, but also summer eggs. Success depends on thoroughness in application, however, and any failure to secure control from spraying is an indication of incomplete coverage due to either carelessness in applying or inadequate appliances.

Examine the Foliage

Frequent examinations of foliage are necessary to guard against red mite becoming so well established as to cause material damage before control measures are applied. Once bronzing of foliage through red mite injury occurs, the pest has perhaps passed its peak on the particular trees affected and is rapidly on the wane, but the damage done is irreparable for that season, and the crop is seriously reduced in size and appearance.

Apple leaf-hopper is another insect pest which causes serious damage to foliage and fruit at times, and growers may be caught unawares unless on the alert. The control is to apply nicotine sulphate 1-800 before the insects become winged. Once the insects are on the wing, control by spraying is not practicable. Apart from the weakening effect from foliage injury caused by apple leaf-hopper, much of the fruit is so seriously marked that it is quite unsaleable without cleansing.

Cultivation and Cover Crops.

Light cultivation should continue at least until the end of January, when the final cultivation should provide a good seed bed for a cover crop. Blue lupin is the most favoured crop for enriching land deficient in humus, but it

must be sown in January to make sufficient growth by early winter. At the time of sowing, an application of 1½cwt. of superphosphate is advised to assist the lupin crop.

Thinning the Fruit

Although the maximum benefit from fruit-thinning may be secured by doing this work earlier, any available time will be profitably employed in further thinning. By this time there should be sufficient indication as to whether the thinning has been adequate for the particular crop and the seasonal conditions. In any case, it is an advantage to go over the trees a second time to remove fruit obviously undersized, diseased, or badly russetted, which may increase the proportion of lower grades or rejects if left. It is far better to avoid handling these in the packing shed during the rush of a fruit harvesting season.

With a possibly much-reduced fruit export—and markets in the Dominion likely to be more than adequately supplied—it is desirable that small and low-grade fruit should be reduced in quantity as far as possible. Small sizes, particularly, are in little demand locally, a fact which points to the necessity for extra thinning to secure larger fruit on the average and the elimination of small sizes. Thinning carried out on a normal crop does not reduce the bulk of fruit fit for market, but brings about more uniformity in size, with an increase in the average size of the remaining fruits.

Handling the Crop

Fruit harvested during the coming month will be mainly stone fruit, although a fair quantity of Gravensteins and other early apple and pear varieties will appear on the markets.

Very great care is required in handling stone fruit to avoid wastage. Maturity for picking should be regulated according to the distance the fruit is intended to travel. Fruit for near markets may approach a tree-ripened stage of maturity, and if special packages, either trays or crates, are used, the fruit may even travel some distance. For long distances, and unless there is rapid delivery to the markets, peaches should be picked while still firm.

Care should always be taken in avoiding any contact between sound fruit and fruit affected with brown rot. Special tins which may be sterilised should be used for picking if any rot is present, and no diseased fruit should be handled when picking sound fruit.

Particular attention should be given to maturity for picking apples. Fruit for immediate sale on the local market should be allowed to reach a greater degree of maturity than fruit intended for cool storage or for export. Under the abnormal conditions prevailing, the bulk of the apple crop could with advantage be left to gain rather more maturity than is usual when picking largely for export consignment.

Packing Shed Hygiene

Packing shed hygiene and care in handling are important factors in minimising subsequent storage rots in fruit. Reject fruit should not be allowed to remain in or about the packing shed to rot, but should be removed and destroyed or fed to pigs. Grading machines accumulate dirt very quickly under certain conditions, and require cleaning at frequent intervals to avoid marking of fruit, which is very detrimental to appearance, keeping quality, and market value.

With the possibility of much greater quantities of fruit having to be held for later markets without extra cool storage facilities being available, growers should make some provision for orchard storage in sheltered and cool positions under shelter belts or in plantations, but avoiding positions exposed to prevailing winds, which may cause excessive wilt in fruit. Fruit will develop less wilt if storage cases are paper-lined.

—N. J. Adamson, District Supervisor, Nelson.

Citrus Notes

Value of Orchard Records Book

WHEN these notes appear the 1939 citrus production year will be closing, and it may be appropriate to suggest that as from January 1, 1940, citrus growers producing lemons, oranges, and New Zealand grapefruit endeavour to begin regular diaries in which is set down a daily summary of the day's activities, matters of particular interest observed in the orchard, out-of-pocket expenses connected with the orchard, and questions for the Orchard Instructor at his next visit.

Need for Records

Some growers may consider that it is neither feasible nor necessary to attempt any such summary, but recent efforts to obtain costs of lemon production clearly demonstrate the necessity for such records to be kept. If growers with bearing groves of more than 200 citrus trees kept such records, they would be invaluable whenever any survey required is to be undertaken. Records of this kind would also tend to summarise results achieved or possible from any block of citrus trees.

Every orchard has its trees of inferior strain, some of which bear coarse or ill-shaped fruits, some which have never borne a reasonable crop per tree, and others which have succumbed to borer, bark blotch, or collar rot. These trees should be noted in an orchard records book, together with the efforts being made towards improvement. Only by such means will the grower be in a position to decide which trees require to be eradicated, drastically pruned, treated for disease, or budded over to a better strain.

Efforts are being made to improve the existing varieties of citrus in New Zealand, and each grower can assist by marking those trees in the grove which are outstanding in both quality and quantity of the fruit borne. This is most necessary for the lemon, New Zealand grapefruit, and sweet orange.

"Off Type" Trees

Now is the time to bud over or top-work a few "off type" trees. The process of budding is better demonstrated

than described, and the co-operation of the local Orchard Instructor is available for this purpose. Few citrus growers have begun reworking trees, but it is undoubtedly necessary when the percentage of inferior type fruits grown is noted. Treat each tree in the orchard as an individual, and record its shortcomings and endeavour to rectify them.

The keeping qualities of lemons are often closely related to field practices, but these are exceedingly difficult to check unless the grower endeavours to retain an accurate record of his field practices. This record is also of great value in efforts towards disease eradication and control. Note the date when the disease was seen, the special symptoms, and the methods employed for its control. All such records noted are of value to the Instructor and to the research worker in their efforts towards disease control and the particular difficulties encountered from season to season.

Do Not Over-cultivate

While endeavouring to conserve moisture at this season of the year, do not over-cultivate. Humus or organic matter is generally deficient in citrus orchards, and excessive cultivation during the hot summer months often nullifies efforts towards the building up of the organic matter during the winter months, either by weeds, cover crop, or by green manuring.

—A. M. W. Greig, Citriculturist, Auckland.

Viticulture

Pasteurised Unfermented Grape Juice

FOR home use in pasteurising unfermented grape juice, an open boiler for heating the must and scalding both the bottles and corks, and an ordinary jelly filter, may be made to serve the purpose.

After the grapes have been stemmed and crushed, the juice is extracted by pressing them in a clean sugar bag or cheese cloth and running the liquid into a vessel, where it is allowed to deposit some of its solid matter. This vessel should be placed for a few hours in as cool a place as possible to avoid fermentation and to allow the bulk of the solid matter to separate from the liquid.

From this settling vessel the partly-clarified must is poured into an open copper, heated up to 180 deg. to 185 deg. F. and kept at that heat for half an hour. A steam-jacketed boiler is the best for this purpose, but an ordinary boiler will answer the purpose if the liquid is frequently stirred to prevent burning.

All scum arising should be skimmed off, and at the end of half an hour the juice run into a fresh settling receptacle properly sterilised. A small barrel which has been steamed or washed out with boiling water and closed with a bung which has been sterilised by dipping it for a few minutes in boiling water will do for this purpose, or a demijohn similarly treated will answer the purpose for smaller quantities.

The high temperature in the boiler will coagulate the albumen and other flocculent matters, and, for that purpose, the temperature should never exceed 190 deg. F., at which some of the albumen will redissolve; nor should it be less than 175 deg. F., or it will not coagulate. A thermometer should be used, but if such is not available the juice should be heated till it steams, but it must not boil, as boiling spoils the flavour.

In the barrel, much of the albuminoid and viscous matters in the must, which will have been coagulated during the first heating process, are deposited. It will take about 24 hours to clear. This renders the operation much easier. After this, the must may be filtered through a conical flannel bag or any suitable filter and run into sterilised bottles, which are then securely corked with well sterilised corks, leaving a space of from 2 to 2½ inches between the liquid and the cork. (The corking is sometimes done after the final heating and while the bottles are still hot, when the bottles can be filled up to the cork).

These bottles are placed on a thin board (if the fire is direct) in the copper, and the temperature gradually brought up to 175 deg. F., at which temperature they are maintained for half an hour and then cooled to prevent the unfavourable effect of the continued heat on the colour and flavour. A thermometer placed in one of the bottles or in a bottle of water indicates the exact degree of heat.

It is essential, in order to sterilise the must, that the above temperature be reached but not exceeded, as a higher degree of heat at the final heating would coagulate a fresh lot of albuminoid matters, which would cause their precipitation and make the liquid turbid.

Champagne or other strong bottles should be used for the second sterilisation, and the corks tied with strong string to prevent their being blown out. When this is done the contents will keep indefinitely unless mould penetrates the corks. This may be prevented by dipping the necks of the bottles into a 2 per cent. solution of sulphate of copper (3 to 4 ozs. of bluestone in 1 gallon of water) and then laying the bottles on their side for some days, after which, if they are noticed to be leaking, they should be placed on one side for immediate use and the remainder dipped at the neck in bottling wax. Care should be taken in melting the wax to keep it stirred to prevent it burning and assuming a gritty appearance.

Grape juice thus bottled may be kept sound for years. It will greatly improve by keeping for a few months before it is used.

To obtain a coloured juice from black grapes, heat the crushed berries and juice to 160 deg. F., or steaming point, and hold it there for a few minutes; then press out juice as soon as it can be handled and proceed as above.

Other fruit juices can be treated in the same manner.

—J. C. WOODFIN, Vine and Wine Instructor, Te Kawhata.

Cool Storage Notes

Overhaul of Refrigerating Plant

FRUIT cool storage chambers will now be empty, and few refrigerating plants, if any, will be operated until the new season's crop is ready for storage. Therefore, an opportunity presents itself to have a thorough inspection made of all the working parts of the plant in order that repairs and renewals may be effected, and all of the equipment of the store put into good running condition before the plant is again required for storage.

The parts of the ammonia compressor which require inspection are the main bearings, especially if these have given any trouble during the past season's run. The suction and delivery valves of the compressor also should be removed for inspection, as cracked or broken plates will need to be replaced, or pitting of the valve or seating may require attention. Worn spindles of stop and expansion valves require renewing, and the seating of faulty valves will also need attention.

Thorough Overhaul

The owner of a private cool store would be well advised to have a thorough overhaul of the electrical and refrigeration plant, including the condenser pump, carried out by his refrigerating engineer during the time the plant is not required.

When an ammonia compressor is not to be operated for some time it is always advisable to close the suction and delivery stop valves of the compressor and make sure that the compressor gland is perfectly tight. All stop and expansion valve glands should also be inspected, and the gland nuts tightened with a spanner. Flanges, also, should be tightened, as these precautions will avoid the leakage of ammonia.

Much of the work of scraping the cooling coils may be carried out by the hands employed on the orchard. These pipes should be thoroughly cleaned of all old paint and rust, and then painted with an anti-corrosive paint, such as aluminium paint. Drip trays and drainage pipes should be cleaned and painted.

All ammonia piping on the expansion side of the compressor which is outside of the cool chambers should be covered with insulation. Condenser coils also will require to be scraped clean of all old paint and rust and repainted.

Cool Chamber Doors

Cool chamber doors are constantly in use during the year, and their padding often requires attention. They should be removed from the hinges for examination and the padding repaired if this is found to be necessary, as a cool chamber door with faulty padding is a potent source of leakage and loss of efficiency.

At the close of the season's run all waste fruit should be removed from the cool chambers and packing shed, and the floors swept clean and the chambers thoroughly disinfected.

To fumigate a cool storage chamber a sulphur and formalin candle is recommended. The door of the chamber should be kept tightly closed for 48 hours after lighting the candle.

Cost of Holding Fruit

The total costs of holding fruit in any particular store are made up of a number of fixed and variable charges, the more important of which are as follows:—

1. Capital charges on building and plant.
2. Depreciation.
3. Labour and supervision.
4. Fuel or electricity.
5. Oil, ammonia, calcium chloride, other stores, and repairs.
6. Insurance and rates.

The whole of these, together with miscellaneous and incidental costs, must be spread over the total number of cases of fruit handled, and it follows therefore that as a proportion of the charges are fixed, the resultant cost of refrigeration per case is more a function of the degree of utilisation of the plant than it is of any other single factor.

Not only is the utilisation of the available space an important factor, but the size of the store and of the plant, the relation of one to the other, and the thermal efficiency must be taken into account when dealing with costs of fruit cool storage space. When estimating these costs, each item of cost should be examined and considered in the light of its relative importance and its bearing on all the inter-related factors that make for efficient and economical storage.

Refrigeration Requirements

Refrigeration consists in the removal of heat. In a fruit store this process presents problems of biological engineering much more complex than is generally recognised by the fruitgrower. The total heat-removal requirements of a case of fruit over a season are very much in excess of the refrigeration effect necessary to chill the warm fruit down to, say, 35 degrees Fahrenheit.

The ammonia system is called upon to remove heat arising from many different sources, which may be classified as follows:—

(a) The sensible heat of the chambers.

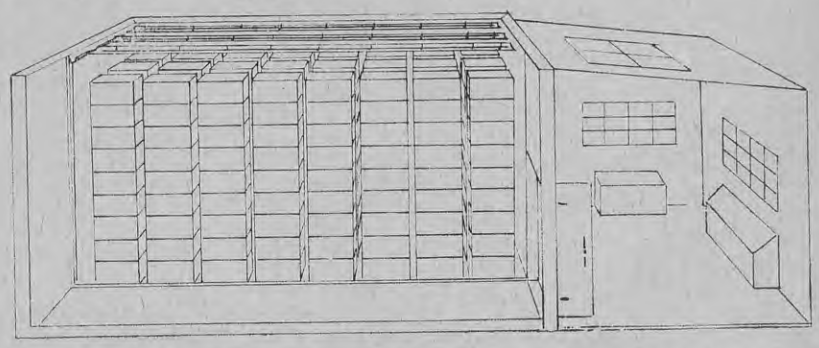
(b) The heat leakage through the walls.

(c) The sensible heat above, say, 35 degrees Fahrenheit of the warm fruit and cases.

(d) The heat of respiration of the fruit.

(e) The heat generated by lighting.

(f) The body heat of workers in the chambers.



A sectional view of a cool storage chamber showing the method of stacking fruit cases to allow for a convextional air movement.

(g) The heat of air exchange caused by opening of doors.

(h) The latent heat of moisture condensation on the coils or in the battery.

(i) The frictional heat of the brine or air circulation systems.

Relative Demand

The accompanying sketch shows in graphic form the relative magnitude of the various components of the season's refrigerating demand on a fruit cool store in Victoria (Australia) with 29,000 case capacity and handling a total of 48,000 cases in the period from January 26 to December 1, totalling 309 days, during which the refrigeration plant ran for 2319 hours.

The construction of the building was timber, with 10in of wood shavings for insulation, which was double-boarded on both sides, and building paper was placed between the double boarding. The refrigeration tonnage of the ammonia compressor was 16 tons, and the system of cooling was brine circulation with air delivered over false ceilings. The area of the outside walls was 25,376 square feet.

