

LINCOLN COLLEGE

(Canterbury Agricultural College)

SCHOOL OF AGRICULTURE
UNIVERSITY OF NEW ZEALAND



The Proceedings of the Lincoln College Farmers' Conference 1951





Aerial View of the College

The Proceedings of the
Lincoln College
Farmers' Conference
1951



LINCOLN COLLEGE FARMERS' CONFERENCE, 1951

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THE POLICY OF THE NEW ZEALAND WOOL BOARD

N. R. Jameson, Ongaonga (Chairman)

(In the absence of Mr Jameson, this paper was read by Mr R. H. Bevin.)

The policy of the New Zealand Wool board can be summed up in two sentences: To further the interests of New Zealand wool growers, and to promote the usefulness of wool.

Those two brief headings cover every one of the numerous activities of the Board, and if to "New Zealand woolgrowers" you add "the woolgrowers of Australia, South Africa and the United States" the same two headings cover also the whole of the extensive international organisation now operating on behalf of the woolgrowers of these four countries.

The Board is a statutory body working under the authority of the Wool Industry Act 1944, and consists of six woolgrower members, two Government nominees and in addition, the Director-General of Agriculture is an associate member.

The representatives of the woolgrowers are elected by the Electoral Committee of the Meat and Wool Boards for a term of two years, but to preserve a reasonable continuity of policy three members only come up for election each year.

To finance the Board's activities, a wool levy on a per bale basis is struck, the present rate being 2/6 per bale, which measured in terms of the value of our product, does not seem excessive.

At the annual meeting of the Electoral Committee, the Board's report and balance sheet is submitted for consideration, and this meeting provides the fullest opportunities for a thorough examination of all the work conducted by the Board on the woolgrowers' behalf.

It is not proposed to explain in detail the system of election of the members of the Electoral Committee, except to say that it enables every sheepfarmer in New Zealand to exert some influence on the framing and applying of the Wool Board policy.

The functions and work of the Wool Board can conveniently be summarised under the following headings:—

- (1) To promote the use of New Zealand wool in existing or new markets by publicity and other means.
- (2) To promote scientific or industrial research into wool and sheep problems.
- (3) To represent the woolgrowing industry in an advisory capacity to the Government.
- (4) To act with similar bodies in other parts of the world in furtherance of its object. This refers to its association with the Wool Boards of Australia and South Africa in the maintenance and direction of the International Wool Secretariat, and to its association, through the Secretariat, with the woolgrowers of America in the Wool Bureau.

As part of its general function of representing the wool-growing industry the New Zealand Wool Board, through its members, participates in the direction of five other organisations. These are:—

- (a) The New Zealand Meat and Wool Board's Economic Service

which was set up by the two Boards in 1950 to collect and provide useful data on the sheepfarming industry in all its branches.

- (b) The New Zealand Woollen Mill Owners' Research Association, which maintains and directs a wool research and service laboratory at the University of Otago. In this enterprise the woollen mill owners are partners with the Wool Board and of the Department of Scientific and Industrial Research.
- (c) The Veterinary Services Council, which encourages the provision of efficient veterinary services for the owners of livestock in New Zealand.
- (d) The Roster Committee, which draws up and supervises the wool sale dates in New Zealand.
- (e) The New Zealand Wool Disposal Commission, which, as the agent in this country of the Joint Organisation, was established to dispose of the wartime wool surplus in conjunction with the marketing of current clips.

Recently there was set up an Advisory Committee under the Wool Proceeds Retention Act, and the Board is represented on this Committee.

Let us now take a more detailed look at the functions and work of the Wool Board under the four main headings already given.

Under the first heading of **Promotion and Publicity** we cover a wide field in this country. Written and pictorial publicity material for wool is placed with daily newspapers and periodicals throughout New Zealand, and, through the International Wool Secretariat, with overseas publications. Material is also supplied to the broadcasting stations in New Zealand.

Educational material is provided for schools and colleges in the way of wallsheets and maps, booklets and pamphlets, from which the children can learn the importance of the wool-growing industry.

The Board also co-operates with the New Zealand College of Retailing by supplying the College teachers with the latest wool information, especially designed to aid sales of woollen and worsted materials and garments across the counters in the retail stores.

Yet another avenue of publicity is through films and filmstrips, of which the Board maintains a comprehensive library, which is constantly in use.

Mannequin parades and fashion displays are used to bring before the notice of the public and particularly the womenfolk, the advantages and virtues of wool for wearing apparel. Emphasis is laid on wool's usefulness for all occasions and on the fact that the International Wool Secretariat's slogan, "There is no substitute for wool," is literally true.

With the increasing rise in the price of wool the threat of synthetic and substitute fibres is undoubtedly increasing and for that reason the Board believes that promotion and publicity work for wool should if anything be intensified to meet the growing competition of rival fibres.

Incidentally, it is not the policy of the New Zealand Wool Board to "knock" competing fibres and fabrics. All publicity is directed towards emphasising the advantages of wool. Fortunately, we have a product that enables us to adopt this positive approach without any difficulty. Because wool is in fact a worth-while commodity we

feel that we do not need to criticise other fibres; it is enough to tell the story of wool.

Under the heading of promotion we can conveniently deal with the Wool Labelling Act, of 1949, which came into force in April of 1950.

Broadly speaking, the Act provides that all products containing 50 per cent. or more of wool must be labelled, giving the wool content, and in the case of goods containing less than 50 per cent., if they are called wool or worsted, they must also have a label giving the wool content.

If goods contain 100 per cent. of wool they can be labelled "all wool" or "pure wool," and in all cases the label must be in the English language. Provision is made for a tolerance of up to 3 per cent. for variation in manufacture and also 7 per cent. for ornamentation.

In preparing the Act, the Board profited from the example of other countries where too-complex labelling laws prove difficult to enforce, and evolved a simple form of legislation that is easily understood and easily enforced.

Now for the second heading—**Promotion of Scientific or Industrial Research into Wool and Sheep Problems.** As has been already mentioned, the Board has some say in the control of the wool research being carried out at the University of Otago, through the grant it makes each year to the New Zealand Woollen Mill Research Association.

