The Proceedings
of the
Lincoln College
Farmers' Conference
1953

A Canterbury Agricultural College Publication
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"If I have an apple and you have an apple and we exchange apples, then we each have one apple, but if I have an idea and you have an idea and we exchange ideas, then we each have two ideas."

—Chinese Proverb.
LINCOLN COLLEGE FARMERS' CONFERENCE
1953

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L. W. McCaskill,

Lincoln College,

Christchurch.
# PROGRAMME

## GENERAL THEME: INCREASING FARM PRODUCTION

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OPENING REMARKS BY THE CHAIRMAN

In welcoming members, the chairman, Mr D. S. Studholme, referred to the fact that the theme of the conference was increased production. He said.

"That is perhaps a hackneyed theme, as it has been shouted at New Zealand farmers from all sides as being particularly important to New Zealand. But I want to look at it with a broader view, the world view.

The population of the world now is about 2,500,000,000 and is increasing at the rate of 50,000 a day. That is, 50,000 more people a day to breakfast. Unfortunately, some of them will get no breakfast. A century ago, world population was about half today's figure. In 70 years, it will be double—that is practically in our own time.

It is estimated that some countries will double their populations much sooner than 70 years from now, but the grim fact is that that just could not happen. There simply would not be enough food to go round. The world is heading for famine on a scale that is appreciated by very few.

The result will be that envious eyes will be cast on the few countries which are able to produce a surplus of food, such countries as Australia, the United States, Canada and New Zealand. From the point of view of their very existence, they will have to produce more food. If we could produce a few more carcases of lamb, or Australia can produce a few more tons of wheat for distribution through the Colombo or other plans, that would relieve things a bit, but it is not the answer.

New Zealand might look for a lead to the United States. The United States had vision and saw that it might be possible for the over-populated countries to feed themselves if they applied themselves to research, but saw also that organising this research would take too long. The United States had therefore sent experts to other countries to help them, and had already had successes in increasing the food available in some neighbouring countries.

I come to the final conclusion that the only hope for the world lies in agricultural research. It is not a good line to start cutting cost in, but what do we find here? The Department of Agriculture is starved of funds, and the D.S.I.R., though it has funds, cannot spend enough of the money on agricultural research.

Much could be done to increase production by offering farmers an incentive. I don't mean 6d on a bushel of wheat, but a serious incentive. It will no doubt be said that that would be helping one section of the community, but they are doing exactly that in England, where farmers are a small minority. They realise there that they must have food."

Mr Studholme concluded by saying that research was not confined to the scientists. Every farmer was in his own way as much a researcher as the scientist. That was why at this conference, the
preponderance of the papers was from practical farmers, with a leavening from technicians and scientists.

Mr Studholme then asked Dr. M. M. Burns, Director of Lincoln College to open the Conference.

Dr Burns:

"My task is a very simple and a very enjoyable one. It is a very great pleasure indeed to see so many frequent visitors and old friends of the College here in this audience today. At the same time we do express regret, as we have done on many previous occasions for the fact that this room will accommodate only a limited number of people.

I would just like to welcome you to the College and to say that we are very pleased to be associated with the Committee organising this Conference. Although it may require a little bit of assistance from us that assistance is gladly given and the return we get is very many times greater than the assistance we give.

You will notice during the three days quite a number of the staff of the College joining in with you. They are here, not because they may be able to make a contribution, but primarily to pick up for themselves a very great deal from your contributions and discussions."

Dr Burns concluded by declaring the Conference open.
CATTLE IN SOUTH ISLAND FARMING

RECENT ADVANCES IN GRASSLAND FARMING AS THEY AFFECT HILL COUNTRY

Dr. J. Melville, Director, Grasslands Division, D.S.I.R., Palmerston North.

In 1945 the newly-formed Manawatu Catchment Board, with the blessing of the Soil Conservation and Rivers Control Council, leased an area of hill country in Pohangina County for research into various aspects of soil conservation. The Te Awa experimental Area, as it is now called, might be described as moderately-steep to steep hill country with main slopes between 25° and 45°. The soil is an unconsolidated sand which, under the original heavy forest cover, was reasonably stable. This stability carried over into the pasture phase which followed after the forest was cut and burnt; the thousands of tree stumps acted as pegs which held the gully floors in position and bound the topsoil and subsoil on the slopes. Then, about 20 years ago, the tree stumps began disappearing rapidly, and degrading of the gully floors accelerated to an alarming degree with consequent instability of the slopes above. When the area was taken over eight years ago the first impression was that urgent remedial methods were necessary to prevent the whole farm being swept down the Oroua River to the sea. And that in fact was the major programme for the first four years, a programme carried out co-operatively by the staff of the Catchment Board and of Grasslands Division. There is a most interesting story to be told of the devices which have been tried to hold the gullies in a state of reasonable equilibrium; of the successes and of the far greater number of failures. But this is not the time or the place to tell that story. Instead I want to give a summary of the work initiated by Dr Bruce Levy and carried out by Mr Suckling and his team on the improvement of pastures on the area. As you can well imagine, research of this nature would inevitably form a major part of any programme in which Dr Levy had a guiding hand. His philosophy can best be given in his own words. The research project on hill country was undertaken "in belief that if soil conservation could go hand in hand with farm betterment as a whole, then it would be accepted whole-heartedly by the farming community and would have that community's whole hearted support."

Now in spending my allotted time on a description of the Te Awa Experimental Area and of the trials which are in progress there, I am perfectly well aware that it is blessed with an excellent grassland climate. Rainfall is just over 40 inches and is remarkably well-spread; there is no marked summer drought, while the winters are not severe by most South Island standards. Nevertheless I am convinced that many of the results achieved are of general applicability, and that if they were applied to the greater proportion of our millions of acres of hill country the increase in carrying capacity would be spectacular.

The problems of hill country are of course all tied up with the fact that the surface of the land is never horizontal and frequently
approaches the vertical. This very obvious statement has a number of important consequences and I propose to list five of the more important of these and then go on to discuss each in as much detail as time will allow.

1. Cultivation of the land and hence preparation of a seed bed is impossible. Other means must be found of introducing new and improved species of pasture plants, and of finding substitutes for the forage crops which are an important feature of land which has been ploughed from pasture.

2. There is a far-greater variability in the amount of direct sunlight falling on hill country than on flat country, and this is reflected in the differences in vegetation between sunny and shady slopes.

3. The effects of rain on hill and flat country have important points of difference. On flat country, under normal rainfall conditions the major pathway for the water is percolation down through the soil; on hill country, surface runoff accounts for a considerable proportion of the total. Hence, the effective rainfall, i.e., the rainfall which passes through the root zone of the pasture plants will be considerably less than the actual rainfall.

4. On hill country there are far greater changes in fertility levels within short distances than on flat country. These fertility changes are directly connected with the grazing and camping habits of sheep.

5. The control of weeds on hill country presents problems which are different from those on flat land.

Oversowing

Taking these points in turn, the first relates to the introduction of new pasture species into the existing sward. And the first question which naturally arises is, "What is the necessity for changing the present pasture association?" The answer to that question lies not so much in the virtues of certain pasture species, but on the soil-fertility status of hill country generally. I am quite convinced that on the great bulk of our unploughable land the major barrier to increased carrying-capacity is simply lack of nitrogen. In other pastoral countries and under quite different farming systems this deficiency might be made good in part by artificial fertilization. Such a solution is however quite impossible in New Zealand, and the only way of overcoming the difficulty is by the introduction of the most efficient legumes, clover, and Lotus species, which will grow under the particular conditions of soil and climate in any hill-country region. I think that 'nobody' will disagree with the statement that no feature of hill-country pastures is more noticeable than the lack of clovers of every description and particularly of clovers of high productive-capacity.

Particular attention has been paid to the introduction of legumes in established pasture swards both at Te Awa and in other areas throughout the North Island. The important findings may be summarized under the headings of pre-sowing treatment, post-sowing treatment and selection of species.

Pre-sowing treatment. There has always existed a considerable difference of opinion among farmers regarding the kind of pasture on which clovers establish most successfully. One group considers that relatively long pastures act as a shelter and a nurse crop for the clover seedlings; the other that if the seedlings are to develop a good rooting system at the earliest possible moment they must be sown on a sward that is eaten off as closely as possible. The findings from
our numerous trials are very much in favour of the second group. All clover species, with the exception of subterranean clover, established significantly better when oversown on short grazed pasture. Even with sub clover there are distinct advantages in sowing on short grass: in order to reach the light the seedlings in tall grass have to develop a long stem which at the first grazing is frequently nipped off below the crown with consequent loss of the seedling.

It is here that the main topic of today's conference, viz., the use of cattle, fits in particularly well. For the removal of dense, tufted, and matted stands of the major hill country grasses and for the bar­ ing of ground by simple hoof action, the working bullock is enormously valuable. Under most North Island conditions it does an excellent job of cleaning up roughage preparatory to oversowing.

The best time to oversow is of course determined by climate. Moisture supply and temperature are the two most important factors in germination and seedling development. Hence oversowing will be most successful when temperatures are high enough to promote quick germination and growth, and when adequate moisture is assured, until the seedling roots have penetrated far enough to withstand a temporary dry spell. We have seen many oversowings fail through lack of moisture over quite a brief period just after germination. Under Te Awa conditions best results with all species have been obtained by sowing in March and April, after the autumn rains have set in. The seeds germinate rapidly and are sufficiently advanced to go through even a fairly severe winter with only small losses. They are then in a good position to make the most of favourable growing conditions in the following spring.

Different districts will, of course, have their own climatic patterns which will determine whether autumn sowings have a reasonable chance of success. This is one of the cases where the farmer might well become his own experimental officer. There is nothing difficult in sowing small areas with clover seed at different times of the year and closely observing which season gives the best results.

One very interesting finding from Te Awa relates to fertilizer application in an oversowing programme. Normally in these days of aerial topdressing, seed and fertilizer are applied together and this is the most efficient way of doing two jobs in one. But aerial topdressing is very much dependent on weather conditions and a job which is promised for April frequently cannot be done till June or July. I am quite sure that such a delay is not very important so far as superphosphate is concerned. But from what I have just said you will appreciate that very little flexibility is possible in the time of oversowing. Our trials at Te Awa and elsewhere have shown little or no direct benefit from combined fertilizer and seed applications as determined by percentage germination and early growth. Provided that the fertilizer is applied by the time the seedling clovers have established and are able to make best use of it the plants suffer no handicap through lack of fertilizer at time of seeding. These experiments were carried out on a range of soils none of which could be described as having adequate phosphate, and we believe that only on soils with extreme phosphate-deficiency would it be necessary to sow seed and fertilizer simultaneously.

The practical application of this is obvious. Seed for 50 or 100 acres can be sown without undue difficulty by hand at the most suitable time, and the fertilizer can then be sown when aircraft are available.

Post sowing treatment. The management of newly sown pastures on fertile flat land has been a matter for much investigation by
Grasslands Division and the steps which must be taken for good clover establishment have been fairly clearly outlined. On hill country however, post-sowing management appears to be of considerably less importance. “Although good establishment was obtained under both close continuous and intermittent grazing, it is desirable to exercise close grazing control during the first six months after sowing,” in other words the big hurdle to the successful introduction of clovers lies prior to and just after sowing. Once the seedling has a few rootlets firmly into the soil, it will thrive under any reasonable system of management.

There is however one aspect of post-sowing treatment which deserves mention. Seeding rates of clovers for oversowing programmes are generally not as high as for pastures sown on a prepared seed bed. Quite frequently less than 1 lb per acre of each of the three main clovers white, sub and red are sown. Moreover, the proportion of seeds which germinate and develop to established plants is naturally much lower in a sward than on cultivated ground. Hence, even if conditions have been favourable for oversowing the resultant clover stand after about a year is likely to be somewhat sparse.

The thickening up of the clover stand can be achieved relatively easily by allowing the plants which are already there to act both as a source of seed and as a distributing agency. The method is well illustrated in a trial on a steep 10-acre paddock at Te Awa. It was oversown in March 1949 with 2 lb Montgomery Red Clover, 2 lb Broad Red, 2 lb White, 2 lb subterranean and 0.5 lb Lotus major. (I might add that apart from suckling and a little white clover the original association contained no pasture legumes). Germination and establishment were reasonably good, but despite the high seeding rate nobody in the spring of the following year would have described the clover content as anything approaching adequacy. The paddock was shut up from November 1950 till March 1951 and during that time all the clover species flowered and set seed, much of which was fully matured. Cattle were then turned in on the area and the whole paddock was thoroughly eaten out.

The results have been excellent. A profusion of clover seedlings was apparent all over the paddock during the next few months, and they resulted not only from the seed shed normally by the plants, but from the seed which had passed through the cattle and had been excreted in the dung. Within a few weeks of voiding, each dung pat had a fair covering of seedlings. The dispersion of seed by the grazing animal has been of considerable value in filling up gaps which had occurred in the initial oversowing.

Two sets of figures are of interest in this re-seeding experiment. The first set has to do with the number of clover seeds per lb of dung on the pasture just described, compared with dung from an adjacent unimproved area. The unimproved area produced dung with 400 seeds per lb; the figure for the improved area was 3,500 seeds per lb. The other comparison has to do with the buried clover-seed content of the paddock before and after seeding. Before oversowing, each square foot of soil to a depth of two inches contained, on the average, 320 clover seeds (10 white and 310 of suckling). After oversowing the average values were 2,200 seeds (600 white, 10 red, 20 sub and 70 Lotus major).

Now, just a word on the significance of these buried seeds and of the seeds excreted in the dung. Clover seed when fully ripened on the plant develops a seed coat which is highly resistant to the intake of water. Unless the seed is scarified, as happens in the normal operations of harvesting and dressing, it may remain in the
soil for long periods of time without germinating. Although we do not know the whole story of what happens in a pasture that is allowed to seed naturally, I think we can make a reasonable guess at it. First of all, the seed which has not fully ripened and which has not become hard germinates shortly after it falls to the ground or is tramped into the ground by stock. Hence within the first month of opening the paddock there will be a healthy sprinkling of seedlings over the area. The hard seeds now take up the running and they will germinate at intervals for periods up to 20 years and longer. Perhaps 10 per cent may germinate in the first year, 9 per cent in the second and so on.

The seeds which survive digestion in the animal and which are excreted in the dung are all in the hard condition. Hence, wherever there is a dung pat the same situation occurs: a small percentage of the seed contained in the dung will germinate at intervals over many years.

I think you will agree that this technique of allowing the natural re-seeding of a sparse clover stand so that the hard-seed content of the soil is markedly increased has great possibilities on all our unploughable land. Regardless of the treatment to which the pasture may be subsequently subjected, there is in the soil a reservoir of seeds which will re-colonise the area when conditions are suitable.

I would just like to add that the paddock which was allowed to re-seed in the summer of 1950-51, was shut up again in November 1952. By February of this year the whole area was a mass of white clover, red clover and Lotus flowers. It was re-opened to stock in early April and we are naturally extremely interested to see how much further the clover seed content of the soil has been built up by the second re-seeding process.

Selection of Species. The emphasis thus far in this discussion of oversowing has been entirely on the clovers, and the reason is not hard to find. Despite numerous attempts we have had no success in introducing any grass species by oversowing at Te Awa or elsewhere, and at our present stage of knowledge I would not recommend the inclusion of grasses in a surface-sown mixture. There are indications that a major reason for this is sheer lack of fertility and we propose further trials on the 10-acre paddock which was used for re-seeding and whose fertility is being rapidly increased through vigorous clover growth.

When we come to the clovers I cannot over-emphasise the desirability of getting a good strain of white clover established at the earliest possible moment. I realise that there are certain areas where, because of the rigours of climate, white clover just cannot survive. On the other hand, there are millions of acres which are climatically suited for white-clover growth and which are far below their potential production because of its absence. Pedigree white clover has already shown itself to be the most valuable pasture plant on the ploughable, more fertile land in New Zealand. I am convinced that it can and should assume the same role over the greater proportion of our hill country.

The value of subterranean clover lies in the fact that it is an annual which produces a good bulk of feed in spring and early summer, sets seed and dies about midsummer. This seed lies dormant through the summer period, germinates when conditions are suitable, and the cycle is repeated. We have found it particularly valuable on dry sunny faces where white clover has difficulty in surviving through the summer. In the drier parts of Hawkes Bay it is undoubtedly the most valuable of the pasture legumes, although even
here there is the possibility of building up fertility and water-holding capacity on limited areas to the stage where white clover would thrive.

The inclusion of red clover depends on the farmer's demand for feed in the months of December, January and February. There can be no question that under certain conditions it is a very valuable plant and our Te Awa experience indicates that there would be little difficulty in perpetuating it by spelling at the right time of year. I think the answer for each farmer is to include it in the seeds mixture on one paddock and decide for himself whether it is a good bet or not.

For two years after over-sowing, Lotus major was very disappointing. Germination was relatively poor and growth of the established seedlings was very slow. Over the last year or two, however, and particularly on the paddock which was spelled for re-seeding, Lotus has done surprisingly well. Not only is there a dense mat on the gully floors and on seepage areas but it seems quite happy up on the drier parts of the slopes. It is especially valuable in creeping over banks, and through fern, rushes, and young manuka, thus encouraging stock to go into weedy areas and get them under control.

**Variability in Direct Sunshine**

Every hill-country farm has its shady slopes and its sunny slopes. Every farm has large or small areas where the sun does not shine for one month, two months, or even three in the winter, and this lack of direct sunshine results in marked changes in soil temperatures and evaporation rates. Unfortunately it is not an easy task to scatter meteorological instruments round hill country or to take the necessary readings, and there is very little factual information on the differences which exist between different aspects of the same paddock. Mr Suckling has however made a start with measurement of soil temperatures at 4in. and 8in. depths. Differences in winter at the 4in. level of 5°F are obtained at two sites which are no more than 200 yards apart on either side of a gully running approximately east and west. A difference of 5°F at 4in. depth corresponds of course to very much greater differences in the top inch, and it is not surprising that considerable differences in pasture associations occur between the two slopes.

To give some idea of what these soil temperatures mean, it is instructive to note that the 4in. winter soil temperatures at Gore are about 5°F lower than they are at Palmerston North. Hence in this one respect the farmer is grazing one piece of land in Gore only 200 yards away from another bit in the Manawatu. It sounds a bit crazy but that is the best way of illustrating the large variations in climatic conditions which occur over quite small distances.

I don't know what the position is in the South Island but in the North Island the farmer regards his shady slopes as almost a liability. Grazing animals always tend to congregate on the sunny slopes even though they are eaten down to ground level, with the result that the shady slopes are covered with fern, scrub and rank unpalatable grasses.

It appears to us that there can be only one logical conclusion. The only way in which sunny and shady slopes can be managed so that each gives its maximum production is to fence them off and graze them separately. Mr Suckling started out on Te Awa with a series of 10-acre paddocks running across an E-W gully. He had all the troubles with shady slopes outlined above and a few others into the bargain. Then about three years ago he subdivided the series by a fence line running along the gully bottom. Not only did his grazing
problems disappear but he has found that in summer when his sunny slopes are dried out and unproductive, the shady slopes provide an excellent bulk of feed for his sheep. Moreover, the shady slopes benefit markedly from the stock concentration and controlled grazing, while overgrazing of the sunny slope is prevented.

You will appreciate that this climatic variability has a bearing on the previous section on choice of clovers for oversowing. We have found at Te Awa that the annual, sub clover, does not thrive in the dense pastures of shady slopes, whereas the perennial, white, and Lotus do remarkably well. On the other hand sub clover grows vigorously on the drier sunny aspects. With either aerial or hand oversowing it should not be unduly difficult to vary the seeds mixture according to the slope which is being treated.

The Fate of Rain

The whole problem of soil erosion and of river control is bound up with the way in which rain behaves after it hits the soil in the river catchment area. Ideally the area should act as a reservoir which sucks up the heaviest rains without runoff and then lets the water away slowly into the streams and gullies. There is no argument that forest approaches closest to this ideal although even forest will fail occasionally to prevent a sudden rush into the water-courses, with consequent flooding down river. But we are not concerned with forest here; we are concerned with the capacity of different grass associations and different managements to prevent surface run-off and soil loss. The problem is of the greatest national importance, but I regret to say that virtually no factual information on pasture under New Zealand conditions exists. The reason is not hard to find: the technical difficulties of such measurements are great while measurements must be taken over a number of years before valid conclusions can be drawn. Such evidence as exists at the moment does not contradict Dr. Levy's original thesis that improved well-managed pastures at high carrying-capacities increase the rate at which rain infiltrates into the soil.

Variations in Soil Fertility

Sheep traffic on slopes above a certain angle results in the formation of clearly-defined tracks which roughly follow contours and from which the sheep seldom stray. Their dung and urine are voided almost entirely on the tracks resulting in a marked increase in fertility on the horizontal portions of the hillsides. On the other hand, the “riser” areas between tracks are continuously grazed but receive no animal droppings. There is therefore a continuous transfer of fertility from the “riser” areas to the track surfaces and this is strikingly apparent in the alternate rings of green and brown round our hillsides.

There is no obvious way of rectifying this fertility transfer although it would be nice to believe that our animal breeders could produce a sheep which either had a stiff neck or swivelling hindquarters or both. The best that can be aimed at is to encourage clover growth on the “riser” areas through rectification of any soil deficiencies which may occur. It is here that the aeroplane as a topdressing agency is far from perfect since fertilizer dropped from above will tend to concentrate on the horizontal track surfaces (which don't need it), while the areas between the tracks (which have a high requirement) get less than their due. Some method of giving the “riser” areas preferential treatment, as can be done when topdressing is done by hand, would be of considerable value.
is another fertility trend which is the direct result of the sheep's habit of camping on high ground at night. During the night period, their excretion of dung and urine is proportionally greater than the ingestion of herbage. The result is that plant nutrients in the herbage consumed on the slopes during the day are transferred to the camping areas at night. It is quite usual to find ryegrass dominance on the hill tops when the slopes are carrying low-fertility grasses such as danthonia and browntop. Certain of the camping areas at Te Awa have produced over 11,000lb of dry matter per acre per year—a figure which is nearly as high as the most productive pastures at the home station in Palmerston North.

The growth of highly palatable grasses on the camping areas, due to transfer of fertility from the slopes, leads of course to extra grazing during the day, and these areas receive the added benefit which comes from what is really first-class grazing management. From the point of view of maximum production it is obviously undesirable to have such big variations in pasture production within a single paddock, and the remedy undoubtedly lies in concentrating on improvement of the slopes. The greater proportion of time that the sheep can be persuaded to stay on the slopes the smaller is the fertility transfer. The best form of persuasion is undoubtedly the presence of palatable plants and at Te Awa it is already very noticeable that sheep grazing patterns on improved and unimproved paddocks respectively are markedly different.

Weeds

It must be very obvious from what I have already said that we regard the competition from high-production pasture plants as the best method of weed control on hill country. Our oversown and top-dressed pastures have all shown a marked decrease in weed content, both through direct competition and through encouraging stock to trample fern and low scrub through which palatable clovers have pushed their way.

There is, however, another side to the story. The weeds which are choked out in this way are very largely those which are characteristic of low-fertility soils. A change has been noticeable over the past two years at Te Awa in that weeds of high fertility are beginning to make their appearance, with Californian, Scotch and winged thistle in the van. For these I have no ready-made remedy—the problem posed by such weeds is no more easily solved than it is on flat country. Indeed it is considerably more difficult since certain control measures such as mowing cannot be applied.

Throughout this talk I have been very conscious of presenting results from North Island experiments to an audience of South Island farmers; of describing an area lying to the west side of the Main Divide to farmers who are almost without exception concerned with land which lies on the eastern side. I am aware that there are hundreds of thousands of acres where rainfall does not exceed twenty inches and where annual grasses and clovers must always be predominant in the pasture association. In such regions the grazing practices which are highly desirable at Te Awa would be disastrous (and in fact have proved disastrous in the past). But it must also be recognised that there are vast acreages of hill country in the South Island where moisture is not the limiting factor and where, I feel sure, improvement as spectacular as that at Te Awa can be achieved. What I have tried to do is to bring out certain principles which are of general applicability: the universal limitation due to nitrogen deficiency; the necessity for introducing clovers and Lotus (and the methods which have proved successful); the variability in direct
sunshine and its consequences; and the fertility transfers which are inherent in sheep grazing. When these principles are understood and intelligently applied by the majority of farmers and not by the few, I would hesitate to put an upper limit on the quantity of animal products which our unploughable lands could produce.

Acknowledgements:

It is the unhappy fate of people like myself that they can present only the results of investigations made by other people and never by themselves. In this talk I have drawn very heavily on the results obtained by Mr Suckling and his team at Te Awa; the section on hard seed and its importance on hill country could not have been presented but for the work of Mr Hyde; many of the principles of the fertility cycle under pasture are directly due to Mr Sears. To these members of my staff I wish to make due acknowledgement.

Mr Judd, South Otago: What was your pH test, and what manure did you use?

Dr. Melville: The pH was 5.7, but we have had no liming programme. All the area oversown was given 2cwt superphosphate per acre per year except one 50-acre block which was manured in 1946, 47, and 48, and then we stopped. It is early to say if the production on this block is going down.

Mr Dillon: You have had no results from oversowing with grasses. Could you elaborate on that? Many of us here have done a lot of oversowing of grasses and think we have had results, particularly with cocksfoot. Do we imagine this or is the grass already there and comes away because it is encouraged by the topdressing?

Dr. Melville: In the North Island the results with grass sowing over wide areas have been most disappointing as far as our trials are concerned. We occasionally get seedlings and in a few months they disappear, but we know of numbers of farmers who do get good results. We don't know yet whether their better germination and establishment is due to higher fertility or not. My own guess is that where we have failure, the nitrogen status is too low. We don't think there is much chance until you build up the clover content. We can get results with oversowing clover; work with grasses definitely must be the next stage.

Mr Hurst: There is much depleted tussock country now cleared of rabbits. It would be valuable if we could establish clover and grass seed on this bare ground. I have been experimenting with concentrating sheep at the rate of 100-150 per acre for short periods and feeding them with hay with seed in it. Have you tried heavy stocking in this way?

Dr. Melville: No, not at those concentrations. We have tried both sheep and cattle, feeding them on mature clover and then turning them out on the hill with good results as far as spreading clover seed, but not grass. Grass seed is more susceptible than clover to damage in the digestive tract.

Mr Trolove: The trouble with sub-clover is that it dies off leaving bare ground as a seed bed for weeds.

Dr. Melville: That problem occurs with us in such places as Hawkes Bay where the climatic conditions are similar to yours. The
vigorous growth of the sub-clover in the winter and early spring dominates the grasses which die out leaving the ground open to weed invasion and wind erosion. The way out is not clear. Do you use sub. in the hope that you will build your fertility to such a state that the more perennial plants will persist? I can't give a direct answer. The whole thing depends on climatic balance.

Mr Trolove: As we build up fertility will white clover eventually take charge?

Dr. Melville: Ultimately with a 30in. rainfall, white clover should become dominant, but the sub. will not disappear.

Mr Cowin, Nelson: Under dry conditions wouldn't it be better to use cattle rather than sheep? Under the close grazing of sheep the surface dries out so much more quickly.

Dr. Melville: One of the most important questions we have to face is the comparative effect of grazing by cattle and sheep. We must get the right balance. Once we thought we could do without cattle at Te Awa but we had to bring them in. Sheep tend to eat patches here and there and let clumps of grass grow away into rank, unpalatable growth. Cattle are less selective and do not graze in a patchwork fashion; but I must stress the fact that economics come into it.

Mr Sherriff: How are your fences standing up on these steep hillsides? I am thinking particularly of the effects of slips.

Dr. Melville: We do have slips and they do affect the fences and their repair is always a major job for the winter. We regard stability of the gully floor as of greater importance than the odd slip on the hillside.

Mr Chapman, Kurow: Our problem is the carrying capacity in the winter. If we improve the hill country and boost up the summer carrying capacity it will intensify the winter feeding problem.

Dr. Melville: I would say it depends on the layout of the property and whether you have flats where you can grow lucerne and roots. If you can improve the ploughable country while it is in grass then you should get heavier root crops in the future and thus enable more stock to be wintered. I see no answer where winter feed cannot be grown unless the extra stock can be wintered off the property.

CATTLE ON THE PLAINS

A. Hugh Sim, Carew.

One often hears this statement: “Never mind about the profits from your cattle, look at the good they do.” I do mind the profits, and I believe the profit angle should hold equal place with the benefits derived from the cattle.

I believe, to make irrigation pay, the irrigated area on our farm must be divorced from the dry land, to the following extent. Provision for dry spells on the dry land, must come from the dry land itself, and not from the irrigated areas. Hence our areas of lucerne-cocksfoot.
If the irrigated area had the heavily-stocked dry land hanging round its neck, the stocking rate on irrigated would have to be kept down, and the heavy capital outlay for the irrigated area would not be justified.

Lucerne-cocksfoot would be a very much cheaper insurance policy.

We make irrigation carry stock to its fullest capacity, and I hope to show you later how this helps to obtain profit from irrigation in a season as wet as this one has been, and how irrigated areas can indirectly help to control dry-land pastures with cattle in a wet season. I hope to show you also that our cattle programme is not dependent to any great extent on irrigation. We ran cattle when we had all dry land, and although our present system has been developed to fit in with irrigation, I believe it would be substantially the same without irrigation.

I manage a 608 acre farm of light-medium land, Government valuation about £13 per acre, situated 4 miles north of the Rangitata river, at a point mid-way between Ealing Railway and Mayfield township. Average rainfall is about 33 inches. I propose to trace the development of the farm from 1946, as cattle were part of the development plan, and because I ran into certain difficulties on the way, and made quite a few mistakes.

Ours is a sheep farm so I will refer as much to the sheep as to the cattle. I have done certain things too, which the cattle have thrived on, and the sheep have not.

In 1946, the start of the development plan, about 50-80 tons of lime per year were applied and this was steadily increased each year, until in the season 1951-52, 400 tons were sown. P.H. tests have shown that we now need only a maintenance application over most of the farm.

We started topdressing selected paddocks with 1cwt. super. per year. This also was steadily increased, until all grass received 1cwt. per year, increased again to 1cwt. twice a year, increased further to 1½cwt. twice per year over most of the farm and increased again until selected paddocks received up to 6cwt. in one year. In 1951-52 almost 100 tons of super. were applied. Soil tests then showed that in super. also, we appear to need only a maintenance ration over most of the farm. I shall refer later to some results from the heavy dressings of super.

We had 18 paddocks in 1946 and today there are 35.

Rotation in 1946 was to plough out of grass, and sow down in the same season. This was changed to a four or five year one, which has now served its purpose, and is to be replaced by a three-year rotation.

Irrigation was added about 1949, but it was not until 1951-52 that we irrigated seriously to carry more stock. There are now 70 acres border-dyked in seven paddocks. 100 acres in seven paddocks are wild-flooded.

The result of this plan has been a rise in stock numbers, as follows:

In 1946 there were 720 ewes and 200 ewe hoggets, but the hoggets were sent out to grazing from September to May each year.

Cash cropping was about 20 acres, with 20 acres of oats for chaff to help winter the sheep.

Today there are 1100 ewes and 300 ewe hoggets with 80 to 100 head of cattle of varying ages.
Cash cropping is 70 acres of peas, wheat etc. Ten per cent of our acreage is in lucerne and lucerne-cocksfoot.

In 1947, 20 heifer calves were purchased, and proved quite inadequate to clean up the accumulated roughage, and so the following year 37 steer calves were added. These did clean up the roughage, but as we were grazing all available grass with both sheep and cattle during the summer, with no provision for hay, or only a minor amount, when the growth slowed up in April-May, cattle feed became a problem. In previous years, accumulated roughage had kept the cattle going well into winter. To be forced to feed large quantities of hay so early was eating into the profits from the cattle, and further, we did not have the hay to do it. Fences, too, were showing signs of wear. These were the main difficulties; not being able to get the maximum profit from our 2½-year cattle, through being forced to sell in late autumn, and not having sufficient feed to buy in fresh cattle for the following summer, plus the damage-to-fences problem.

Slowly the system in use today was evolved.

I make a point of having each spring a mob of well-bred 2-year steers, which have either been purchased as calves or as 18-months cattle. I also have a mob of yearlings on hand. The 2-year cattle are handled until the lambs are weaned to do some work in pasture control, but are always placed where they are most likely to go ahead. The yearlings are given the job of controlling the paddocks not good enough for the 2-year steers.

A border-dyke block of 32 acres is subdivided into four paddocks, and carries 200 ewes with their lambs, often a mob percentage of 130-140. These ewes are rotated in the four paddocks on a strict schedule, and are shifted each eighth day. There are generally about 15 to 20 2-year steers grazing on this block, which are placed either before or behind the sheep to ensure that when the sheep are shifted to their fresh paddock, it is in the state of control most suitable for the sheep.

The eight-day schedule is strictly adhered to. A hay feeder travels with the sheep and is filled with four bales of lucerne hay at each shift. As the sheep are out of each paddock for 24 days, the growth which the cattle are asked to deal with is at times fairly rank. These paddocks had 6cwt of super. per acre in 1951-52 and are a fiery proposition, so at times the cattle need a little hay to counter bloat.

When the lambs are weaned, these cattle are fat and are left there. Weaned lambs are then put in on the eight-day schedule, because theoretically these paddocks are free from worm infestation. As soon as possible however the lambs are graded to rape and dry land grass. More 2-year steers are brought in from other parts of the farm, and the block becomes a cattle-fattening paddock for the rest of the autumn.

Other irrigated paddocks are set stocked with sheep at five or six per acre, and a group of yearlings has the job of controlling these paddocks, being shifted during the season to where they are needed most.

On dry land, sheep are set stocked at three to four per acre, and young grass quite lightly. Odd dry paddocks have the backward 2-year steers set stocked at ½ beast per acre. In a favourable season these cattle are fat by January.

A further group of yearlings is shifted round the remaining dry paddocks to control grass for the sheep. A paddock due to be
ploughed the following winter is not controlled with cattle unless it is getting completely hopeless for sheep, as it is necessary to have some reserve of feed for the dry land cattle if we run into a dry spell.

From lambing to weaning, sheep from dry land are never shifted to irrigation, or vice-versa, but the cattle stocking I have outlined to you is flexible and whenever it is thought advisable the cattle are moved.

After weaning, the dry-land young cattle are used to prepare paddocks for weaned lambs if it is necessary. If not, a young grass paddock receives them.

We will leave the cattle and sheep now and return to them in May.

Of our 608 acres, 220 acres are under the plough each year, growing 70 acres cash crops, 85 acres of turnips and 65 acres of rape. With three 17-acre paddocks of lucerne-cocksfoot on dry land, and 10 acres of straight lucerne irrigated, there are 325 acres of grass available for grazing. The whole area, plus lucerns, is used over the lambing period, but after lambing, all lucerns, plus several small head of cattle, and the 1400-odd head of Romney-Corriedale sheep, which are then crowded on to the remaining 290 acres, which in a normal season would take them through weaning with little or no margin at all. The closed areas (61 acres of lucernes and 35 acres of grass) are for hay, but sheep stocking on dry-land paddocks is reduced, if dry weather makes this essential, by taking out some ewes and lambs with an eye dog. Then we build up a new mob in one or more of the paddocks intended for hay.

This very wet season, one dry-land mob was eliminated by taking some ewes and lambs to each of the remaining mobs, and a further 17 acres were closed for hay. 25 acres of young grass were closed for a ryegrass crop, but was eventually cut for hay. 13 acres of H1 were harvested. The stock had access to 235 acres only, an average of six sheep per acre and just under ¾ of a cattle beast per acre. There should have been, and would have been, over ¾ of a beast per acre, but as I have indicated earlier, we are after profits from the cattle. I therefore succumbed to temptation in October, selling a small mob of 2-year steers, which incidentally gave a gross profit of £16/10/- per head, in the seven months I had them. These cattle were not replaced fully until autumn, to bring our total to 80 once more.

We had 99 per cent control of grass all this summer, the cattle doing as well as or better than ever. The ewes piled on fat, but the lambs did not do as well, while with their mothers, on my very short cropped pasture, as neighbouring lambs did on feed over their backs. They were however very healthy and since weaning have done very well indeed. No fattening-type rams are used but the lambs, although fattening slowly, are going to the works at 38 and 39lb which is just about our usual weight these days. Our short-cropped, heavily-topdressed pasture was eaten by the stock as it grew, whereas the out-of-control pastures I referred to had always a certain amount of dry matter, and there I think is the explanation for the difference in the lambs.

On the other hand, we had no foot-rot, no worm infestation, we returned to the soil everything we grew, or will do, when we eventually feed the very large quantity of hay saved, and my faith in our system, is as strong as ever. Incidentally, may I state that in this exceptionally-wet season, when irrigation water was hardly used at all, we have had I believe, as much benefit from the irriga-
tion as we have ever had, in that we had the larger stock numbers on hand, and are taking a profit from them. Control of irrigated ground presented no difficulties, being fully stocked. Irrigated land grew slightly less than usual owing to lack of sunshine and warmth, and some cattle from irrigation were at times taken to control dry-land pastures, which were producing equally with irrigated ground for the first time in my experience. These small paddocks which we close for hay are important in our system and I shall enlarge on them. They are either permanently fenced eight to ten acre paddocks or semi-permanently fenced with cyclone and barbed wire, and are chopped off 25 to 30 acre young-grass paddocks.

The mixture sown in these, and all other paddocks too, is:—

- 20lb Perennial ryegrass.
- 3lb Cowgrass.
- 2lb White clover.
- 2-3lb Cocksfoot (now increased to 5lb).
- 2lb Dogstail.