Importance of Insulation

This stresses the importance of insulation in relation to running costs. Not only is the thickness of the insulation important, but the actual material is also important.

The conditions for the maintenance of quality in cool stored fruit are temperature, humidity, and ventilation.

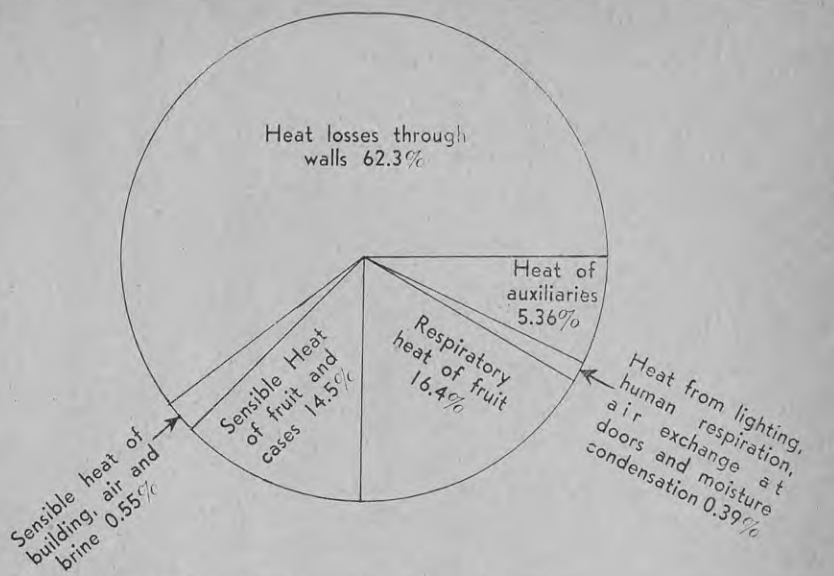
Temperatures must be maintained in each chamber according to the tolerance of the variety being dealt with. For apple storage in New Zealand temperatures range from 32 degrees to 37 degrees Fahrenheit. Steady, unvarying control of temperature conditions throughout the storage period is of major importance.

The control of humidity in storage chambers is of great importance. Shrivel and wilt in fruit are simply the result of the evaporation of moisture from the fruit. If the fruit is maintained in a saturated atmosphere no evaporation can occur.

Chamber humidities of 85 per cent. to 90 per cent. are easily attainable in direct expansion systems, and a well-designed system fitted near to the ceiling of the cool chamber will give superior results for fruit cool storage.

Advantages of Direct Expansion System

The following are the advantages of the direct expansion system where



ceiling coils and drip trays are installed:—

(a) Facilitates temperature control in space, and, where automatic control is installed, in time also.

(b) Provides conditions favourable to the maintenance of correct relative humidity.

	Length.		Width.		Height.		Method of Stacking. Length.		Width.		Height.		Capacity (c/s.)
1.	14′	x	8′	x	10′ 6″	=	8′	x	8′	x	8′	=	512
2.	21′	x	10′	x	10′ 6″	=	12′	x	10′	x	8′	=	960
3.	21′	x	12′	x	10′ 6″	=	12′	x	12′	x	8′	=	960
4.	30′	x	21′	x	10′ 6″	=	17′	x	18′	x	8′	=	2,448
5.	42′	x	21′	x	10′ 6″	=	24′	x	18′	x	8′	=	2,680
6.	50′	x	28′	x	10′ 6″	=	28′	x	25′	x	8′	=	5,600

(c) Enables chambers to be held at different temperatures for different varieties.

(d) Enables the plant to run at higher thermal efficiency because of the higher suction temperatures.

(e) Eliminates the complication of auxiliaries.

(f) Saves power required by auxiliaries.

(g) Avoids the introduction of frictional heat by auxiliaries.

(h) Reduces the depreciation on plant occasioned by brine corrosion.

(i) Saves cost of calcium chloride.

(j) Saves cost of brine concentration.

(k) Saves cost of battery room, ducts, and false ceilings.

(l) Lends itself to automatic and semi-automatic control, and enables the plant to take advantage of low off peak energy rates.

Dimensions

The following are suitable inside dimensions of cool storage chambers for cooling with overhead direct expansion coils. Space has been allowed for vertical air movement among the fruit cases:—

In Nos. 1 and 2 no passage is allowed for; in No. 3 a 2ft passage is allowed for; and in Nos. 4, 5, and 6 a 3ft passage. Dunnage among the fruit cases is not necessary when space is provided for vertical air movement.

Should the process of gas storage be further developed commercially, there should be little difficulty in adapting this direct expansion system to that method.

The physiological aspects of the behaviour of different varieties of apples in cool storage, the effect of soils, seasons, pruning, manuring, etc., are all-important in the holding of fruit in cool storage, and require to be studied closely by the owner of the fruit, as the temperature tolerance of certain varieties of apples, such as Jonathan and Sturmer, vary as the quality of the fruit, as well as its length of cool storage life, is affected by these factors.

—A. POWELL, Cool Storage Officer.

The Home Garden

Small Fruits and Flowers

Vegetables

Care in Harvesting Onions

EARLY-MATURING onions, and onion types such as potato onions, shallots, and garlic, must be watched for the first signs of maturity, which is indicated by a slight yellowing of the foliage and a falling over of the stem just above the bulb. If the weather is moist and they are not taken up at this stage, new growth soon starts and the keeping quality of the bulbs is impaired. This especially applies to early varieties and to the potato onion, which, at the best, is not a good keeper.

When taken up, the bulbs may be left on their sides for several days on the ground where they grew, so that their roots and stems may dry. In small quantities it is often practicable to place them on a path, where they will dry better. Generally, only a small quantity of these onions is grown.

The condition of the shed where onions are stored is of great importance. Cool temperatures and dry, airy conditions are essential. Early onions and potato onions are not good keepers, and will seldom keep for more than five or six months. Shallots and garlic will keep if conditions are suitable for nine months or more. Those who grow potato onions are advised to retain the small bulbs for planting next May or June.

Spraying Potatoes And Tomatoes

BOTH potato and tomato crops are liable during warm, humid weather to attacks by the fungus *Phytophthora infestans*, producing late or Irish blight. The blight is first noticed as small black patches on the leaf or stem which, under favourable conditions of warmth and humidity, rapidly extend until the whole plant is blackened. The spray to use is Bordeaux mixture at the strength of 3-4-50 (see accompanying paragraph on preparing Bordeaux).

Prevention is better than cure. Where the disease is expected, it is wiser to spray before the blight appears, and to maintain a coating of Bordeaux over the entire above-ground portion of the plant by repeated monthly sprayings (more frequent if the weather is humid), using a fine spray. Spraying must be done in fine weather so that it dries on and sticks to the plant. There is little chance of curing plants which are badly infected.

If potatoes are badly blighted late in the season spores will wash down into the soil and infect the tubers. To prevent this, the tops may be removed and destroyed, the tubers being dug within a week or two, before new growth makes its appearance.

Seasonal Don'ts

Don't

let weeds go to seed. It is only by ripening seed that annual weeds are able to perpetuate themselves. When it is remembered how long weed seeds can survive in the ground the fallacy of allowing weeds to grow to maturity will be realised. Some weeds, even as very small plants, can ripen seed. They may set out a relatively small amount of seed, but sufficient to establish several hundred seedlings later in the season.

Don't

cultivate the ground too deeply when plants have made full growth, as at that stage their roots will be penetrating throughout most of the ground. Deep cultivation will damage roots which are near the surface. All that is necessary at that stage is a shallow hoeing with a push-hoe.

How to Make Bordeaux Mixture

The strength of Bordeaux recommended as a preventive spray is 3-4-50—that is, 3lb. copper sulphate, 4lb. lime (freshly slaked), and 50 gallons of water. Proportional quantities of the materials are used when smaller amounts of the spray are required. Thus, if 4 gallons of spray are required, 4 oz. copper sulphate and 5 oz. lime are used.

The copper sulphate is dissolved in water in an earthenware or wooden vessel, the lime is made into a paste with water, and the two chemicals are diluted considerably and mixed. The volume is then made up with the required quantity of water.

Random Notes

Transplanting Seedlings In Dry Weather

WITH the approach of midsummer the weather gets hotter and drier, with the result that it becomes

more and more difficult to transplant seedlings. It is not always practicable to water or flood the area, but satisfactory results can be achieved by making a hole with the trowel, filling it with water (using a pint at least per hole), and setting the seedlings rather deeper than they grew in the seed-bed in a slight depression in the ground.

Plants 3 or 4 inches high, and those which appear to be on the small side but are well rooted and hardened off, are the best to plant. If conditions appear too dry it is better not to delay planting until rain comes, as the seedlings are growing and, when larger, will transplant with greater difficulty even though conditions may temporarily appear favourable.

Moulding of Crops

THE moulding of crops is quite an important operation, and has marked benefits to crops during the dry season. Firstly, it covers the roots with a greater depth of soil, so that the soil about the roots is not subjected to the same amount of drying, as otherwise would be the case.

Secondly, it destroys weeds between the rows and buries those actually in the rows which are otherwise difficult to hoe.

Thirdly, by drawing several inches of soil round the plants, additional support is given to the stems, so that the plants do not lodge so readily.

Small Fruits

Raspberries and Loganberries

AS the picking season passes, wood on raspberries and loganberries from which fruit has been picked should be cut out entirely and burnt. There will be plenty of young growth coming on, and it will benefit both by receiving the whole of the nutriment coming from the roots and by the increased amount of light.

Keep the ground around the plants cultivated.

In districts where the buds are liable to be destroyed by the larvae of the raspberry bud moth later in the season the growth left after pruning should be sprayed with arsenate of lead (1½ lb. per 100 gallons of water), and the spraying repeated at three to four-week intervals.

What to Do in the Vegetable Garden This Month

Summary of operations for the month (until the middle of January).

SEEDS TO SOW.

Turnip, globe beet, carrots, lettuce, beans and peas.

SEEDLINGS TO TRANSPLANT.

Savoy cabbage, kale, broccoli, cauliflower, Brussels sprouts, leeks and celery.

PERENNIAL CROPS.

Keep runner beans well watered and give dressings of blood and bone or liquid manure. Cut back vines that have borne beans to encourage new growth.

SPECIAL NOTES FOR WARM DISTRICTS.

Plant out seedlings of tomatoes for a late crop ripening about Easter.
Sow a late crop of runner beans for late picking.

SPECIAL NOTES FOR COLD DISTRICTS.

Spring cabbages are sown towards the end of the month (in other districts during February).

GENERAL WORK.

Tie up tomatoes and remove side shoots.
Use the hoe frequently to destroy weeds and to conserve moisture.
Apply liquid manure to salad crops.
Thin out seedling crops that have not been thinned previously.
Water as required.
Spray to prevent disease, and use derris dust to check white butterfly.
Earth up potatoes and other crops.

By this time most of the planting should be completed and the vegetable garden well filled with crops at all stages of maturity. The main work of the month is the tending of crops already planted.

Currants

WITH black currants, the wood from which the fruit has been picked should be cut back to strong side shoots or cut out entirely, leaving only the young wood which will be next season's fruiting wood.

Gooseberries

IF the gooseberry bushes were not thinned out during the picking season and judicious summer pruning is practised they should be treated now. This will permit of an increased amount of light to the plant which will assist the development of the buds which are to form next season's crop.

Land for New Planting

LAND on which new plantations are to be made should be selected as soon as possible and prepared in readiness for later planting. To grow the same crop on the same land is not to be recommended, and should be avoided for at least three to four years.

As the ground will be occupied for a number of years, special attention should be paid to its preparation. It should be ploughed or dug deeply and then sown down to a cover crop.

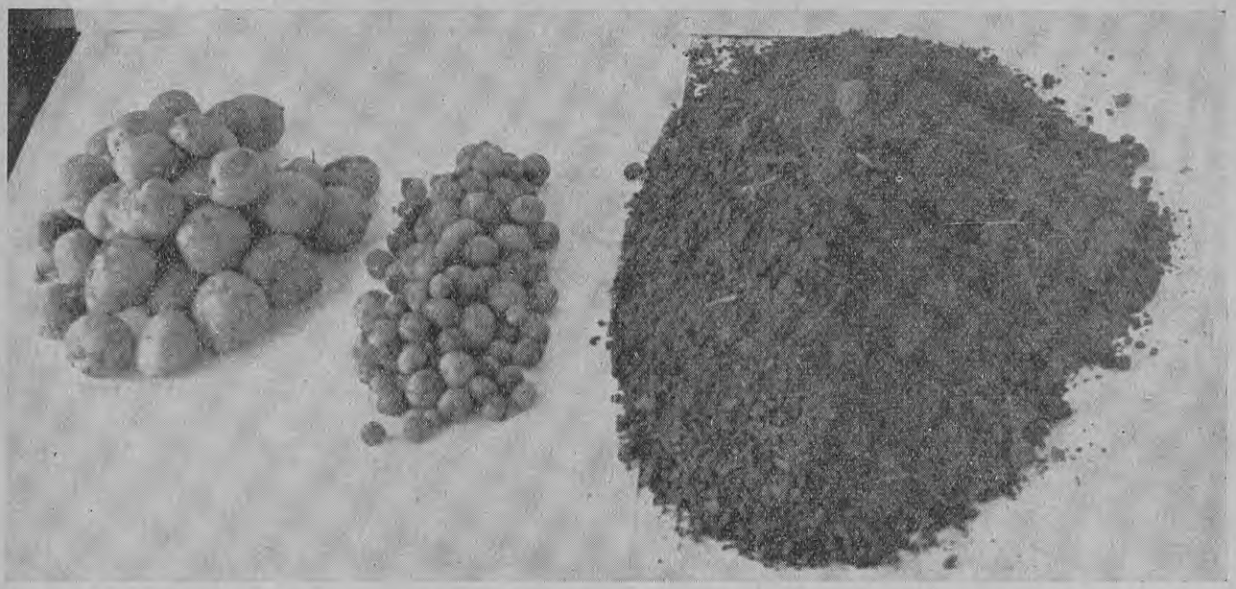
The Flower Garden

DURING the summer months there is not much that can be done in the way of planting to furnish the flower beds. The chief work of the month is to care for those plants that have already been planted. If alterations or extensions are planned, proceed with the work if the soil is not too baked to do so.

The best time to sow lawn seed is March. The ground should be thoroughly prepared and levelled before that time, so that it has time to consolidate and so that weeds can be destroyed as they appear.

(Continued on page 528.)

Unfair Packing of Potatoes



Market Gardener Fined £20; 11¾lb. Of Dirt in Two Bags

STRIKING evidence of a case of unfair packing of vegetables is shown in the above photograph. The potatoes on the left were at the top of the bag examined, and the small ones in the middle were encountered underneath. The heap of dirt shown on the right weighed 11¾ lb., and was taken from two bags.

As a result, a Pukekohe market gardener was charged in the Magistrate's Court, Wellington, with unfair packing, and the Magistrate imposed the maximum fine of £20 and costs.

In evidence, a Fruit Inspector of the Department of Agriculture stated that on October 13, in auction rooms in Wellington, he examined two of a consignment of 47 bags of potatoes from the defendant. The potatoes in the tops of the bags did not fairly represent what remained.

The bags which were examined produced good even-sized potatoes for about six inches down, but the remaining 18 inches contained small and inferior potatoes.

There was also a large quantity of dirt in the lower part of the bags, and no less than 11¾ lb. of dirt was weighed from the two bags examined.

The defendant did not appear, but sent a letter to the Court in which he stated that the bags had been packed by Maoris, who were responsible for the uneven packing.