In addition to this, the Board each year offers two bursaries to assist New Zealanders to take post-graduate courses overseas, improve their knowledge and experience of sheep and wool research, and then return to give this country the benefit of it. The Board is concerned that not enough interest is taken by the young scientists of New Zealand in the Dominion's principal industry—farming and wool-growing—and it intends to do all in its power to foster scientific research and development in this regard.

As a direct contribution of its own to the cause of science in the sheep industry, the Board, in conjunction with the Meat Board, operates the New Zealand Meat and Wool Board's Economic Service whose function it is to inquire into the economics of wool and meat production. For a long time now the need has been felt for a collection kept continually up to date, of reliable and comprehensive data on sheepfarming and woolgrowing. The Economic Service is intended to meet this need.

Under the heading of **Representing the Woolgrowing Industry in an Advisory Capacity**, the Board is continually active, the most recent instance being an association with other farming interests in the enactment of the Wool Proceeds Retention Act, and representation on the Advisory Committee set up to recommend to the Government, general principles that might be followed in dealing with cases of hardship.

As growers are aware this Act "froze" one third of this season's wool cheques in the growers' own accounts, and the Prime Minister has now made a statement regarding the release of the money. Looking to the future, the Prime Minister has given an assurance that discussions with the interested parties will take place prior to the next wool season.

In its advisory capacity to the Government, the Wool Board has also played a leading part in the negotiations which have led up to the proposal to set up a Commonwealth wool-marketing authority to take the place of the Joint Organisation when it ceases operations at the end of this June.

The New Zealand view has always been that some such post-J.O. organisation is highly desirable and the Wool Board has consistently advocated this view.

The proposal as it stands at present is that a Commonwealth Wool-Marketing Scheme, somewhat similar to the J.O. should be set up with the object of buying wool in at reserve prices, should that become necessary. The scheme necessarily envisages the continuation of the present open-auction selling as the very foundation of wool marketing in the British Dominions.

The capital for the new scheme is to be found by the participating Governments, as well as by the growers in the three countries concerned. The United Kingdom Government, as representative of the consuming interests, will also take an active and financial part in the new authority.

As you are aware, New Zealand is in the happy position of having already in hand enough money to provide its share of the finance needed for this scheme to operate. I refer to the surplus J.O. contributory charge funds in the growers' account, and also to the New Zealand Government's half share in the J.O. profits which by arrangement between the Government and the Wool Board is available for financing a continuing marketing scheme.

At the time of writing this address the Australian woolgrowers had not reached a decision as to their participation in the scheme. They are taking a referendum on the proposal, but this was delayed by their Parliamentary Elections.

One of the most important of the functions of the New Zealand Wool Board is the fourth one I have mentioned—**To Act with Similar Bodies in other Parts of the World in Furtherance of its Objectives.**

You are well aware, of course, that it is the Wool Boards of New Zealand, Australia and South Africa, which established the International Wool Secretariat and maintain and direct its operations.

The Secretariat operates in the United Kingdom, and in nearly all the large consuming countries of Western Europe. In the United States of America it has comparatively recently joined forces with American woolgrowers in an organisation known as the Wool Bureau Incorporated, which carries out on the North American continent the same wool-promotion activities as the Secretariat does in the rest of the world.

The Secretariat also has offices in India and Pakistan, and it is planning expansion into other potentially-large consuming countries not yet touched by it.

Operating under four main heads—publicity, education, economics and scientific and technical liaison, the International Wool Secretariat is recognised as the world authority on all matters pertaining to wool, and it can fairly be claimed that not a little of wool's present strong position in the markets of the world is due to the efforts of the Secretariat.

Each Wool Board is directly represented on the Secretariat by its

own appointee. New Zealand's member, Mr Reginald G. Lund, is at present chairman of that body. At regular intervals members of the three Wool Boards meet in London as the International Wool Publicity and Research Fund executive, to determine the policy of the Secretariat.

It should be emphasised that the Wool Board is not a marketing organisation. It does not take any part in the buying or selling of wool, and must not be confused with the Wool Disposal Commission, which is a marketing organisation.

To conclude, I wish to emphasise the policy of the Board as given at the beginning of this address—**To further the interests of New Zealand woolgrowers, and to promote the use and usefulness of wool.** All the work of the Wool Board, as outlined, and of necessity it is only a summary, is at present carried out at a cost to the producer of 2/6 per bale. This also covers New Zealand's share of the work done by the International Wool Secretariat and the Wool Bureau which at present operates in fourteen different countries.

Mr M. Turton, Ashburton—Is the grant made by the Wool Board and Meat Board to the Veterinary Services Council and Clubs, considering the problems we have in the Sheep Industry and also in Dairying, sufficient?

Mr Bevin—I cannot answer that question as yes or no. The decision on the size of the grant is determined by the organization built up by various boards. A point of importance is that we are all becoming more and more aware of the necessity for a more extensive veterinary service in New Zealand as we appreciate what has been done in the past and what might be done in future.

Mr J. R. Little, Hui Hui—A point which is worrying many of us is the principle of the creation of very large sums on meat and wool pools which are accumulating yearly and held in pool. It seems to me to create a lot of unbalanced economy, having a large sum of money bottled in these pools which cannot be realised without upsetting the economy of the country. My suggestion is to consider the possibility of a smaller rate on both meat and wool and let the Board operate on the pool funds.

Mr Bevin—The Board now has sufficient funds to allow consideration of a post-J.O. scheme. As to how future operating funds should be collected by levy, this is a matter of policy and I will pass the suggestion on to the Board. There is, too, the working of the Wool Disposal Commission which has to do with the contributory charge which should not be confused with the levy.

Mr Little—No farmer objects to the very small levies and we fully realise the good work the Boards are doing. No one grudges a contributory charge in view of the immense amount of good work—it is the general policy of greater and greater sums being locked up.