D.D.T. is applied with super. in the spring following sowing down which is done with turnips, the rate being the equivalent of 2lb of 100 per cent. I estimate that if this policy eventually gives us immunity from grass grubs, the carrying capacity on our grazing areas will rise by ½ of a sheep per acre with cattle to match.

These selected small hay paddocks are repeatedly hayed each summer, used for weaning lambs following the hay cut, and closed again until early winter when they have tall growth. As the cattle run out of feed on the pastures, they are taken to these paddocks which keep them going into the winter without hay. Hay is fed in increasing quantities until a maximum of one bale of cattle hay to four or five rising 2-year steers is reached. The rising 3-year steers also go to these paddocks, but as they are fattening for the spring market, some hay is fed earlier and they are drafted to swedes and hay, either early or late depending on how good the 20 acres of swedes grown specially for the purpose may be. If the swedes fail, rising 3-year cattle are sold in the autumn, when they are invariably prime fat. Rising 3-year cattle, if fat, will hold their condition if fed one bale of good cattle hay per day between three beasts, so long as there is a picking of grass. This hay offensive eventually turns these small paddocks into predominantly cocksfoot, with enough red clover to make the resulting hay palatable. Large quantities of cattle hay, as much as 96 bales per acre, come from these paddocks. When they are predominantly cocksfoot they are good weaning paddocks in either a wet or a dry season. When the rising 3-year cattle are taken out to swedes early, a large mob of ewes, about 200 to eight acres, are put in and fed lucerne until the paddock is black with droppings. This keeps up the fertility. As lambing approaches, as many cattle as possible are put on swedes or turnips. This frees these handy-sized paddocks for lambing and gets rid of the cattle as they are best right out of the way during lambing.

There will be by now over 100 head of cattle on hand, having purchased young cattle about April or May to replace the 3-year cattle which are to be sold off prime-fat in September to October. I have omitted to mention that at any time of the year, some cattle are bought, in addition to the basic numbers, as a straight-out profit-making proposition, without very much thought of grass control. Generally in January the ewes are too fat and are more or less locked up. A mob of cattle is bought, and pushed along. These “catch” mobs have proved profitable. Several times one of these mobs purchased in February has grossed between £12 and £16 per
head before spring, and without very much expensive winter feed either.

We feed hay to our sheep and especially to the cattle, to a strict timetable. First thing in the morning the truck goes out feeding out hay, and that time rarely varies. The cattle keep contented, and although they may see the truck moving round later in the day and will probably move over near to it, just in case, they are not seriously upset about not receiving any hay and will return to grazing immediately.

Winter feeding is watched, and costed closely, because profits can be whittled down, but the cattle must be well fed to respond quickly to spring growth.

A good calf can weigh 400-500lb at 16 months but we rarely attempt this. Sixteen month beasts at 425lb have been made to 650lb by October. Those are our better efforts. Our basic cattle we expect to be about 800lb at three years with some really good beasts at 875lb. The lucernes and closed areas are all made into hay. I am interested in silage and watching its progress but have not bought a silage outfit because the large amount of money it would involve will buy me several miles of subdivision.

I feel that I will reach my goal of 1600 ewes and 150 to 200 head of cattle much quicker with the subdivision and no silage outfit, than I would with the silage outfit and no further subdivision.

I am quite happy with the hay. We have a special hay tractor, and the steady stream of hay which comes off the hay areas, keeps me going without being unduly rushed from November until February or March.

Using a contract baling outfit which gives excellent service, I deal with this hay myself, and leave undisturbed both the tractor driver and his machine, and the casual hand and the third tractor which he uses to irrigate.

I claim I take in more good-conditioned hay using this satisfactory contract baling service. I am free to ride the sledge and I have labour I can call on either to turn the hay in front of the baler or stook up the bales when rain looks imminent. Turning the hay in front of the baler frequently enables me to have the hay carted in, also by contract trucks, immediately. The hay areas being all small, enables me, even on a hay day, to find time to attend to the stock. Small hay areas minimise the risks of haymaking. The period between cutting and baling can be reduced, and the quality of the hay improved, by getting the rake going early and keeping it going.

The lucerne-cocksfoot makes excellent sheep hay if cut while the cocksfoot is in broad leaf and if baled without a rain on it. Rain does spoil it to some extent but it then makes first class cattle hay. The normal area closed we expect to yield 5000 to 6000 bales per year. This year the total saved reached 10,000, and we have, with a good turnip crop and a very good autumn-saved grass, a big reserve of hay behind us.

Cattle damaging fences are no longer a worry. About 1948 we started electrifying the fences. Two electric-fence controllers were set up at strategic points. The barbed wire was lifted from the standards, each standard was twisted cold above the last plain wire, using two standard straighteners, until the top hole in the standard faced outwards. A small insulator was bolted to each standard, with either 3/16in. or 1/2in. machine screw, with a metal washer under the head of the bolt and another under the nut. The surplus thread was cut off leaving one thread visible which was rivetted very lightly to the nut. The cost per mile was about £10. This proved most
successful, so each year we add more fences to the circuit using over-head wires at the gateways. At the present time 3 of the fencing is electric and all new subdivisions are electric.

Five or six plain wires and an electrified barbed wire is a very satisfactory cattle fence.

Our sheep have improved, not only in numbers but in quality, since 1947, but the part the cattle have played in that improvement is impossible to assess, as the other development agents, lime, super, and subdivision have obviously done their share.

Cattle have kept worm infestation down every year, very definitely, excepting one; in the season 1951-52. Our experience in that year (when all lambs contracted scabby mouth, and the resulting weakening of them, gave rise to a severe death rate from worm infestation) makes it quite clear that running cattle is not a cure-all for worm infestation, and all precautions must be taken.

We have noticed for several seasons that our ewe lambs are fattening on the short-controlled grass as fast as the wether lambs do on rape. I rather suspect our next move will be to try out a mob of wether lambs fattening behind the cattle on grass against a mob of wether lambs on rape.

If I had the opportunity of starting again in 1946, I would go for the subdivision, the lucerne, the lucerne-cocksfoot and irrigation. I would go for lime and the super., but I would be slightly more cautious about the 5 and 6cwt. of super. I would go for the cattle but I would have a higher ratio of cattle to sheep.

I would enlist the services of the same member of the Department of Agriculture, the same stock agent and the same old student of this College, who have, all three, guided and helped me to obtain some profit and a great deal of satisfaction from beef cattle.

Mr Trolove: If cattle have already had a dose of electric fencing can they be shifted into paddocks without electric fences?

Mr Sim: Definitely no.

Mr Butcher, Springston: Could you give us details of your lucerne-cocksfoot mixtures?

Mr Sim: We have tried both Hunter River and Marlborough lucerne and find the pedigree Marlborough strain the best. We have tried various mixtures but think we get the best balance with 21lb. lucerne and 2lb. cocksfoot. If the season is dry we drill it. If it is wet we take the spouts out.

Mr Wheeler, Windsor: We have had burning of clovers with only 2cwt. of super. What happens when you put on 5-6cwt.?

Mr Sim: We have our own rotary sower and when we put on the 6cwt. we applied one-third before lambing, one-third after lambing and the rest about weaning time. The most we have ever put on in one application was 4cwt. per acre on irrigated lucerne.

Mr Carpenter, Fernside: Have you any experience of fattening cattle on their own as compared with those grazing on the sheep paddocks?

Mr Sim: We use cattle to control grass in the vital period between lambing and weaning. We do not use a definite paddock for fattening cattle until after weaning. We normally give the cattle that will go away first the best picking.
Mr Topp, Waipara: I was disappointed that you didn’t say that you would be putting in yet another paddock of lucerne.

Mr Sim: I didn’t say I wouldn’t. In fact, I am putting in another 30 acres of straight lucerne next spring.

Chairman: Have you tried fattening lambs on lucerne alone?

Mr Sim: We have only once found it necessary and on that occasion it was very satisfactory.

Mr Pilbrow: I assume all your rape was for the lambs. Were all your turnips for the cattle?

Mr Sim: We use swedes for fattening cattle and keep the soft turnips for the sheep.

Mr McGloin, Lincoln College: What would be your increase in sheep carried if you had no cattle, and what would the economic situation be?

Mr Sim: If we hadn’t had cattle this year we would have grazed only 50-60 per cent. of the farm. The rest would have been wild and woolly tufts. Through consistently running cattle the whole farm is short even pasture from one fence to another. If it were a case of stocking entirely with sheep just to make more money, I wouldn’t be interested. I consider that cattle are necessary to use efficiently all I grow. I know it is easier to stock fully with sheep under irrigation, but I am afraid that the stocking rates could get too high.

Mr Hilgendorf: I think most people will agree that the most profitable way to use grass is to feed it to sheep. Even though the price of beef may come close to that of lamb we must remember that we don’t get wool from cattle. But it is no use growing grass unless we use it and I think Mr Sim would agree that there is great scope for cattle on the plains to utilise surplus feed.

Mr Dillon, Blenheim: What do you consider the economics would be if you cut out sheep altogether? There are men in the North Island who are seriously considering this mainly because of the farm labour situation.

Mr Sim: I can’t foresee that day while there is a market for sheep products.

Mr Grigg: Do you consider your sheep do better because you are running cattle?

Mr Sim: I can be fairly strong about that. I consider my sheep benefit considerably but there are so many other factors involved that I wouldn’t like to assess the percentage of value of the cattle.

CATTLE ON THE FOOTHILLS

Melville Turton, Ashburton Forks

For a number of years I have advocated that increased numbers of cattle could be run in Canterbury. By doing this substantial increases in export of beef could take place.

With improved methods of “deep freeze,” beef looks number one as the safest exportable primary product that we have. In being
asked to give this paper on "cattle on the foothills" with particular reference to methods and use of conserved fodder, I give my experiences or methods for what they are worth not claiming in any way that they are the best to get the maximum amount of production. The increased use of lime and manures has given rise to richer pastures; this pasture calls for control by a grazing animal and the best of the grazing animals for control of grass are cattle. They consolidate the ground, put in fertility that could not be put in any other way, give young grass a great start and set up a pasture that should last for a great number of years. Besides this the cattle running with the sheep seem to leave something that helps to keep the health of the sheep right, (this in itself would call for increased production in more weight in lambs and better percentage of lambs).

Probably nowhere have the results of lime and manure shown more spectacular results than in the foothills. The property I farm is within nine miles of the mountains with an average rainfall of 35 inches. There are nine to eleven soil types on the property and at one time a big area was covered in brown-top and sweet vernal. My methods as far as cattle are concerned are divided into three classes to suit this property—bullocks on heavy land, cows calves on with sheep—heifers and dry cows on with sheep and heavy land—calves or baby beef with sheep.

Starting with the latter class I buy the best mixed-sex calves from Southland with heifer calves speyed, taking delivery late April or early May.

When calves come home I box them with a few quiet cattle and drive them round nearly every day through gateways using a quiet eye dog (but no stockwhip). By doing this you get their confidence which helps them to settle and do better. I cannot stress this point enough. Too many calves come on to a farm and are never shifted and that is one way that makes them bad on fences. In plain words: "You have to make them happy to make them do."

After they are quiet I will put them on young grass. I prefer grass which has been sown out with rape. I feed a little hay and leave some rock salt handy. The calves make a great job of this grass and consolidate it and will not feed it too close: thus it is very suitable for ewes, lambs, in the spring. Should I have an abundance of turnips I may put the calves on a break to get them used to them before the cold weather. I also put up an electric fence to let them learn to respect fences.

After feeding the one break, I put them back on good pasture and feed one bale of hay to ten calves. I always work to keep the "calf fat" on, doing this provides a great reserve for the spring. I feed the calves on hay as long as they are holding condition and put them on turnips if possible towards the end of July.

I hold on turnips until lambing has advanced and the ewes and lambs are on good topdressed paddocks. I then put a half to one calf to the acre (be particular to sex; if heifers are speyed they can be run together).

I set stock but may have to vary the carrying according to the season. Lambs are generally drafted off these paddocks before or immediately after Christmas. Then the paddocks are eased up with sheep numbers and the calves get a better chance. Some of these paddocks may be held for calves alone or more put on.

Providing you have wintered calves well and bought good ones you should get the heifer calves away in February at a weight of 400 to 425 pounds and the steers at the end of March at 450 to 500 pounds. These calf paddocks, provided they are controlled, are
ideal for weaning ewe lambs on to. I find the lambs do better on these paddocks than on rape.

Cows with calves at foot I find do well with sheep.

If you purchase run cows in the autumn they will winter on some of the older, rough paddocks and clean up the roughage (that holds the germs). If lightly stocked and fed a little hay and rock salt in late winter I find cows are exceptionally easily wintered and easy on fences. If you have plenty of turnips to put cows on out of the way during lambing, you can almost calve on turnips. To my mind the time when cattle seem to do the best on turnips is when they are almost going to seed and you can squeeze them like an orange. I may sell calves for delivery in early March but prefer to sell in veal pens about the end of January. At this time there are no run calves about and the dairymen's calves are mostly cleaned up; so the young sucker commands a good price.

When calves are weaned the cows just jump ahead. The wet cow will fatten twice or three times as quickly as a dry cow. You will find you will be able to get these cows away at a good price to the works and the heavier ones to Addington.

Heifers particularly speyed ones, settle and do much better than steers and these can be run with sheep on similar lines to calves and perhaps finish off on better paddocks. I do not think the majority of people are aware of the advantages of speyed heifers. They are much quieter than steers and fatten almost twice as quickly; perhaps not to the same weight but you do not have the outlay or the time to wait.

Dry cows, particularly speyed ones, I treat on similar lines to heifers. Like the-in-calf cows they are easily wintered.

Steers, two and three-year-old, I consider a rich man’s hobby. To my mind they must be well treated on good paddocks and you have to wait for your return. I find they are harder on fences than any other class. Certainly nothing is more pleasing to the eye than a straight line of well-bred, well-matched steers in fat condition on a good pasture.

Conserved Fodder. I endeavour to make the maximum amount of hay (lucerne and rye-clover) but only use the second-class meadow hay for the cattle. The best hay goes to the sheep. At times one can buy bright H.1.-threshed or similar hay almost for baling cost and I supplement my stock with some of this. Much more could be done in this field as hay, no matter what class, free of weeds, is very useful at some period of the year, summer or winter. One sees thousands of bales wasting about the country-side that could be used.

Also this season I purchased a silage machine and two trailers and have about 360 tons of silage if required. The reason I purchased this machine was that I had bought cattle that had been wintered on silage; they did exceptionally well and appeared just like turnip cattle in the spring. I think this method has a definite place in one’s farming operations.

Some of the reasons why I run cattle with sheep are:

1. I consider topdressing in Canterbury is more or less in its infancy. You must control if you have more grass and cattle are the best controllers.

2. The health of the sheep is better.

3. Higher lambing percentages; up to 130 in 2-tooth and 169
in 4, 6 and 8-tooths, (but I never keep dry ewes not even 2-tooths. I never give them a second chance).

4. Nothing is better to consolidate a new pasture. If cattle can be run on new pasture for twelve months it gives clovers and small grasses a better chance.

5. They clean up the roughage on old pastures which in turn helps the foot trouble in sheep.

Perhaps I could mention some do or don'ts that come to mind:

1. Cattle must have water—they will always drink where a race comes into a paddock. If there is only a limited supply make a trough and let into the ground. Allow the overflow to run on down the race.

2. Do not drill too close to fence; keep about 2ft. 6in. to 3ft. out. This will stop them putting their heads through and save the fences.

3. Always run sexes separate or spey the heifers.

4. Do not use rubber rings on calves. They leave no cod and this spoils the look of the bullock.

5. When using rock salt put near a patch of thistles. The tramping and the salt will kill the thistles.

6. If you are dismantling a temporary fence in a paddock leave an odd post for a rubbing post.

7. Should you not have enough water to run cattle get on to the powers that be and see you get a sufficient supply; unfortunately on a lot of farms the same water supply has been there the last thirty years. This must be altered.

In conclusion could I say that I consider much could be done to increase the cattle numbers. Even if many would take only one truck it would amount to a large increase.

One unfortunate thing is that our killing facilities are very limited at the freezing works in Canterbury and the competition from freezing buyers is very restricted in the yards.

At Addington, at one time, beef brought the highest prices of any part of New Zealand. Today it is the lowest. I attach a list of prices at the main selling centres over the last few months, and it is seen that beef at Addington has been and is lower than any other centre in New Zealand. Something should be done about this.

And lastly we must be all disappointed with the Meat Board that no trial shipment of frozen, chilled, or deep freeze beef has been sent away from the South Island.

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- To 80/-
- To 122/-

### Prime Cow and Heifer
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- To 122/-

### Ordinary Quality Cow
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- 80/- to 85/-

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27th MAY, 1953

### Mr Bethell:
Why do you buy in calves and sell the heifer calves you breed?

**Mr Turton:** I prefer to buy in because they are so cheap in the autumn. The turnover would almost make you blush. I may have to change my tune from now on.

### Mr Todhunter:
What is your experience with different breeds of calves and do you prefer crosses to the straight breeds?

**Mr Turton:** Southland calves used to be away ahead of those from Canterbury, but recently there has been a big improvement in those produced locally. It is particularly pleasing to see breeders putting quiet calves on the market. I think any well-bred calf is alright, but some of the pure breeds are getting too small. I would like a dash of Shorthorn or Hereford to give them size. The Hereford takes longer to mature than the Black Poll but the cross with the Black Poll is good.

**Mr Todhunter:** Do you think if we introduced Galloway blood for our hill-country cattle that it would affect their quick-fattening quality?

**Mr Turton:** I got a Belted-Galloway bull from Southland and mated him with selected cows of 6 or 7 different breeds. I got 98 per cent of white belts, including black animals with white belts from Hereford cows. I think they have prospects in the back country, but my own conditions are hardly tough enough for them. Where the conditions are really tough I like the Hereford.

**Mr Hurst:** Have you ever tried putting two calves on a cow? In England they pay big money for calves to run with cows.

**Mr Turton:** I tried it four years ago when I had a bit of energy. I got bobby calves off the cream lorry and had 39 calves running on 19 cows, one of them with three. It's a business getting the calf on to the cow but I found that if I took her own calf away for a while and put the strange calf with her she would soon take them both. A friend of mine has a scheme for putting a bag over the cow's head with a hole cut to enable her to feed and he seems to have no trouble.
CATTLE ON TUSSOCK COUNTRY

R. M. D. Johnson, Mt. Torlesse, Springfield.

In 1925 I first became interested in running some cattle on the tussock country. From a small start I gradually collected a few young Shorthorn heifers and let them grow up on the hills. I was warned of my foolishness and told (1) that they would probably all die of tutu poisoning, (2) that the fences were no good and only suitable for sheep, (3) that winter conditions were too severe and that the chance of losing the lot were too great, (4) in general, cattle were not suited to the type of country. However, in spite of all this I decided to explore the possibilities with the few heifers I had collected. I made enquiries as to the hardiest breed and was told to go in for Aberdeen-Angus. This presented a problem as no Aberdeen-Angus bulls were available in Canterbury and I had to buy a bull in Feilding in January, 1928. This was really the starting point for I felt the only way was to breed up a herd on the country. For some years progress was slow as the mobs were so small and as a result difficult to find, and also to handle. For many years the calves were reared onto tussock country; today they are all kept on the farm for the first winter. I have bred the progeny of this original cross to the Aberdeen-Angus ever since and they are now, of course, pure black. With more cattle about they are much easier to handle and with some older ones in all the mobs, they move over the country on their own.

Today it is much easier to establish a herd of run cattle for there are far more suitable lines of beef breeds to make a start with. In 1925 a great many fat cattle to supply the Addington market were shipped from Gisborne and Wanganui which indicates the shortage there was in Canterbury.

I would recommend anyone starting to be very careful to select breeding cows from suitable country. If you take them from the sea coast to the snow you are asking the impossible. You wouldn't do it with sheep, so why try with cattle? Failing suitable cows to start with, get some well-bred calves or yearlings and hold them until they get used to the country and then breed from them. Having established a line of suitable breeding cows one must decide on the future policy. Today calves are at a very high price and on many properties it may be wisest to sell them at weaning and only keep sufficient of the best heifers for replacements. Other properties have sufficient room to run the lot until they are two or three years old. These cattle are kept on separate country from the breeding ones. They do the country good and improve it for sheep. On the lighter hill country I strongly recommend the breeder to be content with selling a good line of store bullocks to the fattener on the heavier land. If the fattener can be assured of a regular supply, he can arrange to be in a position to buy accordingly. The breeder who tries to fatten on this hilly country will be disappointed with his results because (a) there is too much walking (b) feed is not succulent enough (c) it takes too long.

Over the years there has been a gradual improvement in store prices. Here I can quote a standard line of 2½ year steers:
March 1940  38 steers at £7 10 0
February 1946  40 steers at £10 13 0
February 1947  20 steers at £14 0 0
February 1948  38 steers at £15 2 0
February 1949  38 steers at £15 10 0
February 1950  40 steers at £16 11 0
February 1951  44 steers at £18 6 0
February 1952  40 steers at £22 5 0
February 1953  40 steers at £30 10 0

The surplus cows or heifers are sold, some as forward stores, some as fat cows and sometimes for breeding purposes.

The death rate is very low and since I have built up a herd which is used to the country it is only a very occasional beast that dies.

**Uses of cattle on hill country**

1. They clean out rank growth and thus improve sheep feed. This rank growth has in most cases been burnt over the years but today I think it unnecessary to burn.

2. Well-bred hill cattle graze over the whole of a block of hill country.

3. Their weight consolidates the ground.

4. They make tracks through scrub and steep gullies.

5. They make tracks through snow which sheep soon learn to follow. This is most important. They get on the move while it is still snowing and go to some sort of shelter and do not camp and become snowed in as sheep do.

6. They spread clover seed.

7. On blighted manuka country or where gorse has been killed by hormone spray they are of great value for breaking it down rather than using fire.

**A few Don'ts**

1. Don't put to the bull till 3 years old.

2. Don't keep your cattle in one place too long or keep them until they are too old as they will pull the tussock. Always watch for pulled tussock.

3. Don't get your breed too heavy; low-set young cattle are more active on the hills.

**Winter Feeding**

I think it is essential to winter the calves well and the better they are done the better the final results. I used to keep them on hay and chaff. Last year they had hay and ensilage and they came through the winter in the best condition that I have ever had. They are the only cattle that are fed; all the others live on the hills the whole winter. The calves are weaned in May and turned onto the hill in early September.

I would answer my few matters of foolishness which I referred to at the beginning.

1. If you breed on tutu country your losses will be slight if any. If you buy and turn them onto tutu you can expect heavy losses.

2. Fences. If your fences are very low they will walk over them and do no harm. Cattle are very profitable today and they
will soon give you sufficient money to pay for entire replacement of fences. The use of a bulldozer has reduced packing to the minimum and it is not necessary to use batten fencing on tussock country. We use light tram-rail posts as intermediates and standards with barbed wire. Barbed wire holds a fence together in snow country.

3. So far I have not found winter conditions too severe; nor should others provided they have the right breed.

4. Once established, the cattle have done so much good to the country that more cattle can be carried on it. If local consumption cannot deal with the increase in numbers the chiller trade will be able to cope with them.

Mr Chapman: Is it possible for a cow to rear two calves on hard country?

Mr Johnson: Definitely no. On our country it's the same as with a ewe. She is better with one.

Mr Maxwell, Motunau: Can you give us an indication of the number of breeding cows per thousand acres you run on Mt Torlesse?

Mr Johnson: You have to find a separate answer for every bit of country. On the country where I run my cows I have 110 breeding cows on 3,500 acres. To do this I reduced the sheep from 1,500 to 1,100. Their progeny goes on to the harder country.

Mr Todhunter: In the Rakaia basin we have great difficulty in holding the cattle on the country where we want them in the spring. We have cattle-fenced but they come down the streams. The number that we can carry is limited because we don't have paddocks for wintering calves. Mr Johnson has. Does he not think September too early to put the young cattle out on the hill?

Mr Johnson: Every place must work out its own system. I wouldn't dare tell you what to do on Lake Heron. I am talking about the man who has no cattle, but could and should have some. If your cattle come down in the spring I think it indicates that the country is carrying all it can stand. I am fortunate in that I have a farm on which I can make silage for wintering. Where there is no farm it may be necessary to send the calves away for the winter. I would stress the necessity of using the right breed.

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CATTLE ON BANKS PENINSULA

J. E. Thacker, Okains Bay.

In speaking of beef cattle on Banks Peninsula it is interesting to recall that the first cattle in Canterbury were purchased in Sydney and landed at Flea Bay by W. B. Rhodes about the end of 1839. Rhodes had W. Green in charge of a few of these cattle at Green Point, Akaroa when the French settlers arrived in August 1840. These Shorthorn cattle, the very best Rhodes could procure, were allowed to increase for a number of years. The first cow sold realised £43. In 1842 M. Belligny, one of the French settlers, bought a bull and twelve cows from Sydney also.
The Peninsula, because of its hilly nature, is not suitable for ploughing and in the keeping of its pasture, beef cattle play a very important part.

My grandfather ran his first cattle in the bush. They were Shorthorn and grew to an immense size. I have heard my father tell of bullocks shot in the bush dressing out at about 1400lbs. As the bush was cut and burned and the land sown in cocksfoot, clover, and rye grasses, sheep were introduced and very few cattle were kept. The first sheep were fine-woolled ewes, merino rams being used. Acres of fern and scrub soon made their appearance and foot rot in the sheep gave a lot of trouble. Burning was tried to control the fern and scrub but this was found to be a great mistake. (I never do any burning). The land was then fenced into suitable sized blocks. Fencing is essential in control of fern, and scrub apart from pasture control. Some cattle were run among the sheep in each block. The Shorthorns being found to favour the easier country and disliking the steeper slopes, were replaced by the Hereford and Hereford-Aberdeen-Angus cross run today.

The keeping of enough beef cattle has kept both fern and scrub in check. Romney ewes and Southdown rams produce excellent fat lambs. I consider set stocking with sheep and feed control with beef cattle gives very good results with farming on Banks Peninsula.

Quality with beef cattle, as with all stock, is of the utmost importance. A walk through the beef pens at Addington makes me think that many do not agree with me on this point. I favour crosses of the main breeds, Hereford, Shorthorn, and Aberdeen-Angus, rather than the pure-bred beast. Some farmers in my district are using Hereford and/or Aberdeen-Angus bulls with part of their Friesian herds. They foster the calves, sometimes three to a cow, on their cull cows. These crosses make great cattle for our Addington market and have recently made averages of over £40 for both steers and heifers at two years of age.

Some Peninsula farmers run a very limited number of cattle among their sheep and sell them when in good condition in late summer or early autumn. Others run a herd of breeding cows and sell the calves in the autumn, or where the farms are big enough, carry the calves on to beef age.

I buy young cattle each spring, branding, earmarking and dehorning when required, as soon as they reach home. I am a strong believer in having all cattle dehorned. With a good saw the operation takes only seconds to perform and saves a lot of damage to meat and hides. The young cattle are put in paddocks among the ewes and lambs. Steers and heifers are always kept separate. I reserve several paddocks for fattening the grown cattle and sell them mainly from July to November. I replace the fat cattle with those which have done their turn with the sheep for twelve months.

When the cocksfoot industry was flourishing on Banks Peninsula, the stubble provided good winter feed for either fat or store cattle. In many parts of Banks Peninsula, with its cocksfoot-dominant pastures, beef cattle can be kept fat through the winter for the spring market, without any hay or other supplementary fodder. There are many farmers who, like myself, buy nearly all their cattle either as yearlings or when two or three years old. These cattle come from widely-separated districts even as far as the Chatham Islands, and breeders offering well-bred cattle are receiving their reward.

There is still a lot of room for improvement in many of the
breeding herds. Some farmers more interested in sheep will keep any sort of cow to breed from.

Things to consider with beef cattle are shelter, feed, water, and handling. The provision of adequate shelter helps to keep cattle either shaded or warm as required. There is little use in buying well-bred stock unless it is well-fed and sheltered. You often see cattle round a mud hole in the hot weather trying to get a drink. A water trough conserves water and stock have more time to feed and rest. Handling is very important. I never go into a paddock without stopping the cattle if they tend to run away. I then ride through the mob and leave them quietly behind me. Some people rarely handle their cattle in the hilly country. I think this is a great mistake. Many fat cattle from Banks Peninsula have two, and some three days, droving before reaching the railway at Little River, when being sent to Addington. Careful droving and handling means much to how they arrive. You often hear the butchers ask where the cattle are from and a good reputation helps the price.

Many farmers dislike cattle because they damage their fences. A barbed wire or two will stop the damage and well-handled cattle will rarely break a wire.

The British Ministry of Food whose representative, Mr Herbert, was recently in New Zealand, is urging the resumption of chilled beef shipments. It does not appear that Banks Peninsula will contribute much to this unless the numbers of cattle in Canterbury are considerably increased. The greatest incentive to increased production is of course the price paid. We have already seen the effect of poor prices with our wheat yield.

Most Peninsula cattle finally pass through Addington market to supply the ever-increasing demands of Christchurch and surrounding districts. Beef cattle already play a large part in keeping much Peninsula land in good order, as well as supplying the meat requirements of Christchurch. I feel that a greater attention to breeding and stocking would still further improve the pastures as well as increase the returns from beef cattle in this very fertile part of Canterbury.

In conclusion I stress that the price realised for this season's calves must have a considerable influence in increasing cattle numbers, and must encourage people seriously to consider increasing their beef cattle herds.

Mr Kay: Having sent two or three trucks away by transport what is the difference between droving and sitting in the house and watching them go by on the truck?

Mr Thacker: Their condition on arrival depends on how they travel. Some don't mind traffic if they're driven on the road. Some in the trucks don't travel well. The difference in the cost between truck transport as compared with road and rail may be 25/-.

A Speaker: Does it pay not to run sheep on the pasture on which you are fattening your cattle?

Mr Thacker: I give the fattening cattle the best grass. I run young cattle with ewes and lambs.

Mr Acland, Albury: Many of us consider the first cross is the best for fattening, but how are we going to get good first-cross calves unless we keep the pure breeds?
Mr Chisholm, Molesworth: We run 2,200 cows both Herefords and Black Polls. We run them mixed and use Hereford and Black Poll bulls. We get a good percentage of pure Herefords and pure Blacks. Does Mr Thacker think these breeds are getting smaller?

Mr Thacker: It is generally considered that the Blacks are getting too small. That is why people are favouring the Hereford again, but there are a few places where the Blacks are extra good.

Mr Chisholm: If you want to produce beef you must have a frame to put it on. We have increased the number of Herefords considerably, but I am afraid the Hereford bulls have deteriorated in size because the breeders are trying to compete with the breeders of Black Polls and Galloways and are going for the small stuff.

CATTLE IN SOUTHLAND

C. W. H. Tripp, Pukerau.

Most visitors to Southland from other parts of New Zealand, especially the North Island, ask the question, "Why don't you carry more beef cattle?" In this paper I will endeavour to answer that question and, at the same time, make suggestions as to how our cattle population could be increased.

Firstly, it must be realised that most of Southland consists of comparatively-small farms which have been developed enough to come into the category of fattening farms. Although we have a lot of run country, including some of the largest stations in New Zealand, still our fattening country is out of all proportion to our breeding country, and the first question we must ask ourselves, if we are to carry more cattle, is where are they going to be bred?

The single-unit intensive farm is definitely not the place for breeding cows, especially in the winter. There are many farms, however, which include a certain amount of rough grazing in the way of swamp, rough gullies, or unploughable hill, where breeding cows could be wintered; and owing to the difficulty in obtaining store cattle many farmers with this rough grazing are starting to collect small breeding herds, which will undoubtedly make a considerable difference to our cattle numbers in the next few years. It must be remembered, however, that unless it is possible to carry about forty cows it would not justify the purchase of a good beef bull. Rough grazing that would not carry this number would probably be more profitably used for wintering stores.

When one looks at the South Island as a whole, one comes to the conclusion that the only really large area that should be carrying breeding cows, and is not, is in the low hill-country of North Otago and Canterbury. I am firmly convinced that, if the run holders in this area could be encouraged to carry more breeding cows, there is plenty of fattening country to profitably absorb all their progeny, whether calves or store bullocks, and, at the same time, the fertility of much of this run country would be increased.

The next question we ask ourselves if we are to carry more cattle is "How are we going to winter them?" Winter feed can be divided into two categories—store feed and fattening feed—although the two overlap. I will deal with store feed first as I consider it more important for the following reason:
We already produce enough beef for ourselves all the year round with a little for export in the late summer and autumn. If we are going to increase our beef production it will have to be fattened in the cheapest way, which is, of course, on grass during the growing season. Costly fattening-feeds can only be justified by the extra the local butcher is prepared to pay for fresh beef in the spring, and this margin appears to be getting smaller every year.

If, therefore, we are going to winter more cattle on our farms, we will require to bring them through the winter in good enough condition to be sure of getting them prime during the following summer. No farmer likes to get his paddocks potched up by heavy cattle in the winter and, therefore, any great increase in cattle wintered on our farms will almost certainly be calves and yearlings. These young cattle obviously require better feed than older cattle if they are to come through the winter in good condition. It has been shown in experiments at Cambridge that it does not pay to keep a beast fat all its life but, on the other hand, if a calf is not fed well during its first winter it will make no growth and will take a long time to get going again in the spring. I would like to mention here that a large proportion of calves in Southland, and I presume in other parts of the South Island, are reduced to almost half their value by the treatment they receive during the few weeks after weaning. Once that milk condition is lost, it is almost impossible to get it back before the following summer. My own experience has been that if calves are kept going well at weaning time they take far less wintering than is generally supposed.

In Southland we usually get a good autumn growth in our pastures, and my usual practice is to put calves on the best grass available after weaning and start feeding them hay in racks straight away. With my own calves, I give them some hay before weaning to get them used to it. I have often brought calves through the winter in good enough condition for the butcher in the spring, on nothing but autumn-saved pasture and hay. However, I usually have some swedes over and give them to all the cattle in the spring with preference to the calves. We are fortunate in most parts of Southland in that we can be assured of a good swede crop, and a few weeks on swedes makes all the difference to cattle coming away on the spring grass. I have tried chou moellier for calves but prefer the swedes or hard turnips on account of the slight check they get when cleaning up the stalks at the end of each break.

I have not fed silage to cattle but have no doubt that it would be excellent in conjunction with hay, especially as our Southland hay is seldom of the best quality. I have tried to grow pampas grass but it was not a success in Southland. I also tried sample plots of Phalaris tuberosa but it did not make sufficient winter growth to warrant sowing a paddock of it. Crushed oats are excellent for cattle of any age, especially in conjunction with roots, but are usually expensive enough to be justified only as a fattening feed. Oats are becoming increasingly difficult to grow in Southland on account of lodging. It looks as if hay, silage and swedes combined with autumn saved pasture will be our main winter feeds for cattle on Southland farms, which have no extent of rough grazing, for some time to come. However, we are always on the look out for some plant such as pampas grass, which could be planted as a permanent winter feed for cattle.

The older the cattle the easier they are to winter, although it must always be remembered that cattle start to slip back in weight or put on weight before it is noticeable to the eye. I might say
here that in wintering calves I have found that they do better if moved from one paddock to another a few times during the winter however good the feed appears to be where they are, and however much supplementary feed is being fed to them.

Fattening feed is not much different from store feeding except that it will be fed more liberally. Some farmers feed crushed oats and moose nuts to fattening cattle as well as swedes and hay. Two pounds of crushed oats per day per beast will undoubtedly bring them on a lot faster, but whether it pays will obviously depend on the price of oats and the price of beef. It must be remembered that it is very difficult and very costly to fatten cattle in the winter and, if the object is to have cattle ready for the spring market, the most economical way is to have them fat in the autumn and feed them through the winter well enough to hold their condition. A bit of good shelter in the winter in Southland is worth a lot of feed.

I will now pass on to the most important question we must ask ourselves if we are to carry more cattle on our Southland farms, and that is “Will it pay?” This is obviously a most difficult question to answer as it will depend on costs and conditions, which vary on every farm. On the other hand, it is a question that a great number of farmers are being forced into asking themselves at the present time. A great number of Southland farmers developed their farms to a state where they carry five or six ewes to the acre on their grass paddocks from lambing to weaning, and if they are to improve their land any more they will almost certainly have to carry cattle, at any rate during the growing season, in order to keep the lambs healthy. On well-watered and well-fenced farms this may mean no extra expense other than a continuation of the present manurial programme. On other farms it may mean considerable capital outlay in fencing; and the provision of water in some cases might be prohibitive. However, I think that on the majority of farms these two problems can and will be overcome provided the cattle are available and there is sufficient profit in fattening them. This, as I see it, depends almost entirely on the number of breeding cows that are carried in other parts of the South Island, and the export price of beef.

It must be remembered that, although most of Southland is a natural grass country, there is no necessity for farmers to increase their fertility to a degree where they have to carry cattle. They can easily go in for more cropping or cut down their topdressing. In fact, many farmers today are taking one of these two ways out of the difficulty.

The possibility of producing beef in New Zealand by the American feed-lot system is frequently discussed. A typical American ration fed to 800lb. (live weight) steers consists of 19lb. of concentrate and 9lb. of roughage. This feed is fed for an average of sixty days for a weight gain of 2.6lb. per day, or a total of 156lb. Thus, approximately half a ton of grain and a quarter of a ton of roughage is used to give a liveweight gain of 156lb. Estimating that eighty per cent of this gain is carcase, the carcase gain will be approximately 125lb. at say £5/10/- per 100lb. equals £7/10/- worth of beef. Using oats at today’s prices (7/- per bushel for oats good enough for crushing for cattle) and good hay at £10 per ton, the cost of feed would be £12/1/-—a loss of £4/11/- on each beast fattened without allowing for any other charges. I quote these figures to show how the price of beef controls the money that can be spent on fattening and to emphasize the fact that any increase in our beef exports must almost certainly depend on grass-fattened beef.