THE HOME GARDEN—continued from page 527

Bulbs

DURING the latter part of December and January spring-flowering bulbs may be lifted, dried, and cleaned before storing. Take care that they are not damaged during lifting or bruised while handling. The most suitable storage place is a cool, dry, airy shed. If a quantity of bulbs are to be stored they must not be so great a bulk that air cannot penetrate through them readily.

Precautions in drying bulbs must be observed. Some sunburn readily and rot subsequently. This applies to tulips especially and to narcissi to a lesser extent. Hyacinth bulbs can stand exposure to sun, and are benefitted by it.

Hyacinth bulbs should be stored for three months to mature properly. With narcissi, the sooner they are replanted after lifting and dividing the better. It is well to replant tulips as soon as possible, as they are attractive to aphis while in store, and by this means the virus causing striping is spread. If they cannot be planted immediately, watch for the aphids and, if necessary, spray with nicotine sulphate.

Picking of Flowers

PLANTS which produce blooms over a long season can be made much more productive if thought is given to the way in which the blooms are cut. It should be a form of pruning. Only a certain length of stem may be required, but to take only this length will leave much unproductive growth on the plant. This growth may be sufficient to keep the plant nourished.

It is a wiser policy to cut back to well-developed buds. These will then be forced into growth, and in a few weeks should be showing flower buds again. This pruning requires to be done regularly as the blooms or dead flowers are removed. The soil moisture must be sufficient to make this new growth possible.

APIARY NOTES

Contributed by Officers of the Horticulture Division

Advanced Methods of Queen-raising

A SIMPLE method of raising a few queens was given in last month's issue. The method dealt with was principally for beginners, as it was considered the easiest way for those who had very little experience in bee-keeping. A more advanced method is now described for those who have had more experience and wish to raise a number of queens for their own use.

The disadvantage of the natural method, as previously given, is that it is difficult to tell just when they are due to hatch, and it sometimes happens that one queen, if started from a larvae slightly older than the others, will hatch out a few hours earlier than expected. In such cases she will immediately proceed to kill all the other unhatched queens, so that only one queen is left.

By the "artificial" or transferring plan, the bee-keeper can, with care, tell to within a few hours when the queens are due to emerge, and precautions can be taken to guard against losing the queens before and when hatching.

Artificial Queen Cells

Artificial wax cells, to which the young larvae are transferred, can be purchased, but it will be found much more interesting, and equally successful, if the bee-keeper makes his own cell cups. To make good queen cells, a bee-keeper will require to have a good forming-stick, some pure beeswax, a small spirit lamp, and a cup of cold water.

The forming-stick is best made from some hard wood. It should be four or five inches long and somewhat thicker than an ordinary lead pencil. The end should be slightly tapered off and rounded, made smooth with fine sandpaper, and then polished so that it has a very smooth surface.

Place some pure beeswax in a shallow tin over the spirit lamp to melt, and have a cup or tin of cold water alongside. When the wax is melted, take it off the lamp so that it will not get too hot. Dip the stick into the cold water and then into the hot wax to about a half-inch in depth; then dip it again into cold water to cool quickly, and again into the wax. This should be repeated three or four times, but each time the stick should be dipped in the wax a little shallower.

By this means a cell cup will be obtained that has a good thick base, while the entrance will have a knife-like edge.

Fixing Cells on Bars

After the last dipping, and before it has become quite cold, the cell can be loosened from the stick. The base is again dipped into the hot wax, and is immediately stuck on to the wooden bar made to hold the cells. These two bars are made to fit exactly into an ordinary brood frame, the first being placed about 2in from the top bar of the frame, and the other 2in below the first.

They should fit in fairly tightly, and the end may rest on a small piece of wood tacked inside the end pieces of the frame, or it may be secured by driving in a small nail. It is better, however, to graft the larvae into the cells before securing, for the bars are more easily handled when away from the frame. A grafting needle is now required. This can be purchased from the vendors of bee-keeping supplies.

Use of Royal Jelly Advised

Although royal jelly is not absolutely necessary, if the bees are in the mood for queen-cell building, more success will be achieved by its use. If a hive has been made queenless for a few days for queen-raising there will be found a number of queen cells started among brood which is well supplied with this white jelly. Secure a number which are not completely capped over.

The royal jelly may be removed with the broad end of the grafting needle and placed in a warm eggcup or similar vessel. When securing the jelly from the hive, make sure that every cell started in that hive is removed or destroyed. It is important that the jelly be kept warm, and the grafting of the larvae should be done in a warm room. Have the table close to the window, so that there is a good light.

A small quantity of the jelly, about the size of a pea, should be placed in the bottom of each cell cup on the bars. When placing the royal jelly in the cells see that it is placed at the bottom, and avoid dropping any on the sides. Take out the frame containing the pure larvae of about two days old. Keep this warm while moving it from the hive to the room, and if the distance is far enough to allow it to get chilled, wrap a piece of flannel around it. Next, cut out a piece of the comb containing the young larvae and, with a sharp knife, shave it down so that the removal of the larvae is easier.

Removal of Larvae

Place the fine end of the needle in a little warm water to take the chill

off it, or place it in the mouth for a few minutes. Then insert it under one of the tiny grubs, making sure that it is not in any way injured. If there is any doubt in this respect, it had better be discarded and another taken. If it can be so lifted that it partly projects over the edge of the needle it will be easier to deposit it into the jelly, which acts as a soft cushion for the delicate larvae.

When each of the cell cups have received one of these small grubs, destined to be a queen, the bars can be inserted in the frame, which is then placed in the queenless hive prepared for its reception. Great care must be taken to see that they are kept warm during the move from the room to the hive.

Place this frame in the centre of the hive, and if all has gone well the bees will start on the cells immediately, drawing out the wax cup into cells and feeding the young grubs. Unless nectar is coming in freely the hive had better be fed with a light syrup made from equal parts of good sugar and water. In any case, it will be better to feed the hive used for queen-raising a day or two beforehand, as they will then feed the young queens more lavishly.

If the bee-keeper is anxious to know whether the cells have been accepted it will do no harm to have a look at them after 24 hours. Give the hive a little smoke, gently remove the outside frame, and space the frames on either side of the frame with the cells so that it can be easily removed without damaging it.

Handle Cells Gently

On no account attempt to dislodge the bees hanging to the cells by shaking, as in all probability the young grubs would be dislodged and injured. Give them a little smoke, or remove them gently with the finger until the cell can be seen. If the jelly is in the cell all is well, for, if it were not accepted, the bees would clean out the cell and it would be found empty. After taking a brief glance, place them back in the hive.

A record of the date of grafting should be kept in order to know when it is necessary to remove the ripe cells. If the larvae inserted is about the size of a carroway seed it would be about two days old, so that ten days later the cells should be removed, as they would hatch out the next day.

Placing Cells in Nuclei

It will be necessary to have a number of nuclei boxes prepared to receive the cells. If a good, strong swarm can be secured at this time it can be divided up into the nucleus boxes, which will avoid removing frames and bees from the other hives. It will be necessary, however, to find the queen in the swarm and destroy her. If the swarm can be obtained from a distance of a mile or more, so much the better, as, when the bees are divided and have no queen, they will stay "put."

A good swarm should make five or six nuclei. To find the queen, dump the swarm into an empty super, place a queen-excluder on top, and then place another super on top of that with a frame of brood. The bees will soon go up to the brood, but the queen and drones, being unable to get through, will remain below. The top box can then be removed and the queen killed before dividing the swarm into nuclei boxes.

Honey Flow

As the main flow of nectar may be expected any time after the first week in December up to the end of January the colonies kept for gathering the surplus crop should not be unduly molested during these months.

The adding of necessary supers, however, may be done without interfering with the honey gatherers of the hive. It is better to super somewhat ahead of requirements than to restrict the bees from storing through lack of space to store the honey.

—G. V. WESTBROOKE, Apiary Instructor, Hastings.

Slaughterings of Stock

THE following return of slaughterings of stock at meat-export slaughterhouses and abattoirs for the six months, May-October, 1939, has been compiled by the Livestock Division:—

District	Cattle	Calves	Sheep	Of which Ewes were	Lambs	Swine
North Island						
Meat-export Slaughterhouses—						
Auckland	80,704	518,903	39,863	18,624	75,892	56,208
Poverty Bay-Hawke's Bay	20,078	56,162	87,522	23,859	132,034	6,993
Taranaki-Manawatu	46,719	208,377	55,987	27,130	167,004	36,029
Wairarapa-Wellington	15,710	17,813	35,035	14,657	69,919	7,083
Totals	163,211	801,255	218,407	84,270	444,849	106,313
Abattoirs	62,563	20,687	247,842	128,780	17,005	48,140
North Island Totals	225,774	821,942	466,249	213,050	461,854	154,453
South Island						
Meat-export Slaughterhouses—						
Nelson-Marlborough	597	8,984	5,433	2,114	23,420	2,134
Canterbury	5,751	35,798	151,072	110,014	435,833	12,238
Otago-Southland	3,199	37,044	62,409	39,853	572,445	2,076
Totals	9,547	81,826	218,914	151,981	1,031,698	16,448
Abattoirs	29,284	6,203	142,363	69,503	11,326	14,413
South Island Totals	38,831	88,029	361,277	221,484	1,043,024	30,861
Dominion						
Meat-expt. Slaughterhouses	172,758	883,081	437,321	236,251	1,476,547	122,761
Abattoirs	91,847	26,890	390,205	198,283	28,331	62,553
Grand Totals	264,605	909,971	827,526	434,534	1,504,878	185,314
In addition the following stock were slaughtered for local consumption during the 6 months ended 30/9/39, at rural slaughterhouses.	39,522	1,136	115,862	(unknown)	4,363	13,628
Same Period, 1938: Meat-export Slaughterhouses and Abattoirs	248,500	878,953	938,762	543,511	1,339,795	255,844
Rural slaughterhouses	44,240	1,292	107,144	(unknown)	3,807	14,079
Same Period, 1937: Meat-export Slaughterhouses and Abattoirs	261,981	924,320	753,887	408,273	1,449,145	295,444
Rural slaughterhouses	45,301	1,117	107,370	(unknown)	3,077	14,285

Notes for the Poultry Farmer

Contributed by Officers of the Livestock Division

Priming of Table Poultry

THERE is always a keen demand in the main centres for well-primed table poultry, but unfortunately a large number of birds reaching our local markets are of a rather inferior quality, especially as regards age and condition.

The successful farmer realises the advantage of priming his cattle, sheep, and pigs before offering them to the butcher, but it would appear that a number of poultry-keepers do not fully appreciate the importance of priming their poultry before offering them for sale. The result is that the price realised is often unsatisfactory, and the birds are equally unsatisfactory to the consumer.

Tests Conducted

In order to bring this matter under the notice of poultry-keepers, the Department of Agriculture conducted two priming tests in Canterbury some years ago, and full particulars were published in the "Journal of Agriculture."

In the first test 31 cockerels were purchased under competition at one of the weekly poultry sales at Christchurch. The birds were then taken to the Department's reserve at Quail Island, and were fed an ordinary well-balanced fattening diet. After 24 to 31 days' treatment the birds were again offered for sale at the same auction mart, and returned, after deducting cost of feeding, a profit of 92 per cent.

The summarised results of the first test were as follows:—

Number of birds bought			31
Average weight when bought			3.08 lb.
Average weight when sold			5.11 lb.
Aggregate purchase price	£2	7	4
Aggregate selling price	£5	12	7
Gain in value	£3	5	3
Cost of feed	£1	1	8
Profit	£2	3	7

Second Test

In the second test, 61 cockerels were purchased under competition at a weekly auction, and after 26 days' treatment they were again sold at the same auction mart. In this case the birds ranged from four-and-a-half to five-and-a-half months old, and, generally speaking, were of superior quality to those purchased for the previous test.

The summarised results were as follows:—

Cost of 60 cockerels	£7	13	11
Food cost of priming	£3	8	10
Total	£11	2	9
Less three birds unsold	£0	11	2
Cost of food consumed, and purchased cost of 57 birds, including 2 destroyed	£10	11	7
Proceeds from sale of birds	£12	12	10
Profit (equalling 19 per cent.)	£2	1	3

Note.—No reduction was made for food eaten by two birds destroyed and the three not sold.
Average weight of birds when bought, 3.7 lb
Average weight when sold, 5.5 lb.
Average gain per bird, 1.8 lb.

The second test indicates that even some of the better class birds seen in the market are often not as good as they might be.

The test was not carried out to encourage the buying of store birds at auction sales for priming, but to demonstrate in a practical way the advantage of placing birds on the market in the best of condition. It may be mentioned that during the second week of the second test two birds developed chicken-pox and three contracted colds. The two former were destroyed, and the latter were isolated and took no part in the test. It will be seen, therefore, that buying mixed birds at auction is a risky business.

The tests indicated that much money was then being lost to the industry by marketing poultry intended for table purposes which were not in the best of condition, and even today a visit to poultry auction marts will reveal that many birds are still being offered for sale which are not in the most profitable condition.

Age to Market

The keenest demand is usually for well-primed cockerels of the heavy breeds from four to five-and-a-half months old. Early well-done White Leghorn cockerels from 3lb weight sell fairly well, but late Leghorn cockerels are not, as a rule, profitable to rear for table purposes. Heavy-breed cockerels should be at least 3½lb weight before being offered for sale.

Generally speaking, it is a mistake to sell cockerels for table purposes under these weights. Some cockerels are kept too long before being marketed, and for this reason a prime four to five-and-a-half months old bird is much superior for table purposes to one twice that age. The former will command a much higher price and therefore give a better return over cost of production.

Some birds are ready for market earlier than others, but "well-done" cockerels should give the most profitable return if sold at from four to five-and-a-half months old.

Separate Sexes

On most commercial poultry plants the sexing of day-old chicks is practised, but on the general farm where chickens are hatched in the natural way, with hens, sexing is not usual. As it is really useless to try to fatten cockerels while running with pullets, it is advisable to separate the sexes before the cockerels begin to crow.

Curtail Exercise

When the fattening process starts it is well to curtail exercise, for if this is done the muscles are likely to be softened and the flesh very much improved. The birds should do well if placed in a shed with a small run attached, allowing about seven or eight square feet space per bird. If a shed is not available a good-sized packing case should provide shelter. If the floor of the shed or shelter is covered with straw there will be no need to provide perches, as the birds will sleep on the floor.

Care should be taken, however, to ensure that the shed and yard are kept clean and that the birds get plenty of fresh air at night. The less the birds are disturbed or frightened during the fattening period the better.

Preliminary Treatment

Before attempting to prime birds it is advisable to make sure that they are free of insects. They should be dusted with insect powder or fine dust. A suitable mixture for dusting may be made up of equal parts of road dust, sulphur and lime, or a little nicotine sulphate may be painted along the perches about half an hour before roosting time.

It is also advisable to clean out the intestines. This may be done by dissolving Epsom salts, about one packet to each twelve birds, in the water with which the mash is to be mixed. The same amount of sulphur may also be added to the mash before being moistened. This medicated mash need be given only once.

Feeding

There are many feeding mixtures which give good results. The following are details of the feeding of one pen of cockerels, in the first test mentioned previously.

The mash was made up of 50lb ground hulled oats, 50lb ground wheat (both these were ground very finely), 6lb meat-meal, and 1lb salt. For the first week the mash was mixed (to a crumbly mass) with boiled potatoes and skim milk, as near as possible two parts of potatoes to one of the meals. From the beginning of the second week until the end of the test, the mash was made up of equal parts of boiled potatoes and the ground grains.