Mr D. S. Studholme, Ashburton—I would like to know whether the wool research which the Wool Board sponsors and undertakes to support is only when the wool leaves the sheep's back. There are a great many questions for the research before leaving the sheep's back—e.g., dermatitis. Are they left to this College, or does the Wool Board definitely undertake to support that kind of research?

Mr Bevin—The Board of course does not carry out research as such but is anxious to assist wherever possible in any research concerning the sheep industry. This is a matter which the Dept. of Agriculture and the Colleges through their animal husbandry sections are constantly keeping in touch with. There are other members in the assembly better able to tell us what is being done regarding dermatitis than I.

Professor E. R. Hudson, Lincoln College—I assume that everyone present knows that Mr Bevin is acting as representative of the Chairman of the Wool Board. He was at one time a member of the staff of this College, but is now the officer-in-charge of the Economic Service of the combined Meat and Wool Boards. He cannot commit himself or make any statement of policy. I am pleased that the discussion has gone as it has, because this question of research and the application of funds is an important one, and if I were a member of the Wool Board I would be seeking an opportunity such as this to find out what are the major problems of the farmers today and how they can best be tackled—disease, marketing, commercial activities, feeding, loss of lambing—what are the factors limiting efficiency and profitableness of the wool industry, particularly in so far as these things are amenable to research to effect findings. A large number of you are the owners of flocks—what are your headaches in connection with those flocks?

Mr J. H. Grigg, Ashburton—In answer to your question—one of the serious problems facing the wool grower at the moment, especially in wet seasons, has been the loss from fly strike, undoubtedly caused by some form of fungus in the growing wool which after rain is attractive to fly. It strikes this wet parasite in the wool and causes a great loss to the Sheep Industry. I think research money should be found by the Wool Board and the Meat Board to investigate this problem.

Professor I. E. Coop, Lincoln College—As far as I know the Wool Board makes no direct contribution to research on the sheep itself but makes an indirect approach. The sum given to the New Zealand Research Association is £500 a year. If the farmers of New Zealand want research done, they should take it up directly with the Wool Board. My own efforts to interest the Wool Board in getting work done have not been very successful.

Dr. J. F. Filmer, Wellington—Could Mr Bevin give us a little about his own part in the organization—the economic service? The dairy service, are very fortunate in having a service of that kind for a number of years. They have been able to pin-point their problems and estimate the economic value and put the drive behind the request for research on the things that matter most. It would be extremely valuable if we had some real indications as to what we should do first. That is always the problem in research; we cannot simultaneously investigate all the problems brought under our notice. If Mr Bevin could indicate to you what he is doing and to what extent the Meat and Wool Boards will be able in future to pin-point the problems of the sheep industry we would be going quite a long way to direct research into the best avenues.

Mr Bevin—I have always felt, and my observations round the country last year have brought it out, that the stock farmers of New

Zealand have encouraged or welcomed research into their problems in proportion to the value per head of stock they have. That is why the dairy industry, with its valuable cows, has moved ahead with the research side more than the sheep industry—after all, when a ewe was worth only 25/- it was not so important if they died, but now they are worth so much more there is greater interest being taken by the whole of the sheep industry. An advisory service to the dairy industry was set up to find out where were the main cases of loss in the industry. The Meat and Wool Board decided to set up the Economic Service to try to get some idea of the economic side of sheep farming. The sheep commission stated they could not get any definite information on the economics of the meat and wool industry. In addition to getting those facts we are trying to get a picture of management, and the incidence of disease. The work we are doing at the present time is carrying out a survey of the farms throughout New Zealand, and in amongst the material we get from the farmers will be the detail of their losses of stock and as far as possible the cause of such losses. Incidentally, unlike the dairy industry, which is worked over small areas, the sheep are carried over big areas with a large number of stock. If a ewe dies it might be a day or so when you find out. It is often difficult to say what stock did die of—difficult to pin-point the cause of loss. We are collecting information all over New Zealand which we could in due course take along to Dr. Filmer. We are particularly encouraged in our work by the assistance given to us by the farmers in the districts we have been in—mainly the fat lamb districts. The sheepfarmer is now definitely aware of the fact that there are avenues of assistance open to him.

A speaker—Could we hear today the approximate amounts that are given to scientific research and how this is spent, whether on wool research or wheat research. I understand that only the levy of 2/6 on the bale of wool goes for this purpose.

Mr Bevin—The expenditure on research, bursaries and so on last year was between £5,000 and £6,000; Bursaries £1,274; Grant to N.Z. Woollen Mills research £500; Veterinary Services Council £1,600; economic survey £2,000.

A speaker—What percentage is that of their total income? The money that is spent on scientific research is not enough. There could be a long way more spent on scientific research.

Mr Bevin—The contributions of the Board may not be great. But agricultural research in New Zealand is going on through various avenues of activity—through the D.S.I.R., the Department of Agriculture and Colleges. This amounts to a considerable percentage of the total revenue derived from stock in New Zealand and although the contribution of the Board directly may be small, farmers are contributing quite a reasonable proportion of their income in animal and other agricultural research.

Mr T. A. McKellar, Banks Peninsula—The Wool Board should press the Government to have our standard value of flocks regarded as capital and not as revenue as at present.

Mr Bevin—There is a commission that has been set up to consider the taxation problems of the country. The farmers' organiza-

tions are definitely taking up this matter of stock values.

Mr Morton, Wanganui—Referring to the question raised by Mr Studholme. Deaths last year were one in eight. I think this Conference could bring forward to the right authority that research could be carried out. What funds has the Wool Board to go on with a proposed J.O. scheme?

Mr Bevin—The New Zealand Government: Half share of the J.O.—13.9 million pounds; balance, anticipated—3.5 million pounds, making a total of 17 million pounds (approximately). This would be ample to cover the New Zealand share of the post-J.O. scheme set up with Australia, South Africa and the United Kingdom. There are also about £6 million in the growers' contributory charge account.

Mr Cowin—As regards the first figure quoted—13 million—the farmers have no claim to that money at all. It is only by the goodwill of the Government that that money is going into the J.O. scheme.