I will not go into the “battle of the breeds” except to point out
that in Southland we have a large amount of high country where store cattle are run until they are two or three years old before being sold to fatteners on the low country. When these cattle are sold the largest beast will be worth the most and, consequently, these stations will always sacrifice quality for size. The small dumpy animal of whatever breed will never be popular under these conditions. Farmers are beginning to realize that some cattle put on far more weight than others for the same amount of feed, and this rate of increase appears to be quite independent of the shape of the animal.

It is very noticeable in Southland that cattle do much better in some districts than in others, irrespective of the appearance of the feed. I have no doubt that the same will apply to other provinces. This is probably due mostly to soil conditions, but I believe that water plays a part. I prefer running water for cattle where possible. The trouble is, of course, that they make the banks of any running stream very muddy, which can be a nuisance in a lot of ways including the spread of footrot.

Mr Carpenter: You mentioned running water. I take it the alternative to this is a dam.

Mr Tripp: I don't like dams if they can be avoided. Where cattle don't do well in Southland it is often because they have to drink stagnant water. If you have to have a dam it is much better to fence it and pipe the water to a trough. Cattle definitely do better with running water.

Mr Turton: I have been on Mr Tripp's place. I have never seen better. There are hundreds of cattle running on beautiful country previously carrying only red tussock. I saw a blazing mass of Lotus major, cocksfoot and Phalaris tuberosa on the sunny faces. I was interested to see wether lambs running on good controlled grass and being fattened.

Chairman: Have you tried prairie grass?

Mr Tripp: It does not do with us. I doubt if it will grow satisfactorily south of Timaru.

CATTLE IN MARLBOROUGH AND NELSON

B. H. Trolove, Kaikoura

I have been asked to give this address on cattle in Marlborough and Nelson and I must confess at the outset that my knowledge of cattle in Nelson is very limited. I propose to refer chiefly to beef cattle in Marlborough. Beef cattle in Hawkes Bay number 325,000 and in the whole of the South Island 350,000. In Marlborough there are only 32,000 and in Nelson 26,000. But these cattle play an increasingly-important part in the economy of pastoral farming in these provinces.

Cattle as a necessary Pastoral Implement:

Cattle on the grazing runs and foothill farms of Marlborough are today a necessary pastoral implement; an implement that gen-
erally does not show any depreciation but appreciates in value all the time, an implement that fuels and maintains itself, and I might well say one that works at both ends. For cattle are not selective grazers, and not short grazers, and make and improve sheep feed while they eat, putting it back into the soil again and liberally sowing clover seed, at the same time trampling out fern and rubbish and consolidating the soil.

Aerial Top-Dressing and Cattle:

Aerial top-dressing has in many cases revolutionised hill-country farming in Marlborough and with this top-dressing the need for more and more cattle has become evident. On my property I have increased my cattle-carrying capacity, over the five years previous to this phenomenal season, by approximately one cattle beast to every ton of superphosphate applied. Aerial top-dressing and sowing, combined with cattle, have today simplified enormously the eradication of fern. I have had experience of burnt fern top-dressed with super, and sown—particularly with red clover—and then heavily stocked with cattle, having been almost entirely eliminated in one favourable season.

Cattle on the Higher Hill-Country and on the Back-Country:

Marlborough could do with many more cattle, but cattle are today run generally from the coast to Molesworth. They have been found invaluable to clean out gullies and dark faces thus allowing access to sheep, and making sheep feed, and in themselves have proved an added source of income.

Some years ago I was shooting over a large, high hill-country property belonging to a friend of mine who ran no cattle. I came in and asked him, in front of his eldest son who was about to take over the management of the property, why he did not run cattle. The gullies were full of rank feed, fern and rubbish, as were the dark faces. He replied that if ever I suggested, in front of his son, that he should run cattle, he would never ask me to the place again. He said that cattle would ruin his fences and ruin him. Very soon afterwards his son took over, barbed the fences and in three or four years was running some 400 head of cattle. Many more are run on the property today. I would describe that property today as being in almost perfect condition and cattle have worked wonders on it; no burning has been done for years.

Cattle and Burning Off

I will admit that burning off in some rare cases in Marlborough is necessary, as I have said before with regard to the burning of fern, manuring, sowing and stocking with cattle. However, fern can be eliminated without burning. In Marlborough, with few exceptions, cattle have eliminated the necessity for burning with beneficial instead of disastrous results. No longer does one see a pall of smoke over the province in the so-called “burning-off” season; I was brought up in a generation of hill-country men who spent a considerable amount of their time in lighting fires. They loved to sit and watch good smoke and so, I admit, did I. One always knew where a shepherd was by his trail of smoke; if he was not followed by a trail of smoke then he wasn’t a proper shepherd. Nearly all this has gone and many of my neighbours have not allowed an employee to light even a tussock for many years. In fact they would never think of doing so. It is now the privilege of the boss only to watch the smoke—if it is found necessary.

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Cattle and Fencing:

Many owners still are afraid of cattle because of their fences. Fences, even Merino fences, are not difficult or unduly expensive to transform into fences against cattle. I do not say cattle fences. Much of the cattle and fence trouble can be overcome by the proper handling of cattle. I think that any cattle man will agree with me here.

Cattle and Water:

Water has been a major problem to running cattle especially in the Seddon district, but since what one might describe as the Semple era—when the bulldozer replaced the pick and shovel—dam-making presents no great difficulty and is now no excuse for not running cattle.

Cattle and Giant Fescue:

The spread of giant fescue on good hill-country in parts of Marlborough has become a serious problem. I am convinced that the most economic and satisfactory method of controlling giant fescue and preventing its spread is by the use of cattle. If giant fescue is not heavily cattled it will take control of all pasture, it will become tufty and useless, and will spread rapidly to good pastures, where this soil is broken by erosion to form a seed bed. If heavily cattled it can be kept under control where infestation is heavy, and its spread prevented entirely—or almost entirely—on well-grassed country.

Cattle and Nasella:

Interesting and I believe successful experiments have been carried out by cattle control in the only area in northern Marlborough where there is Nasella.

Winter Feeding of Cattle:

In my district our cattle carrying capacity is limited only by the winter feed. In the months of July and August in particular, the proportion of cattle to sheep necessary for the rest of the year are short of feed and will then eat good sheep-feed to the detriment of the sheep.

On many hill country properties hay cannot be made and to buy hay for store cattle may not be economic.

There is, I think, an answer on hill country to the carrying of cattle over that winter period, which naturally limits its carrying capacity. That is pampas grass. I know that pampas is well known as a cattle feed, especially to dairy farmers, and I think to them it has not produced all the benefits claimed of it originally. I cannot claim to be an authority on pampas as a winter fodder, but I have made extensive enquiries and have observed it growing on many properties with the result that I am planting it as rapidly as possible to fill that gap in the winter feed problem. I have planted and fenced acre plots of pampas on good soil in corners of paddocks and intend to have such plots in all large paddocks as soon as possible. I am told by a Marlborough dairy-farmer on town milk supply, who has a wonderful stand of pampas, that it is as good as average hay. This man is undoubtedly an expert farmer and he is full of enthusiasm for pampas. He turns 95 cows on to pampas each night in the winter after milking. He has up to 18 degrees frost. I am told by others in whom I have complete confidence that pampas will keep cattle in good store condition during the winter. The bulk of feed produced is enormous. It will grow almost anywhere in Marlborough, and I have no doubt in colder districts also. It seems
to me to be a cheap and invaluable substitute where it is difficult or uneconomic to feed hay. If we can keep our hill-country cattle in good store condition on pampas during the winter, then pampas has a very definite place in hill-country farming.

It is recommended that pampas should be planted in the late autumn in dry climates, otherwise in the early spring, in rows wide enough apart to allow a grubber between, say nine feet.

It should be cultivated for the first two to three years, when it is then fit to feed and requires no further attention. Flower heads should be cut off in the early period. I have seen good stands on average soil planted with manure and excellent stands on good soil with no manuring. Incidentally a good mature stand is the best natural shelter for shorn sheep that I have ever seen.

Disadvantages of Cattle:

Although the advantage of cattle is obvious, some disadvantage should be observed. Apart from pushing over fences, over-stocking with cattle can on certain types of hill-country eliminate tussock which is undesirable. Cattle can, especially heavy cattle, increase the spread of slides on limestone and other country. I have such a hill of steep limestone with rubble slides, and I find it necessary to run only young cattle in this country.

On certain types of light hill-country in Marlborough care has to be taken that cattle do not eliminate the natural vegetation in gullies of flax and toe toe which protects the water supply and prevents erosion.

Bought cattle can carry, on their hooves, footrot-infected dirt from trucks and from other properties. I always take the precaution of driving bought cattle through a stream and along the beach or roads to clean their hooves before putting them on the country.

Mr McAlpine: I run a property which hasn't been burnt for more than ten years, but I have the problem of controlling matagouri scrub. I have areas which cattle just won't penetrate. Can any of the speakers tell me how we can control it without burning?

Mr Trolove: I don't think cattle can do much with matagouri. I have only a little and what I do is perhaps not economical. I burn it and slash it to get rid of it and then stock heavily with sheep which graze the seedlings as they come away.

Mr Johnson: If you burn matagouri you increase it.

Mr McAlpine: But burning lets the cattle in.

Mr Shand: I have started aerial topdressing and I can carry much more stock in the summer, but my problem is the bad three months in the winter. The only control for extra growth seems to be adult cattle as far as the tough hill-country is concerned. We need cattle which will stand a knocking about in the winter so that we can use them as mowing machines in the summer. Too many people are looking for very quick-maturing cattle for stuff which they can sell as beef. For mowing machines we must look to steers which can stand at least two years' hard work and then be fattened. Would you agree that we should expect breeders to pay some attention to the hill country problem and produce hardier cattle.

Mr Trolove: This blocking up of stock for show purposes and the production of early meat is happening with all breeds of animals.
It is very undesirable for hill-country cattle. The old long-backed animal could put a lot of meat on. Above all we don't want cattle which have their bellies on the ground.

Mr Pilbrow: Would the running of cattle alone on hill country be a payable proposition?

Mr Trolove: Offhand, I think on my country it would give economic returns, but I must mention that it has a cover of English grass.

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SUMMING UP

Mr L. A. P. Sherriff, a member of the Meat Board, summed up the papers and the discussion as follows:

"It is very evident from the papers presented today that you are doing a lot with cattle, but I believe you will do more. A lot of capital goes into cattle and, naturally, farmers want to know whether they will get their capital back. I believe that there is a very good profit in cattle and that they are a safe investment.

Figures recently taken out by the Meat and Wool Boards' Economic Service show that on North Island wool and store-sheep farms, the winter carrying capacity is one beast to ten sheep, but on similar farms in the South Island the figure is one beast to 61 sheep. On North Island lamb-fattening farms, the winter capacity is one beast to 18 sheep, but in the South Island it is one beast to 56 sheep.

From my own experience and the experience of others in the North Island, I have found that good water is an essential for running cattle and so is an adequate supply of winter feed. A point to be watched when buying cows is their milking ability. Only culling can ensure a herd with good milking qualities, but the bull plays a very important part in this matter. In selecting a herd bull, the buyer should make sure that he comes from a good milking strain, that his feet are not impacted, that he is thick in the flesh, smooth, and has good hindquarters. The two weakest points in New Zealand beef cattle are that they are sometimes not well filled out behind the shoulder, and that they are light in the hindquarters.

It is important to keep size and still keep quality. It is possible to have both. The point has been raised whether the early-maturing blocky type of beast is suitable to leave on the hill to work for one or two years and then fatten. I take early maturity to mean the ability to make the best use of the feed available, and I think the well-bred beast will go ahead fastest even after a year or two of work on the hill.

Breeding cows are without question the most profitable sort of cattle, but there are good profits in fattening too. A friend of mine this season bought and fattened 1000 head of bullocks at an average profit of between £8 and £9 a head. Good profits are made by farmers on the west coast of the North Island by buying in-calf cows, and fattening and selling both the cows and the calves at the end of autumn.

In North Island farming, cattle are an absolute essential in controlling grass. Farmers have to have cattle. Usually they are able to sell them fat, but in some dry years they have to sell as stores. A good point to remember is that it is always wise to buy in the same market in which you sell. If you have to sell cheap, you can usually
replace cheap, and will never lose much money by sticking to this rule.

The greater part of any increase in New Zealand meat exports will have to come from beef, both because it is the preferred meat all over the world, and because it will overcome the lack of balance in New Zealand's meat production.

For many years the Meat Board has realised the urgent need for increasing beef production and has done its best to increase it. This is not an easy thing for the board to do but certain steps have been taken. One which has received some criticism is the prohibition of the export of vealers, which was imposed so that the numbers of breeding cattle might build up.

Since the original contract was signed with the United Kingdom, the price for lamb has increased 155 per cent, but in the same time, the price of beef has been increased 260 per cent. I think that shows the Board has tried to encourage extra production. As the price of beef has approached the price of lamb, there has been a greater interest in cattle. The figure now is a little more than 16d. per lb. for the best lamb, and 14d. for beef hinds.

Farmers often want to know why the price of beef is not higher in New Zealand. It is a political matter and I want to avoid talking politics. New Zealand consumes about 60 per cent of the beef it produces, and the Government, which is very interested in the cost of living, is naturally not keen to see the price of beef rise. I believe myself that beef is still too cheap in relation to other meat. You ask any housewife whether she gets better value from 2lb. of mutton or 2lb. of beef.

The British housewife has a strong preference for chilled beef, because frozen is apt to drip when thawed. If the British housewife wants chilled, New Zealand cannot afford to be without it. Even if quick-frozen is as good as chilled, we can't keep up a big enough supply to convince the British housewife of it.

The export of chilled beef is full of problems. It cannot be held for long, and the organisation of shipping to lift it is an intricate job. Freight rates are higher. Before the war the freight on chilled was 20 per cent above frozen, but last year it was 40 per cent.

It is very important for this country to increase its beef production to give a better balance to its trade in meat. We are extremely lucky in having the right of entry for mutton into the United Kingdom for another 15 years. No other country has secured this concession, and the Argentine and Uruguay cannot send any at all. Unless the major part of our increased meat export is in the form of beef, we will be faced with a larger amount than ever of ewe mutton, and that is not desirable meat.

New Zealand now eats 240lb. of meat per head a year. With a third million added to our population, our meat export will drop by 100,000 tons of meat a year, the equivalent of about one-third of our present production. It would be a very serious thing if we had to go without the imports that that quantity of meat would buy."

Mr Scott, Ealing: Will the Meat Board give the South Island a shipment of chilled beef next year? I think it is essential that the South Island should be encouraged in this way. One importer in London told me that he alone could handle 20,000 quarters.
Mr Sherriff: I cannot answer for the Board, but as for myself I will do everything possible to press for a shipment. I hope you are keen enough to persuade your A. & P. Associations to institute competitions for chilled beef.

Mr Dillon: Any increase in production in New Zealand is obviously taking place at a very slow rate. Is the Meat Board perturbed at this slow rate?

Mr Sherriff: The Board is not happy at all. We have just put up a scheme to Federated Farmers whereby interest on pool funds might be spent on plans to increase production. Of course any such scheme must have Government consent to use that money but I hope it will be forthcoming. I believe very definitely that we must keep both feet on the ground. We must put all our energy into increasing production first. Let us straighten the roads afterwards.

Mr Shand: We all seem to agree about the need for more production, but I would warn you all that if, the next time you go to a meeting of the County Council, you ask the Highways Board to straighten more roads, you can't expect to get the labour on the farms. A man out of a shop in town is not much use on a farm but we could use a man who is at present driving a bulldozer on the road. We just have to strive to get the labour off the roads on to the farms. In slump times we have been able to increase production simply because we were able to get the labour.
DAIRY FARMING

INCREASING PRODUCTION PER COW THROUGH BREEDING

W. Stichbury, N.Z. Dairy Board, Wellington

Most of you present today have probably, at some time or another, expressed the wish that you had a herd of cows as good as your best ones. Must we continue to look upon this as just so much wishful thinking, or can we do something about it?

The Dairy Board's consulting officers, during the course of their work, have often come across cases where the task of increasing production per cow, by better feeding and management, appears to be hindered by poor cow-quality, and have expressed the opinion that in these cases the full benefits from improved management are not likely to be attained until cow quality has also been improved. If this is the case what can be done to improve the position?

A farmer who is consistently testing his herd will be in the position of knowing which are the good and which the poor cows, and will be able to cull the poorer cows. It must be obvious, though, that no progress by culling will be made unless the animals culled are replaced by better ones. Our efforts to increase production through breeding must, therefore, be directed towards improving the quality of these replacements.

There can be little argument, I feel, that the ultimate goal must be the cow capable of consistently-high production over a long working life. For this to be possible the cow must calve regularly and be sound and in good health. In addition, particularly now that hand stripping has been dropped in so many of our herds, most farmers will also want their cows to milk out quickly and cleanly to the machines with the minimum of fuss and attention from the milker.

How can we set about achieving this object?

One step we might take is to save our replacement heifers from those members of the herd which most nearly approach our ideals. If it were possible to save replacements from the best cows in the herd only, we could expect them to be perhaps 6 to 8lb. of fat better than the daughters of cows producing around the herd average. This has definite limitations in practice, not the least of which is the fact that often replacements will have to be saved from cows producing at or below the herd average in order to have sufficient replacement stock available. Also other things than production are normally considered when selecting replacements, such as resistance to disease and milking temperament.

Susceptibility to mastitis has been shown to be an inherited characteristic, and it is possible that susceptibility to other common troubles such as bloat, and some forms of temporary sterility, is also inherited. The importance placed on factors other than production varies from farmer to farmer. For example, while one man may be prepared to give extra attention to hard-milking cows provided they are good producers, his neighbour might adopt the view that the extra production so obtained is not worth the extra time and labour.
We should never forget that the more factors we take into account when selecting replacements, the less likely we are to obtain what we are looking for in any individual one of them. For this reason we should confine ourselves to production and those points which bear directly on the ease and efficiency of obtaining that production.

Although the improvement possible through selection on the female side may appear to be disappointingly small, it should not be ignored particularly, if as sometimes occurs, continuous testing has enabled us to sort out families within the herd which are breeding consistently well. Under these circumstances, selection from these families can play a very real part.

It is to the herd sire, however, that we must turn if we hope for any marked improvement through breeding. Whereas any individual cow can be the dam of but one replacement heifer in any one year, it is quite possible that one bull will be the sire of all the heifers reared. The quality of the future herd will, therefore, depend largely on the quality of the bulls used rather than the extent to which selection has been possible on the female side. The truth of this can, perhaps, be best appreciated if we consider what would be the result if, instead of using dairy bulls as our herd sires, we used Hereford bulls for two or three generations. No matter how intensely we selected the dams of our replacement heifers the future herd would be largely Hereford in make-up and would be likely to produce accordingly.

The importance of the herd sire is due to the fact that far more progeny will be obtained from him than from any individual cow, and this is the reason why so much emphasis is placed on selection of the herd sire as a means of herd improvement and the statement is made that the bull is half the herd.

I have frequently heard farmers say that they do not consider it worthwhile to pay any attention to selecting the herd sire as the cows in their herd are too poor to warrant the use of a good bull. They argue that it is time enough to worry about a good bull when they have good cows to mate him to. Perhaps this is some extension into the animal world of the idea of not marrying below one's social standing, but it will certainly not help if the aim is to obtain good cows.

Two points arise, first that poor feeding and management may be the reason why the cows are doing so poorly and secondly that unless luck takes a hand the poor cows will remain poor.

Artificial breeding, which enables us to have daughters by one bull in many different herds, provides further evidence of the importance of breeding. These bulls have lifted production in herds differing widely in production, but the interesting point is that to date they have actually made greater increases in the lower-producing herds. In other words well-bred cows still show their superiority even under poor feeding conditions.

If we are agreed then that it is worthwhile to take some trouble over the selection of the herd sire let us see how we should go about it. Before doing so I wish to emphasise that there is no known method of selecting a young bull which will guarantee that he will turn out a herd improver. Breeding is always a gamble. We do know, however, that the chances of success are greatly increased if we follow certain principles. We will collect a dividend much more frequently if we place our bet wisely. As our aim is to breed cows which will be able to produce consistently at a high level, we must look for a bull likely to pass these qualities onto his offspring.
Occasionally we may be fortunate enough to be able to acquire a bull which has already shown that he is leaving high-producing daughters. Usually, though, we will have to rely on a young bull as the next herd sire.

Farmers will generally buy their herd sire in one of two ways, either by picking their fancy at a bull sale or the much-to-be-preferred method of buying him on the farm of his breeder. Why buy him on the farm? Because it is only here that you can inspect the dam and close relatives of the bull, obtain details of the production records, and see for yourself the conditions under which these records have been produced.

The question to be answered, whether at the bull sale or on the farm is “does the animal’s breeding suggest that he is likely to lift the production of my herd?” What should we look for to answer this question? First the bull himself—what does he look like? If we have a look at prices paid at the various sales throughout the country it is quite evident that a bull’s appearance still has a considerable cash value, not only among breeders but also with the commercial dairy farmers. But aren’t we really fooling ourselves if we expect a bull’s appearance to be any guide to his breeding ability when for example we know that the way the bull has been fed will have a marked influence on his appearance. While it is true that some show bulls have also been good breeding bulls it is also equally true that many of the most-widely-known show champions have been dismal failures as sires and that many of the bulls which have proved their worth as breeding bulls have had a conformation that would have been laughed out of any show ring:

I would suggest, therefore, that provided a bull stands on good feet, shows no evidence of inherited weaknesses, such as undershot jaw, and is sufficiently developed to perform the function for which he is designed, that you pay little or no attention to his appearance as such.

In examining the pedigree of a bull we will be concerned with any information which suggests that the bull has inherited from his ancestors qualities we wish to breed into our herd. The most reliable information in this regard is to note how the bull’s ancestors have themselves bred, remembering that breeding ability cannot be judged unless we know the performance of all the progeny of an animal, not just a few of the tops. In other words it is little use to quote one or two very high records of production if some equally poor records are conveniently forgotten.

Unfortunately, the impression seems to have been created in some quarters that because we have emphasised the importance of the bull as a means of herd improvement that more importance should be placed on the sire of an animal than the dam. This of course is not the case. The qualities of any individual animal are inherited equally from the sire and dam, and in selecting a bull on the basis of his breeding, both sire and dam should be considered equally.

A cow naturally does not have sufficient progeny to enable an accurate estimation of her breeding ability. We shall have to judge her on her own production. The sire on the other hand cannot be judged on his production but must be judged on the production of his daughters. Has he been surveyed? If so with what results?

Sire surveys, as published by the Dairy Board, show two important figures with regard to the production of a bull’s daughters. The first, which is the average production of these daughters, is of obvious importance; the other important figure is the “difference from expectancy.” In calculating the difference from expectancy
the average production of a bull’s daughters is compared with the production of the mature cows in the same herd and from this we are able to see whether the bull is leaving daughters above or below average for that herd. Thus the “difference from expectancy” figure really shows the amount the bull is above or below average in comparison with all bulls used in herds of a similar production level.

It is important to note that, if the daughters of the bull have received more feed than the rest of the herd, then the daughtermature-cow comparison will no longer be a guide to the bull’s breeding ability, and the “difference-from-expectancy” figure will overestimate the amount the bull is above average. We should, therefore, endeavour to find out, if possible, when considering any survey result, whether the owner has fed the bull’s daughters at the same level as the rest of the herd. This again emphasises the importance of going onto the farm and seeing the conditions under which the records have been put up.

On the dam’s side we are unlikely to have worthwhile information as to her breeding ability and we must look to her production records. Here it is a case of the more information the better.

The best guide to a cow’s producing ability is provided by a succession of records. A selected single record is a poor guide inasmuch as it does not represent the year-in year-out productive ability of the cow, but merely what she has been able to produce in one season under possibly very favourable conditions. The cow which demonstrates consistently-good production also demonstrates other points we are interested in, such as regular calving, and freedom from disease.

Again the production records of a cow will depend not only on her productive ability, but also on the conditions of feeding and management she has received. Therefore, an additional question we will want answered is the standard of feeding and management on her owner’s farm. Production records put up under good commercial conditions are obviously of more value to us than if those same records have been produced under conditions which are artificially high in comparison with good farming practice as we know it.

We must also remember, when considering the female ancestry of our prospective herd sire, that it is breeding ability we are after. In other words it is by no means certain that a high-producing cow will always breed high-producing daughters or sons that are herd improvers. Therefore, we should endeavour to find out if the dam is a member of a good breeding family. How have her sisters and half sisters produced? If we go back a further generation and see whether the maternal grandsire of our prospective bull has a good survey result this will give us the desired information on the dam’s half sisters.

What importance should we place on type? We will all be interested in having cows which have udders that last; are easy to milk by machines; that have good strong jaws so that the cow will still be able to eat grass efficiently when grass is short, and that walk around on good strong feet. Other factors such as constitution are better measured by the cow’s actual performance rather than by her appearance. In connection with type it is worth stressing that the sons of merit cows with “C” classifications have left just as good producers as the sons of “V.H.C.” merit cows. This means that we will not need to consider type when selecting for production and we can confine our selection on type to those points I have already mentioned which will affect our ability to obtain that production easily and efficiently.

A very pertinent question must be how are these recommenda-
tions working out in practice? Sons of good proven bulls, that is bulls with good survey results out of cows with a consistent production of a 400lb. standard or better, are proving by their own survey results to be the best bets. Similarly an analysis of the results obtained by bulls from various studs shows that studs with a high proportion of merit cows are supplying better-than-average bulls to the industry.

Having selected the bull, we still have to make the best use of him as a means of increasing our per cow production. If we have been fortunate enough to obtain a proven bull then he should be used extensively, as many replacement heifers by him as possible being saved. In the great majority of cases, though, we will have to purchase an unproven bull which, no matter how good the breeding, is always a gamble. One method of using unproven bulls which has been advocated, and which is of particular value in small herds, is to use the son of a merit bull out of a merit cow for a year or two, and then replace him in turn with another similarly-bred bull. Such a system avoids the dangers of undue concentration on one bull by spreading the risk. Because we know that sons of merit bulls out of merit cows will, on the average, be able to raise production, then steady improvement should result even though you are unlikely to achieve the marked improvement possible from concentrating on one good sire.

The difficulty of this system is that the major source of bulls used in the dairy industry i.e. the pedigree breeders, is unable to supply sufficient bulls of the desired quality for more than a fraction of dairy farmers to carry out such a scheme. The alternative is to keep the bull on the farm until his daughters are in milk. If his daughters show him to be capable of raising production, he can then be used as extensively as possible. In this case you should try to have sufficient daughters tested by the time the bull is five or six years of age to enable him to be proven. At the same time avoid loading the herd with his daughters in case he proves a poor bull. Ideally, this could be done by using the bull sufficiently as a yearling to enable at least six, and preferably more daughters of the bull to be milked in his fifth year and using him lightly until these daughters have been milked. In practice, the degree to which this can be done will depend on the size of the herd and the fertility and breeding ability of the present herd sire. What should be avoided is the practice of sending a bull to the works just because his breeding ability becomes known. Many farmers who have culled a bull because they did not like the type of his yearling daughters have later bitterly regretted the step when these same daughters entered the milking shed.

I would like to emphasise that nationally we are not going to move very far in increasing production per cow merely by proving bulls. In order to improve the national production per cow through breeding we shall have to increase the supply of bulls likely to prove good and make much wider use of the ones which do prove good. We can only have more sons of proven bulls in the industry when more breeders are heading their herds with a proven bull. Those breeders not fortunate enough to own one already or able to purchase one have the alternative now in many cases of obtaining the use of proven bulls through artificial insemination.

I should like to conclude by summarising the chief points I have mentioned.

1. Test continuously as this is the only sound basis for culling low producers and for saving replacement heifers from the best cows and families.
2. Select for essential qualities that are directly concerned with production. Don’t slow up your rate of progress towards the goal of higher production by paying too much attention to non-productive features.

3. Concentrate on selection of the herd sire as the most effective means of raising production per cow through breeding. His appearance, with commonsense reservations, is not important but his own performance or that of his ancestors, if he is an unproven bull, most certainly is. The only sure thing is a bull which has already demonstrated that he is passing on the qualities you are after to his progeny.

When selecting a young bull the best bet is the son of a good proven merit-bull out of a merit cow. However, check on his other close female relatives. If possible select the son of a cow which is the member of a good-breeding family.

4. Buy your bull on the farm where he was bred. Examine the conditions of feeding and management on the farm.

5. Avoid using any unproven bull too extensively in case he is not a winner. Once you do find a winner use him as extensively as possible.

Increasing production through breeding is not usually a spectacular business, but the dividends are there for those who place their bets wisely.

Mr Grant, Waimate: I think we kill something like a million calves a few days old. Is there not some way of producing beef from these? Could we not cross the dairy cow with a beef bull or transplant ova so that we can produce beef animals from dairy cows.

Mr Stichbury: In England they are developing the practice of using a beef bull on a good dairy cow. Artificial insemination centres carry both dairy and beef bulls. Once a farmer has ensured his replacements he can take services from beef bulls, getting colour-marked crossbred beef calves. These are reared with the dairy calves and are either fattened on the farm or sold as weaners to fatteners. As far as New Zealand is concerned, because of our high wastage we have difficulty in getting sufficient replacements. I doubt also whether these crossbred calves could be raised economically on dairy pastures.

Mr Grant: Do you think the type of cow in the North Island, mainly the Jersey, would be suitable to produce these crossbred calves? In England the main cows are Friesian, Ayrshire and Milking Shorthorn. Would it pay us to change to that type of dairy cow?

Mr Stichbury: The North Island dairy farmer runs Jerseys because he considers they are best suited to his requirements. You can run more Jerseys than Friesians, for example, on a given area of land. Before we decided to change the type of cow we would have to decide whether we considered the crossbred beef calf to be the major product and not merely a by-product. I saw the system in practice on a farm at Pukekohe, where the farmer had two bulls, a Jersey and a Poll Angus. He put the Jersey to the cows from which he wanted to breed his replacements and the black bull to the others. I saw the resulting calves at seven months old. The crossbred calves were black and poll, and apart from being a bit lighter were difficult to distinguish from ordinary Polled cross beef animals.
Chairman: What do the Dairy Board think of the future of dairying in Canterbury especially when we consider what can be done with irrigation?

Mr Stichbury: The Dairy Board has no clear-cut views. I have insufficient experience to express a personal opinion but I think you will just have to balance it up against the proceeds from fat-lamb farming. I will just ask would irrigation help you in the winter?

IMPROVED FEEDING OF DAIRY COWS

M. G. Hollard, Lincoln College

It has always been recognised that no matter how good the inherited ability of a dairy cow to produce, she can never express that ability satisfactorily unless she is adequately fed. There has been a great deal of controversy at times as to which is the more important, the inherited ability of a cow, or the environment under which she has to produce. Under differing conditions one may be more important than the other, but they are both so important that no farmer can afford to neglect either in his fight for greater efficiency in producing milk and butterfat.

In the previous paper Mr Stichbury has outlined the methods being employed in New Zealand to breed better dairy cattle. In this paper I wish to call attention to ways and means by which the feeding of dairy cattle in New Zealand as a whole, and in the South Island in particular, could be improved. Mind you, cows under test in the South Island always produce about 20lb. butterfat more than do tested cows in the North Island, in spite of a much shorter average lactation. This to my mind indicates two things. Firstly, the dairy herds in the South Island are already better fed than those in the North. And secondly, I think you must be better farmers down here.

The Scope for Improvement through Feeding

That there is wide scope for improvement in dairy cow production in New Zealand by better feeding, is clear from information available from several sources.

The most striking illustration is that given by the results of the "Production Improvement Project" of the New Zealand Dairy Board's Herd Recording Department. In this project, low-producing dairy farms in various parts of New Zealand are being given the close personal attention of the consulting officers of the Board. By encouraging the farmers in the scheme to improve their husbandry practices, it is hoped that the production of the farms concerned will be substantially increased. One hundred and sixty-two farms have completed three years in the scheme and it is interesting to note that consulting officers have considered pasture composition, pasture management and the level of supplementary feeding to be the major limiting factors on the majority of farms. The production records of herds and farms under the scheme show that in three years a true improvement of 27 pounds of butterfat per cow has been obtained, representing an increase of 17.6 per cent in total production per herd. This improvement is due mainly to better feeding practices.

Experimental work at Ruakura with identical twins also illustrates the importance of feeding in raising production. In one par-
ticular experiment, one member of each pair of five sets of twins was adequately fed on good pasture and supplements over each of three seasons, while the other member of each set of twins was allowed only 60 per cent of the grazing area. The well-fed twins produced an average of 30 pounds of butterfat per head more than did their poorly fed mates. This difference was due to difference in feeding only.

In another series of experiments at both Ruakura and Palmerston North the advantages of good winter-feeding were demonstrated. Increases in production of up to 60lb. butterfat per cow in the subsequent lactation were obtained by good feeding during the preceding dry period.

It must be conceded from the work cited that the scope for improvement in production through better feeding is wide. The average yield of butterfat per cow in New Zealand is still between 250 and 260lb. fat, and the average yield per acre, even in the more favourable dairy farming areas is still below the 150lb. level. But there are some herds which have averaged 500lb. butterfat per cow, and there are some farmers which have produced more than 300lb. butterfat per acre. There is no possible doubt that these high yields have been due in no small part to good feeding.

The Feed Requirements of Dairy Cows

A major reason for the disappointing response on the part of many folk to use the information made available to them in regard to the better feeding of dairy stock, is their failure to fully appreciate the significance of quality in feedstuffs used for dairy cattle. Yet this lack of appreciation is easily understood, for ruminant animals, and cattle in particular, have achieved their present position in agriculture by virtue of their ability to convert rough, fibrous, poor-quality feedstuffs into human food. But there is a limit. With the selection of dairy cows which have been specially chosen for ability to produce milk and butterfat, quality in feedstuffs has become more and more important. The situation is simply this. A cow can, and will, eat only a certain amount of feed in a day, and there must be contained in this amount of feed all the food nutrients that the cow requires.

The amount of feed a cow will eat depends on several things. These include individuality, succulence and palatability of the feed, the amount of exercise she has, whether she is in milk or dry, and on the variety of feed that she is offered. In general, though, cows will eat, in terms of intake of dry matter, about three per cent of body weight. For example, a small Jersey cow of 800lb. liveweight will eat up to 24lb of dry matter daily, while a medium sized Friesian (1,200lb.) will eat up to 36lb. of dry matter daily. All the nutrients the cow requires must be contained within this bulk of feed.

The purposes for which cows require feed are as follows:

1. Maintenance: To provide nutrients for the vital functions of the body there is a continual need for food. This is true whether the animals is young or old, producing or not producing, working or resting, healthy or diseased. The bigger the cow the greater is the amount of feed required for maintenance. Temperature is important too. In cold, winter weather the maintenance requirements increase.

2. Production: The food required for the production of milk depends on the yield of milk and the butterfat content of the milk. The higher the yield and the richer the milk the greater is the production feed requirements.
3. Pregnancy: An in-calf dairy cow requires extra feed to build up her calf. This requirement markedly increases during the last three months of pregnancy.

4. Growth: Extra feed is required for any weight increase the cow may make. This is more important with heifers, but it applies also to all heavy-milking cows which must build up condition during the dry period.

The way in which these feed requirements can best be supplied varies according to locality and individual farm conditions. From the considerable range of possibilities available, the choice must be made after considering carefully the practical economics of supplying and using the feed for dairy cows.

To provide a comparison in regard to feed value between those feeds commonly available on dairy farms, the following table has been drawn up. For the purpose of comparison it has been assumed that a cow of 950lb. liveweight producing milk testing five per cent of butterfat is eating the listed feeds at the theoretical intake. (In fact this would not be so for it is improbable that such a cow would eat more than 22lb. of hay or 90lb. of silage daily as a sole article of diet).

APPETITE AND NUTRITIVE VALUE OF COMMON FEEDING STUFFS FOR 950LB. COW PRODUCING 5% MILK.

<table>
<thead>
<tr>
<th>Feed</th>
<th>Dry Matter %</th>
<th>Theoretical Maximum Intake lb.</th>
<th>Production Worth of the Feed</th>
<th>Amount required to Produce 2lb. Fat or 4gals. Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Pasture</td>
<td>20</td>
<td>135</td>
<td>Maintenance + 2½ lb. fat</td>
<td>125lb.</td>
</tr>
<tr>
<td>Good Pasture</td>
<td>20</td>
<td>135</td>
<td></td>
<td>400&quot;</td>
</tr>
<tr>
<td>Good Hay</td>
<td>84</td>
<td>32</td>
<td></td>
<td>50 &quot;</td>
</tr>
<tr>
<td>Poor Hay</td>
<td>86</td>
<td>31</td>
<td>Insufficient for maintenance</td>
<td>115 &quot;</td>
</tr>
<tr>
<td>Good Silage</td>
<td>20</td>
<td>135</td>
<td>Maintenance + 1 lb. fat</td>
<td>180 &quot;</td>
</tr>
<tr>
<td>Poor Silage</td>
<td>20</td>
<td>135</td>
<td>&quot;</td>
<td>300 &quot;</td>
</tr>
<tr>
<td>Chou Moellier</td>
<td>14</td>
<td>190</td>
<td>&quot;</td>
<td>300 &quot;</td>
</tr>
<tr>
<td>Soft Turnips</td>
<td>9</td>
<td>300</td>
<td>&quot;</td>
<td>1,000 &quot;</td>
</tr>
<tr>
<td>Swedes</td>
<td>12</td>
<td>225</td>
<td>&quot;</td>
<td>600 &quot;</td>
</tr>
<tr>
<td>Mangolds</td>
<td>13</td>
<td>210</td>
<td>&quot;</td>
<td>1,000 &quot;</td>
</tr>
<tr>
<td>Fodder Beet</td>
<td>22</td>
<td>129</td>
<td>&quot;</td>
<td>820 &quot;</td>
</tr>
<tr>
<td>Sugar Beet</td>
<td>23</td>
<td>120</td>
<td>&quot;</td>
<td>800 &quot;</td>
</tr>
</tbody>
</table>

In practice, with the one exception of pasture, none of the feeds listed above would be fed alone to milking stock. Nevertheless certain useful practical conclusions can be drawn from the table.