During the last week whole wheat and some of the ground hulled oats and ground wheat were left before the birds in separate receptacles. The birds were fed twice daily, and were given as much as they could clean up without waste. All birds were given skim milk to drink as well as water in separate receptacles, while grit and charcoal were always before them. Succulent green food was given each day.

The tests indicated that about three weeks' priming is sufficient for well-grown birds, as after that period they do not seem to make the same gain.

It is usually estimated that on an average one-third of the weight of a well-primed fowl is lost in the dressing, and if the bird is not in good condition the loss is greater. Thus, the true value of a carcass is determined not so much by the total weight of the bird, but by the percentage of edible meat on the carcass.

Before Killing

A fowl should not be chased or overheated before killing, as this is likely to toughen the flesh. They should be left undisturbed and given no feed but plenty of clean water to drink for 24 hours before killing.

Save the Best for Future Breeders

Usually the strongest and most vigorous cockerels are among the early birds that develop well and mature fairly early, and it is from such birds that future breeders should be selected. It is therefore advisable to retain some of the best and most promising cockerels, and not to depend upon late-hatched cockerels to head next season's breeding pen.

Obituary

Mr. C. J. C. Cussen

The death occurred in Blenheim on November 23, of Carrol John Charles Cussen, Chief Poultry Instructor of the Department of Agriculture.

Mr. Cussen, who was 58 years of age, joined the Department in 1899 as officer in charge of the Burnham Poultry Station. Four years later he was appointed manager of the Ruakura Poultry Station, and remained there for 13 years.

In 1915 he was promoted to the position of Poultry Instructor, and was stationed at Christchurch. His activities took him to various parts of the South Island, where he earned the highest respect as a qualified and conscientious officer.

On the retirement of Mr. F. C. Brown in 1935, Mr. Cussen was appointed Chief Poultry Instructor, and was stationed at Wellington.

Mr. Cussen, who was due to retire on superannuation this month, was not married.

Eggs from Victoria

DURING August the Department of Agriculture imported from the State Research Farm, Werribee, two settings of 16 eggs each of the White Leghorn and Black Orpington breeds. From the White Leghorn eggs 12 chickens were hatched, and nine chickens were hatched from the Black Orpington eggs.

The best of these birds will be mated with the present Wallaceville stock, and fresh blood will be available to those requiring a change next season.

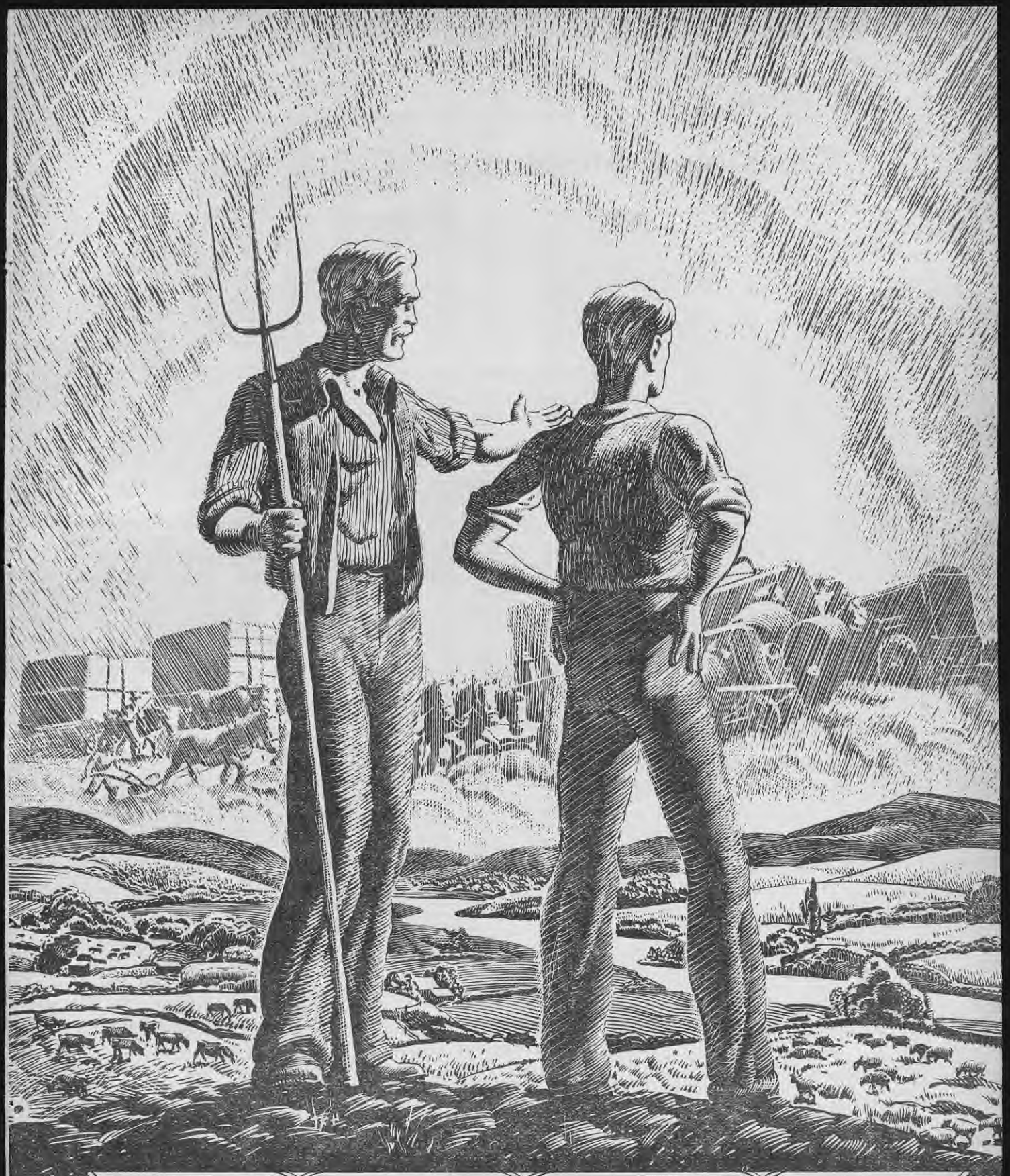
Poultry-Keeping As A Sideline

THERE is no doubt that in certain localities, where land is available and a suitable person has the time and a liking for such work, side-line poultry-keeping can be made a very profitable activity.

The primary essentials to the success of such a venture are suitable housing and the right class of stock. Housing need not be elaborate, but it must provide ample room, dryness, fresh-air, and sunlight.

As egg-production is the most profitable branch of the business, a good method of trying out such a venture is to purchase a certain number of perching pullets. The cost of good eight to 10 weeks' old pullets would be from 5s to 6s each. Good August-hatched birds of the heavy breeds and September-hatched birds of the light breeds should give the best results.

Anyone desiring to try such a venture is advised to start in a small way and gradually build up as their experience warrants, for if 50 such pullets cannot be made to show a profit it is not likely that success will be achieved with a larger number.



NEW ZEALAND FEDERATION OF YOUNG FARMERS' CLUBS
CHRISTMAS SUPPLEMENT

Christmas Supplement Competitions

THE entries in the competitions for the Christmas number in this section were, on the whole, disappointing. The poor response can no doubt be accounted for by the uncertain conditions prevailing at the present time.

In the essay competitions there were only 11 entries in all—"A Scheme for the Settlement of Young Farmers' on Their Own Properties," eight entries; "The Influence of Young Farmers' Clubs on Rural Life," two entries; "How to Save Labour on the Farm," one entry.

There were a few entries in the photographic competition and also in the competition for the best design of a Y.F.C. blazer badge, but the standard in both of these was not considered by the judges to justify any awards being made.

Only one poem was submitted, but as it was not original it was impossible to award a prize.

The winning essays are published in these pages.

"A Scheme for the Settlement of Young Farmers on Their Own Properties."

EIGHT entries were received for this competition. The winning essay was contributed by W. G. Brownlie, Wairoa Club. The second prize and the two other prizes have not yet been decided, and they will be published in the January issue.

The judge's comment was as follows:—

"The subject for the essay was rather difficult—a subject which has provided pitfalls for men of considerable maturity and experience. This fact is well demonstrated by the land-use in many countries.

"Each of the essays was indicative of reasoning based on farm knowledge, and, in general, the essays contained views of value. In my opinion the winning essay gives the best conception of the position as a whole."

First Prize

— By —

W. G. BROWNLIE,
Wairoa Club.

THERE can be no question but that farming in our Dominion has reached a precarious state in the stage of its development. Before we seek remedies we must ascertain the cause of the evil.

In New Zealand the wealth of the country is produced and derived from our primary industries. The production of butter, meat, and wool, as well as other smaller revenue-producing commodities, mean the very existence of the people; not only rural dwellers, but every man, woman, and child in the urban areas depend upon the exportation of our primary produce for a living. Therefore, it may be logically reasoned that the living standards of the people, which really means the rate of taxation per head of population, must be set by the amount of wealth that the farming industry can produce.

Assuming that we accept that statement, then it must be admitted that our farming industry is incapable of maintaining the living standards which we enjoy in this Dominion at the present time. It is not the living standards which are too high, but the wealth produced from the primary industries is too low. The time has come when every acre capable of producing must be in production so that the ultimate objective, of living standards for rural workers which may be comparable with the standards in other avenues of employment, may be achieved.

It is obvious that the only remedy lies in the true principle of democracy. Every small section of land must be under production and worked by the farmer who owns the land. The only way by which the farming industry can hope to guarantee better conditions of living to the workers employed on the land is to give those workers an opportunity eventually to farm their own properties. This is the ambition of every right-thinking young man.

The results could easily be imagined. More country would be under production, more workers would seriously consider farming as their occupation, more jobs would be vacated in the towns and more jobs created, and the production, the national wealth of the country could easily be doubled. It must be pointed out that there is much country in New Zealand which could never be farmed, and much land is being farmed which would never be suitable for more intensive methods of cultivation, but the vast proportion of farming land is suitable for such a scheme as suggested.

The success of such a venture would ensure immediate benefits in three directions in which relief is much needed. Firstly, the national income would be approximately doubled; secondly, the increase in the country population would see all workers in the towns engaged in permanent jobs created by the shift of labour to the country and by the greater industrial demand from the country dwellers; and thirdly, the solving of the unemployment problem would not only assist the country as a whole, but would help the Government in its efforts to develop the country further.

The inauguration of the scheme would not present as many difficulties as might appear from a cursory survey of the problems which have to be faced. This scheme, which would be applicable to and instrumental in encouraging any number of young men on to the land, is confined to the problems of training and financing Young Farmers for the farms of their own. (By Young Farmers it is meant active members of the New Zealand Federation of Young Farmers' Clubs.)

Before the inauguration of the scheme, four major decisions would require consideration—(1) the number of Young Farmers to assist on to their own farms, in yearly batches; (2) the method of selecting the Young Farmers concerned; (3) the selection

of suitable properties; and (4) the financing of the scheme.

The numbers accepted each year would depend entirely upon the success of the operation of the scheme when in progress. For the first year it is suggested that 60 Young Farmers representing 1 per cent. of the membership, could be handled. The method of selection would necessarily entail a great deal of organisation, work, and expense. Committees would need to be set up in each District Committee to work in absolute co-operation with a Special Controlling Committee appointed by the Federation.

The whole success of the plan depends entirely upon the harmony existing between the individual committees and the controlling executive. This is why it would be vitally necessary to have sufficient funds, estimated at £2000, with which to organise the scheme.

Applications for consideration as candidates would be called by the committees in each district committee. Clubs would submit only those names suitable. These applications would be sifted by the Special District Committee according to qualifications, experience, industry, and character. References and personal recommendations would be essential. After the applications had been sifted the remaining Young Farmers would be examined, the course and papers having been finally prepared by the Controlling Committee, and held under the jurisdiction of the Department of Agriculture.

The selection of suitable properties would be handled by small sub-committees appointed in each District Committee area, final approval of all properties to be sanctioned by two officers from the Controlling Committee. The problem of finance can be solved in only one way. The scheme must be worked with the close co-operation of the Government, and without Government assistance to finance the scheme there would be no possibility of floating any workable land settlement scheme.

It is suggested that the Government would arrange the purchase of all properties, and, as well, provide the money for the stocking of the farms. This scheme would entail much expenditure, but so would any land settlement scheme. Money for such a project can only be found in the one place—the Government, the representatives of the people. No objection can be submitted on the grounds that the Government has no business assisting any one section of the community. It has already been pointed out that the development of our farming industry is essential to increase our production, which, in itself, is absolutely vital to the future progress and prosperity of our Dominion.

There is little reason to believe that the Government would reject any scheme requesting its assistance for land settlement, providing that that scheme was outlined in full detail, that it had sufficient support from such an organisation as our own Young Farmers' Club Movement, and that the necessary stimulus and sincerity was behind the scheme. If the Young Farmers can set the organisation wheels in motion it is certain that the Government would receive any deputation from the Federation, and any reply must be based upon the achievements of the Young Farmers in the few years of their existence as a movement.

It cannot be assumed that any Government should consider advancing money for any such scheme without repayment being made. It would be wrong to contemplate such a move. The settlers under the scheme would be required to repay money invested in property and stock at the rate of 5 per cent. per annum, such payment to include interest on the initial outlay and capital repayment. As the capital was reduced the annual repayment percentage rate could be increased proportionately, so that the money saved by the payments already made could be utilised to lessen the time necessary to repay the whole investment and to ensure that the farmer would retain a larger income each year.

Before any actual attempt could be made to operate the suggested scheme it would be necessary to inaugurate a Labour Placement Service to ensure that all Young Farmers would be able to secure positions in the sphere of activity to which they are inclined and suited. Apart from any assistance towards establishing a Land Settlement Scheme, a Placement Service would be of valuable service to the farmers, while it would be a great advantage in the Land Settlement Scheme, for it would allow all the machinery to be used and to be tried thoroughly under working conditions.

The main points in the plan could be summarised under three sections—Selecting, Purchasing, and Financing.

SELECTING.—All nominations to be received through the clubs, which would exercise discretion when forwarding applications. District Committees would weed the applications in preparation for the final examination in co-operation with the Department of Agriculture. Candidates would require to pass a certain standard examination, as well as possessing excellent character and qualifications and references.

PURCHASING PROPERTIES.—Sub-committees in each area would choose suitable land which, when approved by the District Committee, would be submitted to the Controlling Executive for definite approval.

FINANCING.—The purchase of all properties and stock would be financed by the Government, the farmers to repay interest and capital at the rate of 5 per cent. per annum for the first years, with higher rates as the principal is reduced.

The introduction of a Land Settlement Scheme is becoming more and more urgent as time passes. Sooner or later the problem will have to be faced. A scheme launched and controlled by the Young Farmers' Club Movement would boost the movement to a surprising extent in a year or two, which alone would repay any efforts expended in the establishment of the organisation.

However, the major result would be expected from the revitalising of the farming industry, from the anticipated fillip to trade and other industries, from the alleviating of the unemployment problem, and from the retention of the living standard which makes little New Zealand the much-admired country in the eyes of the envious world.

Combined Meeting at Nelson

MEMBERS of the Nelson Y.F.C. were afforded the opportunity on September 28 of welcoming to the Nelson district both the Dominion President, Mr. E. W. Barnett, and the Organising Secretary, Mr. S. Freeman.

At the combined club's meeting held at Brightwater that evening, Mr. R. C. T. Raine, chairman of the Nelson District Committee, extended a cordial welcome to the visitors. In reply, Mr. Barnett briefly touched on Y.F.C. activities, and outlined the useful duties which members might undertake in the present period of national emergency. These remarks were further supported, and other phases of Y.F.C. activity amplified, by the organising secretary.