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MAINTENANCE OF STOCK NUMBERS ON HILL COUNTRY AND THE SUPPLY OF SURPLUS STOCK

D. McLeod, Cass.

This is really one question as I see it, treated first as it concerns the hill country and secondly as it concerns the general body of farmers.

Obviously the better class hill country has no serious problem in maintaining its stock and it is only when harshness of climate or poverty of pasture reduces the production of lambs that the question arises. In the South Island this is mainly in what we call the High-Country—and I shall use that description to cover all country which comes within our scope—even if it is not high in altitude above sea level.

It covers a great variety of soil, climate and vegetation, and may include such widely differing types as the bush country of Nelson, Molesworth, Mt. Algidus, the Central Mackenzie, Queenstown, and the browntop hills of Southland. Wet country, dry country, bush country; safe country and snow traps, big stations with 20,000 sheep and bare subsistence holdings; each type and individual place has different problems and requirements. They have only one thing in common—none of them is ever quite free from the problem of maintaining their stock numbers.

Like a human population problem it is just a question of birth rates and mortality—lambling percentages and death rates; and what a high country manager has to do is to try to keep his lambing percentage up and high death rate down. A lambing percentage of 80 and a death rate of 10 will give him enough lambs to keep up his flock, and a surplus to cull. A 70 per cent. lambing and a 15 per cent. death rate will put him into the position of being short of replacements.

There are two main breeds in the High-Country, Merino and Halfbred, and their characteristics lead to a different method of man-

agement. The Merino is slower maturing and longer lived, which compensates to some degree for its lower lambing percentages. It is less saleable as a rule when cast for age, and so the tendency is to keep it to the limit of its economic life; or even to let it die on the country, which means keeping it past the limit. Slow maturing also means that though the economic life is longer, breeding starts later and two-tooth Merinos are seldom fit to breed from. The policy of keeping the ewe to the limit of her age results of course in raising the apparent death rate of the property. There are certain places where the country is usually hard on teeth and this is a complicating factor which forces the disposal of the ewe at an earlier age than would otherwise be necessary. Merinos are now mainly confined to the drier districts where their wool production is highest.

Half-breds have taken their place in most of the heavy rainfall areas for a variety of reasons which I have not the time to analyse here. They are quicker maturing and have higher lambing percentage but a slightly shorter effective life. To compensate for this they have a comparatively high disposal value if sold while they still have sound mouths, and fortunately for us, most of the wetter high country is easy on mouths. We can sell a technical five-year ewe with a chisel mouth whose true age it would be better not to enquire. Two-tooths are usually bred from, but I suspect that some very low percentages are obtained.

Now we come to the possible methods of bridging the gap between births and requirements.

1. Purchases of stock.
2. Raising lambing percentages.
3. Reducing death rates.
4. Developing new breeds.

I shall take the purchases first because they are the least important. There was a time when large numbers of fairly suitable stock were available at places like Tekapo, Culverden and Omarama. They came from the better class High-Country places which had young stock to spare and they were bought on a large scale by the less fortunate ones or by those who had struck a bad snow. Where are those sheep today? Why are they no longer there? I think it goes back to the period of peak stock numbers which persisted from round about the 1890's to the 1930's. They were living on capital; productivity accumulated in the soil, and were gradually exhausting fertility. In addition they were probably carrying too high a proportion of ewes and so exhausting their winter country in particular. That is why more and more stations are reduced today to the subsistence level in replacement of stock. Occasionally a good year for lambing will throw a few thousand lambs on the market; but more often the only opportunity the High-Country men have had of getting extra stock in recent years is the occasional abandonment of a property, a grim reminder of the wolf that lurks at all our doors.

The raising of lambing percentages is a question familiar to all farmers, but in the High-Country the courses of action are very limited. Supplementary feed for the whole ewe flock is out of the question so it is entirely a question of management of pasture.

It seems odd that rudimentary warnings like these should be necessary, but you would be surprised how commonly these mistakes

are made when sheep are being handled in large numbers. Quite often they are very difficult to avoid.

First and foremost do not overstock. Second, do not keep mobs of ewes starving in bare paddocks when you muster them for drafting for the ram, crutching and so on. Third, it is better to give the ewes free range and plenty of feed when tupping than hold them on small blocks for fear one or two miss the ram. Fourth, do not hunt them down off the hill during tupping—the ewes will go back up the hill, a tired ram will not. If you want to make sure the country is covered by the rams, put some extra rams out, working them quietly up into the odd corners of the blocks, one or two at a time. Do not try to lamb too early; late lambs are better than no lambs at all.

The question of feeding rams before they go out is much disputed. Many Merino men I know will have none of it, but how often have I seen groups of dejected rams collected on the flats long before tupping is over. There was no need to muster the ewes to take the rams out—you had only to drive them away. We always feed out halfbred rams on chaff for a few weeks before tupping and I have never seen rams come down the road trying to get back to the paddocks after they have been put out with the ewes. That is my personal experience for what it is worth.

Reducing death rates is quite a big question, too. Most people imagine that death rates in the High-Country are mainly in the winter. That is not the case by any means, but it is very hard to prove just when they do occur, because you cannot count your dead sheep on the hill. Our only means of telling losses is in the two "complete" musters—shearing and autumn. Of these the autumn muster is notoriously unreliable—very considerable numbers of stragglers are often left; so we are reduced to the shearing muster to establish a true tally. That means we cannot tell accurately how many sheep died in winter and how many in summer. Winter death rates can be reduced by light stocking, good shepherding, and in some cases by provision of artificial feed. Summer death rates are mainly dependent upon weather, and the particular nature of the property. It is significant that on three places I know where there are areas of very high summer country the owners have suspected they were having sheep stolen during the summer.

The question of artificial feeding is interesting High-Country men more than usual just now because the high price of wool makes many practices economic which would not normally be so. We must be careful about this of course because nobody imagines that present prices will be permanent.