(a) High-class pasture is an ideal feed for milking stock.

(b) Poor pasture is useful for maintenance purposes only.

(c) Even the best hay must be supplemented with pasture for high-producing stock. With such a dry feed as hay the actual intake is well below the theoretical level and so the figures given flatter hay somewhat. The same applies to silage. However, where these two feeds are used for milking stock, even as part of the ration, it is evident that they must be of the very best quality if the stock are to be fully fed.
(d) Root crops, in spite of their low protein content, are valuable as a source of energy and for giving succulence when no other succulent feed is available for providing variety in the diet. When they enter largely into the diet of the milking cow, some protein-rich feed such as pasture or green feed (green oats or barley) must be included in the ration.

(e) As pointed out earlier, an adequate ration must contain sufficient nutrients within the limits set by the cow's appetite otherwise the stock will be underfed.

Herein lies the critical feeding problem of the New Zealand farmer who is so dependent on pasture which varies so greatly in quality and quantity over the course of the year.

In the feeding of dairy stock over the year, the important thing to watch, then, is to ensure that the dairy herd is always provided with high-quality feedstuffs. As well-managed pasture is the best and cheapest feed that can be provided, then it is evident that for maximum returns to be obtained, every effort should be made to extend the period over which the herd can be fed mainly from pasture. Every effort should be made, too, to utilise pasture efficiently by careful grazing management. Surplus spring pasture-growth should be conserved as silage and hay, and surplus autumn-growth, as "cool-stored grass." In areas where the pasture growing-season is comparatively short, then supplementary crops will have to be provided.

Extending the Growing Season of Pasture

Ways and means of extending the growing season of pasture have been investigated on many occasions. It is not necessary here to elaborate the advantages, in this respect, of good drainage of pastures, topping and harrowing of pastures, the possibilities of "special purpose" pastures, and of a judicious topdressing programme. These are all practices which have been thoroughly investigated and are widely practised. But there does appear to be one way in particular of extending the growing season of pasture which could be used more widely. And that is by irrigation. In papers to be given later today some experiences in the irrigation of dairy-farm pastures are to be outlined by men who have considerable experience in this field.

Conserving Surplus Pasture

The practice of conserving surplus spring and early summer pasture-growth as hay or silage is long established, although the proportion of silage to hay has varied considerably over the years. It is only in more recent times, however, that grass available beyond the immediate needs of the stock in the autumn has often been conserved as "cool-stored" grass.

The following diagram, after McMeekan, serves to show the relationship between the availability of feed and the food requirements of cows. The place of hay and silage in sward management is portrayed.

This idealised diagram varies greatly with locality and season, but nevertheless it symbolises what we think to be optimum utilisation. Whether "cool-stored" grass is saved or not, whether conservation is all in the form of hay or mainly silage, these differences do not alter the fact that shortages of pasture must be made good by the saving of herbage when grass growth exceeds the ability of the herd to cope with it. The choice of the method or combination of methods of conservation varies according to the circumstances on individual farms.
The following general observations, however, should be made.

Whether surplus grass is conserved as hay or silage, the efficiency of utilisation of that grass will be poor. Even under the best conditions of haymaking and silagemaking, losses of up to 50 per cent of the total available nutrients will be suffered. (It is this fact which forces one to examine the possibilities of “special-purpose” pastures on which the pasture growth can be used on the spot).

Much of the silage made in New Zealand in the past has been of poor quality, and as such has often been no better than a maintenance feed for dairy stock. With a better appreciation of the principles involved in silage-making, and with the availability of methods which lend themselves to obtaining good consolidation of ensiled material, it is likely that better-quality silage is being made in New Zealand today than has ever been the case before. With the availability of labour-saving machinery in the buckrake and forage harvester in recent times, the area of grass and clover cut for silage in New Zealand has rapidly increased. (The area has nearly doubled over the past four years).

The area of grass and clover cut for hay in New Zealand has increased steadily over the past 25 years. It could not be said, however, that there has been a corresponding improvement in quality! In fact, the quality of the hay often made is so poor as to make the cows feel insulted when it has been offered to them.

The prime factor influencing quality of hay is the stage of growth at which the crop is cut. There is no doubt whatever that most hay in New Zealand suffers from the disadvantage of being cut at a too-mature stage of growth for it to be of reasonably-high quality. The reasons for late cutting are twofold. Firstly, the weather is not usually suitable for haymaking when the crop is at its most nutritious stage of growth earlier in the season; and secondly, the yield of hay per acre will be lower if the crop is cut earlier. Hay crops usually make a great deal of growth in the last two or three weeks prior to the flowering stage. If farmers desire to make a crop into hay rather than silage, and wish to obtain a high yield of hay per acre, then it will be virtually impossible for them to make good-quality hay from a milk-producing point of view.
Losses in haymaking, apart from the stage of growth influences, are likely to be high. However, rapid drying, combined with careful handling to reduce the loss of leaf, will reduce the total losses considerably. The use of a recently-introduced hay crusher is likely to revolutionise hay-making methods in New Zealand. Not only does crushed hay dry more rapidly, but the loss of leaf is markedly reduced—and hence a marked improvement in feeding value results.

The conservation of surplus autumn growth as "cool-stored" grass, whenever it is available, is becoming more popular every day. Not only is such feed of high feeding value, but it is, of course, very cheap to conserve and very cheap to feed. In utilising "cool-stored" grass, rationed grazing with the electric fence should be adopted to achieve greatest efficiency in utilisation. It is also a sound plan to feed out the supplementary feed being used on the previous day's break of grass. Such ration-grazed "cool-stored" grass is more nutritious than any farm-grown supplementary feed, and it is also more palatable, thus encouraging the herd to eat more of it. This observation is interesting in relation to our local problem of a low percentage of non-fatty solids in winter milk. It is recognised that one of the many factors which influence the level of non-fatty solids in winter milk is the nutrition of the herd. It has been claimed that low solids-non-fat in winter milk is due, in part at least, to poor feeding, on either a quantitative or qualitative basis, or both. In feeding trials carried out at this College over the past two years, animals fed on autumn-saved pasture have shown a much smaller decline in non-fatty solids in the winter months than have cows fed on either lucerne silage or chou moellier. This situation was probably due to the fact that the cows on the palatable, nutritious, autumn-saved grass were better fed than those on either of the other two rations. It would thus appear that at least part of our local problems with low non-fatty solids in winter might be solved if town-supply farmers were in a position to utilise autumn-saved pasture for winter feeding. It would no doubt be a profitable practice even if it were necessary to irrigate pastures to obtain the autumn growth.

**Cropping on Dairy Farms**

Because well-managed pasture is the best and cheapest feed available for dairy stock, wherever possible every endeavour should be made to make the greatest use of it. In many districts climatic conditions are so favourable that cropping is quite unnecessary to supplement grass, silage and hay. In other districts, cropping may be essential in some cases and just preferable in others.

Where cropping is practised, chou moellier is becoming more popular every year. In view of the comparatively good feeding value of chou moellier, this is a very desirable trend.

Root crops have declined in popularity over the past ten years. This is on account of the high labour requirements in growing and utilising the crops. Whereas in 1940-41 over 9,000 acres of mangolds were grown in New Zealand, in 1950-51 this area was reduced to 2,283 acres.

All root crops yield heavily on suitable soil types but all are low in protein and require to be used in conjunction with hay, silage or autumn-saved grass. A comparatively-new introduction to New Zealand is fodder beet and this crop has several advantages worthy of mention. It produces the same yield of feed nutrients per acre as do mangolds, but it does not require to be stored before use; it is as palatable as sugar beet, but is easier to harvest. Further, fodder beet has a long period of utilisation which extends from May
through to August. Hence, if it is desired to grow a root crop for winter feeding of both cows and pigs, fodder beet is hard to surpass.

Grazing of Pastures

In view of what has been said about the high feeding-value of well-managed pasture it is surely only common sense to use this valuable feed to best advantage. The method of grazing employed will in large measure determine the efficiency of utilisation achieved.

Losses of feed from pasture are surprisingly high. Even under a well-organised system of rotational grazing the cows will actually eat only about 55 to 60 per cent of the grass available. The losses are due mainly to selective grazing and to trampling.

Modern methods of grazing aim at overcoming these losses by more intensive stocking for short periods, a process known as "rationed grazing." The ideal, under this system, is to make available to the herd each day only as much grass as the cows can eat. Breaks of grass can be provided quickly and cheaply with the electric fence. The main advantages of the system, which quickly become apparent, are that firstly, by providing a break of fresh clean grass each day the cows apparently eat more grass—and so production per cow increases; and secondly, by utilising the available feed more efficiently, a greater surplus of grass for silage or hay is made available. This has allowed, in most cases, more cows to be carried, better supplementary feeding of the herd to be achieved, and a substantial increase in the yield of butterfat per acre to be obtained.

Finally, let me summarise the important points in the better feeding of dairy cows. These are as follows:—

1. There is great scope for increasing production per cow in this country by better feeding.
2. As the appetite of a cow is limited, quality in feedstuffs is important if the feed requirements of the animal are to be fully satisfied.
3. Well-managed pasture is the best and cheapest feed available for dairy stock in New Zealand.
4. Every effort should be made to lengthen the period of the year over which the feed requirements of the herd can be met from pasture.
5. Pasture being grazed should be used more efficiently by improved grazing methods.
6. Modern methods should be used to conserve surplus spring and early summer pasture as good quality silage and good quality hay.
7. For winter milkers and early-spring calvers more use should be made of "cool-stored" grass.
8. If supplementary crops have to be grown, more attention should be paid to chou moellier and fodder beet than to other possibilities.

Mr Homesham, Christchurch: Is there any evidence to indicate whether the feeding value of irrigated pasture is any better or worse than that of ordinary grass?

Mr Hollard: No.

Mr Miller, Motukarara: Is there a better chance of improvement in production along the lines of breeding or of feeding?
Mr Hollard: There is no doubt in my mind that improvement through feeding will be easier to achieve in the short run. It is not so painless as improvement through breeding, but the fact that many herds under the Dairy Board’s Production Improvement Programme have increased production so much in only three years is a striking example of what can be done by better feeding. Improvement through breeding is painless; it requires no more effort to use a good bull than it does to use a poor bull.

Mr Stichbury: I fully agree with Mr Hollard. Feeding can give quick results but breeding involves a long-term programme.

Mr Humm, Waikuku: Would you not agree that better-bred cows would automatically lead to better feeding?

Mr Hollard: I think so. The man interested in his stock is likely to feed them better. Good breeding and good feeding usually go hand in hand. Would Mr Stichbury agree with me that up to 80 per cent of the difference in the production between one herd and another is due to better feeding rather than to breeding? I consider feeding and management are so very important that breeding really falls well into the background.

Mr Stichbury: Some people are saying that breeding is relatively unimportant and that practically all the differences between herd averages can be explained by levels of feeding. However, I am not going to attempt to put a figure on it because nobody else has attempted to do that. I personally do not believe that it is as much as 80 per cent. In other words, if it is 80 per cent that is virtually saying that any farmer in the country can reach 380-400lb. of butter fat merely by adopting feeding practices of those people who are at present on those levels. I personally think that something less than 80 per cent is the difference due to feeding. In my experience of high producing farms I have not been able to see the extreme difference in feeding as would be suggested by such a difference as 80 per cent. I think you have to have good cows to get to the top.

Mr Ashen: Could you give us a definition of how to make grass grow in the autumn in Canterbury? Has the College tried nitrate of lime?

Mr Hollard: We have had no experience with nitrate of lime here. As far as superphosphate is concerned, we topdress in the autumn just when we can.

FLOOD IRRIGATION ON A NORTH CANTERBURY FARM

C. W. Humm, Waikuku

Due to seasonal droughts in Canterbury, the dairy farmer finds that nearly every summer his production falls away. In a prolonged drought it will stop entirely. Irrigation is the only insurance the dairy-farmer has against these droughts. His only other alternative is to grow autumn catch-crops, but this is a risky business as the drought also affects them. With irrigation and pasture management, he is assured of green grass right through the autumn and early winter. As every farmer knows, no other feed will give the pro-
duction that grass will. Realisation of these facts started us irrigating at Waikuku almost 13 years ago. We tried wild flooding as it means a terrible lot of work to border-dyke all the paddocks; this could only be done on a long-term plan as all paddocks could not be broken up in the one year.

We started first with a six-inch pump. This was very successful as far as it went but its output was so limited that for wild flooding, complete coverage was impossible. A ten-inch pump was tried with more success and we are now using a twelve-inch pump driven by a 50 horse-power motor. The output of this pump is so great that we have not done any border-dyking whatever and yet get almost complete coverage. This big pump does not allow hollows to become saturated before the rest of the paddock is covered.

Naturally wild flooding uses a lot more water than the border system, but to compensate for this, the paddocks are left in their natural condition which makes them much easier for mowing.

The production from our farm increased from year to year as we were able to carry more stock. Part of the area is 120 acres of river-bed which was all gorse. This was cleared and the area used for feeding the herd in the winter. This increased the fertility of this light country so much that in a wet spring it would carry the whole herd, the good land then being shut up for silage and hay. Sometimes before the hay was off, a dry spell would set in and this light country would just go out of production. This led us to put a twelve-inch pump in the Ashley river. This is driven by a 70 horse-power motor. Like all river-beds this land is more or less undulating and could not be levelled on account of the pure shingle underneath.

A system of irrigation ditches has been put round all the high ridges and this has given us almost a complete coverage with water. Of course you must understand that to have successful irrigation you must first have perfect drainage. Without this the whole position is just impossible, especially with wild flooding.

The big advantages of irrigation are freedom from worry about a dry spell, control of grass grub, full control of pastures, and the ability to harrow and if necessary top every paddock after grazing; this could not be done in our climate without irrigation. Another big asset is that you do away with the necessity of continually renewing the pastures on light land.

Mr Hurst: What quantity of water do you use and what distance do you have to pump it?

Mr Humm: The pump at the house gives us 5,000 gallons a minute from the Coldstream Creek. At the Ashley River we have a 12 inch pump which gives us 8,000 gallons a minute through 18 inch pipes. We pump 150 feet, but there is not much lift. Always be careful that you don't put in a pump which is unsuitable for the job.

Mr Stichbury: Do you irrigate the whole farm?

Mr Humm: We irrigate every bit we can get the water on to, and that is everything except a few dry knolls. If we don't want the grass for the cows we can use it for silage and hay. Even our swamp ground can dry out and crack badly so it is watered too.

Mr Riddolls, Lincoln College: I think it's safe to say there are few farms anywhere in the world using pumps this size. Would Mr
Humm, tell us something of his costs of power, and his methods of ditch building and diversion of water?

Mr Humm: Our electric motors run only on off-peak hours. To water the river bed and the 114 acres of heavy land twice in each case the power bill was £53. The ditches were made with the bulldozer. As regards diversion of water, we found on the light river bed that by pushing in the bank to divert we were losing too much soil, so we put in concrete stops.

Mr Oliver, Hororata: Could you work the river bed as a dairy farm if you didn't have the heavy land?

Mr Humm: Yes, quite easily. You can get your grass both earlier and later and still have enough for the summer to keep you going. With good irrigation and good drainage you could make dairy farms out of any of the lighter Canterbury plains.

Chairman: What is the carrying capacity of this light land?

Mr Humm: On 90 acres we winter all the cows and in the spring until the hay and silage come off the good land these 90 acres will carry from 80-100 cows. This requires continual watering particularly in the nor-west weather.

Mr Wheeler, Oamaru: Do you topdress?

Mr Humm: We use fertiliser only on the light ground. We have used 7½ tons of lime in 13 years and it is now just right. If we use fertiliser on the heavy ground the pastures would get too strong. In a very hot summer if you keep on watering and control your pastures you will find by the end of February that the grass is too young and soft. The cows go round the outside and eat all the weeds, rough grass and other rubbish. Obviously they need roughage; that is the time to start taking out hay. Cows can't live in our district on irrigated pasture alone.

Mr Hurst: How often do you water?

Mr Humm: It depends on the season. If we strike a hot patch on the shingle country then we water once a week. On the good farm with wild flooding we have to take off all the hay and ensilage before we can water at all. We usually water twice at an interval of 10 days and then only again if we have to. If this heavy land is dry then the pump at the house will water only half an acre an hour. The second time over it may do five acres an hour.

DAIRYING UNDER IRRIGATION AT WINCHMORE EXPERIMENTAL DAIRY FARM

G. K. McPherson, Department of Agriculture, Ashburton

Something novel—so far as farming in Canterbury is concerned—was commenced in 1947 when 150 acres of the Winchmore Irrigation Research Station was set aside to be developed as a dairy farm. The land is typical of a great deal of what is commonly referred to in Canterbury as light land. An average soil profile would show about 15in to 18in of soil and subsoil and then shingle. Under normal conditions dairying would not be practised on this class of country, as the naturally-low grass production from the land and the possibility of
drought during the summer and autumn would rule out dairying as an economic proposition. Would irrigation, however, convert this light country into land suitable for dairying? This paper describes the development of the unit and the results obtained over the past 6 years.

Development.

The farm has been developed mainly with the idea of ascertaining whether dairying with the aid of irrigation was a reasonable farming proposition on light land in Canterbury. The Department of Agriculture wanted information on this point as quickly as possible, so instead of developing the unit slowly out of revenue, as a farmer might do, the farm was largely developed out of capital. The fairly-rapid development programme initiated has enabled us to answer such questions as how much butterfat could be produced, were there any difficulties in producing sufficient winter feed, could replacements be reared on the farm, what stock diseases were likely to be encountered and so on.

When taken over by the Department of Agriculture, approximately one-third of the unit had been border diked and sown down to permanent pasture. The main development work since has been the border diking of a further one-third of the farm, the installation of head-gate and junction-blocks subdivision, erection of necessary buildings, installation of water supply and sewerage, and the establishment of further permanent pastures.

Land Preparation for Irrigation.

The present position of the farm is as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Border diked</td>
<td>102.0</td>
</tr>
<tr>
<td>Wild flooded</td>
<td>30.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>132.5</td>
</tr>
</tbody>
</table>

The balance of the farm (17.5 acres) consists of stock tracks, buildings and yards, shelter belts and irrigation races. The possibility of border diking some of the area which is at present wild flooded is being investigated and should this eventuate, increased production can be anticipated. All border diking on the unit was carried out by the Ministry of Works and the installation of head gate and junction blocks by the farm staff.

Subdivision.

Subdivision has been carried out to give 18 paddocks of approximately 8 acres each. With a herd of 80 cows this gives a grazing rate of 10 cows per acre. A race approximately a chain wide runs through the centre of the farm and most paddocks are connected to this control race.

Buildings.

Buildings erected on the unit immediately it was acquired were two houses, an internal-race cowshed with an eight-cow plant, a calf shed, also an implement, fertiliser and tool shed. Later, a modern piggery was constructed with suitable out-door pens and also a Dutch barn capable of holding 3,000 bales of hay.

Water Supply.

To dairy successfully it is essential to have a good stock-water supply and also plenty of water for the dairy and yards. With the large number of relatively-small paddocks on the unit it would not have been practicable to reticulate the farm with stock-water races. An underground concrete tank of 4,000 gallons capacity and fed from the stock-water race was therefore constructed. A pressure pump
was also installed and water pumped through 4-in. and 6-in. galvanised piping to concrete troughs in each paddock.

Pasture Establishment.

The original pastures sown down on the area were mainly of a permanent pasture type, the seed mixture being as follows:

<table>
<thead>
<tr>
<th>Seed Type</th>
<th>lb. per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial Ryegrass</td>
<td>30</td>
</tr>
<tr>
<td>Cocksfoot</td>
<td>5</td>
</tr>
<tr>
<td>Timothy</td>
<td>4</td>
</tr>
<tr>
<td>Dogstail</td>
<td>1</td>
</tr>
<tr>
<td>White Clover</td>
<td>2</td>
</tr>
<tr>
<td>Montgomery Red Clover</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44</strong></td>
</tr>
</tbody>
</table>

About 15 acres were sown in a temporary mixture of:

<table>
<thead>
<tr>
<th>Seed Type</th>
<th>lb. per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian Ryegrass</td>
<td>30</td>
</tr>
<tr>
<td>White Clover</td>
<td>2</td>
</tr>
<tr>
<td>Montgomery Red Clover</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

And 8 acres sown in a semi-permanent mixture of:

<table>
<thead>
<tr>
<th>Seed Type</th>
<th>lb. per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-Rotation Ryegrass</td>
<td>30</td>
</tr>
<tr>
<td>White Clover</td>
<td>2</td>
</tr>
<tr>
<td>Montgomery Red Clover</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

The remainder of the farm, comprising mainly the area not suitable for border diking was sown with 12 lb. cocksfoot and 2 lb. subterranean clover per acre.

Development of Pastures.

Under cattle grazing the pastures have developed very well indeed. In the early stages they tended to be clover dominant, but later on the grasses asserted themselves and now most pastures consist of a good, balanced mixture of grasses and clovers. The original pasture sown with short-rotation ryegrass and clovers has performed very well indeed, and at the end of six years with intermittent haying it still possesses a good grass sole. Acting on this experience, short-rotation ryegrass has been made the dominant constituent in all the pasture mixtures which have been sown during the past three years.

Measurement of production of one of the older pastures (sown February, 1946) over the three years 1950-53 has given an average production of 9,000 lb. of dry matter per acre. This figure, which is equivalent in production to a good Waikato pasture, could not have been attained without the aid of irrigation.

The main effects of irrigation in pasture production are these:—total production is approximately doubled; short dry spells which may check growth in summer are overcome; irrigation enables growth to be maintained at a reasonable level in the autumn; and pastures going into the winter dense and vigorous, are quick to get away in the spring.
Liming and Topdressing.

All paddocks received 1 ton lime per acre either prior to sowing down to grass or immediately after the pastures had established. Further applications were then made at intervals until now the whole farm has received 2 to 2½ tons of lime per acre. These applications have raised the pH of the soil to about 6.1, which is considered a satisfactory level for pasture growth.

Superphosphate at the rate of 2cwt. per acre has been applied annually to all the pastures. More recently hay paddocks have received an additional 2cwt. per acre in the spring. There is some evidence to suggest that the best time to topdress pastures on an irrigated dairy farm is December, and this matter is being further investigated.

To promote earlier growth in the spring nitro-lime, applied towards the end of July, has been tried and results are quite promising, particularly on new pasture.

Shelter.

One of the factors restricting butterfat output at the moment is undoubtedly the lack of shelter. The area is exposed to the prevailing south-west cold winds mostly in the winter; to the strong dry north-west winds during the warmer period of the year and to occasional cold north-east winds from the sea.

The chief shelter required therefore is that against the north-west and south-west with secondary protection from the north-east. Some north and westerly shelter is already being obtained by Pinus radiata planted by the Lands and Survey Department in 1944. Where surplus irrigation water has accumulated these trees have not done well and are of poor shape. Some Pinus radiata in damp spots have already blown down.

A plantation of Cedrus deodara and Lombardy poplar is establishing well on the south boundary. Standard internal high shelter is being provided for by belts of Lawsoniana, Oregon pine, and Lombardy poplar, while low shelter of seedless barberry is now three feet high and well established. Lateral shelter by a belt of Oregon pine and Cedrus deodara is developing.

It is anticipated that some of these belts will be giving shelter in three years' time, that is, seven years since planting. This is slow compared with Pinus radiata which would afford shelter in about four to five years. It is felt, however, that other species would give, in the long run, more permanent and better shelter.

Irrigation.

Irrigation usually commences some time in September and finishes towards the end of April. The amount of water applied naturally varies with the season. Over the last four years the quantities used have been as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949-50</td>
<td>28.60 acre inches.</td>
</tr>
<tr>
<td>1950-51</td>
<td>13.86</td>
</tr>
<tr>
<td>1951-52</td>
<td>36.0</td>
</tr>
<tr>
<td>1952-53</td>
<td>14.25</td>
</tr>
</tbody>
</table>

Approximately five inches of water are applied at each irrigation so that in a dry season it is necessary to irrigate about seven times and in a wet season such as the one just experienced, about three times.

It is interesting to record that the amount of water applied plus rainfall for the four seasons mentioned above has approximated 50 inches for the September-March period. It appears that this quantity of water is necessary to maintain pasture growth for the stock and enable sufficient hay to be saved for winter feed.
With pasture growth, the watering rate has varied between 1½ acres and 2 acres per hour. In 1949-50—a relatively dry year—427 hours were occupied in irrigating whilst in the following year which was a relatively wet one, a total of 241 hours were utilised in applying the water.

Stock.
The present herd contains Jerseys, Friesians, Ayrshires and Shorthorns. Jersey bulls are being used and the ultimate aim is a Jersey herd. For the last three years, heifer calves from the better cows have been retained for herd replacements.

As only 15 to 20 heifer calves are being retained each year, there is a big surplus of skim milk. The aim on the farm is to concentrate on pig-meat production as much as possible and all surplus milk is consumed by pigs. A total of 64 porkers were sold in 1960-51, 85 in 1951-52, and this season approximately 60 will be sold.

The main difficulty experienced with pigs has been to keep them sufficiently warm, and to improve conditions in this respect, the sties have recently been remodelled.

Most of the weaner pigs are bred on the farm and at the present time 11 sows are being kept. Weaner pigs are brought through the winter on a ration of meat meal and barley meal plus ample fodder beet which is grown on the farm.

Butterfat Production.
For six consecutive seasons butterfat production has shown a steady increase. Butterfat figures (factory returns) are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>No. Cows</th>
<th>Butterfat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947-48</td>
<td>27</td>
<td>4,828</td>
</tr>
<tr>
<td>48-49</td>
<td>45</td>
<td>7,860</td>
</tr>
<tr>
<td>49-50</td>
<td>60</td>
<td>15,594</td>
</tr>
<tr>
<td>1950-51</td>
<td>66</td>
<td>18,538</td>
</tr>
<tr>
<td>51-52</td>
<td>71</td>
<td>19,504</td>
</tr>
<tr>
<td>52-53</td>
<td>83</td>
<td>23,700 to end of April</td>
</tr>
</tbody>
</table>

The present season should conclude with 24,500lb. fat which represents 163lb. fat per acre. Considering that replacement stock are reared on the farm this figure must be considered very satisfactory.

Stock Health.
The farm has been remarkably free from stock diseases. Cases of mastitis, failure to get cows in calf, and cases of cows slipping their calves have occurred; but nothing unusual. In the early stages of pasture development a strict watch had to be kept for bloat; but with the maturing of the pastures bloat is not now a problem.

Covering the stock during the winter is not practised; yet even with the cold conditions and the lack of shelter, the cows come through the winter in good condition.

Calves seem a little difficult to rear up to a year old. From then on they seem to develop rapidly into quite good two year olds.

Winter Feed.
Winter feed is provided in the form of hay and roots. The aim has been to provide approximately 1 ton of hay for each animal wintered. The bulk of this hay is obtained from pasture growth which averages about 75 bales per acre. An 8-acre stand of lucerne gives 100 to 120 bales per acre each year and this hay is reserved for the cows when they calve in the spring. During the past two years 1,000 bales of short-rotation straw have been obtained for the cost of baling and cartage.

About seven acres of swedes have been grown each year, but
they have not proved a reliable crop. An excellent crop one year can be followed by an indifferent one in the following year.

**Provision of Early Spring Feed.**
Calving commences about the beginning of August. As growth does not commence till mid-September, provision must be made for about six weeks' feed for the newly-calved cows. This is done by closing about 30 acres in mid-March, the growth produced in the autumn being carried through the winter and fed to the cows in the spring. Pastures of short-rotation ryegrass are ideal for this purpose.

**Conclusion.**
After six years, butterfat production on the farm has been built up to 24,500lb. Further improvement in the quality of the pastures is possible, the herd could be considerably improved and as the trees grow up the stock will receive more adequate shelter. With this in mind a production of 27,000lb. butterfat does not seem unduly optimistic. At that figure dairying on the plains would be a sound farming proposition.

**Mr McKellar:** Do the washings from the cow yard go on to the pastures?

**Mr McPherson:** We have no system of pumping it into a tank and then spreading it. The washings go into an irrigation ditch and thus go on to the pastures serviced from that ditch.

**Mr Hudson:** What was the value of the farm when you took it over, what is its value today on a production basis and what did it cost?

**Mr McPherson:** The value of the 150 acres bare ground in 1946 was £6 an acre. We have put on buildings to the value of £46 an acre. The border dyking and other improvements would bring the total to something approaching £70 an acre. All the work I have described was done in a four-year period. It could not be done out of revenue, but had to come out of capital. For the first four years the farm showed a loss. In the fifth season with 20,000lb. of fat there was a small profit. This year with 24,500lb. of fat I anticipate there will be a substantial profit. The Department would have to get £70 an acre for it today to come out square. I believe that if it is continued as a dairy farm for another few years it will not have cost the taxpayer a penny.

**Professor Flay:** Would the Government sell today for £70 an acre? I don't think so. If it were put up for auction I would suggest it would bring much more. If you compare it with Waikato values of land producing 130lb. of fat per acre Winchmore is worth £100 per acre, less the annual irrigation costs capitalised.

**Mr Campion:** Is Mr McPherson allowing for interest in his figures?

**Mr McPherson:** Yes. I have allowed interest on capital and also normal depreciation charges.

**Mr Riddolls:** The application of five inches of water seems a little high. Is it all used?

**Mr McPherson:** I think at five inches we are putting on just about double what we should. The water-holding capacity of the soil is about 2½ inches but when you have dairy pastures up to six inches high on border dykes you have to apply five inches to get the water to the bottom of the border.
SPRAY IRRIGATION IN NORTH OTAGO

J. B. Bulleid, Deborah

Those of you who have lived in North Otago or passed through during a drought, and have seen some of the best land in New Zealand producing little or no fodder for stock, must have realised the necessity for some method of supplementing the natural supply of rain.

In 1926 we purchased 156 acres of heavy land, partly black tar, partly heavy loam with a clay sub-soil, situated at Deborah three miles south of Oamaru on the main south road. We built a dam in the creek, and installed a pump with 1,300 feet of 6-inch pipe. This delivered 500 gallons per minute to a 45 foot head. This quantity of water proved to be inadequate to flood a reasonable area of land with a moderate amount of labour. This was largely due to the absorbent nature of the soil.

For many years the plant lay idle and was used only during periods of extreme drought.

Then spray irrigation was demonstrated in North Otago. After one demonstration on our farm we purchased a system made up of three spray lines, with sprays at intervals of 70 feet each way, 18 sprays in all. This covers approximately two acres and delivers one inch on that area in two hours.

The main line of 6-inch steel pipe is 1,300 feet long fitted with two removable 3-inch plugs every three chains. After removing a plug an elbow of 3-inch piping with a Y and two 2-inch taps is screwed in and leads of 2-inch canvas fire hose are then taken out to the spray lines. The pump is then turned on and allowed to go for the time necessary to apply the required amount of water. We like three inches as a general rule. If you put on less, the prevailing winds remove a large proportion of the moisture and the remainder will do little or no good.

We have a fourth line of hose which is laid out in position as No. 4 spray line. No. 1 tap then being turned off, the sprays only are uncoupled and coupled up to No. 4 line. The tap is then turned on and No. 1 hoses shifted to become No. 5 line and so on across the paddock.

The pump is driven by a 25 h.p. tractor and uses 1 ½ gals. per hour to apply ½ inch of water on two acres or a fair exchange of 22,000 gal. of water for 1 ½ gals. of kerosene.

Pressure in the lines ranges from 60 to 70 lb per square inch and, with the type of sprays we are using, could be increased slightly to break up the water into finer spray. Large drops tend to cake the ground if it is not covered with foliage to break the force of water.

We have irrigated grass with three inches and have noticed good results over a prolonged period up to three months.

Lucerne in our opinion should, for best results, be irrigated when a period of warm weather is likely, for on our soil even with an adequate amount of moisture, with cold weather the growth is considerably reduced in comparison with warm weather and probably a slight deficiency of topsoil moisture. With irrigation we have had 90 bales per acre in one cut approximately three times the yield of the unirrigated area.

Mangels have responded well to spraying. An application of five inches at one time was made in late February when cracks ½ inch wide and 10 inches deep to the clay were showing. These yielded 70
tons per acre when the average for the year would probably be 30 to 40 tons. Three acres completely wiped off the entire cost of the spray irrigation scheme which we had bought, plus all expenses and a reasonable profit as well. The first acre returned £300 (48/- for a 6½ chain row of mangels).

One main disadvantage of spray irrigation is the necessity for little or no wind, as a steady wind from one quarter will cause the sprays to give a very poor coverage. We find that dawn till 9 a.m. and 6 p.m. till 11 p.m. are generally the best times for perfect coverage.

Manures of a soluble nature, insecticides, weed killers of the hormone types and small seeds such as lucerne and clovers can be injected into the pipe line for application to irrigated areas.

Any great proportion of canvas hose in a spray system is inadvisable owing to the increased labour involved. When the hose couplings are broken for shifting to a new position all water must be worked out of the hose by raising one end and walking slowly to the other end holding the hose high enough to allow the water to completely empty the hose.

If watering root crops, the leaves after several hours watering become extremely crisp and brittle, and to avoid damage the hoses must be rolled up and carried across to the next position and unrolled again. This is extremely tiring with boots sunk two or three inches deep in the soil, and having to carry the hoses across the rows with as little damage to the crop as possible.

We have not tried cows on the irrigated pasture but feel positive that the January-February drops in production due to dry spells could be completely eliminated and extend the lactation period of the milkers very considerably, a very important thing to a town-milk producer.

I have tried to work out costs but find I can come to many different conclusions. I am placed in a very favourable position, in that I have a dam, a pump, a 1,300 ft. 6-inch main line and an adequate supply of water to pump eight hours daily for all time. All of which cost me nothing as they were assumed worthless until spray irrigation came in.

The sprays, hoses and all fittings cost less than £400, making an interest charge of only £20 per annum at 5 per cent.

Anyone considering spray irrigation could ask the questions—
1. Can I use my land to greater advantage?
2. Can I find the necessary labour?
3. Will my pastures last longer?
4. Will manures be used to greater advantage?
5. Will I be able to buy stock during dry periods at lower prices than I would after rain?
6. Will I be able to hold my existing stock without sacrificing them at low prices because of inadequate food supplied?

I would suggest that if anyone decides to purchase spray irrigation, the best way of costing the scheme is to wipe out the initial cost in your mind, and try to cover as great an area of land as possible, and have as much of that land producing crops returning £100 per acre per annum.

Gentlemen, my subject has been a difficult one and with little or no literature available I have made mistakes, and will probably continue to do so, but of one thing I am certain: “It is most satisfying to
be able to see the things you plant and the stock you rear thriving to the maximum.”

Mr Homersham: You say you put on the equivalent of three inches of rain on each occasion. Have you tried experiments to find the effect of reduced applications? Where you have to pump, every gallon costs something.

Mr Bulleid: I work largely by instinct and my knowledge of the farm. I do it by eye until I get even coverage but I also test the soil by my foot and dig down to find the penetration of the moisture.

Dr. Weston, Lincoln College: Is it any advantage to irrigate at night time to reduce the amount of evaporation?

Mr Bulleid: Evaporation during the day is serious with us mainly because of wind, but as my hoses are liable to break I prefer to have them under observation. I sometimes take a chance and irrigate from nine to eleven p.m.

Mr Hurst: Could you handle 75 acres; if so, how many applications?

Mr Bulleid: It depends on the labour available. As I am situated I can do 75 acres once with three to five inches. As regards costs, I would guess that an acre with one inch would cost 12/6 to 15/-.

Mr Watt, Christchurch: What is the effect on the life of your lucerne?

Mr Bulleid: The only irrigated lucerne I have has been down for four years. It is pedigree strain and is doing particularly well.

Mr Topp: Can you give us an idea of the cost not counting the tractor?

Mr Bulleid:

13000 feet of pipe line @ 18/- a foot ........... £1,170
Dam .............................................................. 750
Pump ............................................................. 160
Hoses, taps and sprays .............................. 400

but many of you would not require a dam.

£2,480
RURAL HOUSING AND FARM LABOUR

FARM LABOUR IN NEW ZEALAND

R. H. Bevin, Executive Officer, N.Z. Meat and Wool Boards’ Economic Service

Much has been said of recent years concerning the labour shortage in our farming industry. In this paper I would like to review the position and summarise some opinions on this question.

Figures taken from the Census Department reports show that the number of people working on our farms increased at a fairly steady rate until the year 1936. After this date a decline set in—a decline which was hastened by the outbreak of World War II. In 1945 some degree of recovery was reached but a decrease became operative at this point till 1950.

**TABLE I**

N.Z. Workers Engaged in Industry.