The gathering of Young Farmers, farmers, and members of the Nelson District Committee was then entertained with several interesting and instructive sound films, after which both the chairman of the district committee and Dr. Miller, Assistant-Director, Cawthron Institute, and Director of the Entymological Division, spoke eulogistically of the programme. A very hearty vote of thanks was accorded the visitors.

—D. MERRY, District Secretary, Nelson.

"The Influence of Young Farmers' Clubs on Rural Life."

First Prize

— By —

T. A. TURNBULL,
Pohangina Valley Club.

DURING the past 25 or 30 years a great change has taken place in the general conditions governing the lives of those comprising the rural population of this country.

Gone are the days when the farmer and his family were tied by the chains of almost mediaeval transport to the comparative vicinity of their own farm. The horse and trap—while comparing most favourably in respect of fatal accidents due to excessive speed with the transport of today—did not allow, or even invite, any considerable intercourse with other districts.

That popular butt of modern wit, the "party line," was just beginning to provide Mr. and Mrs. Brown with an excellent opportunity of learning Mr. and Mrs. Smith's business without having to ask questions, besides bringing the outside world much nearer the farmhouse, and Mr. Ford was providing cheaply, and at the same time with a fair measure of certainty, transport which abolished for ever much of the farmers' isolation.

As for radio. Well, it had been heard of, but except for a few "ultra-moderns," who struggled manfully with the vagaries of battery sets, the thought of our skies lanced with an ever-growing array of masts for receiving purposes was hardly even a beautiful dream.

So, in a comparatively short space of time, the lot of the ever-grumbling, much maligned, but, on the whole, I think, the average person will agree, rather likeable "cocky," has been raised from a mere existence to a plane which at least places him within shouting distance of the city-dweller.

Though I dislike to dispel a popular fallacy, every farmer is not the possessor of a costly motor-car, but on most farms there is some sort of mechanical contraption which generally goes—even if it does not always come back.

Cars, radios, telephones; they make an important addition to the every-day life of the farmer, and count as a great debt which we owe to science. And now to add to them has come something which, though it was not conceived in the brain of a scientist, has done much for the young farmers of today.

I make no apology for coupling our Y.F.C. movement with those achievements I have mentioned, and I know that thousands of my fellow-members will agree with me when I claim that, with the assistance of the three modern aids to social advancement I have acknowledged, the Y.F. clubs are rapidly bringing together with mutual advantage young farmers, not only locally, but all over the country.

A common charge laid at the doors of the farmers of this country is their apparent lack of a proper appreciation of the advantages of co-operation within their own ranks. That charge cannot be made at the expense of the younger generation, however, at least as far as our Y.F.C. movement is concerned.

The growth and rapid expansion of clubs all over the country is evidence of the desire of the Young Farmers to get together and learn something of the methods of successful farmers in their own districts as well as those of men who have made their mark in farming in other parts of the country. The generosity of these men in placing their farms and methods at the disposal of their natural successors is one of the most pleasing features of the Y.F. movement, and is a significant commentary upon the general attitude to the effort we are making to widen our scope of general farm methods.

The desire for knowledge of how the other fellow lives, works, and spends his leisure, has hitherto, for at least very many of us, remained unfulfilled for a variety of reasons; but today, with cheaper travel facilities and a surer knowledge gained through our own organisation of where to go and what to see, an almost constant interchange of visits between representatives of all the provinces in the country is taking place, with mutual advantage to all.

It seems almost incredible that, prior to the formation of a Y.F. Club in many districts, scores of fellows living just a few miles apart had the merest acquaintance with one another. But now the chap we knew just well enough to nod to is one of the lads, and is probably one of the leading lights in the club.

If it has done nothing more, our organisation has handsomely justified its existence by the bringing together of chaps within a radius of anything up to 10 miles and in some cases even more, and giving them something which has made life very much more worth while.

Our monthly meetings are just an opening door to a variety of educational and recreational experiences to every Young Farmer, and there are very few within reach of a club who do not avail themselves of these opportunities.

Let us glance at some of the facilities of which we may avail ourselves with regard to an improvement in our farming knowledge.

At each monthly meeting there is a speaker, who may be a Government servant in the Department of Agriculture, a private farmer passing on his own hard-earned knowledge, or a highly-qualified professor at one or other of the agricultural colleges, such as Massey College or Lincoln College. Quite often his talk will be illustrated by means of a movie camera, or perhaps a talkie camera is used, and in the course of the evening we are shown a number of films covering a diversity of subjects ranging from the propagation of species to heredity as applied to lunacy, with, of course, no personal application intended.

In every district there are farmers who have, through sheer hard work and intense application, become expert in some particular phase of farm work, and a talk by one of these gentlemen is always productive of a fount of farm lore, because it has been garnered in the harvest of hard and oft-times disappointing personal experience.

Then we have the visits to such institutions as Massey College or Lincoln College, plant research stations, and others of a similar nature, while no less instructive are the visits to the farms of men who have made a success of their profession.

Sheep farms, dairy farms, pig farms, and, indeed, every type of farming, is available to us through the generosity of these men, who are only too glad to tell us just why and how the results they have gained have been achieved. Dairy and cheese factories are open to us to let us see just what happens to our milk and cream after we have finished with them. Newspaper offices, too, show us how the day's news we all so much appreciate is gathered from all parts of the earth and built up into that white cylinder that is tossed nonchalantly at our gates by speeding paper-runners.

There is hardly a factory or institution in any of our cities which is not open to us, and it is merely a direct illustration of the old adage: "United we stand, divided we fall," as, shorn of our organisation, we, as individuals,

would have little or no chance of gaining these many and varied experiences.

We also learn to conduct meetings and to get up on our feet and deliver ourselves of various weighty (?) observations, and that, I think, is one of the more important lessons to be learned at our meetings—the faculty of being able to speak to a meeting without feeling that one's world is coming to an end.

It is manifestly impossible to give more than a rough outline of the opportunities available to us, and I have not space enough to enlarge on the possibilities for cheap and yet instructive and first-class holidays, sports meetings, football tourneys, and many other chances we have for healthy sport and social recreation. Debates, dances, and, in the club of which I am a member, a gymnasium club offer many opportunities for the young fellows of the country to get together and enjoy themselves in ways hitherto unpossessed by them.

Truly, the Y.F.C. movement has done much to educate and entertain us, and to the mind in which the idea first came to life thousands of Young Farmers owe a great debt of gratitude.

Though we are faced with what is almost a tragic certainty that our ranks will suffer severe depletion due to the struggle in Europe, I have no doubt that those left behind will carry on the good work so capably begun, for surely this organisation of ours is, if I may plagiarise, "of the Young Farmers for the Young Farmers, and by the Young Farmers."

Second Prize

— By —

ROBERT SINCLAIR
Pohangina Valley Club.

IN every community, whether town or country, there exist bodies and organisations, which cater for the needs of those who live therein, but to the youthful farmer no such organisation contacts so definitely or provides such a diversity of interests as does that virile movement—the affiliated Young Farmers' Clubs.

While our Young Farmers most probably give a certain amount of their time to activities in their district, the Y.F. Clubs present an almost unlimited scope of interests for our farm lads.

These clubs, whose foundations are soundly based on those things which concern the man on the land, in no way confine themselves to such things, so that within this single movement a Young Farmer may find opportunity to direct his activities in which ever direction he chooses.

In the past one of the drawbacks to country life has been the lack of opportunity our boys have had of giving voice to their views on matters concerning their occupation. Today, as a member of a Y.F. Club, a young man can get on his feet at a meeting and express his attitude to things concerning his club, or on the debating platform thrash out a subject with his own chaps or those of another club. Thus, if perhaps in only a small way, a chance is given for self-expression and the cultivation of confidence, both of which must be valuable assets in the days to come.

With executive positions in every club to be filled (and it takes conscientiousness, together with enthusiasm, plus efficiency, to fill these positions), excellent scope is again offered for the methodical handling of club business.

In most Y.F. Club meetings regular features are lectures and talks generally, given by anyone who has anything interesting to say. These lectures are usually very informative, and enjoy a fair share of popularity.

Essentially a movement of progress, practically every day brings forth news of really ambitious undertakings by Y.F. Clubs and district committees.

The writer's district alone can boast, over a comparatively short period, of several quite creditable achievements, notably a seven-a-side football tournament in conjunction with a Cavalcade of Agriculture at the Palmerston North Winter Show. This cavalcade received high praise from those who witnessed it, and reflected great credit on the work of the committee. The following spring show at Palmerston North was the venue of the New Zealand Y.F.C. shearing championships held in Palmdrawing excellent entries. This year also saw the Wellington provincial shearing championships held in Palmerston North, with equal success.

To give an example of enterprise by an individual club there comes to mind the effort of a neighbouring club. These boys organised a very successful one-day stock show, well attended, efficiently run, and financially well on the right side. In all these enterprises the Young Farmers themselves took a large part, which goes to show that, given the chance, our country lads can do the job.

A phase of Y.F.C. activity which also cultivates the competitive spirit and must leave its influence on farming in the future is the holding of stock judging competitions. These contests are generally held in conjunction with A. and P. Association shows, giving opportunity for Young Farmers to display their knowledge of all branches of farm animals.

Perhaps one of the most popular of Y.F.C. activities are the educational tours that are conducted by most of the district committees. Having been fortunate enough to have taken part in two of these tours, the writer can vouch for their popularity. With all arrangements made carefully beforehand, these tours provide a cheap holiday plus the advantage of a prepared itinerary. As a method for bringing chaps from one district in contact with those of another these tours are unsurpassed, and it would be safe to say that many permanent friendships have resulted from these trips.

This subject would not be complete without mention of the practical demonstrations given by those of experience at field days held from time to time. Ranging from demonstrations on farm animals, stock diseases, mole draining, and plough setting, these field days give an excellent opportunity for obtaining first-hand knowledge.

As stated previously, Y.F. Clubs in no way confine themselves to farming matters. Today our Young Farmers are to be seen vieing with each other in all kinds of sports, either organised in a large way, such as seven-a-side football tournaments, or as friendly inter-club games. Mention of friendly matches recalls to the writer two pleasant days of cricket with a neighbouring Y.F. Club.

Thus it is seen that this comparatively young movement, rapidly taking into its sweep most of New Zealand, and already showing its influence on our rural life, must surely in the future leave a very definite mark.

Mid-Canterbury Stock Judging

THE Mid-Canterbury Young Farmers' Clubs held a very successful stock-judging competition at the Ashburton A. and P. Annual Show on November 2. Twenty-one entries were received, and competition was very keen.

The Hinds Club was again successful in winning the Farmers' Union Shield. Individual placings were:—

D. G. Tait (Hinds), 1.

C. A. Watson (Methven), 2.

A. Bennett (Ashburton) and J. M. Johnston (Hinds), tied for third place.

The thanks of the clubs were expressed to the judges and to the A. and P. Association for their generous assistance.

As a preliminary to the competition a demonstration of judging was given to the Mid-Canterbury Y.F.C. members at the showgrounds on October 24.

Border Leicesters were demonstrated by Colonel J. Findlay, and Southdowns by Mr. R. J. Low.

After the demonstration a competition in judging four Southdown ewe hoggets was held, J. Denley winning first place and J. Brophy second.

—R. INCH, District Secretary, Ashburton.

Wellington Council Shearing Competition Attracts Many Entries

ORGANISED for the Wellington Council by the Manawatu District Committee, the 1939 shearing competition was held at the Manawatu and West Coast A. and P. Association's Spring Show on Saturday, November 4, in perfect weather. In spite of the counter-attractions outside the Shearing Hall was crowded to capacity from 10 a.m. to 3.30 p.m., which was another outstanding example of the attraction exercised by Young Farmers' Club events at A. and P. Shows. The committee was gratified with the manner in which the Young Farmers supported the various classes, and also with the willing co-operation of the various officials

A general view of the intermediate final. [*K. H. Shea, Photo.*

The winner of the championship class was Mr. V. Freeman (Kimbolton-Kiwitea Club), with 78 1-3 points, who shore consistently well throughout. R. Hutt (Onga Onga), last year's winner, placed second, was only two points behind Freeman. These two men created much excitement in the final, as their speeds were very close, and they were shearing at the rate of more than 260 sheep per day. The third man, D. McGibbon (Dannevirke), 76 points, was only one-third of a point behind the second man. McGibbon gave a good exhibition of clean shearing, and was most consistent throughout the day.

The prizes were £15, £7, and £3, and the entries totalled 20.

The intermediate class for shearers capable of shearing between 100 and 150 sheep in a nine-hour day was won by G. Blenkhorne (Levin Club), who gained 85 1-3 points. The second man was G. F. Toms (Mangaweka), who gained 85 points. M. Dickie (Waverley) was third with 80 2-3 points. There were 30 entrants in this class, and the general standard was good, the prizes being £10, £5, and £2.

The junior class for those whose capabilities were limited to 100 per day or less proved very interesting. On their times, all the competitors were very near their 100 per day, due probably to the practice which they have had since entering their names for the shearing contest. Some of the competitors seemed to place too much reliance in speed and so lost points in style and neatness, but all showed that they understood the general principle of the business, even if the execution of these principles was somewhat unpolished in a few cases. In this class the first prize was £2, and eight £1 prizes were awarded, which meant that each final competitor received a prize.

Of the 27 Young Farmers competing in this class, S. T. Carter (Onga Onga) won with 82 points. The winners of the £1 prizes were: A. Stewart (Bunnythorpe), 80 2-3 points; B. Rowland (Kairanga), 78 2-3 points; D. T. Waugh (Kimbolton), 76 points; F. C. Sowerby (Waituna West), 76 points; A. Brightwell (Bulls), 74 1-3 points; D. McMurtrie (Apiti), 73 2-3 points; W. Lodge (Kimbolton), 73 points; G. Pritchard (Bulls), 64 2-3 points.

During the afternoon Mr. L. B. Green, well known as an expert shearer, gave a demonstration of blade shearing.

The fleece competition was won by Ivan Old (Waituna). R. Hutt was second, and V. Freeman, the winner of the championship shearing, was third.

The committee wishes to record its appreciation of the services rendered by the judges, Messrs. Basil Mitchell (Longburn), Donald Scott (Forest Hill), Dick McDonald (Raumai), A. W. Hudson (Massey College), and Les Little, who judged the fleece class and supervised the classing and shed work.

At the conclusion of the contest the New Zealand Farmers' Distributing Company's Cup was presented to Mr. V. Freeman by the manager of the firm, who drew attention to the value of the competition as a means of fostering the art of shearing, which was so important to the success of our pastoral industry.

The champion, V. Freeman, in action. [*K. H. Shea, Photo.*

Bulls District Y.F.C. Field Day

Members taking part in one of the sheep judging competitions.

["Point Blank" Photo.

THE Bulls Club held a successful field day on the property of Mr. C. E. Vile (club advisory president), "Pukenui," Bulls, on July 13. The weather was anything but favourable, and no doubt kept many people away from an otherwise well-attended event. All events went off smoothly and were well contested, which spoke well for the efficiency of the stewards, who all worked well.

Cold weather made the sawing contest a popular event, and the performance of the winners (Messrs. Smith Bros., of Marton) was very good. An "old-timers" competition resulted in a win for Messrs. Torrey Bros., who later gave an exhibition, cutting through their log in 16 seconds (racer saw). The main events of the day were the dog trials, for which the response was very good.