First of all only a proportion of stations has enough suitable land to cultivate. The cost is very high owing to isolation and the return per acre is low on account of the short growing season. There are three crops which have been grown effectively—turnips, oats, and grass. Turnips include swedes and grass includes clovers and lucerne. The use which can be made of these crops consists mainly of increasing the winter-feeding capacity of the property though there are a few places where moderate altitude, good climate or irrigation permit the development of productive "summer farming." In the majority of cases supplementary feeding can benefit only a small proportion

of the total flock. Either all or part of the hoggets or perhaps the older ewes can be fed. On some places they make hay alone and use it simply to provide emergency feed in times of snow.

The supplementary feeding of hoggets may reduce their death rate 10 to 20 per cent. This alone may result in making enough two-tooth ewes available to keep up the flock. One of the difficulties is that it cannot be kept on long enough in the spring. The grass begins to grow so late in the High Country that there is apt to be a horrid gap between the end of turnips in September and the real spring which is often not till November. I have toyed with the idea of greenfeed oats or rye-corn to fill the gap, but the area would have to be considerable and the cost would be high. There is some discussion at present about the possibility of other forms of artificial feeding. Contact with American woolgrowers has revealed that a variety of concentrates are used over there as supplementary winter feeding but we know little about it and it is doubtful if the foods would be available here at a reasonable cost.

Altogether we cannot help the conclusion that the happiest High-Country men are those who have a nice safe bit of country with sufficient hogget and ewe country, and have never dabbled in cultivation at all.

The question of breeds is as old as the provinces. Many breeds have been tried but the High-Country is pretty firmly tied to wool and attempts in the past to run Cheviots, Romneys or other mutton breeds have not survived. It is a little difficult to convince some people that this should be so, and I was rather at a loss the other day when an earnest student asked me whether Angora goats might not be a payable proposition! You can imagine my horror at the suggestion, but I did not know enough about the horrible creatures to be able to dispose of them in a few well chosen words! In the dry semi-desert areas the dainty feeding Merino seems the obvious choice of all known breeds and even in the wetter districts the carrying capacities are so low that light-boned active types would seem to be essential. What the effect would be of running Scotch Blackface or Welsh Mountain sheep, I do not know, but it is difficult to believe that any increase obtained in sales of surplus stock could compensate for the much lower value of the wool. Besides this it would be likely to result in the same mistake to which I referred before—carrying a high proportion of ewes in order to make money out of the sale of stock. Wool farming is likely to do less damage to the country than any other and the general tendency today is to run only enough ewes to keep up the flock numbers, selling as surplus only cast-for-age sheep, unwanted wether lambs and perhaps a few cull ewe lambs or two-tooths. There is one bred that I have not referred to and that is the Corriedale. It is so important and successful in hill-country farming that most people have wondered why it has not been accepted in the high country. We are told it hasn't the constitution. If that is so, why is it so? I can't believe that it is an inevitable result of establishing a new breed in such a way. It must be only the consequence of breeding sheep which are too good for a certain environment. There are ample precedents in cattle and other stock for such results. There are some successful Corriedale flocks in High-Country and I hope we shall hear during this Conference

something of the policy adopted in their breeding. The point I wish to make here is that the first-cross halfbred rams which most of the High-Country halfbred flocks use, have one big disadvantage—they leave a high proportion of lambs of uneven type. This aggravates the problem of replacements because one often has to keep ewe lambs which are not true to type—either too coarse in the wool or too rangy in the carcase,—simply because one hasn't enough lambs to cull any. This results in a progressive deterioration of the flock type. If sufficient hardy sires of fixed type were available, I believe it would do much to improve High-Country stock in the halfbred areas.

There is one other step which may help to overcome the difficulty, but it's not a question of management. I refer to the proposal in the Sheepfarming Commission's report which advocates the regrouping of High-Country properties so that each holding is assured of adequate ewe country. This is a large and complicated problem and it is sufficient to say that it hasn't been forgotten either by the Lands Department or the High-Country Committee. Its achievement is a dream of the distant future which can only be reached by patient stages.

Now, how do these suggestions and conclusions affect the supply of stock to down-country farmers? It would appear that the golden age of large ewe flocks and big surpluses is gone for good, but there is no reason why a steady supply of the classes I have mentioned should not continue. What type of surplus stock is most suitable to the buyer? That is a question I don't feel very competent to answer. There was a time when Canterbury farmers were mad for Romney ewes, but many farmers are inveterate "market chasers" and I think that higher prices for fine wools may preserve the popularity of the fine half-breds. It would seem to me that provided the policy of concentration on light-weight lamb for export is continued, the smaller-boned ewe mated with a suitable sire will produce what is wanted, under Canterbury conditions at any rate. In my experience the first thing a farmer looks for when he buys for breeding fat lambs is a reputation for "doing well." He will pay good prices for rough looking back-country ewes simply because he knows they have constitution, even if their carcases leave a good deal to be desired. Perhaps some farmers present won't agree, but we must remember that it's useless looking to the High-Country to produce a type of sheep which doesn't suit its economy because the production of surplus stock must be incidental to the main business of wool production. If the High-Country turns back towards Merinos to any marked extent that would certainly be detrimental to the farmers who want stock to breed fat lambs—neither ewes, wethers, nor lambs are of much interest to them. On the other hand surplus Merinos of all classes might find a ready market among the High-Country stations themselves; and on some better-class hill country for breeding first-class halfbreds, so I don't think we should dismiss them altogether. This is taking place, to some extent, but I don't think it is likely to go further than to oust the halfbred from country to which it was never suited. Over-subdivision and poor wool prices forced people to run halfbreds on some of the typical dry Merino country. Now that Merino wool has come into its own again these places are likely to revert to Merinos, though the change back is a

very slow process, and it might be arrested by an economic change before it went very far.

A good deal hangs on the whole problem, as most of you realise. If the stations can keep their flocks up and turn off surplus ewes which are genuinely five years old—and that's not by any means impossible—many of them do it as it is—then a supply of really good ewes is available to farmers. A genuine five-year station ewe should do another three years so there would be virtually three times as many on the market as there would be if they were kept until they were only good for one year.