<table>
<thead>
<tr>
<th>Year</th>
<th>Farming</th>
<th>All Industry Total</th>
<th>% Farming to Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1911</td>
<td>110,000</td>
<td>478,000</td>
<td>23%</td>
</tr>
<tr>
<td>1916*</td>
<td>118,000</td>
<td>474,000</td>
<td>25%</td>
</tr>
<tr>
<td>1921</td>
<td>131,000</td>
<td>549,000</td>
<td>24%</td>
</tr>
<tr>
<td>1926</td>
<td>120,000</td>
<td>588,000</td>
<td>21%</td>
</tr>
<tr>
<td>1936</td>
<td>151,000</td>
<td>673,000</td>
<td>22%</td>
</tr>
<tr>
<td>1945*</td>
<td>119,000</td>
<td>638,000</td>
<td>19%</td>
</tr>
<tr>
<td>1950</td>
<td>126,000</td>
<td>736,000</td>
<td>17%</td>
</tr>
</tbody>
</table>

*Number affected by Armed Forces.

The main alteration in the nature of our farm working population since the turn of the century has been the result of the steady change over from employees to owner workers. The last fifty years has seen the breaking up of the “Stations” and their replacement by smaller holdings, these in turn being further subdivided as development progressed to give the “one man farm”: this progressive subdivision has accelerated following the end of World War II and is still going on.

The rapid development of the dairy industry in the North Island coincidental as it was with the general appreciation of the value of topdressing, gave great impetus to the idea of “each man his own farm” so stocked and regulated that all the essential work could be done by the owner worker. As long as the prospect of ownership was held out by the land settlement trends of the day, young men entered the farming industry determined to save sufficient to enable them to start out on their own account. In the dairying districts share milking offered an ideal starting point for the potential farmer and the steady rise in numbers of farm workers over the 1930’s is a reflection not only of the increasing numbers of owner workers, but also of the increased intake into the industry of young men over that period. It is safe to assume too that this was a time when the em-
ployment position in the urban occupations was bad as a result of
the depression, and labour was moving out to the country.

The experience gained by the dairy farmers in topdressing was
being passed on to the North Island sheep farmers—especially those
on the easier lowlands. The expanding use of superphosphate on the
fat-lamb farms increased the carrying capacity and output to a de-
gree comparable with that experienced on the dairy farms. The area
necessary to run an economic flock of ewes for fat-lamb production
was materially reduced and the move towards subdivision of larger
holdings to one-man units was under way.

Examples of this show in the following returns:

**TABLE II**

<table>
<thead>
<tr>
<th>District</th>
<th>Number of Holdings</th>
<th>Number of Holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Island</td>
<td>51,000</td>
<td>58,400</td>
</tr>
<tr>
<td>Auckland</td>
<td>12,000</td>
<td>16,000</td>
</tr>
<tr>
<td>Hawkes Bay</td>
<td>4,890</td>
<td>5,650</td>
</tr>
</tbody>
</table>

In the South Island this type of development cannot be
matched, there being, according to the statistics, a decrease in
the number of holdings over this period in all districts except
Southland where there was a slight increase.

<table>
<thead>
<tr>
<th>District</th>
<th>Number of Holdings</th>
<th>Number of Holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Island</td>
<td>34,700</td>
<td>31,800</td>
</tr>
<tr>
<td>Canterbury</td>
<td>13,400</td>
<td>12,300</td>
</tr>
<tr>
<td>Otago</td>
<td>8,000</td>
<td>7,100</td>
</tr>
<tr>
<td>Southland</td>
<td>5,900</td>
<td>6,020</td>
</tr>
</tbody>
</table>

Keeping pace with agricultural development and our growing
population, there has been a steady expansion of our industrial and
urban activity. This has been accelerated over the last 15-20 years,
and with the industrial growth has gone the provision of greater op-
opportunities for urban employment. Despite this, however, the propor-
tion of rural workers—including owner workers—to the total working
population had till 1920 shown no marked fluctuation. Figures of
population in 1906 show that approximately 25% of workers
were on the land. This figure decreased at a fairly slow rate until during
the war when it fell to its present level of approximately 17%. To
restore the 25% balance would call for a further 60,000 rural workers
in addition to the present 126,000 (approximately). It is perhaps
worth while to consider whether there will ever be a restoration of
this balance.

It must be recognised that with modern methods of farming the
number of workers required to maintain our production is consid-
erably less than it would have been say 30 years ago. No estimations
have been made for New Zealand but in Queensland recently an
attempt at “reconciliation” of labour in terms of output was made.
The result showed that “if Queensland’s current production depended
on methods used 30 years ago, 67,000 more rural workers would be
required than are now employed in the State.”

Again we must appreciate that while mechanisation may result
in fewer farm workers being immediately engaged on the land there
is now a considerably greater labour force devoted to the production
and servicing of farm machinery in factories and workshops almost
wholly devoted to the rural industry.

Nevertheless we have evidence based on general observation that
there are opportunities for the employment of more rural labour in New Zealand and because of this it may be worth our while to consider some of the factors which operate in determining the rural urban labour balance.

It was becoming apparent even before 1939 that the maintenance of the number of our farm employees was becoming difficult. Prices of farm produce were low and the wage-paying ability of the average farmer was correspondingly at a disadvantage compared with that of the urban employer who could pass on his costs to some degree while the farmer depended entirely on the overseas trade position. In the late 30's the price of wool was showing a slow recovery from the depression years, but we were in a state of uncertainty as to the future of our meat market.

One authority gives the comparative wage returns in 1937 as £298 per annum for urban workers against £146 for rural workers. Such a disparity in a country like New Zealand where free movement of workers from one locality to another is a fairly easy matter, could not but weigh heavily against the farmer employer.

During the war years the position was no better. The prices of wool and meat were determined by regulation in the interests of stabilisation, and while, theoretically, rates did not increase for urban workers, there was a considerable rise in the amounts earned, as the urgency of war resulted in overtime and incentive payments. Up till 1947 when the rise in wool prices began, the sheep farmer could not compete on the labour market.

**TABLE III**

**COMPARATIVE MONEY RATES OF PAY PER WEEK FOR VARIOUS WORKERS**

(Report on Prices, Wages and Labour—Census and Stats. publication 1950)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>1914</th>
<th>1939</th>
<th>1949</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bakers</td>
<td>55/-</td>
<td>115/-</td>
<td>148/-</td>
</tr>
<tr>
<td>Butchers</td>
<td>72/6</td>
<td>123/2</td>
<td>165/-</td>
</tr>
<tr>
<td>Bricklayers</td>
<td>68/5</td>
<td>115/-</td>
<td>148/4</td>
</tr>
<tr>
<td>Carpenters</td>
<td>52/6</td>
<td>93/4</td>
<td>140/10</td>
</tr>
<tr>
<td>General farm hands (found)</td>
<td>41/4</td>
<td>65/-</td>
<td>130/-</td>
</tr>
</tbody>
</table>

Since 1949 the figures indicate that something approaching parity has been reached as a result of higher returns for our farm produce—particularly for wool.

There has developed the tendency of farmers as a whole to "make do" with the labour available by the application of the following expedients:—

1. Co-operation with neighbours for seasonal work.
2. Simplification of management by reduction of the number of operations undertaken and the labour required for efficient working.
3. The calling in of contractors as required.
4. Mechanisation wherever possible.
5. The restriction of expansion or development beyond the range of the present labour force.
6. The payment of a premium on standard award rates as far as the revenue will allow in order to retain whatever labour is available.
The decline in number of our farm workers is not a simple matter of economics—particularly over the last few years when farm returns have been relatively high, and wages have increased generally. Recruitment to the industry and the retention of labour in subsequent years was the subject of study some two or three years ago and on this matter the Labour and Employment Gazette makes a special comment (February, 1951). "The peak age of employment in farming lies between 20 and 24 years of age as in the case of the total labour force. The proportions employed at each age fall away sharply after the peak is reached with the result that throughout the "middle" ages the proportions employed are significantly below the average. This characteristic of farm employment is associated with the urban drift of farm workers, accentuated by increased mechanisation on farms and the localisation and development of secondary industries in urban areas. Those who do not join the drift to the towns but remain on the land tend to keep working to an older age than do men employed in other industries."

**TABLE IV**

Table Showing "Rural/Urban" Balance in Population

<table>
<thead>
<tr>
<th>Year</th>
<th>Rural</th>
<th>%age</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excluding Maoris:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1881</td>
<td>60</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>1891</td>
<td>56</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>1901</td>
<td>54</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>1911</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>1921</td>
<td>44</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>1936</td>
<td>40</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>1945</td>
<td>37</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>Including Maoris:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1926</td>
<td>44</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>1936</td>
<td>44</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>1945</td>
<td>40</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

This movement in population from rural to urban areas is not new. Colin Clark in his "Conditions of Economic Progress" quotes Sir William Petty who wrote in 1651: "There is much more to be gained by manufacture than husbandry and by merchandise than by manufacture. . . . Now here we take notice that as trades and Curious Crafts increase so the trade of Husbandry will decrease, or else the wages of the Husbandman must rise and consequently the Rents of Lands must fall."

Without doubt the "Trades and Curious Crafts" have steadily increased in New Zealand. Initially this increase in industry was matched by our agricultural and pastoral expansions but latterly the emphasis has been on urban expansion and the attractions and apparent opportunities offered thereby have reacted adversely on an agriculture which until recent years was not financially able or psychologically prepared to compete for labour.

It may be agreed that farming has received its share of recruits to the ranks but once the young men in their middle twenties begin to consider marriage and home responsibilities, a great number turn from the land to urban occupation. And, equally important, in most cases they evidently have the approval and connivance of their brides in this change over of occupation.

In many ways this seems to indicate the most vital point at
which to attack the problem of labour retention. At a recent meeting in Melbourne, Mr P. B. Newcomen, a former President of the United Graziers' Association, spoke on this question of farm labour. He said—and his summary is a fair and comprehensive one—“Inability under ordinary circumstances to attract labour to land industries is due to—

a. Better amenities offering in cities and provincial towns.

b. Attractiveness of employment in city-based industries.

c. Post-war establishment of factories in country towns with consequent competition for local labour.

d. Lack of availability of educational facilities conveniently adjacent for children of farm workers.

e. Lack of housing for farm employees.

f. Inability of the farmer’s wife to carry the burden of provision ing extra hands and at the same time educate her children by correspondence school courses.

g. The loneliness.

To quote again—this time from a writer reviewing the labour situation in Australia in “The Economist.” “The magnet-like attraction of life in the big cities will be readily understood especially when it is compared with the heroic work of the stations in the “outback”—in isolation, far from movies and race tracks and beaches, in peril from natural hazards, tied to the milk pail or the feed pen among animals which disregard all human preferences for an eight-hour day or a five-day week. A majority of workers plumped whole heartedly for the policy of full industrial employment in the cities.”

Is there any counter we can offer in melioration of these conditions of country life?

It is a certainty that where individuals prefer the bricks and mortar and concrete pavements of the city to the open spaces of the country, they are not suited to the rural life, and are well advised to stay in town. But there are still a great many young people who are not so wedded to town life and who would prefer to live their lives and rear their families in the freer and more healthy surroundings of the country. The early recruitment to the farming ranks shows that initially at any rate, young men are available and the main job is to enable them to become established in homes measuring up in quality to what they might hope to find in the city. In New Zealand we can (physically at least) build suitable homes and equip them with all the modern conveniences of the day. Our educational authorities are doing a great deal by transporting children to centrally-placed schools and by assisting materially in the correspondence system. Our country is small and with modern road and rail transport the degree of isolation over most of the country is inconsiderable when measured by the continental standards of Australia or America, while telephone communications and electrical reticulation cover practically the whole country.

On the material side wages and housing are of prime importance. We are facing up to the payment of wages above the standards which for so long seemed adequate. This is being done today by a great number of farmers, but there are still many who cannot reconcile present wage rates with those of past years. And it is not easy to do so, as it doesn’t seem so long ago that men were readily available and “a fair day’s pay for a fair day’s work” was paid in terms of farm work as such and not in terms of the competitive standards set by city employers.

Today the competitive margin has narrowed compared with what it was only a few years ago. The cost of living in the towns has risen steadily and the amount left of what seems a bulky pay envelope at
the end of the week is probably no greater proportionately than it was in pre-war days. Many are beginning to realise that the cost of food and clothing—considerable items in the family budget—can be much lower in a well-managed country household than they are in town, while rent and fuel may be very considerably less.

Housing presents a real problem—one which cannot be solved readily. Not only is it difficult to get houses built in the country, but the costs under present labour conditions are such that the average farmer hesitates to take the plunge into further loading the property with such a costly improvement. But without a house for the young man and his bride, the only alternative is to lose them to the town and start again with a new employee.

At this stage many farmers have given up the unequal struggle and gone in for subdivision, retaining the “homestead” block which they can work comfortably without reliance on outside labour. Where more than one man is required, the policy is often to set up one married couple and pay the wife to cook for the man or men who live in the whare, if she is prepared to do so. A few cases have occurred of having houses erected in a nearby village and employing the men by the day—this will be a subject for special attention during our conference.

In the last few years extra houses have been built or old houses renovated despite the expense involved, in the hope that the higher prices of farm produce may continue long enough for the cost to be amortised in reasonable time.

We might at this point revert to Sir William Petty’s penetrating comment “The wages of the husbandman must rise and consequently the rents of land must fall”—in other words the burden of the overhead is shifted from rent to wages and “amenities.” In New Zealand rental on the majority of our farms is rarely a charge—it is replaced by interest on capital invested. Our land values or perhaps more correctly the purchase price of farms, speaking generally and disregarding the depression years and the period of land price stabilisation, have been and still are fairly high because of the emphasis on “potential” and, hitherto, low costs of production. There has often been insufficient margin between the highly improved properties and those in “good going order.” As a result, farmers as a rule have been loath to apparently over-improve their properties—even specially in regard to buildings. This, together with the traditional tendency to employ single men and/or casual labour—neither of which is readily available today—finds us with high-priced land ill-equipped to provide housing facilities for married employees and so capitalised as to deter one from loading it further by buildings.

It is evident then that on properties where the employment of labour is a necessity, the value of the land as land must in time fall in order to compensate for the increase in value of the improvements—especially buildings—essential for the efficient running of the property. And further the opinion as to what are the minimum essential buildings will need to be revised by land valuers and purchasers alike. Essentially the value of a farm, as a farm, must depend on its economic productive capacity which the provision of further buildings may raise while the lack of housing facilities (where it limits the employment of adequate labour) may result in a lowering of the production.

In our sheep farming, subdivision has to a certain extent enabled us to meet the labour shortage: refinements in pasture management aimed at increasing the amount of in situ grazing and thereby reducing the areas sown to forage or saved for hay: the alteration of the flock balance, by decreasing the ewes and increasing the dry sheep: or the cessation of development once the flock has reached the maxi-
mum manageable size—these measures have been adopted in an attempt to meet the labour position. But there is a "hard core" of properties—mainly on our hill country—where the economic stocking of the property in terms of sheep and cattle demands a staff of farm hands. For years many of these properties, depending on wool and store stock for their revenue, showed but a moderate surplus in their annual trading accounts and for them the provision of staff amenities has been, to say the least, difficult. In the last few years buildings have been overhauled, thanks to higher prices allowing for a limited surplus to remain after working costs and taxation demands are met. But it is neither cheap nor easy and if production of this country is to be maintained, or better still increased, then every encouragement should be given to the occupiers in their struggle to attract and hold competent farm labour by, for example, allowing adequately for buildings, even if this means lowering the unimproved value of the land and a reduction of the annual rental.

It has already been mentioned that local industries set up in country towns can adversely affect the farm-labour position. Of late years there has been a great deal said as to the desirability of shifting industry from the city centres to the country. Experience to date seems to indicate that while such a move is in many ways to be commended insofar as it brings many benefits to the town or village in which the industry is centred, there is real menace in it for the surrounding farmers if it depletes the labour supply. Two main lines of approach should be considered. One is the transfer of at least a proportion of the operatives to the new factory site so as to ease the impact on the local labour position; the other is to consider the balancing of the labour demands on both farms and factories—the type of arrangement encountered in some European countries where the relative needs of both industries are appreciated on a seasonal basis.

The provision of farm workers' homes in villages contiguous to farm lands has yet to be exploited. Originally some of our earlier subdivisions were planned on the basis of the village centre for workers but difficulties arose through the problem of distance which ruled out the idea under colonial conditions. Subsequent subdivision and modern transport facilities make the scheme much more practicable now, and where it can be developed, a measure of co-operation between farmers in the alternation of employment on an agreed basis can go a long way to solve the casual worker problem on so many farms where the full time employment of labour is economically unjustified. As I have said, the detailed consideration of what is being done at Sanson, Gordontown and other rural centres is listed for special discussion.

In the sheep industry as viewed under our survey, taking owners and employees together when determining the permanent hands on any property, it would appear that on hill-country properties producing wool and store sheep there is an acute shortage of casual labour, and difficulty in getting good permanent labour.

Here, perhaps more than anything else, we have to contend with the distance factor. In many cases it is not only a question of mileage: it also includes indifferent and difficult road access into hill country where isolation is experienced because of the terrain. By Australian standards, our distances from a reasonably sized town are not comparable with the real outback of that country. Nevertheless by local standards, back country localities suffer severely in the competition for labour. The only counter to this is better roads and motor transport and the possibility that the property should be prepared to provide or assist in providing reasonable facilities to employees for their coming and going. This should be recognised as a charge against station expenditure, resulting from the changing times in which we
are living. To many land holders the idea is new and as such is not readily conceded but there are others today who have accepted it and have found that the concession has encouraged the retention of labour.

Another problem posed by the distance factor is that of providing schooling for the children of farm employees. So many cases can be cited of married men who have become experienced and valuable members of the station staff but who, when their children reach school age, have to pack up and go down country. There is in general only one policy adopted in this case: the circumstances are accepted, the experienced man is lost and a new man replaces him. On much of our hill country it may take a man three or four seasons before he is familiar with the vagaries of the terrain and the climate, and so a period of training must be faced up to when the man, through no fault of his own, is not pulling his weight. If such a case is to arise every 8-10 years as married men fall out, then on a property with 3 or 4 permanent hands, there is a state of continual change in the personnel.

It may be that this can be taken as being "in the nature of things"—something to be put up with. On the other hand if a really good man is to be lost—or a series of good men as may happen—just when he is really valuable to the property, it is surely worth while considering some alternative policy.

Education:

There are facilities today whereby insurance taken out when children are still infants can in due course provide for their education. The suggestion has been made that the amount paid in premiums could be a charge against station expenses and the payment of the sum realised on the expiration of the policies be devoted to the education of the station children without placing an impossible load on the farm worker and his wife. Whether there should be some contribution from Government towards the expense is a matter which policy in relation to universal free education would need to decide. In this regard it must be realised that the number of children involved would not be great in proportion to our total school population. For this reason it is probable that any scheme for the furtherance of their education will not loom large in terms of political significance. Nevertheless, in terms of the area of country affected and the vital importance of our hill country to the whole of our sheep industry and the lowland farming generally, any step which will enable us to continue the efficient occupation of the country is of national importance.

The Royal Commission on sheep farming made certain recommendations concerning rural education which merit careful consideration—especially the section dealing with boarding-house costs. Attention however does not seem to have been sufficiently directed towards the position of the employee's families as distinct from the owner's children.

Housing Facilities.

In touching on this matter earlier, it was emphasised that New Zealand farms have always tended to be "underbuilt"—mainly because in the days when the pattern of our present-day farming was being drawn, there was a good supply of farm labour both permanent and temporary and the general standard of accommodation was strictly functional. It is not easy to drop traditional ideas in any industry and in farming, conservatism is one of the important components in a stable system. But the time has come when we must regard the "good old days" as gone and a modification in the accommodation
for farm workers is one of the changes which must eventually be faced up to.

It is unfortunate that this need arises at a time of high costs and shortage of labour—especially for country jobs. In spite of this, farmers throughout the back country have been battling to carry out improvements, and it would appear that here, more than anywhere else, is the case for prefabricated houses. They are not cheap, but they are houses and they can be erected in a fraction of the time taken for normal building.

The matter is essentially one of deciding whether or not a property can be efficiently run without further accommodation or of determining whether it is cheaper to make do with the position as it is and avoid the expense of further building on the property. Any decision must in the end depend on the financial position of the owner, his determination of what the future holds in the way of market prices, and the possibility of carrying on with whatever labour may be available as and when required.

Our low country properties have been subject to subdivision and creation of one and two man farms wherever possible. This has tended to reduce the demand for labour—particularly permanent labour.

**TABLE V**

Size and Number of Sheep Holdings 1920-1950

<table>
<thead>
<tr>
<th>Class of Holdings (Sheep Carried)</th>
<th>Number of Holdings 1920</th>
<th>Number of Holdings 1950</th>
</tr>
</thead>
<tbody>
<tr>
<td>500—2,500 sheep</td>
<td>15,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Over 2,500 sheep</td>
<td>2,014</td>
<td>2,531</td>
</tr>
<tr>
<td>500—1,000 sheep</td>
<td></td>
<td>Increased by approx. 4,000 in 30 years</td>
</tr>
<tr>
<td>1,000—2,500 sheep</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>2,500—5,000 sheep</td>
<td>&quot;</td>
<td>&quot;</td>
</tr>
<tr>
<td>Over 5,000 sheep</td>
<td></td>
<td>Decreased &quot;</td>
</tr>
</tbody>
</table>

From observations made, it appears that today one man with casual labour or assistance from neighbours can handle efficiently up to 1,000 ewes. It is the property carrying 1,000-1,500 ewes which presents difficulty—the "man-and-a-half" farm where years ago casual assistance for three or four months of the year was available as required. Today the shortage and uncertainty of such labour is tending to limit development on many of our sheep farms since the cost of additional accommodation and the outlay in extra wages cannot be immediately met by the increase in revenue. Mechanisation and the employment of contract labour, as for haymaking, harvesting and some or all of the cultivation, is an expedient which may and often does bridge the gap until increased stock numbers, or increased revenue from arable farming steps up the annual return sufficiently for the employment of an extra man to be justified on economic grounds.

As has been mentioned earlier, it is with farms of this type that the introduction of a farm labour scheme with housing provided in the nearest township offers the greatest scope and a careful study of its possibilities should be made in most districts where subdivision and land development are taking place.

**Farm Ownership and Recruitment to the Farm Labour Force.**

The main objective of many young men entering the farming industry was the ultimate ownership of a farm. As development proceeded, the opportunity for such ownership was a feature of our
land settlement, but in recent years as the availability of new land diminished, so the possibilities of individual farm ownership decreased. Today there has been apparent the growing conviction that for a young man to set out to buy a farm, the possibilities are limited. But they are not absent by any means as the settlement of returned servicemen over the last ten years has demonstrated. There are still areas in New Zealand where with improved agricultural knowledge and techniques, development and settlement are possible. The present methods of such development are regarded as costly and so it is considered advisable that the State should undertake the work. To establish settlers on a sound economic footing some “write off” of the initial expenses may be necessary—this charge to be borne by the country as a whole.

It should be possible to provide for young men with the necessary farming experience and limited finance, land that has been brought in, on much the same basis as that adopted for our rural rehabilitation scheme. The degree of development which is done before the “take over” and equally, the amount of work which the owner can from that point do to bring the property to full production are matters meritng careful consideration. But until we can see no further land development in sight in New Zealand—and I venture the opinion that that day is some distance away—we should be thinking constructively of this question of making farms available for an oncoming generation of young farmers.

There is, too, the expressed opinion that a great many rural workers can be comparatively well off as employees. There should be just as good opportunities for them to lead a useful and worthwhile life as if they were employed in the cities where there is even less opportunity of ever owning a factory or whatever may be the employing organisation to which they are attached. There is however one marked difference between rural and urban employment. The former is on a much more personal basis than the latter and for satisfactory conditions of work there is a need for each party—employer and employee—to be able to get on with the other in the circumstances associated with the average farm set-up.

That this is so is clearly illustrated by the everyday acquaintance we all have with some properties where men stay for years and others where labour turn-over is a constant headache. As I see it there is little one can do about this condition—some men are good employers, some are not—some men are good employees and some are not. It becomes a question of personal relationships where eventually everyone must work out his own salvation.

Finally—if I can attempt to sum up this rather rambling discourse—there is ample evidence that the farmer today is concerned about the future of the labour position. The attitude to it depends on individual circumstances and ranges from one of academic interest on the part of the man who is fortunate enough to be running a nicely-balanced, one-man farm, to one of near despair—at certain times—on the part of the man who owns a property well back and difficult of access where good experienced musterers are needed and where time is of the essence if the work is to be completed from the first spring muster until winter sets in.

It is apparent that the problem of labour shortage is not one capable of simple solution. There comes a point where mechanisation and other substitutes for labour cannot entirely fill the bill for farm maintenance, improvement, development and full production. If we are determined to see our production reach its maximum then we must as a primary-producing country, see that the farmers are in a position where they can provide wages, housing, educational facilities and other amenities for their employees, such that they can
compete on the labour market with the urban industries. It may be that the downward trend in the number of rural workers has been checked or is in process of being checked, by the improved conditions offering on farms in recent years. If this is not the case we must sooner or later be faced with a situation where the farms other than those of the one-man type will become increasingly difficult to manage and their production will be geared not to their capacity, but to those limits which available labour will allow—a state of affairs which could only be regarded with concern in this young developing country where our wealth in the future as in the past lies in the productivity of our farmlands.

THE NEEDS OF MY DISTRICT AND A PLAN TO SATISFY THEM

T. E. Rowlands, Ohoka.

Situated in North Canterbury between the Waimakariri and Ashley Rivers at the lower end of the Eyre County, ranging from 20 ft. above sea level up to 160 ft. at the Ohoka end, this area of heavy land and reclaimed swamps is mainly devoted to dairying. As a focal point for much of the surface drainage and subterranean water pressure from the higher plains country, farm drainage plays a vital part in the farming practices of the district, and many areas are kept in production only through continued efforts to maintain these drains.

The existence of freezing works in close proximity to this area has been an added complication to the peculiar problems of our district, and my first reactions to the subject of this paper were brief and to the point,

1. The needs of my district—
   To be left in peace—DO NOT DISTURB.

2. A plan to satisfy them—
   See above—same as No. 1.

This gloomy attitude expresses what I have often felt about our farming activities in this district after nearly 20 years association with this section of the farming community.

However, the theme of this Conference is "Increased production," so something of a more constructive nature is indicated, and I must add to this theme that topical question of today "The Third Million."

My district covering Ohoka, Ohapuku and Clarkville has been settled since the early days. Hand labour was used to dig a large main drain to the north branch of the Waimakariri River, the district was covered with a network of subsidiary channels, and farmers laid down board and tile drains to tap the subterranean springs.

Prior to 1902 two large creameries had been built in the area to handle the milk for separation, a Dairy Farmers' Association was formed in 1919 to enable farmers to test their herds and some of the first milking machines were installed in the district.

This is what we in Britain associated with colonial development, and I arrived here in 1927 to find dairying very much of a "going concern." 2,500 cows were milked in the area and there was an adequate and satisfactory source of casual labour for harvesting, drainage and maintenance work. This casual labour, incidentally, saved the farmers a real headache, for these men had seasonal jobs
to go to when they were not wanted, the threshing mill, shearing and timber felling. I started on my own in 1931, and looking back over those years I sometimes wonder if increased production is really applicable to the district.

I make no apology for referring repeatedly to my first 25 years in New Zealand. Arriving here quite new to farming, I was impressed with many aspects of farming activities and organisation, and have been fortunate to witness the tremendous strides in farming technique and pasture improvement since that date. Home separation and the expansion of the pig industry suggested a rapid expansion and consolidation in the area I had settled in; this has not happened, and I shall try to analyse the reasons for this, and my suggestions for a plan for the future.

I may appear to be critical, that is my intention. As a young man I came out to New Zealand to learn to be a farmer; I haven't learned all about it yet, and I must confess disappointment that despite all the results of modern agricultural research, there has been so little advance in my area.

I am convinced that the key to the full development of this district is an organised (and I must emphasise organised) system of farm labour and adequate rural housing. If we are going to play our part in the increased production that will be so essential to our national economy, we must do a lot better than in the last 25 years.

At present the dairy cow population is practically the same at 2,500. The excellent work of the Rehabilitation Department in settling returned servicemen on dairy farms and also making new dairy units on land compulsorily acquired has brought in new production that has probably assisted to make up for the 12 dairy farms that have gone out of cows during the last 25 years.

Many farms have reduced their herds, using sheep or cropping to balance their inclinations and reduced labour commitments, all on land that is essentially dairying country already within the reach of the Christchurch Milk Company, land that will surely be needed for future milk supplies.

There are now 37 dairy farms on factory supply for butterfat, while 15 are on liquid milk supply for Christchurch. There were only two on milk supply when I came out, and this is an inevitable change for the future.

There are also approximately 12 small herds of 1 to 10 cows while one enterprising farmer is trying to establish a dairy farm on light country using the latest forage harvesting equipment to handle his lucerne. His lone efforts will be watched with interest.

Of the 52 dairy farms, 46 can be classed as "one man farms;" few of them could employ an additional permanent hand or erect a worker's cottage; most could profitably employ casual labour on a group employment scheme, if the general standard of farm maintenance is any criterion.

I have treated my subject in general terms and my plan is as vague as the needs of the district. Being somewhat of an optimist I am looking to a future for our area when it becomes one of the main milk suppliers for Christchurch.

Essentials for efficient city milk supply are adequate labour, housing for workers and housing for our cattle. A plan to achieve these ends must remove the present disabilities. Such a plan involves a new approach by the Town Planning Authorities, the State Advances Corporation and our Federated Farmers to place rural housing on a more equitable basis. It must also include on the farmer's part a willingness to face the fact that our land must be farmed more
efficiently with encouragement and support for youth settlement schemes and it must include a rating system that will not operate unfairly against our small farm units and their necessary increased farm improvements and facilities. Let me hasten to add, in this connection, that there are many excellent dairy farms in our area. I often look over my farm with the hope that some day I may reach their standard.

I hope that I am am not painting too gloomy a picture. I know full well the disabilities of shortages and rising costs, the difficulties of uncertain and often unsatisfactory labour, but I am convinced that, while economic conditions have played a big part, the farmer himself must take his full share of the blame for the present position, while so many of the young people drift away from the land.

It has always amazed me to hear farmers decrying their occupation, emphasising the longer hours they work and other disadvantages, and as if that isn't enough to discourage any young man from taking up farming, we have the all too frequent emphasis on the work thrown on to the long suffering farmer's wife in feeding and looking after the "hired hand." I was one of these hired hands myself for the first five years, and I was treated as one of the family at each of the farms on which I worked. I know full well that farming is perhaps the only industry that has to house and feed its permanent employees, but I refuse to believe that the women on the farm today are less capable than their mothers or grandmothers, who managed, and managed well, without all the modern labour-saving devices found in most farm homes today.

Our area has slowly deteriorated from the days when threshing mills could move over land now wet and some of it carrying rushes. Drainage today is our main essential. The modern trend toward one-man units and the loss of the casual labour force have both over the years had a serious effect on farm maintenance in what is a very difficult area to maintain, but I must remind you that lack of labour is the farmer's first excuse for not doing things, and the rural community has been at fault in expecting labour to be on hand just when wanted.

Our local branch of Federated Farmers tackled this job some years ago and by February 1950 we had sent forward an estimate of 12 houses to be erected at the centre of the area in Ohoka, as a State Housing Settlement. Our progressive Eyre County Council offered to assist by taking six houses, while we anticipated that the district could absorb six men on a Group Employment Scheme to be organised through our Branch. I am sorry to say the scheme failed for two reasons, firstly—the ten year guarantee of rent insisted on by the Department, secondly—the failure of the farmers to back up a scheme for organised casual labour.

The County Council has now completed its own housing project with three houses at Ohoka, and is tackling our major problem with a comprehensive drainage scheme for the whole area.

This picture of my district will, I hope, help to explain my first gloomy reaction to this project. It is to the future that I look and knowing the potentialities of the area I am going to anticipate our needs in the years to come.

Now just what are going to be the needs of our district?

If we are going to play our part in the increased production so essential to the future economy of New Zealand, there must be
full utilization of the land available, given adequate drainage and pasture improvement. I am convinced that our area could go a very long way towards Dr Bruce Levy's estimated "doubling of production" in ten years. I refer of course to dairy production which is the logical product for this district.

Those needs are few:—
1. A new (for us) policy of production per acre to replace the policy of production per labour unit.
2. A new approach to the rural housing problem.
3. A revised system of county rating.

1. Production per acre. During this 25 year period when dairy cattle in Canterbury have fallen from 73,000 to 66,000, our district has maintained its numbers of dairy cows. Credit must also be given to the farmers of the district for their production per man. Many of them are already up to the limit for one unit, but that is obviously not good enough for what we must face up to in the near future. Improved drainage will make possible the best use of the pastures, increased production will follow the extended use of lime and fertiliser, but there is something more; the farmer must be prepared to extend himself. A comfortable living on what he can do on his own is no philosophy for a future where our primary production may only just feed our increased population. And our area must surely develop as one of the milk suppliers to the city.

2. A new approach to the rural housing problem. There is an urgent job ahead of the town planning authorities in preparation for the third million. The wasteful ribbon extension of urban building along areas of good farm land should cease, and the unfair discrimination against rural housing abolished. There seems to me to be no justification for the insistence on a rental guarantee for houses erected in rural areas as these houses would have a community value if built near an existing settlement as at Ohoka. When one views the massed settlements near some other cities throughout New Zealand, it is evident that more rural settlements would be a worthwhile asset. Our main cities have now outgrown their locations, they already have their problems of crowded streets, overloaded drainage and sewerage systems, and the problem of finding room to build the necessary schools and other public facilities. The third million is expected in about 20 years time; the farming community is being told by the papers, the radio, and I expect by television when it arrives, just what it is expected to do about it. Now is the time for the authorities concerned to meet the challenge and take the bold step of designing new residential areas where they will be of most use in the foreseeable future; also let them assist the drive for essential increases in primary production by removing those unfair obstacles that have choked the many proposed rural housing projects.

I have every sympathy with the farmers of our district over the attitude of the housing authorities—I have no sympathy with them over their failure to support a group labour scheme.

3. A revised system of rating in our County. The present system of rating on capital value acts as a real deterrent in our district to any individual efforts in buildings and static farm improvements. Many counties in New Zealand are already rated on an unimproved value, and I am sure that such a change here would remove a serious obstacle to expansion. Some of our farms are now
carrying a buildings and improvements valuation well in excess of the land supporting them.

I have listed those matters as the main needs of our district. I have not dealt with the questions of high costs, as I do not believe they enter into this discussion. The problem has been one I have seen developing during my time in the district, a period during which butterfat has varied from 1/- per lb. down to 7d. and slowly risen to its present level.

There has been no concerted effort by our farmers over the years to meet the challenge of these changing conditions, and I have recollections of the unfavourable replies from many farmers when enlisting support for our Council's drainage scheme.

Of course we are individuals, so also are many other sections of the business world. I only wish we could take a lesson from say the small grocers who have their combined buying organisation.

A plan to satisfy those needs. I am assuming a future for our area of improved drainage; this is assured as far as the main channels are concerned.

I must also assume that our farmers are convinced of the necessity of increased production.

Let me quote here the words of Dr K. B. Cumberland: "Unless production increases as fast as population, and it's not doing that, we'll soon have no exports. No exports—no imports; what are the prospects?"

The necessary labour must come from two sources:

1. An organised casual labour force housed in a central housing settlement.

2. The young men, both town and country, who are the best reinforcements we can get. To attract these boys, farming as a career must be made more attractive. Wages alone are not everything to the boy who is interested in the land; I know—I was one of them myself for nearly five years, and I think our biggest need today is to make it possible for all these young men who prove themselves, to have a reasonable chance of starting on a farm of their own. The large number of members in the local Young Farmers' Clubs, boys who are being admirably trained and led, will soon be able to take their share in our national production. I only hope they can be retained. Most of these are country boys.

There is the very commendable work of the Canterbury Youth Farm Advisory Council to be mentioned here, for some of their boys are working close to our area. This is a scheme for boys with a good educational training. They are given a year's training at Rangiora High School in farm subjects before going on to approved farmers for three years' training. It is hoped to have some scheme of civilian land settlement in operation in the future, for suitable boys who meet the requirements.

There are three flourishing dairy farms here on a block of land compulsorily acquired for soldier settlement; there may be other areas available if the need arose, and not many miles away on the lighter land of the County, there are large areas with a future if irrigation develops as it should.

Our future casual labour force can only be housed in a State
Housing Settlement, and it is hoped that there may be some relaxation of the previous unfair "anti-rural" conditions imposed by the State.

With the inevitable increase in demand for liquid milk from adjacent areas, I expect this district to change over from butterfat to milk supply, and that will mean provision of additional labour for continuous production. In addition the penalising effects of our rating system will need modifying to encourage the erection of the necessary buildings. Rating on the unimproved values will provide some incentive.

Our County has had finance available for many years for rural housing in the County, a facility used by only three farmers; and they were not dairy farmers.

Now, my discussion reminds me of the story of the old woman who went to market to buy a pig. Buying was the easiest part; before the pig would cross the bridge so many other people had to do this and that. And the problem here seems to be somewhat similar. Now that there is a prospect of efficient drainage it is up to us.

Let me summarise:

We have had a real problem here in a district formerly maintained with adequate labour. Many farmers have re-organised on a basis of minimum labour, while in general, farm maintenance standards have deteriorated. Many dairy farms have gone out of production, a few new ones developed.

Most of the dairy farmers have increased their herd yields by testing and management, but despite the large numbers of tractors on these farms, the numbers of dairy cows is practically the same as in 1927 when I came to the district.