During the afternoon, Mr. C. B. Anderson, in the unavoidable absence of the club chairman, Mr. S. G. Avery, welcomed the visitors, among whom were Mr. C. J. Hamblyn, Fields Superintendent, Department of Agriculture, and Mr. A. R. Dingwall, Wanganui District Secretary. Mr. Anderson thanked Mr. Vile for placing his farm and stock at their disposal, and he also thanked other judges and demonstrators for their services, and Messrs. H. Bowen, J. G. Wilson, and R. O. Dalrymple for the loan of stock, Mr. J. Simpson for carriage of stock, and Mr. Bob Cole for generally assisting. The local branch of the Farmers' Union was thanked for assistance.

Mr. C. E. Vile, in reply, said it gave him the greatest pleasure to do anything possible for the Young Farmers, and wished them well in future activities. The other judges and demonstrators offered to give their assistance on future occasions.

Captain B. Barrington, Recruiting Officer of the Defence Department, spoke briefly on the recruiting campaign, and afterwards interviewed a number of young men who were interested.

The stewards for the day were Messrs. A. and G. Torrey, F. J. Thorby and C. Harris, C. B. Anderson, J. G. Wilson, and S. Last-Harris (hon. secretary).

Y.F.C. Centennial Camp Abandoned

Because of the relatively small number of applications for attendance at the proposed Y.F.C. Centennial Camp in Wellington, it has been decided to abandon the idea of holding the camp. Those members who have sent in applications will be communicated with shortly.

Results

Results were as follows:—

Y.F.C. Dog Trial (Judge, Mr. F. W. Norris).—A. Brightwell, 1; F. J. Thorby, 2. Also placed: B. Coleman, A. Torrey, G. Torrey, D. Grace.

Southdown Judging (judge and demonstrator, Mr. C. E. Vile; maximum points, 120).—C. B. Anderson (120), 1; B. Palmer (111), 2; S. Last-Harris (85), 3. Also placed: C. L. Grace, K. Field, J. Gibbons, G. Pritchard, W. Bowen.

Romney Judging (judge and demonstrator, Mr. W. Morton, Hunterville).—S. Last-Harris, 1; C. B. Anderson, 2; J. Gibbons, 3. Also placed: W. Bowen, N. H. Amon, C. L. Grace, G. Pritchard, J. G. Wilson.

Local Dog Trial (judge, Mr. F. W. Norris).—T. Torrey, 1; J. McLean, 2; D. Grace and G. Torrey, equal, 3. Also placed: K. Scott, G. Woods, D. Stent, J. Preston, A. Torrey, B. Coleman, A. Brightwell, and R. Homes.

Log Sawing (for M. tooth saws).—First heat: Smith Bros., 1. Also placed: J. Palmer and S. Last-Harris, W. Lamberg and J. Young, B. and T. Palmer. Second heat: C. B. Anderson and E. J. Kilgour-Carter, 1. Also placed: G. Pritchard and J. G. Wilson, H. Webber and G. Ellery, N. H. Amon and A. Young, R. Simpson and W. Bowen Smith Bros. won the final in 19 seconds, Anderson and Carter taking 27 seconds.

Trophies were awarded to the winners of each competition.

The final item was a demonstration on a hack and a Clydesdale by Mr. Hocken, Feilding.

Additional Activities

In addition to the field day, the club recently formed a junior branch of the W.D.F.U. A meeting, at which the young women were invited to attend, was held on June 26, when Mrs. Fields, organiser, Manawatu W.D.F.U., outlined the aims and objects of the junior section. Also present by invitation were Miss Matheison and Mrs. Jennings, and seven members of the Halcombe Junior W.D.F.U. Sixteen of the local girls joined. with Miss G. Guy as chairman and Miss N. Avery as hon. secretary. After the business had concluded supper was served by the boys, and the evening concluded with a dance, music being supplied by the club's own orchestra.

The club is also to participate in the Centennial tree planting scheme. The Bulls Town Board has offered a suitable site, and has also offered to supply the necessary fencing materials, and with this co-operation it is expected that the day will be highly successful.

Mid-Canterbury Young Farmers' Day

Mr. D. H. Leigh, curator of the Ashburton Domain, explains the method of propagating plants.

SOME fifty Young Farmers participated on October 3 in the first Young Farmers' Day to be held in Ashburton, which was held with the object of showing the club members a little of what happens to the farmers' produce after it has left the farm. Meeting at the Technical College Assembly Hall at 10 a.m., the party was entertained at morning tea by the Ashburton Club.

Mr. W. Crawford, principal of the Technical College, gave an address on "Food Production in War Time," pointing out that it was the duty of New Zealand to place the whole of her resources at the disposal of Britain in her hour of need. So far as this country was concerned the feeding of the people was an easy matter, he said, but with Britain, from half to two-thirds of her foodstuffs, amounting to £1,200,000,000 in value annually, came from overseas. She had to import more than 80 per cent. of her flour, 50 per cent. of her meat, and more than 90 per cent. of her fats, including lard, butter, and oil for making margarine. It required 7,047,000 tons of wheat to supply her people, but she produced only 1,965,000 tons. Much of her imports came from sources that were now shut off from her, and she would have to turn to other countries for supplies.

Mr. W. H. Amos, president of the Rotary Club, welcomed the Young Farmers, and mentioned that the Rotary Club was glad to assist in any way possible.

Increased Production

Mr. Jas. Lowery, on behalf of the A. and P. Association, spoke of the need for increased production on all sides. He mentioned that many farms had deteriorated in recent years, and appealed to all those connected with farms to maintain and increase the fertility of the soil. Any help that the older farmers and the Department of Agriculture could give would be given willingly.

Mr. T. V. Wilkinson, vice-president of the Farmers' Union executive, also welcomed the visitors. After apologising for the absence of the president, Mr. C. A. Campion, Mr. Wilkinson emphasised the need for young men with brains and vision in the farming community. He added that the Farmers' Union was whole-heartedly behind the Y.F.C. movement.

Mr. R. Penney, Methven, and Mr. E. Rhodes, Hinds, thanked the speakers for their addresses, the Ashburton Club for the refreshments, and the Technical College for the use of their hall for the meeting.

First Visit

The first visit was made to the factory of the Midland Dairy Company, where Mr. J. Keig showed the party how the cream was received, weighed, graded, and pasteurised, how the cans were sterilised, and how butter was made. Great interest was taken in the mechanical patting machine, which does the work of seven men. Mr. Keig stressed the fact that really good butter could be made only with the co-operation of the supplier in sending fresh, clean cream. Mr. K. Moore, Mayfield, thanked the company for the visit.

The party next visited the Domain, where they were met by the curator, Mr. D. H. Leigh, who conducted them through the propagating houses, explaining in detail just how the young plants were grown from the seed onwards. Mr. Leigh drew attention to some of the more interesting features of the Domain, and answered many questions. At the end of the walk, just before arriving at the pavilion, Mr. Leigh left the party, and was warmly thanked by Mr. A. Bennett, Ashburton.

Welcome by Mayor

At the pavilion the Mayor, Dr. G. I. Miller, officially welcomed the party to Ashburton. He pointed out that it was the farmers who made the town, and that without them the town simply would not exist. He hoped that when they travelled they would take every opportunity of seeing and learning as much as possible. By this means they would learn to take a broader view of life, and would find the world a much more pleasant place to live in.

After a light luncheon provided by the W.D.F.U. the party gathered outside the Canterbury Roller Flour Mills, where Mr. D. Moore explained the process of making flour. A tour of the mill followed, and the machinery was seen at work. After L. Watson (Hinds) had expressed their thanks, the party made for the last visiting place, the seed-cleaning plant of Messrs. Wright. Stephenson, and Company.

Here they were met by the head storeman, Mr. A. Hayston, and the manager, Mr. A. A. McDonald, who welcomed them to the store. Mr. Hayston then showed the party around the machines, explaining the reason for the great care that had to be exercised if a good sample of seed was to be produced. Many questions were asked, and great interest was shown in the work. The large amount of foreign matter contained in what was apparently a fair line of seed was a great surprise to all.

Mr. R. Penney expressed the party's thanks, and a very pleasant and instructive day was brought to a close.

—R. INCH, District Secretary, Ashburton.

Among the Clubs: Reports on Activities

Western Southland

Dipton.—A debate was held with the Farmers' Union on the subject "Should Country Boys Marry Town Girls?" The Farmers' Union, which took the negative side, consisted of W. McRae, T. Nevin, W. Nevin, and J. Milligan. The club was represented by D. Milligan, A. Muclie, B. Wilson, and C. Helm. The negative team was the winner by a 20-point margin. At a previous meeting two talks were given, "Life in a Military Camp" (I. Miller) and "Agricultural Course at Lincoln College" (G. Helm).

Wyndham.—General discussion on national stock-judging contest to be held at the Royal Centennial Show at Invercargill and on the Centennial Tree Planting Scheme. A talk was given by W. L. Stewart, a club member, on the weather and weather forecasting.

Eastern Southland

Balfour.—Discussion on stock-judging at Royal Show and Centennial Tree Planting Scheme. An interesting address was given by Dr. W. Boraman entitled "The Soil and its Properties."

Otama.—The chairman reported that the club debating team, by defeating Thorbury representatives in the final of an elimination debating contest, now holds the W.D.F.U. Trophy. Details of stock-judging contest at the Royal Show brought to the notice of members. The club's representatives at the Dunedin Educational Week, Messrs. C. White, B. Wilson, H. White, and K. White, gave a report of the week's activities.

South Otago

Clinton.—An interesting lecture on engineering was delivered by Mr. F. Grant, Public Works Department, Balclutha. He also gave the meeting some helpful suggestions on the making of concrete and the use of explosives.

Milton.—General business. Mr. H. Fagg, Milton, gave an interesting talk on the work of the St. John's Ambulance Association.

Stirling.—Arrangements made for the club to broadcast from Station 4YA. A lecture on first-aid was given by Mr. Ogilvy.

Warepa.—Made application to the district committee for trees to be used in the Centennial Tree Planting Scheme. An address was given by Mr. Lock, South Otago High School, his subject being "Artificial Fertilisers." At the conclusion of his talk Mr. Lock answered numbers of questions on the subject.

Dunedin

Middlemarch.—Business meeting.

Palmerston.—Business meeting. At a previous meeting Mr. B. A. Taylor, Department of Agriculture, addressed the meeting on pulpy kidney in lambs.

South Taieri.—Mr. R. Henderson elected deputy chairman in place of the former club chairman who is now in Burnham Camp. A committee of three appointed to select a paddock for next year's ploughing match. Discussion on national stockjudging championship at the Royal Show.

West Taieri.—General business, followed by a social evening. At previous unreported meetings Dr. Dinesse spoke on farm husbandry in general and pig husbandry in particular, and each member present gave a short talk on farming.

North Otago

Duntroon.—Business meeting. Arrangements to hold club dance.

Enfield.—Discussion on Centennial Tree Planting Scheme. Mr. G. A. Elliott, Department of Agriculture, Wellington, spoke on his impressions of the Y.F.C. movement as a whole.

Hampden.—Business meeting. Seven club members attended a lecture at Oamaru on engineering, the speaker being Mr. Johnstone, Waitaki Boys' High School.

Tokarahi.—Business meeting. A short lecture was given on engineering.

South Canterbury

Geraldine.—Arrangements for field day and club dance. A talk entitled "The Control of Farm Pests" was given by Mr. E. N. J. Hannah.

Hunter.—Address by Mr. J. D. Wraight on lime deficiencies of Canterbury soils. The lecture was well illustrated by soil tests.

Milford.—Arrangements and selection of teams for forthcoming debates with the Temuka Farmers' Union. An interesting talk was given by Mr. Booth, Department of Agriculture, on the dairy industry, in which he dealt particularly with the precautions to be taken in the care of milk. At previous unreported meetings impromptu speeches were held, all members taking part in the talks. Mr. Grant, Department of Agriculture, spoke on the sugar beet industry.

Waihaorunga.—Discussion on proposal to send representatives to the stockjudging championships at the Royal Show. As a Centennial Memorial it was decided to plant five acres of trees on the Hall site and in the Waihaorunga School grounds. Field day and club debate to be held. Decided to carry on during war and to lend all possible assistance in increasing production, etc. General discussion on land settlement and labour distribution.

Mid-Canterbury

Ashburton.—Proposal to plant trees in the Show Grounds as a Centennial Memorial. Talks were given as follows:—"Worm Infestation in Sheep" (B. Clement); "Manufacture of Wool" (A. Bennett). Miss Chamberlain, Technical High School, gave a spinning demonstration to illustrate Mr. Bennett's lecture.

Hinds.—General business. A talk on blue lupins was given by Mr. G. K. McPherson, Department of Agriculture.

Methven.—Five-minute talks were held, each member speaking on one of the following subjects:—"The Farm of the Future," or "The Value of Heredity in Farm Practice." R. Perry was the winner, and received Mr. Dunkley's cup. C. Wightman and H. Poff were placed second equal and hold Mr. Gerard's trophy jointly. Mr. J. W. Dart acted as judge.

Christchurch

Darfield.—Arrangements to hold barn dance in conjunction with W.D.F.U. Mr. R. Stewart gave a talk on his recent visit to Australia.

Ellesmere.—An address entitled "First-aid on the Farm" was given by Mr. W. G. Volkman. A successful field day was held at the Mid-Canterbury irrigation works, there being an attendance of 25. Lectures and demonstrations were as follows:—"Construction of Races and Gates, etc." (Mr. J. O. Riddel), "Benefits of Irrigation on Stony Land" (Mr. W. Stafford), and "Working of Machinery" (Mr. Smith).

West Melton.—Business meeting. Report of annual dance.

North Canterbury

Cheviot.—Decided to hold a field day. The club president spoke on the Lincoln College short course of agricultural instruction, which he attended during the winter months.

Nelson

Dovedale.—General business. Talks were given by club members as follows:—"Hedges and Shelter Belts on a Farm" (K. Burnett) and "Machinery v. Manpower" (W. Kenyon).

Marlborough

Blenheim.—An interesting address was given by Mr. Wilfred Gane on his recent travels in America. At previous unreported meetings Mr. Gordon Cuddon showed a series of films demonstrating the progress of modern farm machinery, and a debate was held between the Blenheim Students' Accountants' Society and a team from the club. The subject debated was "Should the Marlborough Sounds be made a National Park?" The visitors took the affirmative and were placed first by two points.

Wairarapa

Ballance.—Lecture on seed certification by Mr. F. J. S. Holden, Department of Agriculture.

Carterton.—Mr. N. Lamont, Department of Agriculture, Masterton, showed several films on genetics.

Masterton.—Messrs. D. McGregor and W. James donated £1 each as a prize to the member who collects the most fleeces for the district committee's competition. Mr. N. Lamont, Department of Agriculture, Masterton, exhibited a series of films on heredity.

Manawatu

Colyton.—Impromptu speeches by L. Thurston, H. Rook, R. Shortall, and A. D. Simpson reviewing the club's past activities and putting forward suggestions for the future.

Levin.—General discussions on Centennial Tree Planting and National stockjudging. Mr. L. Earl, Department of Agriculture, gave an interesting address on Canterbury.

Opiki.—General business, including discussions on the Centennial Tree Planting and national stock judging at the Royal Show. A talk entitled "Farm Accountancy" was given by Mr. J. A. Edwards, accountant, Palmerston North.

Oroua Downs.—Decided to apply for trees suitable for planting around the dairy factory and school. A donation of 10s 6d was made to the Wellington Council. Propose to hold a club dance. An interesting address was given by Mr. P. Cope on farm accountancy.