If the breed of hill-country halfbreds could be improved, it would reduce the difficulties of the breeder and result in a more uniform and desirable type of sheep, to the benefit of the breeder and of the ultimate purchaser.

Mr J. H. Grigg, Longbeach—What is your opinion of burning?

Mr McLeod—There has been a great reduction in burning in the high country in recent years. On no account do we burn tussock to obtain fresh feed. We burn only to control scrub. I realise that scrub is a serious problem on much of the higher-rainfall country and where it does not pay to cut scrub, fire is the only weapon. Cattle are often advocated. The problem here is the difficulty of fencing and of being able to carry enough cattle to be effective.

Mr W. B. Trotter, Fairlie—Parts of the Mackenzie country are carrying more stock than ever they did but much of the increase has been in the form of rabbits.

Mr A. C. Hurst, Papakaio—I would like to mention the wonderful results being obtained by the sowing of improved pastures on a property in the Omarama district at a height of 2,000 feet. Then near Lake Wanaka great improvement on rough fern country is being obtained by feeding out lucerne hay and hay containing grass and clover seed.

Mr McLeod—Cultivation certainly helps the problem but we must have suitable areas of land and a suitable climate. In the drier areas irrigation can often be a wonderful help.

Mr J. C. H. Chapman, Kurow—The increase in the rabbit was largely due to the rabbiters going to the war. Tussock was destroyed and even the matagouri scrub died. With the aid of the Rabbit Destruction Council we should be able to do something about it.

Mr L. P. Chapman, Mt. Somers—I agree with Mr McLeod that part of our problem is due to the fact that the early runholders lived on accumulated capital in the form of the original vegetation. Stock numbers do not give a true picture. What matters is the production. I am very keen on bluegrass (*Agropyrum scabrum*) which is obviously palatable and we find it now only in matagouri scrub or in the centre of the tussocks.

Mr B. J. Woods, Golden Bay—Have high country men ever considered introducing the Scottish Blackface?

Mr McLeod—No, not that I am aware of.

A speaker—Does not browntop tend to come in when tussock disappears? Is this not an advantage?

Mr McLeod—The browntop on wet areas is a very serious prob-

lem and it has done more than anything else in the areas that are free from rabbits to starve out the tussock. The space between the tussocks used to be filled in with palatable grasses. The mat of brown-top which has replaced them is an effective feed in the summer but produces nothing in the winter.

A speaker—It is a mistake to fence the cattle on to the flats. If they are allowed to move on to the hills they will carry seed and improve the tussock.

Mr McLeod—I would like to point out that under certain conditions cattle may damage tussock severely. In a hard winter with the ground covered with snow they may pull the tussock out. Every run is different—every problem must be judged on its merits.

A speaker—More fencing is essential to better control of the high country. Should it not be given a higher priority?

Mr McLeod—I agree, but a runholder is very dubious of incurring heavy expenditure on fencing unless he can be certain of compensation.

Mr P. C. Ensor, Double Hill—Care in handling sheep at all times is one of the vital factors in maintaining stock numbers.

Mr M. Turton, Ashburton Forks—The supply of surplus stock is a national problem and requires a national effort. We must do all we can to keep the experienced man on the high country.

Mr McLeod—I would like to stress the fact that maintenance of the tussock cover is fundamental to keeping up lambing percentages. No scrub or other shelter can compare with tussock for sheltering a lamb, especially under snow conditions.

A speaker—Is anything being done to re-sow high country with tussock?

Mr C. C. Leitch, Department of Agriculture—We have been collecting seeds of tussock but find it very difficult to get large quantities and the germination is very low. We are establishing plots for the production of seed and are importing plants from other countries which we expect will be useful for sowing in high country.

Professor McCaskill, Lincoln College—I believe there are strains of both Poa and Fescue tussock which have high germination. The D.S.I.R. are investigating the different strains of bluegrass but nothing seems to be done about seed-production on a large scale. I think all bluegrass is good and while we are waiting for the special strains to be selected we should be producing seed, in quantity, of the existing strains for surface sowing tussock.

Mr Grigg—What do you think about yarrow for tussock country?

Mr McLeod—I think it may have an important part to play. It is a low-fertility-demanding plant and provides valuable feed. The difficulty is to obtain the seed. The trouble is that we don't know what our sheep really eat. We know they eat catsear and we think it is because they get from it something they need at that particular time of the year. We do not know what quantity is needed nor what other plants are required. There is a vast field for investigation into the diet of our stock on hill country.

Mr Chapman, Kurow—I have yarrow growing on thin soil over rock at 4,000 feet. It is flourishing and seeding.

BREEDS FOR HILL COUNTRY

A. CORRIEDALE.

P. C. Ensor, Double Hill.

I wish to compliment very sincerely the Director and others connected with Lincoln College, on providing this opportunity for a discussion on breeds of sheep for hill-country, as this has been a very neglected section of farming considering its importance to the general economy of New Zealand, and also its importance to the farmers who look to the hill-country to supply annually such a large number of their breeding-ewes.

Definition of Hill-Country.

The term "breeds for hill-country" could cover an extremely wide range of sheep and country, so for the purposes of this discussion I would like first to define more clearly just what hill-country I am going to discuss. Having defined our country we can then consider what sheep we shall use to graze on this country.

For our present purposes I would put hill-country into three categories.

1. First is what I generally refer to as "hill-country" and would embrace the foothills bordering the Canterbury plains and large areas of North Canterbury and Otago, in general, hills ranging up to say 3,000 feet and all fairly accessible.

2. The second, "back-country," is more inaccessible and generally held in larger areas than the first but not running to extremes of altitude.

3. The genuine high-country of the South Island, of necessity held in large areas—the tops ranging from 5,000 feet to anything over 7,000 feet having an extreme range of climatic conditions, subject to heavy snowfalls—feed sparse over large areas and accessibility generally bad necessitating practically all mustering being done on foot.

Type of Sheep to Run.

Now what type of sheep are we going to run on this country, the most difficult of all grazing country in New Zealand with probably no counterpart in any part of the world?