To play our part in the essential increase in production what is needed? A realisation that we must farm more efficiently the land we have. To do this involves efficiency of management, of labour and of mechanisation. Assuming that the farmers adopt a policy of production per acre, then it is the duty of our Farmers' organisation to organise a labour force on the lines suggested above.

The enthusiastic co-operation of the farmers themselves is essential for the success of such a scheme. So also is the cooperation of the State Advances Corporation and the Town Planning Authorities—with a new and more sympathetic approach to our problems, an approach that can appreciate and visualise primary production far ahead of present-day standards.

Efficiency of mechanisation in this modern age is relatively simple.

Efficiency of labour and management rest with the farmer. As stressed previously I am looking forward, forward to a future where we can reach those production standards so vital to our economy.

With the welcome assistance of the rising generation of young farmers, and the removal of the present disabilities, I am confident that our district can expand its production.

In conclusion I shall quote Dr Cumberland again:

"No exports, no imports—what are the prospects—what do you think? Where's that new car, those new dress materials, that bottle of whisky, that new dinner service—where are they to come from if we've not got butter, cheese and meat surplus to our needs?"

We can do it, and my district is fully capable of meeting those needs and more.
A SURVEY OF FARM LABOUR IN SPRINGS COUNTY

B. G. Broadhead, Lincoln College.

This paper gives an account of a survey of farm labour and
domestic help carried out in Springs County during the summer of
1952-53. The purpose of the survey was to discover the extent and
severity of the labour problem in the county and, if possible, to
discover if there were any ways of lessening it. Springs County
was chosen for the study because it was readily accessible from
Lincoln College and also because of the remarkable diversity of
farms occurring in it. The results obtained from the survey, al­
though only strictly applicable to Springs County itself, should give
some idea of the situation on similar types of farms situated in other
parts of the country.

The method employed was to interview each farmer residing on
a holding of 30 acres or over and to obtain from him answers to a
set of questions concerning the labour situation on his farm. Since
90 per cent of the farmers in the County were interviewed in this
manner, the facts and opinions collected were representative of the
whole county. Some of the most interesting information gathered
during the course of the survey was gleaned from discussions with
farmers. Such material threw light on situations for which figures
alone offered no explanation.

For the purposes of this survey farms were classified as dairy
farms, sheep farms or mixed farms, according to the main line of
production pursued. On this basis nearly half the farms surveyed
were dairy farms, one third were sheep farms, and the remainder
mixed farms. Cash cropping was carried out on more than half
the holdings, although in many cases cropping amounted to only a
few acres of wheat or potatoes. Size of farm varied from about 2000
acres down to 30 acres, with an average of 170 acres.

The farmers interviewed were asked, amongst other questions,
how their farm work and domestic work was done at the present
time. I will deal with this question first.

The instances where a farmer ran his farm alone were few. Only
three men stated this to be the case and they were on small dairy farms.

Part-time family help was more widely utilised on dairy farms
than on other types, and in most cases took the form of wife or
children helping with the milking. Several dairy farmers said they
would be unable to carry on without this assistance and attributed
their present position to the help and encouragement they had re­
ceived from their wives. Assistance from children was less common
and it appeared that, in general, it was not demanded. In some
cases, on the other hand, the children's day was worked out to a
strict routine in which the hours not spent at school were given over
to assisting on the farm or in the house. In almost all cases this
occurred on farms where dairying was a line of production. Many
of these dairy farms were small and capable of keeping only one man
fully occupied. However the burden of milking cows all the year
round was relieved by utilising family assistance in the shed. There
were several cases in which the husband and wife shared the work
on the farm while the children went off to town to work. Some
disappointment over this was expressed but in most cases the
children were not blamed for striking out on their own. The opinion
was fairly generally held that work in town was more desirable than
country work, providing better pay, fixed hours of work and greater
opportunities for amusement and companionship.

Contract services were widely utilised on all types of farms.
They were especially in demand on smaller farms which couldn't profitably own their own equipment, such as balers and headers. For example, 40 per cent of dairy farms grew some cash crops although the average size of such units was only 126 acres. These farms could scarcely support a range of costly machinery merely in order to harvest a few acres of wheat or barley once a year. The result was that besides the bigger full-time contractors in the district, there were others who had bought a baler or a header and were willing to do outside work at a time suitable to themselves. In this way the majority of small-scale farmers were saved the expense of owning their own machinery.

There were few complaints about the difficulty of getting a contractor when required. Drain cleaning was an exception. There were several drain-cleaning contractors working in the county, but judging by the remarks of a number of farmers there is room for more. The scarcity of casual workers created a widespread demand for drain-cleaning and gorse-cutting machinery in particular, but all types of contract services were in demand. At the present time they represent the chief means of overcoming the shortage of labour.

Co-operation with neighbours to get work done was practised on more than half the farms surveyed. The extent to which it was used varied from a few days' assistance at tailing or hay-making time, to the sharing of machinery and almost continuous working together. Fathers, sons and brothers, in particular helped each other in this way. In some areas the farmers said they were not troubled with labour shortage at all as they invariably combined together and helped each other. In other areas there was little co-operation, a fairly common reason given for this being the need for independence. In general, farmers did not of their own accord mention exchanging with neighbours as one means by which they got their work done. When asked about it they would say they did a little of it, although on further inquiry it was often found that some of the most difficult times of the year from the labour point of view were got over by helping each other.

About one quarter of the farms made use of part-time or casual labour during the year. The actual number of men in the county prepared to take on casual work was small and was largely composed of elderly men living in semi-retirement. One of the most striking features of the survey was the great difference of opinion existing as regards the difficulty of obtaining casual workers. The majority were convinced that no casual labour was available. On the other hand there were a small number who said they had no trouble at all getting men whenever they wanted them. Several attributed this to the fact that they treated their men well and fed them well. The situation seemed to be that many of those who did casual work were bachelors who were pleased to get some work and a meal reasonably close to their place of residence. Once they had found such a place they tended to remain there and to refuse requests by other farmers. The level of wages which some farmers were able to pay may have been another important factor. Part-time help was used most on sheep-cropping farms, the double demands of harvesting and shearing doubtless being responsible for this.

Partnerships other than those between father and son were not numerous. Most were of long standing and appeared to be a very satisfactory means of overcoming a labour shortage.

Less than a fifth of the farms were worked by father and son. Some of the sons had their own blocks of land which were run in conjunction with their father's farm as far as labour went. There were several, however, who were discontented with their lot and
expressed their intention of going off to town where better pay and less hard work were available. It would seem that taking a son into partnership at an early stage was the most satisfactory means of keeping him interested in the farm. In this respect the Young Farmers' Clubs were also a potent force. The opportunities they provided for discussion and for meeting other people served as an admirable substitute for the social activities in towns which are such a strong draw to many young country people. Local sports clubs were of value for the same reasons.

There were full-time employed men working on one in five of the farms surveyed. Farms on which cropping was carried out employed most of the men; dairy farms employed very few. Considerably more than half the farm workers were single men. The majority had had no training in agriculture and in general the educational standard was low, half having had primary education only. Most came from a farm background outside the county. Although the majority had no reservations about the fact that they were farm-workers they were often loath to say whether their father had been a farmer or a farm-worker, giving the impression they felt there was some stigma attached to being a farm-worker. This may be a reflection of the public attitude which holds that farm work is a job for those of lower intelligence. The fact that such an attitude is ingrained in some farm-workers themselves makes the situation even more distressing. More than half the farm-workers surveyed hoped to own their own farm eventually and thus merely regarded their present position as a stepping stone. A number went to considerable pains to point this out. Although owning one's own farm was put forward as an ambition, it was in many cases done without much conviction that such a state of affairs would ever come to pass. Several of the older men expressed their intention of remaining as farm-workers.

As would be expected, married men stayed on a farm much longer than single men, the difficulty of moving a family about doubtless being responsible for this. Most workers had some form of transport of their own, usually a car. In spite of this the amount of social participation amongst the farm workers was surprisingly small. One third said they took no part in organised social activities at all. In the case of married people it appeared that working and rearing children were full time occupations which left little opportunity or inclination for outside activities. Some farmers had gone out of their way to introduce their man to local activities as soon as possible after his arrival in the district as they believed it was important for him to feel a part of the community. One owner, knowing that the young man who was working for him intended to go dairy farming, had presented him with two heifer calves which in due course would be milked with the rest of the herd. Particularly amicable relations existed here with a result that would more than compensate for the cost of the calves.

In the main, the farm workers employed in Springs County were well satisfied with the life and showed no inclination to move out of farming. Some of the men were very proud of their achievements on the farm they worked on, and it was obvious they were allowed a measure of independence and a hand in making decisions which drew forth a certain loyalty on their part. Some had suggestions for improving the farm worker's lot; one man thought they should be paid by the hour so that overtime work could be allowed for. Some found it difficult to persuade their employer they needed a day in town occasionally.

The farmers themselves were generally satisfied with their men. Some wanted to obtain a married man in place of a single one as they felt this would protect them against the unfortunate tendency
of many single men to leave after one season. Others weren't wholly satisfied they got a full measure of work in return for the high wages they paid but this was not a general complaint.

The demand for farm labour followed closely the present distribution of the labour force on farms. Cropping farms presented the greatest need both for full-time and for part-time men. In the majority of cases farmers who said they needed additional help were very definite about it. However, whether they would give the same answer if confronted with an available farm worker is a matter for speculation. Assuming their answers to be correct there is a demand for at least 15 full-time men in Springs County. The demand for part-time help is greater and exists on one-fifth of all the farms surveyed.

Farmers needing assistance were asked if additional help would increase their production. More than half said that their production would not increase. Many said labour shortage had already altered their production pattern mainly by reducing or cutting out cash cropping. Several of these said they wouldn't go back to cash cropping even if labour were available. It seems therefore that cash cropping has suffered most as a result of labour shortage and this is borne out by the reduced crop acreages grown in the county over the years. This would seem to be due not only to labour shortage but also to the unwillingness of many farmers to grow cash crops on the scale they once used to.

Another question asked was why the farmer didn't at the moment have the help he needed. By far the commonest answer was that there were no men available. In a number of such cases, however, farmers admitted they hadn't really tried to get a man but had relied on the generally-held belief that men were almost impossible to obtain. Others said they could get men of a type but not those who would give satisfactory service in return for the high wages they were paid. Another common reason given for not having the labour required was that the farmer couldn't afford to pay the wages demanded. Lack of suitable accommodation didn't appear to be an important reason for not having labour.

Farmers who wanted part-time help were asked their opinion of a co-operative labour scheme on the lines of those operating successfully in the North Island. Most of the farmers in Springs County had heard or read of these schemes and were interested in them. The majority of those needing part-time help expressed their willingness to take part in such a scheme. Dairy farmers were less enthusiastic than others, because their labour problem was largely associated with a few days at haymaking time when they could use a dozen men in the district. During the remainder of the year, however, they had only enough work to keep themselves going. Thus with any sort of co-operative labour scheme they thought difficulties would arise in allotting the man at the busy time of the year while during the remainder of the year they couldn't guarantee him full-time work. To a suggestion that they might be able to take a fortnight's holiday each year if there was a man capable of taking charge of their farm while they were away, many replied, with some pride, that though they had been on the farm for 10 or 15 years they hadn't yet been for a holiday. It seemed they had become so used to this way of life that they saw no particular virtue in altering it. Farmers on other types of farms saw fewer difficulties in operating a labour scheme although a number were also worried about the allotment of the man at harvesting time.

A map of Springs County with those willing to participate in a labour scheme marked on it, shows distinct possibilities for starting
a successful scheme. Farm workers living in houses situated at Springston, South Springston or Lincoln would find ample work to keep them fully occupied throughout the year.

The problem of domestic help in the County was also studied. In about three-quarters of the cases the information was obtained from the farmer and not from his wife. Domestic help in Springs County was almost non-existent. Two farms employed part-time domestic help. There were no full-time domestic helpers. Children of course gave help in many cases but even this was by no means common. The remainder of the domestic labour force consisted of relations and friends who lived on the farm and helped with the housework.

The demand for domestic help was likewise surprisingly small. Only two farmers wanted full-time help. Part-time help at busy times of the year was required on one-tenth of the farms surveyed. The remainder said they needed no domestic help. Some light was thrown on this situation by the farmers' wives interviewed. Many of these, while saying they were overtaxed at times, said they would rather struggle along on their own than have a strange person in the house who mightn't do things according to their ideas.

There is no ready solution to the problem of domestic help in Springs County. Many of those who were at one time available for such services have moved into the towns where more attractive and lucrative work is available. A workers' bus which runs through the County each morning enables the remaining young people to work in town while still living at home on the farm.

To end this discussion it might be profitable to look at the changing picture over the last 20 years and to see the effect, if any, of labour shortage on production. Over the last 20 years there has been a steady drop in the total acreages sown in cash crops and fodder crops. Corresponding to these decreases has been a marked increase in the area cut for hay and silage, in the area kept for small seeds and in the area topdressed. There has been a small increase in the number of sheep and cattle carried, particularly dairy cattle. Pigs, however, have decreased. Machinery has increased considerably with the exception of reapers and binders and cream separators. There are many more people living on farms now than there were in 1930 but the number of people engaged in farm work has dropped by one-third. The result is that only one-quarter of the people living on farms are engaged in farm work at the present time whereas one-half were actively engaged in 1930. This large difference would be partly accounted for by the increasing birth rate over the last 20 years but must also indicate a big increase in the number of people living on farms but working elsewhere.

Since the total farm population in the county has increased by one-third since 1930 and since the number of holdings has remained the same, it follows that the potential farm labour and domestic labour force in the County is greater now than it was then. But fewer people are working on the farms than ever before. This of course is not important unless it has an effect on production or on the fertility of the land. However this survey suggests that if it is required to increase the production of cash crops in the County, an increased labour force is a pre-requisite, and further that the most permanent way of accomplishing this is to divert back into the country the labour which is now going into the towns to work. And there we return to the old subject of making country life more attractive for young people. In the meantime some form of co-operative labour scheme would ease many of the immediate labour problems in the County. Local farmers would be well advised to investigate the possibility of establishing one or more such schemes in the near future.
THE FINANCING OF HOUSES FOR FARM LABOUR AND A DESCRIPTION OF EXISTING COMMUNITY FARM-LABOUR SCHEMES

L. W. McCaskill, Lincoln College

In preparing this paper I have taken for granted that—
1. it is desirable to increase the rural labour force,
2. rural labour is entitled to housing of a standard comparable with that in urban areas,
3. to attract and hold suitable labour there must be some guarantee of full employment.

RURAL HOUSING SCHEMES

For the past 30 years the New Zealand Parliament has been conscious of the need for more rural housing and has enacted measures aimed at providing, through the State Advances Corporation or through County Councils, houses in the country for farmers, farm workers, tradesmen and others. The most important measure was the Rural Housing Act of 1939, which enables any county council to advance money "to a farmer to enable him to provide a dwelling for his own use or for the use of any farm worker who is principally employed by him or for the use of any member of his family who is engaged in farming operations on the farm, or to enable him to repair or add to existing dwellings."

The advances may be made only upon the written application of the farmer and by a resolution of the council and must have the precedent consent of the State Advances Corporation who are empowered to make loans out of the housing account to any local authority to enable it to make the advances.

The housing accomplishments under this act have been disappointing. Up to 31st March, 1951, out of 125 county councils only 44 had made applications, and of the £15,550 authorised for loans, only £272,427 had been uplifted in respect of 369 houses. In the past two years nine counties have applied for loans totalling £185,000, of which £70,762 has been uplifted.

The majority of counties have shown little interest; a few who have shown some interest have produced little in the way of new housing. But there are one or two outstanding exceptions, including Raglan which has its headquarters at Ngaruawahia. While the Raglan councillors deserve full credit for their decision to implement the 1939 Act, I think the results achieved are due largely to the interest and enthusiasm and the vigorous and successful administration of the county clerk, Mr G. Brownlee-Smith. He has kindly supplied full details of the Raglan schemes for the information of this conference and the following is merely my summary of his communications to me:

"The council has made simplicity and informality the basis of its dealings with farmers on housing matters. This does not mean that there is not sound administration. Every loan application is thoroughly investigated, titles are searched, securities are keenly valued, the actual building is supervised by a clerk of works on behalf of the council and every normal precaution is observed to ensure that ratepayers do not suffer. Farmers are encouraged above all to regard the county office as a friendly place in which everything possible will be done to simplify their housing problem. Housing is a personal matter and can most satisfactorily be dealt with on
a personal basis. In Raglan the council considers that when it comes to the valuing of security, the personal assessment of the borrower by the local councillor is as necessary as the Government valuer's ideas of the stock-carrying capacity of the farm.

The council provides alternative plans to those prepared by the State Advances Corporation but an applicant may prepare his own and frequently does. In such a case the plan is checked by architects of the State Advances Corporation and the applicant receives the benefit of their criticism.

Every job is tendered for. The farmer thus gets the benefit of competitive prices. Contrary to experience elsewhere, it has been shown in Raglan that even in times of shortages of material and scarcity of labour, building contractors will accept work in country areas often many miles out of town. By reducing administrative detail to a minimum, the county, the builder and the farmer work as a team—all interested in the idea that another rural house is another weapon in the battle for more production.

The following summary of operations up to 31st March, 1953, gives some idea of the success of the scheme.

Period 1st April, 1940 to 31st March, 1953.

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total expenditure under authority of the Rural Housing Act—65 loans</td>
<td>£72,387</td>
</tr>
<tr>
<td>Principal repaid to date—includes 23 loans repaid in full</td>
<td>£25,917</td>
</tr>
<tr>
<td>New houses built</td>
<td>58</td>
</tr>
<tr>
<td>Additions and repairs</td>
<td>7</td>
</tr>
<tr>
<td>Accumulated credit balance in council’s Rural Housing Act Working Account</td>
<td>£1536</td>
</tr>
</tbody>
</table>

(The interest rate has recently been increased. The money is borrowed at 3½ per cent from the State Advances Corporation and lent to farmers at 4 per cent. Application fees, which include all costs, amount to 10/- per £100 of loan. The 65 loans have been granted on farms varying from 35 to 1000 acres and include sheep, dairy, and fat-lamb properties. No payments have been defaulted.

Several returned servicemen who have taken up farms with rehabilitation finance have, rather than uplift further money from that source, built their homes with rural housing loans.”

On enquiry as to why counties were not implementing the 1939 Act, the usual reply was “lack of interest” but two difficulties were raised.

(a) A condition of a loan under the Rural Housing Act is that the council’s loan takes priority over any existing mortgage and the council may not make an advance if the lessor (if any) or any mortgagee objects. In Raglan no difficulty has been experienced where the farmer had a State mortgage. In general, private mortgagees have given consent in the belief that the security is being improved. Where the private mortgagee refuses consent, the county suggests refinancing with the State.

(b) Some counties have been afraid that a farmer of character and efficiency who has borrowed under the scheme may sell to an incompetent or unfinancial farmer who may not meet his loan obligations. Any possible difficulty here has now been obviated by an amendment to the Rural Housing Act Regulations which authorises a council to demand repayment of all Rural Housing loan moneys owing at the date of sale. The council has an option in the matter; if it is satisfied with the new owner, it
may allow him to make the half-yearly repayments in the usual way.

What I have described would normally be considered a major achievement for any county council. But Raglan has done much more towards rural housing.

1. Since 1936 it has built 33 houses for its own staff at a cost of £48,375. The maximum rent charged is 30/- per week.

2. Reviving disused provisions of the Counties’ Act, Section 192/195 1920, Raglan is also catering for the housing needs of other members of the community such as school-bus drivers, dairy-factory workers, agricultural contractors and tradesmen. The Counties’ Act enables any county council to buy land and erect houses which it may then sell, lease or rent. Or it can lend money on mortgage to any person living within the county, whether a farmer or not, to enable him to build a house. Raglan now has £20,000 obtained from the State Advances Corporation and is prepared to lend up to £2,000 at 4% per cent provided the applicant finds at least 20 per cent of the total cost of the house and section. All applicants will be required to be covered by a mortgage-repayment insurance policy and to apply for a suspensory loan and may be required to register under the Joint Family Homes Act.

3. The council has guaranteed for 10 years the rentals of three houses erected by the State Advances Corporation at Onewhero. These houses will be controlled by a local housing committee of the Onewhero branch of Federated Farmers who will select the tenants and collect the rents. The council will approve of similar guarantees for other centres where it can be shown that houses for casual farm workers are required.

In concluding this outline of the work of one county, I think it can be claimed that Raglan offers us not only inspiration but a sound working model for similar action in any other area where more rural workers are urgently required. By entering the social field of housing, counties could ultimately make as great a contribution to material welfare as they are at present doing as a result of their work with roads, bridges and drains.

Local Farm-labour Schemes

The following information is presented as a result of the cooperation and goodwill of the secretaries of 16 schemes which I have investigated.

Production drives during the war drew fresh attention to a major difficulty in implementing the plans of the Primary Production Councils—the shortage of rural workers. The Rural Housing Act of 1939 had not been properly tried and several groups of farmers in various parts of New Zealand set out to see what they could do on their own initiative.

The first such group to go into action was the Warkworth branch of Federated Farmers. At a meeting in 1944, 40 of the 76 members stated that they needed casual labour and would be prepared to guarantee this to a suitable man. A group of 14 immediately guaranteed among them a full year’s work and each paid one week’s wages in advance to finance the scheme. A house became available in the district and an ex-serviceman was engaged to commence work in January 1945. Before the end of the year, three more groups were in operation. The scheme worked successfully for over three years and set the pattern for similar schemes in other parts of the North Island. It collapsed because one vital link in the requirements was missing—there were no houses tied to the scheme. Once the houses
being used were required by the owners for other purposes, the workers had to move on, and vital work on farms remained undone. The first time—schedule for the jobs from January to September 1945 is quite an historic document so I quote it in full.

<table>
<thead>
<tr>
<th>Task</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrub cutting</td>
<td>313</td>
</tr>
<tr>
<td>Gorse cutting</td>
<td>163</td>
</tr>
<tr>
<td>Gorse grubbing</td>
<td>159</td>
</tr>
<tr>
<td>Blackberry cutting</td>
<td>42</td>
</tr>
<tr>
<td>Clearing fence lines</td>
<td>218</td>
</tr>
<tr>
<td>Knapping metal</td>
<td>9</td>
</tr>
<tr>
<td>Fencing</td>
<td>36</td>
</tr>
<tr>
<td>Draining</td>
<td>398</td>
</tr>
<tr>
<td>Pump repairs</td>
<td>18</td>
</tr>
<tr>
<td>Sewing stack covers</td>
<td>9</td>
</tr>
<tr>
<td>Hay making</td>
<td>58</td>
</tr>
<tr>
<td>Concreting</td>
<td>18</td>
</tr>
<tr>
<td>Topdressing</td>
<td>69</td>
</tr>
<tr>
<td>Digging rushes</td>
<td>18</td>
</tr>
</tbody>
</table>

Total = 1523 hours.

It was in 1944, also, that at a meeting of the Primary Production Committee in Sanson it was decided to inaugurate a Casual Farm Labour Scheme. (Within a few months, when the committee disbanded, the scheme was taken over by the Sanson-Ohakea branch of Federated Farmers). Almost immediately, Cabinet approved the erection of three State houses in Sanson, these houses to be available only to workers in the scheme. Although the first worker commenced in January 1946, the houses were not completed until July 1948 since when three workers have been fully employed in the scheme. Late in 1952 two more houses were completed and five workers are now employed. Sanson must be considered lucky in one way in being the pioneers in this type of scheme in that they have five houses available to them without having provided any specific guarantee. The branch membership is 100 of whom 60 members participate in the scheme.

Other early schemes were those at Maharahara near Dannevirke in October 1946, and at Carnarvon near Palmerston North in 1947. In both these cases a local house became available for renting. The Gordonton branch of Federated Farmers, mainly “one-man” dairy farmers, first made application to the Government in 1942 for a State rental house for a farm worker. They were offered one in return for a 25-year guarantee but declined. In 1949 one of the farmers offered the use of a house on his farm in order to get a scheme started. Immediately 22 farmers guaranteed work for one farm worker who was engaged and occupied the available house. (Twenty of the original participants are still in this group). In June 1949, having read about Sanson, application was made for three State houses. These were approved and building was completed in February 1952. At present there are 50 farmers in the scheme with three workers; work is available for one more if a house could be obtained.

The Rongotea scheme was commenced in September 1951 when the State provided three houses. Two casual workers are employed on 33 farms. The third house is let by the branch to a blacksmith who is in business on his account.

There has been considerable resentment among other groups of farmers that at Sanson, Gordonton and Rongotea the State built the houses without the guarantees now required. They were made available to local branches of the Farmers' Federation as head tenants for a period of one year, the lease to be renewable on three months' notice. The position seems to have been that these schemes were considered as experiments. In addition, because of the location of the houses, there were reasonable prospects of sale or reletting without loss to the State if the labour schemes fell through. What we need to consider now is the present system and whether it is applicable to South Island needs and conditions.
In November 1951 the State Advances Corporation agreed to build a house for a rural worker if ten farmers in a group will guarantee the rent for ten years. A joint-and-several guarantee is required on a form similar to that used for ordinary tenants of State houses but modified to provide for the 10-year term and the right to sub-let to the casual farm worker. The State Advances Corporation undertakes release of the estate from the guarantee in the case of death. It will also release if the guarantor leaves the district or withdraws from the scheme provided that, if the numbers remaining drop to four, any future withdrawals are released only on the finding of a satisfactory substitute.

It is essential for the group to be able to terminate the sub-tenancy and to obtain vacant possession in the event of the worker leaving the scheme. This is best done by the group and the tenant making a written agreement prior to the commencement of the tenancy, before a rents officer, that the protection of the Tenancy Act 1948 will not apply to the tenancy.

Many branches of Federated Farmers and other groups considering the establishment of farm-labour schemes refuse to take any further action until the guarantee is abolished. They say, "State houses are built in towns without guarantee; why not in the country?" The answer is that houses in towns are not reserved for a particular individual; houses under the farm-labour schemes are reserved for an individual who will work only for the guarantors.

In spite of this opposition to the guarantee there are plenty of farmers keen to participate. Up to 31st March, 1953, 89 houses had been authorised by the State Advances Corporation in over 50 different localities. From a survey of most of the schemes already in existence I submit the following information and suggestions:

1. Membership fee. In some cases there is an initial, non-recurring fee to provide the working capital. In one case two farmers have guaranteed the account at the bank for £200. In others there is a fee large enough to cover all costs of the scheme.

2. Payments. In all cases except one the farmer pays the secretary and the secretary pays the worker. The exception is one where the worker works on contract for the farmer who pays him direct. The farmer pays 6/- a day to the scheme towards overhead costs.

3. Allocation. This is usually by ballot but may also be made by agreement round the table at the half-yearly meeting. Periods are usually of two weeks but may be reduced to a maximum of three days at harvest. Periods may be interchanged by mutual agreement. In cases of illness or death, the farm concerned receives immediate priority.

4. Insurance. A policy is taken out by all schemes.

5. Legal agreement. There is usually a legal agreement between the scheme and its individual members and between the scheme and the worker. (I include as an appendix, draft agreements designed for South Island conditions which may prove useful to groups planning schemes).

6. Dirty work. Members of groups agree that they will not allow dirty jobs to accumulate until their turn for the worker.

7. Meals. The normal procedure is for the worker to provide his own meals.

8. Travelling. Workers provide their own transport. Some schemes pay mileage, others so much an hour, others include allowance for travelling in the wage paid.
9. Holidays. The scheme pays for the annual holiday of two weeks and usually £1 per day for the statutory holidays.

10. Wet weather. Most schemes make the farmer responsible for providing suitable jobs in wet weather. In two cases the scheme uses the men to make such things as gates, troughs and concrete posts which are sold to members at cost and to others at a profit which goes to the working funds of the scheme.

11. Possible extension. I have mentioned that one scheme provides a house for a blacksmith. Others plan to provide for a carpenter and a painter-paperhanger.

12. Success of schemes. This seems to depend on:
   1. Provision of a suitable house on a central site.
   2. An enthusiastic secretary.
   3. A reasonable committee.
   4. The employment of a good all-round worker. (Two recent schemes had 28 and 22 applicants).
   5. Fair play and conditions of work.
   6. The provision of a reasonable amount of over-time.
   7. Willing co-operation between the committee, the members and the worker.
   8. Enthusiasm on the part of farmers for the theme of the present conference—"Increasing Farm Production."

In conclusion I would remind you that we now have a scheme in action in the South Island, that at Waipara. If we are going to make any worth-while contribution to the demand for more production I consider we need many more Waiparas.

Professor Flay: The attitude towards increased production appears to be very mixed. Some are enthusiastic, some lethargic. It is a pity that we have to allow the North Island to teach us what we should be doing as regards housing and farm labour. The need here is greater because the farms are larger.

Mr Bevin: The fact is that some North Island districts have a very progressive attitude. The smell of the bush is not far away there, but in the South Island we are inclined to think we have finished with development. I wish you could listen to the enthusiasts that Professor McCaskill has mentioned. They are dynamic. I would remind you that this housing idea originated in Canterbury. A dozen places like Charing Cross were laid out originally as centres for rural labour and its housing. We ought to go back and learn from our grandfathers.

Mr Little, Hui Hui: We mustn't overlook the fact that in the North Island, land is more highly productive per acre than ours and there are more one-man farms. What I dislike about these schemes is they seem to be designed purely to overcome the disadvantage of peasant-style farming.

Mr Pilbrow: Practically every farmer in the South Island would increase production if he had another man, but if we don't build the houses on our farms we would be up against the problem of the distance which would have to be travelled from the housing settlement. But the difficulty about building houses on farms is that it causes over-capitalisation, sends up the rates and involves the owner in difficulties with the valuer if he wants to sell. The housing schemes mentioned seem to be designed purely for dairy farms.
Professor McCaskill: The schemes in the North Island are not just dairy farm schemes. Some service sheep and sheep-and-arable properties as well. One scheme with 60 farmers participating employs two men to do nothing but sheep work. They are fully occupied with shearing, crutching and various other types of work with sheep. I do not think the answer is the building of all the houses on farms, because of the problem Mr Pilbrow mentioned. I believe that if we got down to the district level and analysed the problem from the local point of view we would find plenty of places where we could have a housing scheme without too much travelling. In mixed farming areas we could employ both specialised workers and those who could do a variety of jobs. I would stress the fact that these North Islanders don't go in for these schemes just to help the taxpayer; they are doing it to help themselves. I would stress the importance of having workers in such schemes who can take charge and allow the owners to go away for a holiday. In the Waikato many farmers for the first time are now able to have a summer holiday at the beach with their families. Don't think that these schemes work to a rigid pattern. The most successful ones are where the farmers get down to it and carefully analyse their local needs.

Mr Grigg, Longbeach: The greatest urgency is for houses in the back-country. It is a tragedy to see a young man competent and happy at shepherding being forced to move to the town when he marries to bring up his children away from the country. I know it is expensive to build in the back country, but surely if the Government were interested it should be possible to work out a simple scheme.

Mr Bevin: Unfortunately from the political point of view we can't count many heads in the back country. But it is more than a labour problem. If we come to the stage where we abandon the back country in less than 25 years the plains will be very great losers. Let us provide housing in the back country and achieve stability of labour and we will get rewards in the preservation of the land out of all proportion to any money we spend.

Mr Williams, Halswell: I was particularly struck by the suggestion of an insurance scheme to finance the education of the children of farm workers in the back country so that they may be sent to a good boarding school when they get to the post-primary stage. They would go back home for their holidays, thus keeping in touch with the country. Such a scheme should ensure the supply of future shepherds and musterers to say nothing of their wives.

Mr Blunt, Kaikoura: What is the greatest distance a worker has to travel to get enough farmers participating in the scheme?

Professor McCaskill: In a sheep-farming district eight miles, but in the dairying districts, usually within three or four miles.

Mr Rowlands: I hope we won't lose sight of the main problem of the future, that is the settlement of young farmers on the land. We have two main sources of increased production, one is the increasing of our farm efficiency, the other is the making of new farms and Mr McPherson has shown us today one way in which that can be done on the light land of Canterbury. As far as State houses are concerned we need more efficiency and co-operation on the part of the Housing Department and the State Advances Corporation.

Mr Hardy, Winton: The State Advances Corporation are very slow to give decisions on rural housing. We applied for housing two years ago, but have got nowhere yet. This is the thing which causes
interest to wane. I feel that we would do better doing it through the counties.

Professor McCaskill: I am not here to defend or attack any Government department. All I have tried to do is to give you some facts. To show that the State Advances Corporation has really been active the figures up to the end of March 1953 are as follows:—

- 89 houses under the guarantee by farmers.
- 78 houses guaranteed by Rabbit Boards, and
- 207 houses under the guarantee by Dairy Companies.

Mr Turton: With the bigger areas to cover the South Island counties have had a real problem with their roads and they have tended to by-pass housing. If we want the counties to take any action in implementing the Rural Housing Act I think the pressure will have to come from Federated Farmers.

Mr Topp: The Waipara scheme plans to overcome the problem of having our worker on award wages working beside highly-paid seasonal workers during shearing by allowing him six to eight weeks off at shearing to earn all he can for himself. There are 20 farmers in the Waipara scheme and already those outside it are clamouring for another house and another worker.

Concluding the discussion Mr Bevin said that the country had reached the end of one phase of development and would now have to plan for another. People were always talking about the land development in the North Island, but here in Canterbury we had 1,500,000 acres of light land which had scarcely been scratched, but housing and labour were essential to its proper development.

The Conference then agreed that some assistance should be given to the farming community, particularly to the back-country farmers, to erect good accommodation for farm workers, whether it be in the form of some remission in taxes for money spent on accommodation, or in a special depreciation allowance.

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APPENDIX i

THE FARM LABOUR SCHEME

AGREEMENT AS TO TERMS OF EMPLOYMENT OF FARM WORKER

It is hereby agreed that the following terms of employment shall operate:—

1. The worker will work on such farms and for such periods as directed by the Committee.
2. The worker is guaranteed employment for a minimum of 42 hours per week including work in wet weather.
3. The worker will diligently carry out the duties assigned to him.
4. The worker will provide his own conveyance but will not be required to provide his own tools or materials.
5. The worker will record on the form provided the number of hours (up to 42) worked for each member each week and at the end of each week or such other period as the Committee may require will send the form, duly signed by himself and by the farmer to the secretary of the Committee.
6. The worker will be paid by the Committee at the rate of 5/- per hour for 42 hours per week worked except that on the eight statutory holidays the worker will be paid by the Committee at the rate of £1 per day.

7. During the currency of this agreement the worker will occupy the dwelling house provided for him by the Committee and will permit the Committee to deduct from the monies due to him as wages by the Committee the amount of rental payable from time to time in respect of his occupation of such dwelling house. Within fourteen days of the termination of his employment by the Committee, the worker will vacate such house of which he is not deemed to be a tenant within the meaning of any statutory enactment but will during his occupancy of such house keep the same in order to the satisfaction of the Committee.

8. The worker will be paid by the Committee for two weeks' annual holiday, the time at which such holidays are to be taken to be agreed upon between the worker and the Committee.

9. The worker will be insured by the Committee under the Workers' Compensation Act, 1922 and amendments.

10. In the event of the worker being unable to work for a time owing to illness the Committee will pay the rent of the house for a period up to a maximum of four weeks. If by arrangement with the Committee the worker takes special leave, then he will be responsible for the rent of the house for that period of leave.

11. By arrangement between the Committee, the worker and the member concerned, the worker will take charge of the farm if the member is ill or on holiday. In such event the worker will carry out essential duties on Saturdays and Sundays such as milking, inspection of sheep and the feeding of animals. For such weekend duties the member shall pay the worker direct the sum of ten shillings per day plus 5/6 an hour for each hour worked.

12. The worker shall not work for farmers who are not members of the scheme except by permission of the Committee and on such terms as shall be decided by the Committee.

13. In the event of a dispute between the worker and a member who is employing him, the matter shall be referred to Committee whose decision shall be final.

Signed by the worker: ____________________________

Signed for the —— Farm Labour Scheme: ____________________________

In the presence of: ____________________________

______________________________

APPENDIX ii

AGREEMENT BETWEEN THE SCHEME AND ITS MEMBERS

An agreement made between the —— Farm Labour Scheme and of those financial members of the Scheme whose names and addresses are listed on the attached schedule. It is hereby agreed between the parties hereto:

1. That each of the members will guarantee employment for the worker for the number of weeks set opposite the name of that member in the schedule, the period allocated to be decided by ballot.
2. That upon the signature of this agreement each member so signing shall pay to the Committee the sum of £2 (Two pounds) as annual membership fee and shall continue to pay that sum annually as long as he remains a member.

3. That each member hereby agrees to the terms of employment arranged between the Scheme and the worker.

4. That each member shall, from Monday to Friday inclusive, provide a minimum of 42 hours work per week for the worker and within a fortnight of the worker's commencing work shall make payment to the Committee by cheque at the rate of 5/6 per hour for the number of hours worked up to 42. Provided that in the case of the following statutory holidays—New Year's Day, Good Friday, Easter Monday, Anzac Day, Queen's Birthday, Labour Day, Christmas Day and Boxing Day, the member providing employment at the time shall not be liable for payment of those holidays.

5. That the member employing the worker shall ensure that the worker is fully employed during wet weather.

6. That hours worked at shearing, crutching and harvesting shall be paid for at ruling rates, any difference between these ruling rates and 5/6 per hour to be paid direct by the farmer to the worker.

7. That hours worked in excess of 42 hours per week shall be by arrangement between the member and the worker, and payment shall be made by the farmer direct to the worker at a rate of not less than 5/6 per hour.