Otaki-Te Horo.—Report on club dance. Mr. C. J. Hamblyn, Department of Agriculture, spoke on stock judging competitions.

Pohangina Valley.—H. M. Linklater and D. Bockett nominated for the national stock judging championships. Mr. J. Linklater gave an interesting talk on his recent Pacific cruise.

Rongotea.—Openi meeting at which there was an attendance of over 60 parents and friends. Three members nominated for district team for the national stock judging championship. Seventeen members signified their intention of attending the Centennial Camp at Wellington. Debate with the Farmers' Union entitled "That the Young Farmer of Today has Better Opportunities of Success than his Grandfather." The teams were:—Farmers' Union (negative): Messrs. J. Scott, M. Frecklington and G. R. McKenzie. Club (affirmative): J. Gloyn, R. Brown and R. Gloyn. The affirmative won by a small margin.

Shannon.—General business. Discussion on Centennial Tree Planting, it being the intention to plant suitable trees around the dairy factory.

Tokomaru.—Business meeting. Report on club dance.

Waituna.—An address was given by Mr. Sydney Freeman, Dominion Organising Secretary, on the activities of the Y.F.C. movement generally and he also exhibited several films on agricultural topics. At a previous meeting all members present were requested to give short impromptu talks on some farming subject.

Whakarongo.—Talk on manure and lime was given by Mr. A. Galpin.

Woodville.—General business. Entries received for shearing competition. Several members delivered five-minute talks as follows:—"Sheep Ticks" (A. Arrow); "Care of Implements" (K. Mitchell), "Wool-classing" (W. T. Toogood); "Learning to Fly" (A. Fountaine), and "Value of Plough" (A. Compton).

Wanganui

Bulls.—Mr. H. J. Rees delivered an address on farm accountancy.

Mangaweka.—An interesting demonstration of plumbing was given by Mr. Moyle, and Mr. T. Dickinson illustrated the method of sharpening saws.

Taihape.—Field day held on Mr. J. Webb's properties at Papaki Road, Taihape. Mr. Webb, a well-known stock breeder, showed the club over his flocks of Cheviot, Suffolks, and Southdowns. His Aberdeen Angus cattle were also inspected.

South Taranaki

Alton.—Two club members, S. Garnett and W. K. Saggors, were elected to represent the club on the local Red Cross Society's committee. A social evening followed.

Hawera.—Mr. C. Dickie gave an address on farm finance.

Pukengahu.—Decided to hold a pasture judging contest and a cricket match, Y.F.C. v. The Rest. A short talk by G. L. Burgham on potato spraying. At a previous meeting Mr. J. E. Davies, Department of Agriculture, gave a lecture on the Y.F.C. tour of Australia.

North Taranaki

Cardiff.—Talk by Mr. J. E. Davies, Department of Agriculture, on the tour of Australia by members of the Y.F.C.

Karawaka.—General business. Arrangements finalised for a debate with the Hillsborough Club.

Midhurst.—Field day held on Mr. Bunning's property at Midhurst. There was an attendance of 24, five of whom were visitors. Mr. V. Bunning gave a demonstration on bacon pigs.

Okau-Tongaporutu.—Members of the club and of the Farmers' Union were addressed by Messrs. Sorrenson and Peirson, the topics being "Pig Club Affairs" and "Pig Management."

Rahotu.—Club debate, the subject being "That Home Separation is Superior to Milk Supply." The judge, Mr. W. J. Wright, gave his decision in favour of the affirmative side.

Southern Hawke's Bay

Onga Onga.—A general discussion relative to the preparation of ground for crops.

Waipukurau.—General business. Talks were given by club members as follows:—"Electric Fencing" (I. E. Elliott); "Using Waste" (J. G. Mackie); "Tractor v. Horses" (C. Cork).

Northern Hawke's Bay

Wairoa.—Announced that F.U. accept the club's challenge to a wool competition at the Wairoa Show. Report on annual ball, which showed a profit of £58 0s 10d. Arrangements for anniversary dance to mark the third year since the foundation of the club. Debating contests held, the subject being "That Top-dressing is the only practicable method of improving second-class hill-country." Mr. B. E. Parkinson acted as judge, and placed the teams as follows:—Clydebank (negative), E. Pattison, W. Taylor, O. McKenzie, 274 points, defeated Frasertown, W. Brownlie, R. Brownlie, E. Brownlie, 268 points. Tawhara (negative), R. Powdrell, R. Mullins, J. Hervey, 284 points, defeated Opoiti, H. M. B. de Latour, S. Gloyn, T. Byrne, 270 points. At a previous meeting a discussion took place relative to military service, and it was pointed out that at the present time most good could be done by remaining on the land and helping to keep up production.

Poverty Bay

Gisborne.—Arrangements for field day. Mr. D. E. Chrisp addressed the meeting on law and laws relative to farming. Much interest was shown, and a number of questions were asked at the conclusion of the talk. At a previous meeting it was decided to institute an annual weight judging competition at the A. and P. Show in aid of the Red Cross Society. Entries taken for sheep shearing competitions and the dried sheepskin competition at the show. An interesting lecture entitled "Soil Erosion" was delivered by Mr. K. F. Jones.

Tolaga Bay.—Talk by Mr. Matherson, bank manager, on banking and its effects on Y.F.C. members. At previously unreported meetings a discussion took place on lambing troubles, and Mr. N. Sadler spoke on the sowing of subterranean clover on the hillside. Mr. S. Freeman, Dominion Organising Secretary, gave an address on the Y.F.C. movement, and a talk on explosives was given by Mr. O. G. James.

Taumarunui

Ohura.—Arrangements for stock judging at A. and P. Show. At a previous meeting a general discussion took place on Y.F.C. affairs.

Western Bay of Plenty

Kati Kati.—General business. A lecture was given by Mr. A. W. T. Hyde, his subject being "The Manufacture of Tyres and the Rubber Industry Generally." The speaker illustrated his talk with lantern slides.

Paengaroa.—Discussion on stock judging championships at Royal Show and Centennial Tree Planting Scheme. Talks were given by club members as follows:—"Farming in the South Island" (L. Ashe); "Choosing a Breeding Sow" (J. Gulliver); "Breaking in Horses" (K. Ball), "Farming in Canterbury" (G. Williams), "Breaking in Wild Horses" (G. Mortersen), "Making a Cowyard Scraper out of a Motor Tyre" (E. Blackmore).

Tauranga.—Report on successful club birthday celebrations. Two members selected to act as junior judges at the Tauranga Calf Club. At a previous unreported meeting it was decided to apply for suitable trees to plant under the Centennial Tree Planting Scheme.

Te Puke.—General business. An address on cropping by Mr. A. V. Allo, Department of Agriculture, in which he gave useful information relative to the most suitable crops to plant in the district.

Waikato

Huntly West.—Business meeting.

Te Kowhai.—Business meeting.

Auckland

Clevedon.—Decided to give support to the Centennial Tree Planting Scheme. Messrs. Rayburn, Sutherland, Driver, and White each gave a short address on breaking-up and laying-down pastures. These talks were then criticised by Messrs. Munro, Bell, and Wilson, all club members.

Franklin.—Arrangements for club dance and field day.

Harrisville.—General business. A film entitled "The Manufacture of Superphosphate" was exhibited by Mr. Woodyear-Smith.

Mauku.—A lecture on general stock troubles by Mr. Carberry.

Warkworth

Warkworth.

Port Albert.—General business. Mr. Syme, Department of Agriculture, spoke on manures.

Dargaville

Arapohue.—An illustrated address on better feeding of livestock was given by Mr. E. H. Arnold, Department of Agriculture.

Marohemo.—Impromptu speeches by all members present.

Tangiteroria.—Report on club dance. Lantern lecture by Mr. E. H. Arnold, Department of Agriculture, entitled "Better Feeding of Livestock."

Kaitaia

Oruru.—Business meeting.

Health Notes for the Farm

Contributed by the Department of Health

This Miracle of "Sleep"

"TIRED EYELIDS UPON TIRED EYES"

God bless the man who first invented sleep,
So Sancho Panza said,
And so say I,
And bless him also that he didn't keep
His great discovery to himself,
nor try
To make it, as the lucky fellow might,
A close monopoly by patent right.

EVERY mother, as she watches her sleeping babe, no doubt marvels at times at this wonderful law of Nature, this miracle "sleep," which may be defined as a natural condition of insensibility more or less complete, or a period of recuperation for the body and the mind. As expressed by Leigh Hunt, "a gentle failure of perception creeps over you, the spirit of consciousness disengages itself once more, and with slow and hushing degrees, like a mother detaching her hand from that of a sleeping child, the mind seems to have a balmy lid closing over it like the eye—it is closed—the mysterious spirit has gone to take its airy rounds."

Sleep has been described as a natural rhythm. It has been said that it bears a resemblance to the alternation of day and night, that rhythm is innate in Nature. After activity comes rest; after energy, torpor; after mobility, quiescence; and after waking comes sleep, because it is a law of Nature that action and reaction are always equal and opposite.

This rhythm, if it be so, is seen not only in man and animals, but also in the vegetable kingdom. Witness, for instance, the leaves and flowers of many plants which open by day and close at night. However, although there have been no lack of theories as to the cause of sleep, there is no doubt that, without sleep, healthy and bodily life is impossible.

Loss of Sleep

It has been well said, "Without plenty of sleep, the activity of a working day is like a house built on sand." Common sense tells us that the time and effort spent in educating a tired mind is largely wasted. According to an overseas medical authority, even nutrition, of which we hear so much in these days, is not of greater importance as a factor in the health of the child than sleep. Man can fast for several weeks provided water is supplied, but loss of sleep even for a few days may prove disastrous. However, the loss of a certain amount of sleep should not be considered as a forerunner of something dreadful. Persons often get much more sleep than they think they do.

Almost every rule of hygiene and right-living could be quoted as a sleep-producer. Restlessness and insufficient sleep in adults may be due not so much to the work itself as to the manner of working, and particularly the foolish and utterly unnecessary habit of not

shutting down the business or professional part of the brain works for a reasonable time before retiring. Intellectual over-indulgence is an unwise form of excess, the consequence of which may be disastrous.

Nature's Bill

The ambitious student should therefore particularly guard himself in this direction. As Robert Louis Stevenson said of the industrious student, "He sows hurry and reaps indigestion; he puts a vast deal of activity out to interest, and receives a large measure of nervous derangement in return."

The grand laws of health are not violated without paying some penalty; Nature always sends in her bill. You might as well expect to plunge your hand into a crucible of molten metal and take it out unscathed.

In a well-regulated mind sleep should come as it did to Napoleon—"Different matters are arranged in my head in drawers. I open one drawer and close another as I wish. I have never been kept awake by an involuntary pre-occupation of the mind. If I desire repose, I shut up all the drawers and sleep. I have always slept when I wanted rest, and almost at will."

Rule of Bedroom

To those troubled with sleeplessness, the rule of the bedroom is important. It should be quiet, cool, and with an open window, but darkened, and the bed should be without hollows or inequalities. As a rule, light sleepers should avoid late and heavy meals. On the other hand, a glass of hot milk and a cracker biscuit may be helpful.

The habit of rising and restlessly moving round at night should be avoided. A change of environment may be beneficial. Eyestrain is a fertile cause of insomnia. Restless sleep, as with headaches, calls for a thorough examination of the eyes.

Drugs should be taken only under the supervision of the family physician. Sometimes, want of sleep is accounted for by a real want of physical exercise, but such exercise should be a real distraction and entered into with heart and mind. Golf, bowls, gardening, tramping, and such outdoor recreations usually promote sound, refreshing sleep, which is "a generous robber, giving back in strength what it robs in time."

Sleeplessness is a very common disorder in children. Apart from being a symptom of illness, it has many other causes. For instance, the young subject cannot be expected to cease an exciting pursuit and retire to profound slumber at a word of command. An hour spent before bedtime with a peaceful storybook and then the soothing words of a mother at the bedside produces that quiet attitude of mind which encourages sleep.

Some modern parents appear to have lost sight of the fact that the nervous system of the young in process of development needs a great deal of sleep, and to deprive it of an adequate amount is to starve it to an extent that leads to various forms of nervous disorders, some of grave significance. Medical authorities and others agree that children four years of age need at least 12 hours' sleep; five to seven years, 11 hours to 12 hours; and 12 to 14 years, nine to 10 hours.

Noise and Sleep

The relationship between noise and sleep is close, for, as the "British Medical Journal" points out in regard to children, the child who has slept in the midst of uproar will wake listless and tired, and if the conditions persist his growth will suffer. The never-ending restlessness of modern city life manifests itself by noise far into the night. Think of an invalid whose chances of recovery mainly depend on uninterrupted sleep doomed to lie awake in some hospital or room by reason of the thoughtlessness of some noisy home-bound party, or late vehicle traffic or noisy speeding motor-car or motor-cycle.

The increasing traffic noises year by year have caused several hospitals in America with hundreds of thousands of pounds invested in buildings and grounds seriously to consider moving to quieter quarters. It is encouraging to find that many of our local authorities are endeavouring to deal with this problem, for all people need a proper setting for rest and recuperation for the day's work.

"Early to Bed"

At puberty, adolescence, and "change of life" special attention is needed to secure the amount of sleep which each particular case needs. Regularity in time and duration of sleep is essential to the growing organism, so the wise mother starts a regular bedtime from babyhood for her child and never deviates from this regularity. One of the most important forms of health education is to get ingrained in the child's consciousness that early to bed and a long night's rest is one of the essentials of good bodily and mental growth and fitness.

It should be borne in mind that neglect of the rules of hygiene and right-living may cause sleeplessness, and that regularity in time and duration of sleep is important for mental and bodily health, and for a sleep to "knit up the ravelled sleeve of care," and be the "chief nourisher in life's feast."

"Making New Zealand"

If a New Zealander wishes to gain a concise yet comprehensive conception of the development of his own country over the century just completed he can do no better than to obtain the full set of "Making New Zealand," the pictorial surveys issued by the Department of Internal Affairs. These are 30 in number, and are 1s per copy. For a full set of Centennial publications the price is £9 10s. (plus postage) for orders booked prior to December 31.

The first five of the series to hand are outstanding both in quality and interest. These are no formal, dull-as-ditchwater history books, but are entertaining magazines. Although accuracy has been the guiding principle throughout, the authors have ingeniously contrived to combine education with entertainment.

The magazines are profusely illustrated. While some of the photographs are, of necessity, of an instructional nature, others are delightful examples of the camera's art.

Survey No. 1, "The Beginning," traces the gradual evolution of New Zealand through millions of years until life eventually made its appearance. No. 2, "The Maori," is full of interest, and No. 3, "Navigators and Explorers," vividly describes the adventures of the first voyagers to New Zealand. In No. 4, "Whalers and Sealers," the hazardous life of these early traders is graphically presented, with a wealth of authentic pictures and drawings. The work of the early missionaries is described in No. 5," "Missionaries and Settlers." Other booklets in preparation are listed in an advertisement in this issue.

As an authoritative and concise summary of the development of New Zealand these pictorial surveys are unequalled.

The Farm Home and Kitchen

Contributed by the Association for Country Education

Are Our Children Getting A Fair Chance?

IN our section of the November, 1938, and March, 1939, issues of the "Journal of Agriculture" it was shown that children, unless adequately fed, are handicapped physically and mentally for the battle of life. The question is: Is this actually happening in New Zealand, and, if so, why?