The food supply is what nature alone has provided except in very small areas where the normal farming practices of pasture improvement can be carried out.

First and foremost a sheep must thrive on this country to give an economic return and to thrive it must have an exceptionally good constitution, combined with an ability to get about the country and make the best use of the feed available.

Take a look at the type of animal nature has evolved to graze on the mountains—the red deer and chamois are the two that come most readily to mind. In both cases we see a neat animal, not gross in any way, with each particular portion of the body well-developed and in proportion to the animal as a whole and we can't go far wrong if we keep this picture in the back of our minds when looking for a sheep that will do well on this country, as without the constitution he can neither produce the wool or grow the meat required.

Another way of putting our problem, is that we must relate the sheep to the feed as we can do very little in the way of altering the feed to suit the sheep.

The principle source of revenue has been, and I think will remain, wool from the high-country and this, taken together with the type of grazing available, makes the Merino the most obvious choice. There is no doubt of his ability to thrive when of a good type and well managed, especially in the more arid regions, but in regions subject to a higher rainfall, of which there is a large area in Canterbury, then I am by no means convinced that the Merino is the only sheep to run.

Drawbacks of Merino and Half-breds.

Whilst conceding his premier position as a wool producer there are, however, some disadvantages with the Merino which I will list briefly as:—

- (a) Low reproductive rate.
- (b) Delicate constitution of young stock.
- (c) Surplus stock not in great demand.

These disadvantages have long been recognised and on a lot of country the Merino has given way to the half-bred produced by crossing the Merino with a long wool.

In the main this half-bred has been successful in overcoming the disadvantages of the Merino, but whilst admitting that there are many very fine half-bred flocks in the high-country I am not convinced that they are the best or most suitable that we are capable of breeding for the high-country.

Without going into too much detail I base the last statement principally on two factors:

- (a) Lack of uniformity in a half-bred flock,
- (b) Lack of purity as a breed.

It is inevitable from a breeding point of view that if you cross two opposites such as a Merino and a long-wool, the progeny will vary greatly on either side of the mean average.

In other words, by crossing the Merino and long-wool you hope in theory to produce a wool of say 56 count; unfortunately cross breeding being what it is you will find that in practice, whilst the overall average may be 56 the amount of 56 wool may be very small—the rest being above or below that mark by many counts.

From the point of view of purity of breed, I maintain that there is little progress to be made by the continued use of 1st X rams, unless your 1st X ram is continually on the improve through the medium of his parent stock, as each year you introduce a complete new set of genealogical factors. Any progress in the way of fixing type is very slow, if at all possible through the ewes.

With what sheep can we replace the Merino or half-bred?

To achieve a constant factor from a breeding point of view the only thing to do is to in-breed the 1st X half-bred and once you in-breed your 1st X you must ultimately, if the breeding is carried to its logical conclusion, arrive at a Corriedale. If you don't continue with the inbreeding you will get all the disadvantages of a Corriedale with none of its advantages.

Now it is with the use of the Corriedale in the high-country that I wish to deal and I am well aware that it is a subject about which

there is a lot of prejudice and I must admit that the Corriedale has not been as successful in the high-country as I know it is capable of being.

That the Corriedale can be successful, and in fact superior, in the high-country is a fact of which I am absolutely certain and I would say that practically all failures that have been attributed to the Corriedale have been through lack of understanding of the breed and the use of the wrong type. I am afraid that the stud breeders must take their share of blame for this.

To clarify this statement we must go back to the inception of the Corriedale which arose largely through the development of the frozen-meat trade when a demand arose for a sheep, free of the bulk of the ordinary long woolled breeds, suitable for use on hill-country, but with quicker powers of development and fattening than the constitution of the Merino permits.

The original conception of the Corriedale was for a hill sheep.

What has happened to my mind is this. Once the Corriedale became established as a breed it became immensely popular, doing much better on good land than probably the original founders ever thought possible, with the natural result that breeders, willingly or not, bred to their market; in other words favoured a type suitable for plains and fattening purposes rather than attempting to breed for what was probably not such a lucrative market further into the hills.

Put in another way, once a satisfactory fleece was established any further influence from the Merino was not wanted, with the natural result that the Merino instincts have become subservient to the long-wool. I say without fear of informed contradiction that no sheep will succeed on high-country in which the ranging instincts inherent in the Merino are not fairly near the surface.

It may appear that I have been at some pains to explain what is wrong with the Corriedales and taken as a general picture I think it is true; but the degree to which this is true naturally varies with every individual flock and it is only to those flocks that have retained to a large degree the necessary characteristics of the Merino can we look for suitable adaptation to the high-country.

The average wool production in the hill-country is 1 to 2lb. per acre; compare that with land carrying 3 or 4 sheep per acre and producing 30lb. or more wool per acre. The sheep on hill-country expends perhaps 16 times the energy in his search for food to produce a pound of wool.

This comparison may not be strictly accurate in practice but it does indicate the big problem to be faced in the high-country and emphasises the paramount necessity for sound constitution if the sheep are to produce results, comparable with those grazed on easier country.

The Sheep we Want.

Let me sum up again the type of sheep to be aimed at.

1. A sheep that will thrive in the country.
2. Purity of breed.
3. A producer of high quality wool.
4. Surplus stock of acceptable type on market.
5. High reproductive rate.

I have stated earlier that the Corriedale can be a superior sheep

in the high-country and goes closest to fulfilling the ideal aimed at, which brings me to the second part of this talk, namely to show that these objectives can be obtained by the use of the Corriedale.

In doing this I hope that I will not be misunderstood if I quote certain facts and figures about the flock with which I am most closely associated. In doing so I will as far as possible quote only such facts as are readily available to anyone such as market reports.

A brief description of the flocks referred to would probably be useful here.

They are run on something over 100,000 acres of Canterbury high-country. In 1916-17 my father and others took over this country with the sheep which were on it, very mixed flocks at that time containing anything from Merinos to Romneys.