8. That the Committee will pay wages due to the worker up to a maximum of 42 hours per week at the rate of 5/- per hour less a sum equal to the weekly rent of the house provided.

9. That the Committee will insure against claims under the Workers' Compensation Act, 1922, and its amendments and pay all premiums payable in respect of such insurance. Provided however that, if any member by arrangement with the Committee employ a worker on any class of work which shall result in a higher premium being payable in respect of such insurance, such member shall pay to the Committee forthwith and on demand the amount of such additional premium, and provided further that nothing herein contained shall relieve any member from his responsibility to insure under the Workers' Compensation Act, 1922, should he employ the worker on any prohibited work.

10. That all moneys payable by any member to the Scheme shall, when paid, be credited in the books of the Scheme to the member paying the same. Any wages and other payments due to the worker in respect of his guaranteed employment of 42 hours per week shall be paid by the Scheme out of such moneys. Also, payments of rent to the State Advances Corporation, premiums for insurance, payments for statutory holidays, honorarium (if any) for secretary, and general expenses of running the Scheme shall be paid by the Scheme out of such moneys.

Signed by the member: ________________________________________

Signed for the Farm Labour Scheme by its Secretary: _____________________________

In the presence of:  

Date: ____________________

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FACTORS CONTRIBUTING TO THE LOW NATIONAL LAMBING PERCENTAGES

THE FACTUAL POSITION REGARDING LAMBING PERCENTAGES—PAST AND PRESENT

P. G. Stevens, Lincoln College

If we are to talk about lambing percentages we ought to be quite sure what we mean by the term. I was thinking over this when a sheep farmer from Otago called to see me. Fortunately he wanted to talk about lambing percentages. He had raised his flock lambing percentage from 75 to 95 and was keen to improve it still further. After some discussion the figures in Table I were set down.

<table>
<thead>
<tr>
<th>Time</th>
<th>Ewes in Flock</th>
<th>Lambing Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tupping</td>
<td>2,000</td>
<td>92</td>
</tr>
<tr>
<td>Crutching</td>
<td>1,980</td>
<td>93</td>
</tr>
<tr>
<td>Beginning of lambing</td>
<td>1,950</td>
<td>95</td>
</tr>
<tr>
<td>Finish of lambing</td>
<td>1,875</td>
<td>99</td>
</tr>
<tr>
<td>(Dry ewes)</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Ewes with lambs</td>
<td>1,795</td>
<td>103</td>
</tr>
<tr>
<td>Lambs tailed</td>
<td>1,852</td>
<td></td>
</tr>
<tr>
<td>Ewe mortality</td>
<td></td>
<td>6%</td>
</tr>
<tr>
<td>Dry ewes</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Total ewes which failed to breed</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

This Table is of particular interest to us as it illustrates a variety of ways of arriving at lambing percentage. We would all agree that a lambing percentage shows the relationship between a group of ewes and the lambs they produce. But the same flock of ewes in Table I gives results varying from 92% to 103%, depending on when the ewe count is taken. My visitor took his at the beginning of lambing, but he added as an afterthought: “Of course we ought to take the ewe-flock count at tupping.”

If lambing percentages are to be useful for any purpose at all there must be some agreement as to the source of the figures on which they are based. Even when the figures are comparable, caution is necessary in interpreting the final figure because a lambing percentage is a measure of a lot of unrelated features.

It is the end result of prolificacy in the ewes, fertility in the rams and the general management of the flock. Although management is placed last, it is of prime importance as it includes feed supplies during autumn, winter and spring, and general weather conditions, particularly during the peak of lambing in spring. High lambing-percentages result from a favourable combination of all factors, but low percentages may result from any one of them being unfavourable.

You will want to discuss some of these aspects more fully and as it is my duty to place before you the factual position regarding
lambing percentages rather than to discuss possible causes of variation, I will pass on to the New Zealand lambing percentage.

The New Zealand lambing percentage is obtained by calculation from the total number of breeding ewes enumerated in the autumn census and the number of lambs tailed, which is published in the spring census. These figures are published in the "Report on the Agricultural and Pastoral Statistics of New Zealand," which is compiled by the Census and Statistics Department.

The report is based on "seasons"—for example, 1950-51, 1951-52—and not on the calendar year. In the livestock section are two columns of figures, one giving the number of breeding ewes and the other the number of lambs tailed. The breeding-ewe figures are collected in a census at the end of April (since 1951, the end of June), while the lambs tailed are not received until the following spring. Thus the lambs tailed which appear in the column alongside the breeding ewes do not belong to these ewes but to the ewes which appeared in the report for the previous year. I warn you of this in case you wish to check my figures for New Zealand or for your own country.

There is one further point; during the spring an estimated lambing percentage is released by the Department of Agriculture. This figure is based on returns from officers of the department who use sample farms and their knowledge of local conditions. It is usually an excellent estimate, but for some reason it is not replaced by the actual figure when this becomes available, and thus the estimated rather than the actual lambing percentage is carried along from year to year.

![Graph of N.Z. Lambing Percentage](image)

**TABLE II**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lambing Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1921-25</td>
<td>84.5</td>
</tr>
<tr>
<td>1926-30</td>
<td>86.5</td>
</tr>
<tr>
<td>1931-35</td>
<td>85.0</td>
</tr>
<tr>
<td>1936-40</td>
<td>90.3</td>
</tr>
<tr>
<td>1941-45</td>
<td>92.5</td>
</tr>
<tr>
<td>1946-50</td>
<td>89.3</td>
</tr>
<tr>
<td>1922-24</td>
<td>86.8</td>
</tr>
<tr>
<td>1927-30</td>
<td>88.9</td>
</tr>
<tr>
<td>1932-35</td>
<td>88.0</td>
</tr>
<tr>
<td>1937-40</td>
<td>89.7</td>
</tr>
<tr>
<td>1942-45</td>
<td>91.0 (est.)</td>
</tr>
<tr>
<td>1947-50</td>
<td>95.6</td>
</tr>
<tr>
<td>1923-25</td>
<td>85.2</td>
</tr>
<tr>
<td>1928-30</td>
<td>89.2</td>
</tr>
<tr>
<td>1933-35</td>
<td>88.8</td>
</tr>
<tr>
<td>1938-40</td>
<td>86.2</td>
</tr>
<tr>
<td>1943-45</td>
<td>88.0 (est.)</td>
</tr>
<tr>
<td>1948-50</td>
<td>94.0</td>
</tr>
<tr>
<td>1924-26</td>
<td>87.7</td>
</tr>
<tr>
<td>1929-30</td>
<td>89.7</td>
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<tr>
<td>1934-35</td>
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<td>1944-45</td>
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<td>1949-50</td>
<td>98.5</td>
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<tr>
<td>1925-27</td>
<td>83.4</td>
</tr>
<tr>
<td>1926-30</td>
<td>82.7</td>
</tr>
<tr>
<td>1931-35</td>
<td>89.1</td>
</tr>
<tr>
<td>1936-40</td>
<td>93.4</td>
</tr>
<tr>
<td>1941-45</td>
<td>94.7</td>
</tr>
<tr>
<td>1946-50</td>
<td>97.0</td>
</tr>
<tr>
<td>Five year average</td>
<td>85.5</td>
</tr>
<tr>
<td></td>
<td>87.4</td>
</tr>
<tr>
<td></td>
<td>88.0</td>
</tr>
<tr>
<td></td>
<td>89.2</td>
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<tr>
<td></td>
<td>92.9</td>
</tr>
<tr>
<td></td>
<td>94.9</td>
</tr>
</tbody>
</table>
If you refer to Table II and Figure I you will see what has been happening to the lambing percentage in New Zealand during the past thirty years.

The annual figures show an impressive range of variation from the lowest lambing in 1930 (82.7%) to the highest in 1949 (98.5%), a difference of over 15 per cent. If the lambing percentage in 1930 had been as good as that in 1949 there would have been over 2,000,000 more lambs tailed. Even years which are closer together than those quoted and in which the composition of the breeding-ewe flock could have changed but little, show big differences (1939-1940 7%, 1946-47 6%). These differences can amount to over 1,000,000 lambs.

Table II gives a summary of the New Zealand weather conditions during autumn and spring for selected years.

**TABLE III**

<table>
<thead>
<tr>
<th>Year</th>
<th>Lambing Percentage</th>
<th>Weather Conditions</th>
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</thead>
<tbody>
<tr>
<td>1930</td>
<td>82.7 Dry</td>
<td>Cold and stormy</td>
</tr>
<tr>
<td>1938</td>
<td>86.2 Wet-lush feed</td>
<td>(July dull, wet, cold, August changeable, September improved)</td>
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<tr>
<td>1939</td>
<td>86.3 Dry-feed short</td>
<td>(July cold, hail, snow, August cold, wet, September dry, sunny)</td>
</tr>
<tr>
<td>1940</td>
<td>93.4 Wet-March good</td>
<td>(July dry and frosty, August fine, September mild)</td>
</tr>
<tr>
<td>1943</td>
<td>88.0 (est.) Generally dry. Feed N.I. short, S.I. satisfactory</td>
<td>(July cold, sunny, August cold, rain, September very unsettled)</td>
</tr>
<tr>
<td>1944</td>
<td>94.7 Mild-unsettled feed good.</td>
<td>(July dull, mild, August dull, mild, September light rain, mild)</td>
</tr>
<tr>
<td>1946</td>
<td>89.3 Satisfactory weather and feed</td>
<td>(July mild, August frequent rain, September high rainfall, lamb losses heavy, Canterbury and Otago)</td>
</tr>
<tr>
<td>1947</td>
<td>95.6 N.I. feed good S.I. short</td>
<td>(July fine and dry, August mild, September sunny and mild)</td>
</tr>
</tbody>
</table>

Of the seasons quoted some show good autumn-feed (with assumed good flushing) while in others feed was in short supply. In the early spring a similar situation exists—some years mild and fine.
others bleak and stormy. It is of interest to observe that the best years (1940, 1944, 1947) are a combination of good autumn-feed and mild spring-weather. While the lowest years agree with cold and stormy spring-weather they do not necessarily agree in having the same sort of autumn. It would appear that our lambing percentages are very much at the mercy of the spring weather but at the same time the autumn is a not-unimportant contributor to the general situation.

The next point of importance in the national lambing percentage is the steady improvement. The five-year averages, which help to smooth the annual variations, show a rise from 85.5 per cent. to 94.9 per cent. This is an improvement of 9.4 per cent. during the six five-year periods under review. I am at a loss to account for this, although it has been suggested to me that you are better shepherds than your fathers or that you are merely getting the benefit of the plantation shelter they planted for you.

A point of interest can be added here from figures gathered at the College over a number of years. The figures are from the three stud flocks (Romney, Corriedale, Border Leicester) and show the number of ewes rearing twins compared with the total number of ewes rearing lambs. This is not a lambing percentage although the relationship is expressed as a percentage. Results for each year from 1936 to 1952 are shown in Table IV and Figure II.

**TABLE IV**

<table>
<thead>
<tr>
<th>Year</th>
<th>Per cent</th>
<th>Year</th>
<th>Per cent</th>
<th>Year</th>
<th>Per cent</th>
<th>Year</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1936</td>
<td>39</td>
<td>1940</td>
<td>39</td>
<td>1944</td>
<td>34</td>
<td>1948</td>
<td>46</td>
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<td>1937</td>
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<td>1941</td>
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<td>1945</td>
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<td>1938</td>
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<td>1942</td>
<td>33</td>
<td>1946</td>
<td>51</td>
<td>1950</td>
<td>48</td>
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<tr>
<td>1939</td>
<td>31</td>
<td>1943</td>
<td>48</td>
<td>1947</td>
<td>54</td>
<td>1951</td>
<td>50</td>
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<tr>
<td>Average</td>
<td>37</td>
<td>Average</td>
<td>37.7</td>
<td>Average</td>
<td>44.7</td>
<td>Average</td>
<td>46.7</td>
</tr>
</tbody>
</table>

**Fig. II**

**EWES REARING TWIN LAMBS**

Again, a summary of weather conditions during these years may be of interest and those in Table V are taken from the College meteorological records.
<table>
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<tr>
<th>County</th>
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<th>90-100</th>
<th>100-110</th>
<th>110 plus</th>
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<td>-80%</td>
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<tr>
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<td>29,063</td>
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<tr>
<td>Whangaroa</td>
<td>14,163</td>
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<tr>
<td>G. Barrier Is.</td>
<td>5,920</td>
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<td>30,767</td>
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<td>Rotorua</td>
<td>110,524</td>
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<td>Taupo</td>
<td>18,437</td>
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<td>Opotiki</td>
<td>46,469</td>
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<td>Uawa</td>
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<tr>
<td>Mongonui</td>
<td>29,063</td>
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<tr>
<td>Whangarei</td>
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<td>Waitomo</td>
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<td>Taupung</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuapeka</td>
<td>353,291</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ewes</td>
<td>1,536,448</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-90</td>
<td>4,637,931</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-100</td>
<td>8,648,518</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100-110</td>
<td>5,302,587</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>110 plus</td>
<td>1,762,587</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE V.

<table>
<thead>
<tr>
<th>Year</th>
<th>Autumn (Feb.-Mar.-Apr.)</th>
<th>Spring (July-Aug.-Sept.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937</td>
<td>Average.</td>
<td>Good—2 storms.</td>
</tr>
<tr>
<td>1938</td>
<td>Wet and dull.</td>
<td>Excellent—1 3-day storm.</td>
</tr>
<tr>
<td>1939</td>
<td>Dry—feed short.</td>
<td>Cold and wet—6 storms.</td>
</tr>
<tr>
<td>1940</td>
<td>Dry—feed scarce.</td>
<td>Fair, wet Sept.—5 storms.</td>
</tr>
<tr>
<td>1941</td>
<td>Wet—good feed.</td>
<td>Wet and stormy, 2 days’ hail and snow.</td>
</tr>
<tr>
<td>1942</td>
<td>Dryish—green feed short.</td>
<td>Excellent—2 brief storms.</td>
</tr>
<tr>
<td>1943</td>
<td>Dry—feed less than 1942.</td>
<td>Hard winter—showery Sept.</td>
</tr>
<tr>
<td>1944</td>
<td>Wet—best feed for years.</td>
<td>Good winter—average spring.</td>
</tr>
<tr>
<td>1945</td>
<td>Wet—March sunny.</td>
<td>Wet early, good late August—September.</td>
</tr>
<tr>
<td>1946</td>
<td>Dry—slow growth.</td>
<td>Ideal spring.</td>
</tr>
<tr>
<td>1947</td>
<td>Average.</td>
<td>Good—one storm late Sept.</td>
</tr>
<tr>
<td>1948</td>
<td>Dry—little growth.</td>
<td>1 5-day storm early.</td>
</tr>
<tr>
<td>1949</td>
<td>Dry—feed supply poor.</td>
<td>otherwise weather good.</td>
</tr>
<tr>
<td>1950</td>
<td>Sufficient rain, good growth.</td>
<td>Excellent weather.</td>
</tr>
<tr>
<td>1951</td>
<td>Very wet—abnormal growth.</td>
<td>Dry except 1 bad storm mid-August.</td>
</tr>
</tbody>
</table>

The best years had a good spring—with that observation I will content myself although you may wish to make others. However, like the New Zealand lambing percentage, the percentage of twins reared in the College flocks is rising.

It is possible to look at the lambing percentage in a little more detail by seeing what happens in the various counties. These figures are placed before you with some reservation. The breeding ewe figures show the breeding ewes in each county at the end of April (now June) while the tailing figures show the number of lambs tailed the following spring. You are all aware that in some areas there are considerable ewe movements between counties after the end of April and this introduces a possible error in the calculation of lambing percentage for counties. However, in Table VI and Figure IV the counties are grouped according to their calculated performance. In addition, the total number in each county is given.

This is an arbitrary grouping of counties but it is of interest to observe that approximately one-third of the total ewe flock is in areas which return a tailing figure of better than 100 per cent.

These higher lambing percentages are in areas where sheep farming is intensive and where mature ewes are in the majority in the breeding flocks. The importance of intensive farming as a factor in securing higher percentages is generally recognised but the advantage gained by using mature ewes is worth further consideration. In a paper published recently (Non-nutritional Factors Affecting Fertility in Sheep. Hart and Stevens, 1950) it was pointed out that the age of the ewes has an important bearing on prolificacy and therefore can affect lambing percentages. In the paper quoted the material used was from the five stud flocks kept by the College.

Recently, Mr E. C. Topp, who prepared a paper for this conference two years ago on “Breeding for Prolificacy”, provided me with figures from his flock which were not then available. These figures deal with part of the flock in which there were two groups of ewes—Group A, which were born singles (92 ewes) and Group B, which were born twins (183 ewes). Both groups were run to-
gether as one flock during their five-year breeding life-time on the farm at Waipara.

The performance of each group is shown in Table VII and Figure III.

**TABLE VII**

**LIFETIME BREEDING PERFORMANCE OF EWES**

A—Born singles. B—Born twins (Sires of ewes unknown)

<table>
<thead>
<tr>
<th>Group A—Ewes Born Singles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of Ewes</strong></td>
</tr>
<tr>
<td>One shear</td>
</tr>
<tr>
<td>Two shear</td>
</tr>
<tr>
<td>Three shear</td>
</tr>
<tr>
<td>Four shear</td>
</tr>
<tr>
<td>Five shear</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group B—Ewes Born Twins</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of Ewes</strong></td>
</tr>
<tr>
<td>One shear</td>
</tr>
<tr>
<td>Two shear</td>
</tr>
<tr>
<td>Three shear</td>
</tr>
<tr>
<td>Four shear</td>
</tr>
<tr>
<td>Five shear</td>
</tr>
</tbody>
</table>

**Lifetime Breeding Performance**

<table>
<thead>
<tr>
<th>Ewes with:</th>
<th><strong>Group A</strong></th>
<th><strong>Group B</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Five sets twins</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Four sets twins</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Three sets twins</td>
<td>26</td>
<td>68</td>
</tr>
<tr>
<td>Two sets twins</td>
<td>34</td>
<td>39</td>
</tr>
<tr>
<td>One set twins</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>No sets twins</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Group A</strong></th>
<th><strong>Group B</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>92</td>
</tr>
</tbody>
</table>

The figures quoted are a measure of prolificacy and are not to be confused with a lambing percentage. They contribute to the lambing percentage but so do a number of other unrelated features. The use I want to make out of these figures at present is to show the effect of age on prolificacy.

If the hill-country sheep man takes three lambs from his ewes under conditions similar to those on the Waipara farm of Mr Topp, his anticipated prolificacy would be 1.3 for the singles and 1.47e for twin ewes. But the fat-lamb raiser who has the ewes for two or three years of their mature life can anticipate a prolificacy rate of 1.5 for the single ewes or 1.7 for the twins even if the conditions are no better than those under which the ewes spent their first three breeding seasons. This age difference in prolificacy is of considerable practical importance and any work which aims at prolonging the breeding
life of the ewe must be rated as of considerable national importance. Where twins are available it is obvious that they too can contribute to high prolificacy.

We can summarise the position regarding lambing percentages as follows:

1. If lambing percentages are to serve any useful purpose there must be agreement as to the source of the figures used in calculating the percentage.

2. Even when lambing percentages are calculated on a common basis, care is required in their interpretation. They are the end result of such unrelated features as prolificacy in the ewes, fertility in the rams, general flock management and the vagaries of climate.

3. In the New Zealand lambing percentage there are considerable fluctuations from year to year. These can amount to differences of more than 1,000,000 lambs tailed.

4. During the past 30 years the national lambing percentage has increased steadily from 85.5 per cent. (for the first five-year period) to 94.9 per cent. (for the last five-year period).

5. There appears to be a good relationship between the weather during spring and the lambing percentage, together with autumn conditions as a contributing factor.

6. County lambing percentages (which in many cases must be accepted with some reserve) show that areas in which sheep farming is intensive and the flocks predominantly mature ewes, return better than 100 per cent. There is no evidence as to the relative contribution to the lambing percentage made by (a) the system of farming, (b) the mature ewes.

In conclusion I think it is important to emphasise that with our ewe flock now numbering over 20,000,000, each one per cent difference in the number of lambs tailed means 200,000 lambs. Improved
Lambing percentages offer a cheap method of increasing production and they could help the sheep industry as herd testing has helped the dairy industry.

Mr Hurst, Papakaio: Two years ago we had an excellent paper on lambing percentages by Mr Topp of Waipara. We know that Mr Topp keeps his twin lambs and that he feeds his sheep largely on lucerne. Is flushing with lucerne an important factor in Mr Topp's high percentages?

Mr Stevens: Although flushing does have an appreciable effect, some other things are equally important including weather. This may have an enormous effect, not on the number of lambs born but on the number which survive. At the College we had a flock of 200 experimental ewes. The first night of lambing we had one of those famous wet sou-westers. We lost 25 lambs which shouldn't have died. That lowered our percentage in one night by 12.5 per cent. Although flushing can be effective, management during lambing is even more important.

Mr Napper, Woodlands: Flushing is not the only thing of importance. Nutrition of the ewe is vital; particularly through the gestation period it is of even greater importance than flushing. The use of the turnip in the south is sadly abused and much of our mortality is due to a lack of protein in the diet of our animals. I would mention that lucerne is important because of its high protein content. We've had cases of farmers who can no longer produce fat lambs from old pastures which used to do so. I think there is a falling away of quality in the individual plants which change from a high protein to a low protein content. Right through this Conference we have had evidence of nitrogen deficiency. If we are to increase production we should think in terms of nitrogen and how to use it. This will give us more protein and therefore better quality in our crops and pastures, and better health in our animals.

Mr Topp, Waipara: I am not very concerned about flushing. Many farmers knock their ewes back after weaning, then give them a damned good feed and say they're flushed. My practice is to keep the ewes in good condition throughout their life and I think that is the main reason for my good percentages. My sheep are fed highly on lucerne but as they are on a big range of country they have to travel to eat and don't get gross as they would in small paddocks.

Mr Averill, Lincoln College: Work in England has shown that a flushing feed for three weeks gives good results. That is really what happens in Canterbury. We bring hill sheep to the plains and feed them well for three weeks before tupping. At Lincoln we did an experiment with ewes flushed on lucerne silage compared with those on pasture alone. The ewes on silage shed sufficient eggs to produce 150 lambs; those on pasture only enough to produce 140 lambs. When we slaughtered the ewes (to feed the students) we investigated mortality in the embryos. At the end of 30 days the ewes flushed on silage had 120 embryos per 100 ewes still alive. Those on pasture had only 97 per 100 ewes still alive.

Mr Turton, Ashburton Forks: Experiments at Ruakura showed that unless ewes were flushed for at least three weeks it was hardly worth while.

Mr Maxwell, Motunau: Has anybody conducted experiments to investigate the effect of soil type on lambing percentages? In our
district we can get only 90 per cent on greywacke country but on adjoining volcanic and limestone country they easily get 100 per cent. We wonder if there isn't a trace-element deficiency which may affect the percentages.

Mr Little, Hui Hui: Does the ability to produce twins also incorporate the ability to provide them with milk?

Mr Averill: Assuming that you are breeding from twins which have been reared successfully, the dams of those twins must have been good milkers. The capacity to produce milk is known to be a heritable quality.

Mr Cowin, Nelson: The high lambing percentages in England have been mentioned. I think they are the result largely of the breeds used. In Canterbury the sheep are largely of Merino descent, whereas in England the big majority are of Cheviot-Border Leicester type. These breeds are famous for their high lambing percentages.

Mr Bevin: So far the question of shepherding has not been mentioned. I think there may be some correlation between the rising percentages over the years and the subdivision of the larger estates into smaller holdings where the flocks get more individual attention. When we select ewe lambs for our 2-tooth flock we tend to pick the bigger ones and those in the best condition. Most of these will be singles. Does that mean that we are selecting away from twins? Has this practice any significance as far as lambing percentages are concerned?

Mr Stevens: I don't think it has had any great effect in recent years. We have been flock building at such a rate that there has been practically no selection and most of the twin lambs have been retained. By the time we come to breed from them they have usually caught up in size so much that you could not pick them from the singles.

THE FERTILITY OF EWES AND RAMS WITH SPECIAL REFERENCE TO DISEASES AFFECTING THEIR FERTILITY

R. Crawford, Investigational Officer, Veterinary Club, Gisborne

When one considers the matter of sheep fertility or lambing percentages, it is found that there are some main factors not entirely divorced from each other which affect the extent of a flock's natural increase. From the title given to this talk it is what many would expect from a veterinary surgeon by its reference to disease: but disease is only a facet for consideration and in many cases it may not be the most important cause of reduced economic returns to the sheep breeder. These factors mentioned can be broadly stated as including heredity, management, environment, nutrition and disease. Let us take a brief look at each of these noting how discussion of one requires more than a side glance at some of the others. It is impossible to keep each entirely in its own category; not because the fences are bad and there are bound to be "strangers," but because every farming enterprise must fit neatly into the jigsaw puzzle which is presented to the farmer and which includes matters outside as well as within the boundary fences. Remember that the opinions expressed are those of one who gained his experience on one particular type of
country, i.e. the east coast of the North Island, and, if grain can be winnowed from the chaff of his ignorance, so much the better.

Heredity was mentioned first because many flockmasters believe that pedigree points the finger to success with sheep—be it their wool, conformation, constitution or fertility. In fertility there are wide differences between breeds and of strains within breeds. If the breeds most suited to a farm vary in fertility, then the most fertile can be chosen. Note that they must be suited to the farm and high fertility can be disregarded if the climate is going to kill half the results. This is the limitation that environment places on selection of a breed for fertility. Stud masters know that, within breeds, strains and individual sheep inherit a propensity for being good breeders. Such knowledge means that selection in the studs for this will ensure it being transmitted to the commercial flocks. Selection of this type will include such things as ability to sire large numbers, to get in lamb readily, a pelvis roomy enough for easy lambing and avoiding wool-blindness. There are other things to be bred into or out of flocks. Wool-blindness is mentioned because ewes with it are bad mothers. The subject of heredity is left emphasising the thoughts of choosing breeds for the farm, and sires from studs where fertility is considered in their breeding plans and the results become obvious by the satisfactory number of lambs these rams leave.

Now, taking the matter of environment, it will be seen that it overlaps with heredity in choice of breed for any particular farm. This applies not only to rams but to flying-flock ewes. It is worthwhile knowing where fat-lamb mothers come from and how they adapt themselves to different country and conditions. With young rams, they should be bought from a similar environment or, if not, they must be bought early and given as long as possible to become acclimatised. Some people consider that we might get greater benefit, from the point of view of fertility, if more rams were bought as lambs. Turning now to environment on any particular property, knowledge of sheep husbandry in knowing the best paddocks for mating and lambing can affect the lambing percentage. Thus it is seen that the grazier must have clear ideas on general and special details; these are about the effect of environment on breeds and how best to depasture a breed on his land; experience will teach him more than books or lectures.

Ewes and rams will be considered separately as far as management is concerned. This word "management" will mean husbandry or shepherding. A close and critical scrutiny of New Zealand's sheep husbandmen and shepherds is greatly needed by our meat and wool industries; many of us might expect pats on the back; let us hope they would not be low in the back and delivered with a boot. The last sentence smacks of the brighter sayings of the upstart politician so let us come to consideration of the ewe and how she is to be treated through the year. After weaning as early as possible, the ewes can be fed on light rations until between two and three weeks before tupping. Then they are given better feed which amounts to flushing them. Dr Wallace's work at Ruakura has shown the effect of flushing in the increased number of twins. After tupping, the ewes can be reduced to short commons and returned to good feed about a month before lambing. Shearing or flank crutching before lambing can be considered; the latter in some ewes is necessary to give the lamb access through wool to the teats. As for shearing, again experience is the best adviser. Let the ewes know their ground before lambing commences. Good shepherding during lambing is important; here hard work, long hours, patience, skill and above all,
knowledge of sheep will bring just rewards in the number of healthy lambs tailed. If ewe lambs are kept for future breeding, their first year's management should ensure that they will become well-fed, healthy mothers. Now we are round to weaning again and culling has not been mentioned. Throughout lambling and when the ewes are milking all bad milkers should be marked. With "bearing trouble" ewes, these are usually culled. When ewes are culled for age, wool and type, don't forget to examine their udders. Those with diseased udders or teats that point at curious angles should be culled. Good shepherds will recognise these by their starving lambs earlier and they may be marked.

Rams are used for a short portion of the year and should not be forgotten for the remainder. They should be kept free of foot-rot all year; it's too late in the last month before tupping. Feed them well for a month after the tupping season and then adequately but not lavish for the last month before going to the ewes. By feeling the testicles many people with experience can tell when a ram is in his breeding season. The testicles become larger and firmer. The pink colour of the skin shows that the breeding season is starting but rams still breed well after it goes away. Veterinary examination before tupping should enable the elimination of diseased rams and indicate those which to use first. Remember that sheep have a breeding season and they don't all come to it at the same time. When rams are mated they should be in paddocks so stocked with ewes that they can easily cover the area occupied by the proportion of ewes alloted to them. Good husbandry and knowledge of the country must ensure that ewes do not come on heat in isolated places with no rams near. The number of rams per hundred ewes should increase after ten days. That is brief advice on some topics given without the reason why; for sheep management may reduce or entirely prevent reduction of fertility caused by some of the diseases yet to be mentioned.

Nutrition was the fourth main consideration listed earlier. It has been mentioned already in the flusling of ewes and reducing rations for them after weaning and in early pregnancy. The quantity of food available has been the only recommendation. In the case of pasture, care must be taken to ensure that it is available and that the weather does not limit the time of its availability each day. Quality of food is important. Rams before their tupping season need green feed. Trace-element deficiencies, apart from their effect on general health, occasionally strike severely on the lamb crop. Lambs born dead or dying soon after birth with goitre are a loss which is an indication of insufficient iodine or that their mothers, while in lamb, were fed on crops predisposing to goitre in unborn lambs. Further enquiry will have to be made into this problem as we do not know enough yet. It is thus seen that knowledge of quantity, availability and quality of food is required to get the best results in fertility.

The matters affecting fertility, other than disease, have now been mentioned, with omissions, and it should be clearly understood that, while many things are not mentioned, there may be inaccuracies in opinions expressed. People disagreeing with any statement or wanting to know the reasons behind suggestions will ensure a lively discussion if they give other opinions or ask questions. Some details for consideration in getting the best out of healthy sheep have been given. Such methods may increase resistance to disease or avoid its occurrence. This type of approach is most important, as good breeding and feeding practices will make the onset of disease more easily recognisable. That is, no confusion of the results of bad husbandry
with disease is likely in sheep well cared-for. If things go wrong, we must find out which disease is the cause.

Let us now look at the diseases which, directly or indirectly, reduce lambing percentages. Ewes with facial eczema get in lamb but often die the following spring. Avoidance of this disease is therefore important because the effect on ewes not showing obvious symptoms during an outbreak become manifest at the next lambing. Foot-rot has already been mentioned for rams but it predisposes ewes to sleepy sickness. Ewes too lame to graze, that are carrying twins, are bad risks for this disease. Any other upset to the pregnant ewe’s health is important although two only have been mentioned. Of the diseases commonly associated with pregnancy, some will be mentioned but described only briefly. Sleepy sickness is associated with a fall in nutrition in late pregnancy by ewes carrying twins. Prevention is suggested if possible; the day may come when the number of lambs inside a ewe can be counted accurately three months after tupping. That aid, with preferential feeding for those ewes, will be the best prevention. A treatment is being recommended about which we shall hear more in the near future. For those willing to try it themselves, here it is; add 4 ounces of glycerine to 4 ounces of water and drench the ewe with this twice a day for four or five days. This means that a pint of glycerine and a pint of water makes five doses. If ewes cannot drink, inject the mixture into the paunch. Bearing trouble also affects pregnant ewes. To those with greater knowledge this will be left for discussion. Ewes get milk fever before and after lambing. Treatment is advertised in the press for “lambing sickness” or is available from veterinary sources. If it does not cure, diagnosis may be wrong and the ewe has sleepy sickness or else the treatment is given too late.

Abortion in ewes has been receiving greater attention in New Zealand recently. Workers at Wallaceville Animal Research Station have found it to be widespread over the country. Four different types have been found caused by different bacteria. The ewe’s afterbirth is the guide to which laymen or veterinary surgeons can turn for easy recognition of some types. Other symptoms are presented, all of which should arouse suspicions. The typical signs shown, if abortion is in a flock, will include some of these:

1. Poor conception rate. If many ewes are still on heat at the end of the tupping season an infection may be present.
2. Abortions. Lambs “slipped” or born before due date. This is frequently not noticed nor is it the only sign to be seen. Staining around the female external sex organs during late crutching often indicates recent abortion.
3. Lambs born dead or dying in the first three days. A proportion of these are dead because the ewe is infected with an abortion-producing germ. It does not produce abortion always but lambs at or nearly full term have a poor expectation of life.
4. Diseased after-birth. These are easily recognised. With little experience, a shepherd can recognise them without getting off his horse. Later a description of different types of abnormality will be given for different diseases.
5. A high percentage of dry ewes. This is a suspicious feature whenever it is observed. If it is the only clue, it is helpful to know whether the ewes:
   (a) did not hold to the ram.
   (b) held and then aborted.
   (c) had dead lambs at or soon after birth.
   (d) lost lambs before marking.
Any evidence which will split dry ewes into these groups is of value. The day will come when the importance of this will be recognised and "dry ewes" will be a term with more meaning.

6. Wide yearly variations in lambing percentages. Providing no other reason can be given as highly probable, disease must be suspected, as infectious diseases give us some good years and then bad ones.

Of the signs mentioned, some will seem at the first glance to have little connection with abortion. Taking the first, where poor conception rate is noted it may be that the rams are infertile and cannot get ewes in lamb, but it is as well to remember that epididymitis in rams is caused by a germ that also causes abortion in ewes.

The appearance of diseased afterbirths and lamb livers:

Abortion type 1, caused by a kind of bacteria recently identified by workers at Wallaceville, is a variant of Brucella melitensis. Brucella melitensis causes abortion in goats in other countries but we have here a variant germ and not an identical one. It is widespread in both islands of New Zealand. Both rams and ewes are infected. Field diagnosis is easy and is based on the examination of the testicles of the ram and of the afterbirth, particularly of lambs born dead. The examination of the testicles is a veterinary matter but the disease of the afterbirth is so obvious that the stockowner should have no difficulty in recognising it. The affected afterbirth is often very much thickened, i.e. 1/16in. to 3/16in. in the case of normal, up to 2in. to 3in. in the case of the diseased afterbirth. This thickening is caused by the accumulation of a jelly-like fluid in the wall of the afterbirth. In addition to the thickening, death of the tissues changes the colour in parts from the normal rather deep red to a yellow white. The dead tissue looks rather like chamois leather.

Type 2. Research work is proceeding on this type and its causal organism. The ram is not known to be affected but the possibility exists. The afterbirth shows the buttons (cotyledons), to be enlarged, more firm and paler than normal. The buttons have also white areas on the surface shaped like millet seeds and varying a little in size. The membrane between buttons is slightly thickened near the affected buttons. Not all, in some cases only a few buttons, are affected in one afterbirth.

Type 3. Vibrionic abortion. This disease is widespread in the North and South Islands. So far as we know, the ram is not infected, but more work will have to be done before we can be sure of this. Field diagnosis is possible and is based on the examination of the livers of the lambs born dead. In our experience only about one liver in ten or twenty is infected, so that it is necessary to open up a large number of lambs before one can be certain that no vibrionic infection exists. There is no mistaking the lesions. The dark liver is studded with white dead circular areas varying in size from 1 inch to 1½ inch in diameter. The afterbirth is thickened and gelatinous with discharge of a fluid pus.

Type 4. The bacteria causing circling disease have been found to cause abortion in only one property so far. No obvious signs were observed in the afterbirth.

The recognisable signs and hints indicating the possibility of abortion in a flock have now been given. Once a doubt is in a
farmer's mind, professional help must be sought to deny or confirm the presence of the disease and to avoid future losses.

Other diseases occurring at lambing or later are blood-poisoning or blackleg and black udder. Veterinary advice about the former will be of use. In the same period lambs may get arthritis, pulpy kidney or diseases following docking, of which tetanus is one. Hygiene, husbandry and veterinary aid again should prevent or reduce these losses.

Diseases of rams can be divided into three main groups: general diseases which affect fertility, apparently minor upsets with effects on fertility, and diseases with obvious damage to reproductive organs. Of the general diseases, again as for ewes, facial eczema leaves the male infertile or poorly fertile for many years afterwards. Footrot in acute form reduces the ability to produce sperms and, in less active forms, prevents the ram from seeking ewes in his ground. Any disease which raises the body temperature temporarily, at the least, reduces male fertility. Too much wool on the purse in hot weather achieves the same effect; it is not a disease but, by its retention of heat in that area, acts similarly. The apparently-minor upsets include such things as dipping scald and frequent use of footrot treatments containing arsenic. The results of dipping rams in arsenical baths when they are in the flush is well known. Use of arsenic round the feet every few days makes its mark on the size and tone very clear. The seasonal increase of size and firmness of testicles does not occur; in cases seen, wethers would have been as much good. It must be added that these arsenical “footrot cures” produced their worst results where the rams lay in pens, wet from their recently treated feet, for many hours.