In our studies and observations of what people are eating it has always been rather difficult for us to be sure that the diets or menus which have been sent to us are really representative. Some people are only too willing to let us have all the information we ask for, but it is generally found that these are the people who are interested in nutrition and whose meals are better than the average.

But we do not so often have an opportunity to study the "average" or "below-average" diets and to observe to what extent delicate children—children prone to colds and other infections, children with poor posture, and carious or decaying teeth, children backward at school—are associated with meals or diets that are below average—meals that in quantity are all right, but in quality and variety are failures.

Two Weeks' Diet

Recently it was our good fortune to acquire absolutely reliable records of what 15 country school children ate as their ordinary diet for two weeks—one week during last summer and one week during the winter. Their records made intensely interesting study, and gave a very clear insight into the way the New Zealand child, in that particular part of the country at any rate, is fed; and if they represent the average it is very easy to understand why more than half the young people in this country are not 100 per cent. fit.

The following menu was picked at random from the fifteen. It describes the meals eaten by a girl of 11½ years for a school-week during the winter.

Monday:	Tuesday:	Wednesday:	Thursday:	Friday:
Breakfast:				
Porridge Toast	Porridge Toast	Porridge Toast	Porridge	Porridge Toast
11 a.m.:				
Fruit	Fruit	Fruit	Fruit	Fruit
Lunch:				
Cake	Cake	Cake	Cake	Cake
4.30 p.m.				
Fruit	Fruit	Fruit	Fruit	Fruit
Tea:				
Fish Potatoes Sauce Bread & Butter Tea	Potatoes Tea	Stew Potatoes Jelly Bread & Butter Tea	Soup Potatoes Jelly Bread & Butter Tea	Potatoes Bread & Butter Tea

Some Worse

The others were worse or less like this menu—some were better, but others were worse. Two of the children (one nine years old and the other twelve) began the day with ham, fried potatoes, and cocoa or coffee; another had fried bacon, fried potatoes, white bread, butter, and jam, and tea to drink. The remaining 12 all had porridge. One had nothing else, some had toast or bread and butter, the rest had something cooked (either egg or meat). Seven had tea to drink, three cocoa or coffee, and four had milk. One out of the 15 had a daily dose of cod-liver oil.

At 11 a.m. a few of the children did not have anything to eat, two had fruit, four had sandwiches, and five cake.

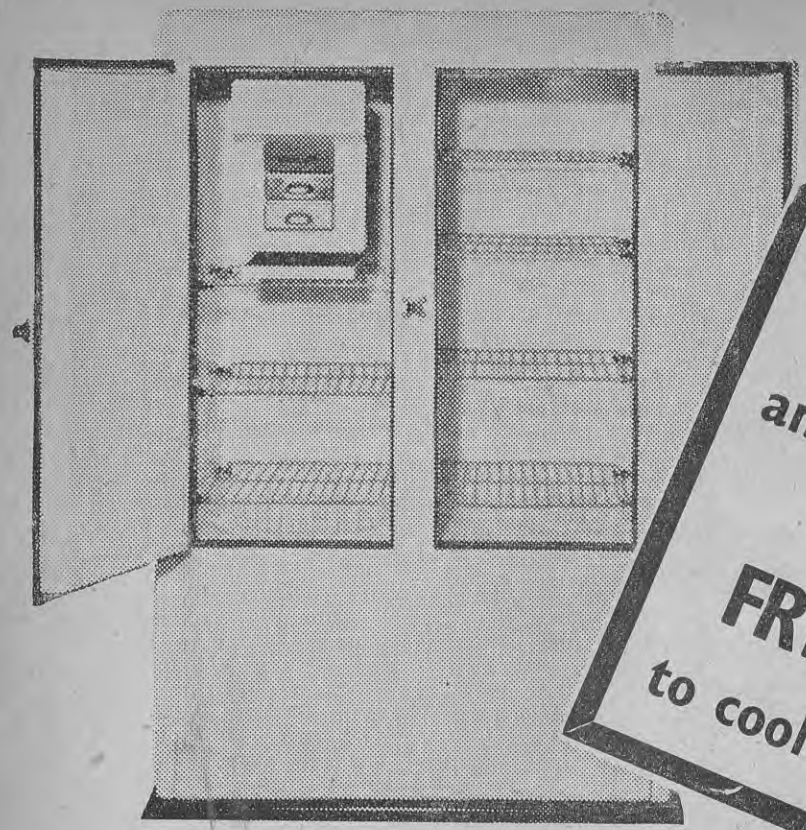
The lunches were very varied, but all were taken to school. Two of the children had cake and nothing else. The rest had sandwiches; a few actually stated white bread, but none said brown. Most of the children had jam sandwiches, a few had meat occasionally, two or three had honey, and one sometimes had egg.

In the summer tomato sandwiches appeared frequently. Nearly all had cake or biscuits of some kind or other—fruit cake, ginger cake, cream cake, wine biscuits and jam, or apple tarts were all mentioned. Only one had an apple or other fruit for lunch every day. One or two had it once or twice a week. In the winter they had cocoa to drink, and in the summer, water.

Afternoon tea was at any time from 3.30 to 4.30 p.m. In a few cases it was just fruit, but more often it was bread and jam with cakes, scones, or biscuits and tea to drink.

Dinner

Tea or dinner was at 5.30 or 6 p.m., and was supposed to be the main meal of the day. It varied from potatoes and sauce (Worcester or tomato) with white bread and jam and tea, to meat, potatoes, cabbage, milk, or steamed pudding and a glass of milk. Only eight of the 15 children who took sandwiches and cake to school and who mostly had just porridge and toast for



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breakfast had meat or fish for the evening meal. Fried potatoes and sauce seems to be the most common tea dish. Only two had any vegetable other than potatoes during the winter. In the summer a few had tomatoes with their bread and butter. Very few had a pudding of any kind. Most of the children had cake for the evening meal, and most had tea to drink.

This briefly outlines the menus from the 15 school children whose ages ranged from eight to 14 years. One's first impression on reading them through was of meals consisting of potatoes, white bread and butter, jam, cake, and tea. On a closer examination, half of them were found to be just that and nothing more, and the other half were more or less improved by the addition of meat and fruit, and, in one or two cases, of milk.

Glaring Inadequacies

The inadequacies of the diets were glaring! Not one child had nearly his quota of 1½ pints of milk per day. In summer, when cocoa was not served at school, most of them had no more milk than the small amount they would have on their porridge or in their tea (which, by the way, none of them should have had at all.)

Few of the children had eggs, even in the summer when they are more plentiful; yet the healthy child can, and should, eat an egg a day. Cheese, another excellent body-building food, was scarcely mentioned at all. It could have been used so easily in the school lunches, and would have been so much better than the sweet jam sandwiches which really do nothing more than temporarily satisfy hunger.

Except for potatoes, which are really very good food, especially if boiled or baked in their jackets, the children, excepting two, had no vegetable at all in the winter. For maximum health and vitality a child requires green vegetables as often as possible, and root vegetables when green ones are not procurable are absolutely necessary. So, also, are raw fruits and vegetables. It is easier to get them in the summer, but it is just as important to have them every day in the winter.

Most Important Factor

It must be that parents whose children have meals such as these cannot realise that food is the most important factor of all their child's development. The child who is to lay the foundation for a successful life while at school must be fit to study, to play games, and to hold his own as an individual. Only well-balanced meals will give him this strength and vitality. Such meals may take a little longer to prepare, but the results more than compensate for that.

It is just as important for the child at school to have the meals which provide for his growth and development as it is for the infant. Yet we often find that, although a good start has been made with the infant's diet, as the child gets older his meals become worse and worse. One cannot believe that this is due to carelessness on the part of the mother, but rather to her not realising the great part played by food in the building of strong, healthy bodies, not only for the present, but for the whole lifetime.

Is there any reason why a child should not have porridge and brown toast and butter, a glass of milk, and perhaps an egg for breakfast—good nourishing sandwiches and hard, nutty biscuits for lunch—meat or fish and plenty of vegetables and milk pudding and fruit for dinner—and in between meals, raw fruit? It costs no more than meals consisting of cake, and saves so much later on in doctors' and dentists' bills.

How to Enjoy Good Health

Many people over-estimate their vitality and endurance, and frequently work (or play) themselves into a state of over-fatigue and nervous exhaustion. Probably no one thing is the cause, and certainly no one magic thing will cure.

Good endurance with freedom from undue fatigue is the result of a constant building up and tearing down process that must never be neglected. The first essential is good nutrition, which means good food and good hygiene habits, not just for to-day or this week, but every day.

A good health regime means both "do" and "don't." Look over these lists and see whether you really have earned the vitality which you would like to enjoy.

DO YOU PLAN TO HAVE EACH DAY—

- **A pint or more of milk?**
- **A serving of orange or tomato?**
- **At least one other serving of fruit?**
- **One serving of potato?**
- **At least one other vegetable and a raw one several times a week?**
- **A dark bread or cereal?**
- **Two servings chosen from: eggs, meat, fish, cheese, dried legumes?**
- **Plenty of drinking water?**
- **Some cod or halibut liver oil?**

ARE YOU GUARDING AGAINST—

- **Irregular meal hours?**
- **"Scanty" breakfasts?**
- **"On the run" lunches?**
- **Careless posture?**
- **Eye strain?**
- **Insufficient sleep?**
- **Poor ventilation in sleeping rooms?**
- **Constipation?**
- **Infections and colds?**
- **Too strenuous exercise?**
- **Emotional upsets?**
- **Worry?**

"Eat What You Can, and Can What You Can't"

EAT WHAT YOU CAN, AND CAN WHAT YOU CAN'T.—This sounds silly, but it really is a shrewd American saying, because canning in the U.S.A. is the most popular and successful method of preserving foods in the home. In the regions where all-the-year-round vegetable gardens are not possible because of drought or other causes, the farmer and his wife plan out how many acres of garden are needed to grow in one single planting practically all the small fruits and vegetables needed for the entire year's supply.

To arrive at this area the housewife works back from the needs of the family. Knowing that green vegetables and fruit will be needed every day to give a balanced diet, she calculates how many jars of greens and fruits are required, and, on this basis, so many rows of spinach, beans, peas, maize, etc., are planted.

Neighbours Help

Then, when the vegetable crop is ready it is a matter of "eat what you can, and can what you can't," and all hands help to harvest the crop and get it into the jars and into the pantry for use during the rest of the year. Neighbours help each other, and equipment such as pressure cookers and can-sealers are pooled.

Similarly, at the right season there is a great slaughtering of pigs and steers and a canning of meat for use not so much in the winter as in the hot summer weather.

It certainly means a lot of hard work, but unless it is done the people find that they have a very inadequate, uninteresting and expensive diet of grocer's foods during the greater part of the year. In these districts, where canning has become so general, people are living more cheaply, are better fed, and are much healthier than ever before.

Planning Ahead

Farm women in New Zealand were quite appalled when a visiting Texan told them of how her neighbours worked and put up great pantries full of canned fruit, vegetables, soups and so on, but when all is said and done, we go to no end of labour to make huge stacks of ensilage and hay, and grow winter feed so that the stock can keep in good condition through the winter, and we think nothing of it. In fact, we would think it a mighty poor farmer who did not plan ahead so that when feed was scarce there would be enough hay and roots to give the stock that balanced winter ration which ensures the next season's profit.

When we realise that human beings also need a balanced ration if they are to come through a hard winter in good heart and with full vitality, we see that the efforts of these Texans are just as vital to the success and happiness of their life on the farm as is the growing of winter stock feed on ours. We are fortunate that our climate in most districts allows us to grow vegetables nearly all the year round. Hence such extensive food preservation is not necessary.

But although vegetable gardens **might** be keeping the table supplied with the wherewithal to balance the ration and give a pleasing variety to winter menus, we find that in the majority of country homes there is no winter garden, and that, except for an occasional cabbage, practically no vegetables besides potatoes and roots are served.

Saving on Bills

So it seems that if we, too, aspire to save on our grocers' and chemists' bills and enjoy an interesting variety of foods during the off-season, we must either plan to have an all-the-year-round garden, or if this is not possible, plant a big spring garden, and when this is ready—Eat what we can and preserve what we can't!"

Here are some useful preserving recipes.

BOTTLED RHUBARB.

There is more than one good way of bottling rhubarb:—

(1) Pack the rhubarb as tightly as possible into the jars. Fill the jars to overflowing with a hot, heavy syrup made of twice as much sugar as water and cooked until the syrup forms a thread when dropped from a spoon. Adjust the rubbers and lids, but do not seal the jars. Boil them for 16 minutes in the hot water bath. Rhubarb bottled in this way makes good sauce or filling for pies.

(2) In pint jars place a layer of sugar one-half inch deep, then a layer of rhubarb of equal depth, and alternate in this way until the jars are filled, having a layer of sugar on top. Adjust the rubbers and the lids and boil the jars in a hot water bath for 25 minutes. This makes a richer sauce than the method previously described.

(3) Rhubarb will keep if sealed in clean jars with cold water only.

HOW TO DRY PEAS.

Shell the peas (which should be fully grown but with pods that are still green) and blanch them for three to five minutes in boiling salt solution (one tablespoonful of salt to two quarts of boiling water). Lift out of the water and dry off the water with a cloth. Spread on a perforated tray to a depth of not more than one inch, and put in an evaporator at the initial temperature of 115 deg. F. and gradually raise this very slowly to 145 deg. F. after 1½ hours, and keep it at this temperature for a further two hours. Stir frequently, especially during the first two hours of drying.

Note.—An evaporator can be made from a box without a bottom and with the end knocked out. Fit it with cleats for holding trays or shelves, and make these with a wooden frame and a wire gauze bottom. Stand the evaporator with its open bottom over a source of heat. Use an old kerosene burner or electric heater to provide the heat, and place a sheet of metal over it to spread the heat. Put the thermometer on the bottom shelf, and change the shelves up and down regularly. Sometimes dryers are placed on top of a coal stove, in which case they need to have asbestos pads nailed to the legs which support them.

HOW TO BOTTLE GREEN PEAS.

Peas should be bottled immediately after they are brought from the vines and before the sugar in them has had time to change to starch. For satisfactory results, select pods that are well developed and green. After the pods have begun to wither and the peas are hard, it is too late to bottle them.

Shell, blanch (that is, pre-cook in boiling water in a saucepan for five minutes), strain and pack in hot jars within one inch of the top. Add the hot water to cover, and one teaspoonful of salt and one tablespoonful vinegar or lemon juice to a quart. One teaspoon of sugar may be added. Use a new rubber on each jar, screw lids on them, give one-half turn backwards to allow for expansion of the contents of the jar. Place in a water bath in sufficient water to cover the top to the depth of about one inch. The temperature of the water should be the same as that in the bottle. If this is observed there should be no fear of breakage. Do not begin to count the time until the water boils over the jars. Two hours are sufficient for young peas. Allow two and a half hours for peas which have been bought and are not strictly fresh. Immediately on removing the jars from steriliser, screw down the lids and invert them to cool. Avoid draught on the jars, but cool them as rapidly as possible. Wash the jars thoroughly, label, and store in a cool place.

BOTTLED CAULIFLOWER.

Break the cauliflower into flowerets. If desired, place in cold brine for a short time, but do not allow to soak. Blanch in boiling water five minutes and plunge in cold water. Pack in hot jars, fill with boiling water within one-half inch of the top, add teaspoonful of salt for each quart, adjust rubber and lid, seal lightly, and process 1½ hours.

To serve.—Heat to boiling point, pour off water, and add white sauce, butter, and seasonings.

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And Miscellaneous Matter.

SUBSCRIPTION RATES

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