Of diseases with obvious damage to reproductive organs, the first to consider is injury. Injuries to the sheath are seen occasionally which prevent the penis being used in service. Many, but not all, come at shearing. Early recognition makes surgical correction easier. Injury tends to be cited as the cause of abnormalities seen in testicles after slaughter. This appears to be a contention lacking proof unless it is claimed that the occurrence is rare. A few infected wounds and abscesses are seen; but note the word “few.” Pizzle rot, if neglected, can seriously impair sexual performance. Veterinary advice will indicate methods of treatment and possibly future prevention. Mange of the scrotum (purse), has been shown to occur in flocks over most parts of New Zealand recently. Its effect on the testicles after long infestation is marked. The ability to produce sperms, while the sheep is “mangey,” is greatly reduced. If early cure is not achieved, the effect may be permanent. The wool on the purse is matted with a cheesey thick fluid in it. It has a typical smell. When the testicles are gently rubbed the ram lifts his head and champs his jaws. Time does not permit discussion of the treatment fully but it should be done under the advice of professional men. This is said because there should be certainty that mange is the cause of the trouble the owner notices and also because the mange mites live in the lower part of the legs as well as the scrotum.

Attention now comes to diseases in the testicles or closely-related sexual glands. They may, for the purposes of this paper, include conditions that do not mean “disease” to many. Such abnormalities as small and undescended testicles are examples. Testicles too small to promise economic breeding-efficiency, for the time of the year and the age of the sheep, may indicate failure to develop or they may have withered because of some previous
condition. Wide variations within normality occur and experience is required in a person designating testicles as "too small." One undescended testicle may not reduce fertility but it can be inherited and the pros and cons of buying such sires must be considered by the purchaser. Double rigs never breed while both testicles are undescended.

An infectious disease of sheep found in the testicles and accessory sex organs affects a considerable proportion of rams. It is called epididymitis because the organ most obviously affected in the male is the epididymis. It is obvious because the swelling and hardness of some part of the epididymis is easily felt. In many cases in slaughtered or castrated sheep it is also easily seen. So far, it has been stated that this is an infectious disease of sheep and it affects the genital organs of males. What else does it do? Transmitted to the female, it causes the abortion Type 1, already described. It is known that transmission can be from ram to ewe and then to another ram. As it is a venereal disease, we should know from the fate of a species supposed to have more brains how infectious it can be. What is the effect on the ram? After catching the disease, the ram is infertile after a short period. For a portion of one subsequent breeding season he may recover some fertility but is never again a good bet for high fertility. Always after infection the ram is a carrier of the disease. Once a ram is known to have it, his only future use should be as food for dogs. For reasons given, this should be obvious.

It must now be pointed out that there is yet a good deal to be found out about this trouble. How, it may be asked, do 2-tooth virgin rams get it? We know that vets have rejected rams as 2-tooths for this disease. We also know that a ewe can have a live lamb which grows to maturity but the same ewe can carry the germ and transmit it in her milk. That is an explanation which requires proof yet; but it is a conclusion that might be jumped to without getting sore feet. Much enquiry continues and will continue about this disease. We have some idea of its economic importance and this warrants investigation into methods of prevention and cure. So far, no cure is known nor is any adequate preventive measure. Its effects on lambing percentages can be reduced by the elimination of all affected rams from the flock by veterinary examination before tupping. This decreases its reduction of the fertility of the sheep on a farm but it does not get rid of the disease. If clean rams join the ewes, in another six months some of them can be suffering from epididymitis. The reasons for this must come from two possibilities which are:

1. Some of the ewes are carrying the infection, or
2. Rams showing no abnormality of the epididymis that can be felt are infected and therefore transmitting the disease. Present knowledge makes the second guess a probability: a few of the rams were clean to the sense of touch but would not be to the bacteriologist examining the semen.

Summing up about epididymitis, what do we find? An infectious venereal disease reducing the fertility of rams and ewes which is widespread over New Zealand. Work is now being done to combat its effect which is known to be nationally serious. At the present any farmer can take measures to reduce losses from it.

In conclusion, some remarks—however obvious—are required. In a relatively-brief talk, an attempt has been made to cover too many subjects with insufficient detail given about any of them. It was written for reading and, if a portion of those listening have
subjects about which they require more intense discussion the paper will have achieved its object. The fertility of our flocks greatly affects our national prosperity and few subjects demand wider exchange of ideas. Good ideas do not all come from laboratories or people holding professional status. In the matter of the woolly animals that graze the Dominion, I am quite sure of this. I would like to hear the opinions or queries of South Island farmers.

Mr Topp, Waipara: When they did their flushing trials at Ruakura did they try ewes which had been kept in good condition right through?

Mr Crawford: Mr L. R. Wallace at Ruakura showed that ewes which are flushed tend to have their first heat of the breeding season just a little sooner than do ewes which have not been flushed. The effect was, however, of such small magnitude as to be of little or no practical significance. Ewes which had been flushed, proved rather more difficult to get in lamb, returning to the rams more frequently. As a result, the mean lambing date was somewhat later for flushed ewes, and the lambing rather less concentrated. As a result of this situation, it was further shown that a higher proportion of barren ewes might be expected under conditions where rams are allowed to remain with the ewes for a definitely restricted tupping period. Flushing was shown to result in a considerably higher proportion of twins being obtained from those ewes which lambed. A period of flushing even as short as one week was shown to be beneficial in this connection but a flushing period of four-five weeks was necessary in order to obtain the best results. Certain limited evidence suggested that the beneficial effect of flushing may persist for approximately a fortnight after the flushing process is discontinued. The neo-natal mortality rate among lambs from flushed ewes was shown to be higher than among those from unflushed ewes. This was the result of a higher death rate among lambs born as twins, which were obtained in great numbers from ewes which had been flushed. Analysis of the data indicated that a properly conducted flushing programme may be expected to result in a lambing percentage, 20 per cent. higher than that obtained when no flushing is practised.

Mr Wheeler: Could epidydimitis be transmitted to the dog eating diseased organs and thus affect its fertility?

Mr Crawford: No. My dog always travels in the car with me. He has a wide taste in food and bits of rams, diseased or otherwise, have been a main article of diet. The last bitch he was mated with had eleven pups. There is no danger to dogs as far as our present knowledge goes.

Mr Little: Apart from disease altogether, what is the effect on ram fertility of change in feed or environment and the effects of transport during the breeding season?

Mr Crawford: All these have an effect varying according to the severity of the change. I think it is necessary to buy rams early and give them a chance to acclimatise in the district where they will do their life's work. Rams should not be transported during the breeding season. It is well known that one cold, wet, windy day during tupping will put the rams right off breeding and they may take a full week to recover.

Mr Bowmar, Gore: Do you advocate the purchase of rams as lambs?

Mr Crawford: We have no proof, but I think it is a wise plan as it gives them full opportunity to acclimatise before being used. I
do think the breeders pay too much attention to putting condition on rams before the autumn sales. They are so intent on preparation for sale that they give too little attention to other factors. This question of acclimatisation is a good argument for holding the ram fairs much earlier than at present.

A speaker: Can the disease be detected in lambs?

Mr Crawford: At present epididymitis can be detected only by feeling the testicles. Until we get a blood test we will not be able to detect it in ram lambs. Few 2-tooth rams have the disease. The rate varies from one per cent. in 2-tooth rams to 20 per cent in five-year-old rams. The risk you run in buying a ram lamb is very slight.

Mr Grant, Wainate: Most rams are now tested for soundness before sale. In some cases buyers have claimed later that the rams were infected. Would they have picked up the disease on the new farm or was the disease just latent?

Mr Crawford: All a veterinarian is entitled to say is that on the day he examined the ram there were no abnormalities. A ram may appear sound today and may show gross signs of epididymitis in a week. It obviously can develop very rapidly. It is possible that it can remain latent and become obvious to the feeling hand in a few days. I think it would take a minimum of four weeks from the time of infection to when it could be detected by feeling.

Mr Jebson, Rangiora: Experiments with artificial infection of rams showed that lesions took from three to twelve weeks to develop. As regards 2-tooths, although as already stated the incidence is usually very low, I would like to mention two cases where it was high. In one case of 66 2-tooth rams, 17 had to be culled because of infection. As hoggets they had been run with a mob of killer ewes on chou moellier. They had mated with these ewes (as was proved by some of the ewes being in lamb) and had thus become infected. In the other case of 14 rams, six were affected. They also had been run with ewe hoggets in the previous autumn. If you are breeding 2-tooth rams don't give them any opportunity to mate before sale.

Mr Hunt, Wanaka: Will it ever be possible to tell in advance if ewes are going to have twin lambs?

Mr Crawford: I hope that it won't be too long before we can do it. We need money to carry out the experimental work. It would have to be done with a special type of X-ray plant. If it could be done for one shilling a ewe it would mean a great deal to many people to be able to sort their flocks into those which had singles, twins, or no lambs at all.

Mr Bowmar: Would you define what you understand by a "dry ewe"?

Mr Crawford: In my investigation I try to find out how many ewes were dry before lambing (I call them the "dry-dry ewes") and how many were dry at tailing but were known previously in lamb (I call these the "wet-dry" ewes).

A speaker: Do you recommend quitting a dry-dry 2-tooth ewe or would you give her a second chance?

Mr Crawford: I have no sympathy with the non-producer. There is a farmer present who culls all the ewes which don't have a lamb. In recent years he has had to cull less and less. It is an excellent method of selection. But may I ask you to sell these culls to the works, not to some poor sucker who may attempt to breed from them?

Mr Blunt: Reverting to epididymitis—what methods do you recommend that we should adopt to control this disease?
Mr Crawford: I have no very hopeful answer. I compared 70,000 ewes in two countries for three years and found their lambing percentage to be within 0.8 per cent. of the county average. Each year for three years we removed all diseased rams. The lambing percentage in these ewes was five per cent. above the county average. This system raises lambing percentages but does not reduce the percentage of infected rams. The first year a farmer has his rams tested he shows a greater number of rejects because he gets rid of a number that have been walking round as "wool-bearing ornaments" for years. In my district the average number of rams of all ages that are rejected is about ten per cent.

THE DEVELOPMENT OF TWO FAT-LAMB FARMS

1. A. R. Dawson, Invercargill

Fat-lamb production in Southland has increased in a most spectacular manner during the past 30 years. Rapid progress has been made in the past 10 years during which the value of exports from the province has risen by 239 per cent, compared with the average New Zealand increase of 154 per cent. The province now produces 8 per cent of New Zealand's production and twice as much in value a head of population as the average for the Dominion.

Before discussing in detail the results in fat-lamb production on my own farm and those of two other well-known farms, I will describe some of the features under which our farming is carried out.

The productivity of Southland is more related to its suitable climate for farming than to its soil formations. In the coastal belt in which I live, the average rainfall is in the vicinity of 45 inches. Sheep farming is general with fat-lamb production predominating on the now fertile plains. The quality of fat lambs produced is unrivalled as is shown by the success of the province in winning the N.Z. Meat Board Shield Competition for the South Island on all occasions, except one, on which it has been competed for. Western Southland districts (my own farm is in this area), won the Shield with the past season's lambs.

The average carrying-capacity of sown grasslands of Southland is approximately equal to that of the Waikato at three sheep to the acre. (This comparison has been arrived at by using a conversion rate of six sheep being equal to one cow).

<table>
<thead>
<tr>
<th>Year</th>
<th>Killed</th>
</tr>
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<tbody>
<tr>
<td>1923</td>
<td>432,000</td>
</tr>
<tr>
<td>1933</td>
<td>1,141,000</td>
</tr>
<tr>
<td>1943</td>
<td>1,632,000</td>
</tr>
<tr>
<td>1952</td>
<td>2,069,595</td>
</tr>
<tr>
<td>1953</td>
<td>2,300,000 (estimated) but based on killings to 8/5/53.</td>
</tr>
</tbody>
</table>

Over a period of 30 years, the increase in fat lambs killed is thus almost 2,000,000. The breeding ewes in 1950 totalled 2,622,000.

The results in fat-lamb production on the three farms which I will now discuss with you, can be taken as somewhat typical of successful methods employed in Southland. They will, I think, indicate some of the methods by which the number and quality of fat lambs in the province have reached the present level.

Review of Procedure on my Farm:

My farm is situated five miles north of Invercargill and consists of a total of 455 acres.
It was divided into nine paddocks when I bought it in April 1920. Three of these were browntop-dogstail pasture, 50 acres in oats, 60 acres in turnips and the remainder of the area was useless swamp and run-out bidi-bidi, weeds and some browntop.

On taking possession, the initial stocking was 400 ewes and they produced 400 lambs. By early November they were so short of feed that I was forced to send 200 ewes and their lambs out to graze until the end of December. The previous owner had neither limed the land nor topdressed it and as can be imagined all lambs had to be fattened on supplementary feed. They were not ready for the freezing works until the middle of April.

In contrast, my stock in 1952 were 1500 ewes, lambs tailed 2130, and of these 1687 were drafted as milk lambs. Also, there were 60 head of cattle.

In the first ten years I ploughed, cropped and sowed out in grass, with ½ ton of carbonate of lime and 2cwt. of superphosphate to the acre and topdressed with the same fertiliser each second year.

In 1930, the ewe flock had increased to 800 ewes and about 50 per cent of the lambs were fattened as milk lambs at an average weight of about 34 to 35 lb. In 1934 one half of the pastures was topdressed with 5cwt. of burnt lime, 1cwt. 30% potash salts, and 1½ cwt. reverted super to the acre. The following year the other half of the pastures was similarly treated.

By 1935 the ewes had increased to 1200, with 1440 lambs of which 1050 fattened as milk lambs at an average weight of 36 lb. per head. I am of the opinion that the spectacular increase in fatmilk lambs was due to the addition of potash salts to the phosphate topdressing.

The year 1936 was notable in another direction of great importance to farming and fat-lamb production in Southland. It marked the commencement of lime-carrying by motor lorries on a fairly big scale. As a result I stepped up my liming programme and adopted the practice of applying 1½ tons to the acre for second-crop turnips, and 1½ tons to the acre on sowing out with grass.

The year 1940 marked a new phase in pasture management and treatment. I commenced a policy of buying 60 to 70 head of store cattle annually to control surplus pasture growth on which they were fattened. Also, cobaltised super was used for topdressing for the first time.

From 1940, to 1947 and 1948, each pasture as it was sown out was topdressed annually for six years with 2cwt. of cobaltised super and 8cwt. carbonate of lime to the acre. After the sixth year the pastures were topdressed each second year only.

A further change in topdressing procedure took place in 1947 and 1948 when potassic cobaltised super was applied. Since 1948 I have reverted to my usual 2cwt. cobaltised super, topdressing half the area in pasture each year.

I will now detail my fat-lamb returns:

<table>
<thead>
<tr>
<th>Year</th>
<th>Ewes Tapped</th>
<th>Lambs Tailed</th>
<th>Milk Lambs</th>
<th>Average Weight- lb.</th>
<th>L. Fat off Grass</th>
<th>Average Weight- lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920</td>
<td>400</td>
<td>400</td>
<td>nil</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1930</td>
<td>800</td>
<td>—</td>
<td>450 approx. 34/35</td>
<td>—</td>
<td>238</td>
<td>40.13</td>
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<td>1949/50</td>
<td>1400</td>
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<td>183</td>
<td>—</td>
</tr>
<tr>
<td>1951/52</td>
<td>1450</td>
<td>1950</td>
<td>1732</td>
<td>41.32</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>1952/53</td>
<td>1500</td>
<td>2130</td>
<td>1687</td>
<td>37.70</td>
<td>144</td>
<td>37.92</td>
</tr>
</tbody>
</table>
The figures quoted for the 1952/53 season give a grand total of 2068 lambs killed of which 1687 were killed as milk lambs. The average weight of them is rather lower than usual. This is attributed to a period of unusually dry weather which commenced in December and continued for some two months with a loss of succulence in the pastures. This was in violent contrast to the preceding luxuriant spring growth.

**General Methods of Management Employed:**

The rams used are Southdowns, the ewes are Romney-Cross. The replacement ewes are hill-country full-mouthed ewes bought annually. The grazing management is set stocking of ewes with lambs from lambing to drafting and weaning. During the set-stocking period, ewes are limited to five to the acre. When and where surplus roughage occurs, it is controlled by a mob of cattle.

Cattle are bought in annually, 60 to 70 of them, sometimes as yearlings in the autumn and alternatively as 3-year-old bullocks in the spring.

On my farm, about six acres of hay are saved annually; the hay is used chiefly for feeding cattle.

I usually have 20 acres of fodder crops with swedes as first crop on ley ploughing. In the following season the same area is sown to yellow turnips with perhaps, part of the area in choumoellier. The area is sown to pasture in the third season. The fertiliser used consists of $\frac{2}{3}$cwt. reverted super and $\frac{1}{2}$cwt. blood and bone to the acre. The grass-seed mixture consists of:

- 20lb. certified mother seed perennial ryegrass.
- 5lb. certified short-rotation ryegrass.
- 5lb. certified cocksfoot.
- 3lb. certified timothy.
- 4lb. certified white clover.
- 1lb. certified Mont. clover.
- 1lb. certified dogstail.

39lb. seeding to the acre.

This is sown with $\frac{1}{4}$ tons of lime and 3cwt. cobaltised super to the acre. Subsequent topdressing is 2cwt. cobaltised super, and 8cwt. of carbonate of lime to the acre annually for six years.

After weaning, I endeavoured to keep ewes on short rations with the object of reducing their condition until within two weeks of putting the rams out, usually about 5th April. The ewe flocks in Southland are usually very fat at weaning time. We usually have good, fresh, autumn growth from February to May and this provides excellent feed for flushing the ewes.

My flocks usually do not require supplementary feed until early in July, when they receive a ration of swedes or turnips for four to five hours daily, and 20 acres usually carries them until mid-August. The ewes are then spread out on the paddocks at the usual rate of five to the acre.

My ewes are station ewes and I buy in an annual draft of about 600. The reason that I supply them with little or no hay, is that they are not accustomed to eating it. To offset this, I provide a good run-off to pasture saved specially for the purpose.
I may state here that our winter period of dormant growth is now very much shorter than it was 20 years ago. The regular topdressing, adequate liming and the resultant building-up of fertility, has had the effect of enabling pasture growth to continue much later into the winter than formerly, and to commence much earlier in the spring.

With the object of making the most effective use of the rams, I have experimented with a number of different systems. About ten years ago, I settled down to the following procedure:—

I first put out rams at the rate of one to 70 ewes, then every four days add extra rams until there is one ram to every 45 ewes.

I am of the opinion that one of the important factors contributing to the high fat-lamb percentages obtained in Southland is the concentration of producers on the care of their earlier ewe flocks at lambing time. Usually four to five rounds of the ewes are made daily. This system enables personal attention to be given to each ewe requiring it. On my own farm I make at least four trips around the ewes each day.

Each set of twins is marked. I use a pressure oil-can filled with paint and we number the sets of twins from 1 to 100, using a different-coloured paint for each series. Sets of twins marked during the past season numbered 750. The twin lambs are separated from the singles and are placed in separate paddocks. This system of marking twin lambs is most valuable in cases where lambs become mistmothered during this first few weeks of life.

I sear the tails and have used rubber rings satisfactorily on the ram lambs for the past six years. This work is usually performed when the lambs are about three weeks old.

In common with practically all fat-lamb producers in Southland, I practice “set stocking” from lambing until drafting. (Rotational grazing has been advocated in some quarters and some farmers have tried it, mostly without success).

On my farm the objective in pasture management is to prevent an undue amount of roughage, and to keep the growth limited to about two or three inches. From October to February I have been successful in doing this by the judicious use of cattle. Wherever growth shows signs of being in excess of the requirement of five ewes and their lambs to the acre, I put in a mob of cattle to deal with it. The cattle are moved from time to time as the situation in respective paddocks demands.

In regard to the use of cattle, I am strongly of the opinion that a combination of cattle with ewes is conducive to more healthy pasture and soil condition than is the case where no cattle are used.

Conclusion:

I have endeavoured to present a description of many important features of fat-lamb production in Southland.

While there are many variations in the methods used by Southland farmers, in the main those which have been described have been fairly closely followed by those who have been most successful.

From my own experiences and observations over a long period, I have formed the opinion that the highest standard of success in fat-lamb production cannot be obtained, unless the farmer has mastered the art of good management of his soil, stock and pastures.
APPENDIX I

FAT-LAMB RESULTS AND METHODS OF MR N. H. JEFFERIES
SOUTH MORTON MAINS

Area of Farm:
634 acres including 14 or 15 of swamp, creeks and trees purchased in 1938. The previous owner carried 640 ewes and 300 dry sheep when half the farm was in browntop and several paddocks had not been ploughed for 35 years.

Mr Jefferies commenced a policy of liming and topdressing with cobaltised superphosphate.

CHART OF TREATMENT AND RESULTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Acres Pasture</th>
<th>Crop</th>
<th>Tons Lime</th>
<th>Tons Super Hoggets</th>
<th>Cattle</th>
<th>Tons Sheep</th>
<th>Horned Ewes</th>
<th>Milk Lambs</th>
<th>Total F. Lambs</th>
<th>Average Weight-lb.</th>
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<tr>
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<td>530</td>
<td>90</td>
<td>250</td>
<td>44</td>
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<td>42</td>
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<td>2000</td>
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</tbody>
</table>

TOPDRESSING AND LIMING FOR THE YEARS, 1949 to 1953 INCLUSIVE

All pastures topdressed with 2cwt. cobaltised super and 4 ton of carbonate of lime to the acre.

Dry Sheep: Ewe hoggets bought in each year from Mokoreta hill country.

Rams: Southdowns (bred on the farm).

Stock Tick: Double-strength cobalt in salt.

Drenching: The only lambs drenched are those which did not fatten as milk lambs.

Lime applied in first 10 years: 1939 to 1949—1795 tons.
## APPENDIX II
### TREATMENT AND RESULTS OF 618 ACRE FARM AT WOODLANDS

<table>
<thead>
<tr>
<th>Year</th>
<th>Acres Pasture</th>
<th>Crop</th>
<th>Swamp</th>
<th>Cattle Tailed</th>
<th>Lambs</th>
<th>Milk</th>
<th>Average Weight—lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1935</td>
<td>280</td>
<td>40</td>
<td>298</td>
<td>1000</td>
<td>820</td>
<td>424</td>
<td>35.7</td>
</tr>
<tr>
<td>1945</td>
<td>295</td>
<td>46</td>
<td>241</td>
<td>1280</td>
<td>1250</td>
<td>976</td>
<td>39.53</td>
</tr>
<tr>
<td>1950</td>
<td>298</td>
<td>32</td>
<td>241</td>
<td>1415</td>
<td>1530</td>
<td>1416</td>
<td>42.0</td>
</tr>
<tr>
<td>1951</td>
<td>344</td>
<td>42</td>
<td>216</td>
<td>1387</td>
<td>1761</td>
<td>1399</td>
<td>41.3</td>
</tr>
<tr>
<td>1952</td>
<td>336</td>
<td>50</td>
<td>216</td>
<td>163</td>
<td>1933</td>
<td>1638</td>
<td>39.64</td>
</tr>
<tr>
<td>1953</td>
<td>336</td>
<td>50</td>
<td>216</td>
<td>1977</td>
<td>2032</td>
<td>1740</td>
<td>38.33</td>
</tr>
</tbody>
</table>

### SUMMARY

Fat milk-lambs in 1935 were only 424 at average weight of 35.7lb.

Fat milk-lambs in 1935 had increased to 1740 at average weight of 38.53lb.

Cattle carried in 1935 were 80 head.

Cattle carried in 1953 had increased to 153 head.

(The cattle have usually been bought in the month of October).

**Rams:** Southdown.

**Limming:** On taking possession heavy applications were made with the object of reaching between pH 6.0 and pH 7.0—the lime was concentrated in several paddocks each year.

**Topdressing:** During the years of development, chiefly cobaltised super was applied. About 10 years ago a policy of topdressing one or two paddocks annually with potassic super was adopted.

In more recent years all pastures have been topdressed annually with 5cwt. of carbonate of lime and 2cwt. of cobaltised super to the acre, usually applied in the autumn. However, periodically 1cwt. only of the cobaltised super was applied in the autumn and a further 1cwt. applied in the spring.

The paddocks due for potash now receive it in the form of copperised potassic super.

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**Mr Haughey:** What precautions do you take for the control of disease?

**Mr Dawson:** We find if we don't increase our ewes beyond five to the acre and if we control our surplus growth with cattle that we don't get the same disease problem as do those who are heavy stocking with ewes and not using cattle.

**Mr Averill:** What is your percentage of dry ewes and how long do you leave your rams out?

**Mr Dawson:** My average over the years has been 2-2½ per cent. of dry ewes; that of course includes ewes which have slipped. I leave the rams out eight weeks.

**Mr Maxwell, Motunau.** How do you avoid high mortality with pulpy kidney?

**Mr Dawson:** Twenty years ago, I had heavy losses and might lose from 60 to 70 lambs. During the last ten years my losses have not been more than 20. Our experience in Southland has been that when you are building up your fertility you are in danger of losing a lot of lambs. The losses decrease once you have built up the fertility of the land.
The property is situated in the Hororata district about 40 miles due west of Christchurch and is mainly on the clay-down type of soil to be found along the foothills extending from the seaward slopes of Mt. Grey north of the Ashley River down to the Hunter Hills of South Canterbury.

I farm a total of 334 acres, of which 238 acres is heavy-clay down and the remaining 96 acres sharp-stony country adjoining the downs.

The rainfall in my area has ranged from the low level of 31.84in. in 1949 to as high as 51.23in in 1951, but the usual range is from 35in. to 40in. per annum.

The clay-down country is typical of the foothill country of Canterbury having about a foot of good loam over feet of stiff clay. This is really browntop country, partially subdivided with gorse fences and would quickly revert to browntop and gorse if left to its own devices. A characteristic of this type of soil is that it tends to lie very wet in the winter months and consequently the time available for cultivation is limited. It is not very easy to work and unless handled properly and at the right time, can be very difficult to break down.

The farming methods used for some 20 years were similar to those on any other farm in the area—out of grass to rape or skim fallowed to wheat, generally two crops, then perhaps oats or rape and sown down with Canterbury ryegrass—no lime or topdressing. The pastures usually ran out by the end of the third year.

Sixty to eighty acres was sown in wheat each year and yields ranged from 40 to 35 bushels according to season, but gradually declined. In 1940 in response to the call for more wheat, 80 acres were sown and yielded 21 bushels per acre. This was the deciding factor and convinced me that I had only two alternatives—to leave the farm and get a job perhaps as a farm adviser or to try some different method of farming.

I chose the latter and fallowed that wheat stubble till the following autumn and then broadcast 25lb. perennial rye, 3lb. white clover and 2lb. dogstail with 1 ton of lime. By 1945 I had been over the whole of the downs block using this method.

Each year following the sowing down of a pasture it receives ½ ton of lime and 13cwt. of super per acre in the autumn until a total of 3 tons per acre of lime has been put on that paddock, but continues to receive an annual topdressing of super. The practice of spreading the application of lime over a number of years instead of making one large application has proved more beneficial.

These pastures were put down with two objects in view, the first to take advantage of the lucrative seed market to obtain returns to further the build up of the farm, and second, pasture for stock. Ryegrass seed is taken in the first harvest and white clover seed in the second year and either ryegrass or clover seed in the following year according to prospects for seed and needs of stock. One paddock was harvested for seed in six consecutive years.

The pastures themselves, while tending to open up a bit with early harvesting, certainly improve with age. Yields of seed average about 30 bushels per acre machine dressed perennial rye first year, and 150 to 180lb. white clover in the second year—in subsequent years 10 to 15 bushels perennial rye and 50 to 60lb. white clover and in a wet season a good yield of dogstail.
As pastures improved, stock numbers were increased to cope with the feed, although the actual area available for grazing remained practically constant as from 1945.

In 1940 254 ewes were put to the ram.
In 1945 620 ewes were put to the ram.
In 1950 845 ewes were put to the ram.
In 1952 920 ewes were put to the ram.

The area for small seeds depended on the season but would be closed up by middle October. The remainder of the pastures could stand being doubled up with stock—the area in seed and hay being usually 70 to 80 acres each year. Seed, hay and other crops grown reduce grazing area available to stock, as indicated by the following figures.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Area in Seed, Hay and Cereals</th>
<th>Grass Available for Grazing</th>
<th>Grass for Ram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945</td>
<td>116 acres (86 seed and hay) (32 cereals)</td>
<td>202</td>
<td>626</td>
</tr>
<tr>
<td>1946</td>
<td>95 &quot; (73 &quot; &quot; &quot; ) (22 &quot; )</td>
<td>225</td>
<td>650</td>
</tr>
<tr>
<td>1947</td>
<td>115 &quot; (90 &quot; &quot; &quot; ) (25 &quot; )</td>
<td>205</td>
<td>669</td>
</tr>
<tr>
<td>1948</td>
<td>103 &quot; (67 &quot; &quot; &quot; ) (36 &quot; )</td>
<td>217</td>
<td>795</td>
</tr>
<tr>
<td>1949</td>
<td>130 &quot; (100 &quot; &quot; &quot; ) (36 &quot; )</td>
<td>190</td>
<td>828</td>
</tr>
<tr>
<td>1950</td>
<td>99 &quot; (54 &quot; &quot; &quot; ) (45 &quot; )</td>
<td>221</td>
<td>849</td>
</tr>
<tr>
<td>1951</td>
<td>107 &quot; (81 &quot; &quot; &quot; ) (26 &quot; )</td>
<td>213</td>
<td>918</td>
</tr>
<tr>
<td>1952</td>
<td>80 &quot; (59 &quot; &quot; &quot; ) (21 &quot; )</td>
<td>240</td>
<td>920</td>
</tr>
</tbody>
</table>

Although the sheep numbers have increased considerably the area available for grazing has remained fairly constant. The area in seed and hay is not wholly lost for grazing as it is available before shutting up in October and after seed or hay taken.

As a result of this improvement in pastures and annual top-dressing, ewes remain on the grass paddocks till the end of July with some grass hay to supplement in rough weather. Lucerne is grown on the stony block and 1400 to 1600 bales is saved each year from 17 acres. Approximately 25 acres of greenfeed is sown each autumn and will be dun oats, dun oats and lupins, or Italian ryegrass and lupins.

Ewes are rationed on greenfeed from 1st August with one bale lucerne to every 50 ewes per day. No turnips are grown now but prior to 1940 some 15 to 20 acres would be grown each year for the 2-300 sheep, and were fed with greenfeed and very little hay. Ewes lamb about 10th September when grass paddocks on the downs area have freshened up.

The practice has been to spread ewes in small mobs over the whole farm rather than have them in large mobs which dirty the grass as paddocks are usually wet in the spring. On several occasions after a good seed crop has been taken off in February, the paddock has been shut up and saved through winter to be rationed out to lambing ewes in the spring.

Lambing percentages average 110 per cent on ewes put to ram and in the first draft in early February 30 to 50 per cent of the total lambs go fat off the mothers. This lambing percentage is not outstanding and I can not give any good reason for it. Actual tailings of ewes with lambs average about 120 per cent but every
year there are too many dry ewes, amounting to about five per cent of the ewes put to the ram.

Rams are now tested for fertility but this has not made much differences to the lambing percentage. Ewes usually carry a fair amount of condition and it is hard to keep them down to good store order. As regards the flushing of ewes, it does not always work out in practice; for example, the autumn of 1948 was one of the driest for years and yet lambing percentages were considerably above average.

Rams used are Southdown and South-Suffolk cross and some young rams are purchased each year. Lamb-weight averages are about the 36lb. or better for the season and of course, as the total number of lambs sold increases, there is an increase in the total production of lamb meat.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number Sold</th>
<th>Total Weight-lb.</th>
<th>Average Weight-lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1949/50</td>
<td>*920</td>
<td>32652</td>
<td>36.2</td>
</tr>
<tr>
<td>1950/51</td>
<td>890</td>
<td><strong>32062</strong></td>
<td>36.0</td>
</tr>
<tr>
<td>1951/52</td>
<td>991</td>
<td>36231</td>
<td>36.6</td>
</tr>
</tbody>
</table>

* In addition 128 lambs were bought in and fattened, making a total of 1030 lambs fattened and a total weight of 37282lb. of meat.

** Weight estimated.

The weaned lambs are fattened mainly on rape and about 20 acres is sown each year, the area in rape determining the cropping area for the following season. Some lamb fattening is also done on lucerne after the last crop of hay in March.

The problem today is to decide which paddock to plough. This year a paddock of 25 acres sown to grass in 1940 was ploughed for rape and it seemed a shame to break it up.

Ewes are Corriedales and are purchased as 4-year ewes from North Canterbury and an attempt is made to buy the same sheep each year. They last three years and are culled and sold fat in Addington in June. On occasions they have brought more as fats than what it cost to purchase them three years previously, although this has not been the case more recently.

Wool weights too have increased considerably both in total and per head of sheep shorn as indicated by the following figures. It must be remembered that the stock do not have the use of the total area of the farm:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number Shorn</th>
<th>Total Wool (lb.)</th>
<th>Average weight per head (lb.)</th>
<th>Wool Weight per acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940/41</td>
<td>366</td>
<td>2,884</td>
<td>7.9</td>
<td>8.6 lb.</td>
</tr>
<tr>
<td>1943/44</td>
<td>515</td>
<td>4,630</td>
<td>9.0</td>
<td>13.9</td>
</tr>
<tr>
<td>1945/46</td>
<td>612</td>
<td>5,630</td>
<td>9.2</td>
<td>16.0</td>
</tr>
<tr>
<td>1949/50</td>
<td>848</td>
<td>7,422</td>
<td>8.75</td>
<td>22.0</td>
</tr>
<tr>
<td>1950/51</td>
<td>884</td>
<td>8,858</td>
<td>10.0</td>
<td>26.5</td>
</tr>
<tr>
<td>1951/52</td>
<td>864</td>
<td>10,038</td>
<td>11.6</td>
<td>30.0</td>
</tr>
</tbody>
</table>

As yet, cattle have not been used extensively although they would be very useful at certain times of the year as it is becoming increasingly difficult to control pasture growth. The wintering of cattle, however, presents difficulties. No doubt sufficient hay could
be grown for them, but they would damage the pastures on the clay downs by pugging in the winter months. Also, in my case, extensive fencing modifications would be necessary.

On the stony portion of the farm, paddocks are sown in a mixture of ryegrass, white clover, sub-clover and cocksfoot after the second year in greenfeed, the lime and super programme being the same as for the downland.

This block acts as a runoff for stock from the downs during wet periods and with the heavy concentration of stock, fertility has been built up considerably. Pastures there now compare more than favourably with those on the heavy land.

No drainage has been attempted on the downs, as no natural water courses exist to drain into, but it is a job that will have to be tackled one day. I once heard a well known agricultural officer in this district say that when the ground was wet it was too wet to drain and when it was dry it didn’t want draining anyway.

In the past this downland was regarded as poor fattening country for sheep and lambs, but in the light of my own experiences I am convinced that there are great possibilities for future development.

Chairman: How do you manage to keep on harvesting white clover when you have built up your fertility so much and have a fairly high rainfall?

Mr Oliver: I have had no trouble except in a wet season. At the same time I wish the stock white clover would flower a bit better.

Mr Leitch: If the cereal in the tables means wheat, that provides the answer as to why you can get a white clover crop.

Mr Oliver: Yes. We do knock the fertility back by taking wheat, whereas we used to get only 20 bushels; in 1948 we took one crop of 60 bushels, but I take only one crop out now.

Mr Cowin: Has Mr Oliver tried to graze his pastures with cattle in the first year? In Nelson we find difficulty in establishing pastures if we graze them only with sheep.

Mr Oliver: I’d hate to put cattle on our pastures in the autumn. I’d have no chance of harvesting white clover as I’d pug the country too much. I use a big mob of sheep to consolidate the pasture when it has been in about a month, taking them off each night. Later on I control with the mower.

A speaker: Have you ever considered using the Romney instead of the Corriedale?

Mr Oliver: No. Some people don’t like Chevrolet cars, some people don’t like Fords. I don’t like Fords.

Professor Flay: Might I ask what is the future ahead on both Mr Dawson’s and Mr Oliver’s farms?

Mr Dawson: I would not increase my ewes to more than five to the acre. I might be able to carry extra cattle.

Mr Oliver: I aim at taking 1000 fat lambs and some white clover. I was born conservative and I think I will remain that way.
CLOSING REMARKS

Chairman: "Before we close this Conference I would like to express my appreciation of your co-operation. We came here with many questions and in most cases we go away without the full answer. This is as it should be. Too easy questions would be an insult to the intelligence of 200 farmers. If we have learned something and heard different points of view then it has all been well worthwhile. I shall ask Professor Calder, the Assistant Director of the College, to close the Conference."

Professor Calder summarised the main points that had arisen in the delivery of the various papers and the subsequent discussion. He drew attention to the fact that in spite of the reduced population working on the land, production was nevertheless gradually increasing. He asked whether we were really concerned about the rate of this increase. He considered that as trustees of the agricultural industries we should endeavour to ensure that we are doing all we can to increase production and should also strive to see that others do all they can. He congratulated the executive on the quality of the programme which had maintained the standard of the previous years.

Mr J. H. Grigg expressed the gratitude of the Conference to the Director and staff of Lincoln College for all their help. It would be impossible to hold the Conference without them. He thanked the chairman for his guidance of the Conference and particularly for his brilliant opening address.

ANNUAL MEETING

The following suggestions were made for next Conference:

1. That someone should be appointed to sum up the papers and the discussions at the end of each session.
2. That a session should be set aside for the answering of questions, especially those which were crowded out of the discussions owing to lack of time.
3. That as many members as possible should reside at the College and take part in the informal evening discussions thus made possible.
4. Possible topics—
   (a) Wool and its Production in the South Island.
   (b) Farm forestry.
   (c) Trace Elements and Soil Testing.
   (d) Lucerne.
   (e) The Economic Side of Farming.
   (f) Disease in Live-stock.
   (g) Progress Report on Research into and Control of Epididymitis.

Any farmer is invited to send in further suggestions to the Secretary.