Since then, with but two small exceptions, nothing but Corriedale rams, from the one flock, founded 1889, have been used.

Results obtained with Corriedale.

The original cross of this flock was the English Leicester-Merino, which is not the most popular cross in the present day Corriedale, but I have reason to believe it is the most suited for the purpose under discussion.

I will confine most of my remarks to the flock of 6,500 which I control, but the picture over the whole area is much the same and I propose to go through the points previously set out and see how near to our ideal of a sheep we have been able to get.

Point 1: That the sheep will thrive on the country.—If we can get a satisfactory answer to the other points then this first must automatically receive a satisfactory answer.

Point 2: Purity of breed. An important point this one, as it is the essential difference between the use of the Corriedale as opposed to any form of half-bred, and only by working with a sheep whose breeding is pure, can you hope to achieve any great degree of evenness of wool fibre and carcase shape throughout a flock.

This question of purity of breed is fundamental in any future improvement of high-country sheep. Today the Merino is the only pure breed used extensively and in our search for an alternative to the Merino we must look for some other breed containing pure breeding qualities. The Corriedale is the only sheep that we have today that contains this purity of breeding and will provide most of the other characteristics that we are looking for.

The advantages to be gained in a flock which breeds true to type, I hope to make clear as we discuss points 3 and 4.

Point 3: A producer of high quality wool. It is commonly acknowledged that the Corriedale is second only to the Merino in this respect but when it comes to putting the Corriedale on to high-country we have to readjust our ideas somewhat. The Corriedale Society lays down 50 to 56 count in the wool. In my experience wool for the high-country requires to be finer than this. If it were possible to breed a straight 56 I would say "go ahead" but in any flock there is a certain degree of variation and I prefer to keep the count a bit higher as anything below a 56 appears to drop in quality very quickly under high-country conditions.

Although I advocate a wool finer than a 56 I must issue a warning in regard to the 58-60 type of wool which is very often the next

step to something finer than a true 56. The 58-60 type is a very short-stapled wool and though it brings a very attractive price on the market it is very liable to delude a grower into thinking his wool is much better than it really is. I say this because a sheep producing this type of wool is invariably a light-clipping sheep—you will probably get a certain proportion of this type in any flock, generally off the oldest ewes. It may very probably be your top priced line, but should anyone attempt to breed to this type and fix it on young sheep, then in a year or two he will suddenly wake up and wonder why he is not filling as many bales as previously.

What I advocate is a wool, finer than a 56 whilst retaining its characteristic length—the only way to keep your wool weight up.

Having achieved the desired type of wool complete success is still a long way off unless there is quality in the wool.

That almost indefinable character in wool generally termed “quality,” is of the utmost importance as it is the one thing, regardless of fineness or otherwise of a fleece, which determines whether or not it will stand up to adverse conditions.

“Quality” as I have said, is almost indefinable, but it can perhaps be characterised to a certain extent by the following points:—

(a) The first is in the feel of the wool; it is soft to handle with no trace of harshness.

(b) Wool of even count and length over the whole fleece with a reasonably broad lock and square tip.

(c) The crimp remaining even throughout the length of the fibre, with no suggestion of a pencil tip—a sure characteristic of a light clipping, wasty fleece lacking character.

Wool Produced.

To illustrate the advantage gained through the breeding flock being pure—and in this case, the Corriedale was bred on the same lines for many years—in gaining a desirable standard of quality and evenness through a flock, I have compared two wool clips, sold at the same sale, both high-country clips off somewhat similar country.

In each case the top price was virtually the same, and allowing a margin of 7d. below the top price, to include most of the better grades of wool the half-bred flock showed 31 per cent. of the total wool offered within this price range whilst the Corriedale produced 57 per cent.

I don't want anyone to assume that these figures are correct for anything but this one particular case, and all I claim is that they give a certain weight to my contentions.

This Corriedale clip regularly gets a high proportion of its wool into the higher groups and did, not many years ago, top a Christchurch wool sale with a line of 34 bales.

The total weight of wool produced would appear to be quite satisfactory but as accurate comparisons are very difficult to get I will just quote that three individual Corriedale flocks clip 25, 25 and 27 bales respectively, per 1,000 sheep shorn. Anyone knowing high-country will agree that these are at least satisfactory.

Points 4 and 5:

These can be taken together as without point 5 (a high rate of reproduction) we lose most of the benefit of point 4, of having surplus stock of acceptable type for marketing.

The half-bred is always saleable but here again it lacks evenness and quality which can be obtained with a pure breed.

Size is not our objective, but a shapely carcass, as the country alone sets its limitation on size. If the frame and constitution are correct, then generally speaking adequate feeding is all that is required to produce sufficient size—pure size is not difficult to obtain in itself though the resulting animal may be ungainly and ill proportioned.

Only by insisting on quality throughout the carcass as well as the wool can we get that neat, well-proportioned sheep that we are looking for and it is here that the original English Leicester cross appears to hold an advantage if used wisely.

I don't want to try and discredit the Lincoln cross, the most popular in the present-day Corriedale, for use on country that will carry it, but under hard grazing conditions I would say the English-Leicester cross is preferable. The Lincoln cross can almost be described as a gross wool producer, necessitating comparatively heavy feeding to keep the frame up to the wool,—in other words, it is quite possible to grow more wool on a carcass than the carcass will carry under certain conditions of feeding.

As constitution is one of the fundamentals upon which we must build, we must look to what type of carcass is most likely to give us this.

Heart and lung room are essential and a well-sprung rib is necessary for this. The question of a well-sprung rib can almost be described as a hackneyed phrase in any text book on sheep but I repeat it here as I don't think that it is as well understood as it should be and is, after all, fundamental to the whole shape of the carcass.

When sheep are in store condition, not when fat and well fed, is the time to study them for faults in conformation, and it is then that this question of a well-sprung rib comes to the fore.

It is not uncommon to see a sheep's ribs judged by placing the hands down the sides of a sheep but the crucial point is in the setting of the ribs on the backbone.

A sheep whose ribs are not set correctly here will very soon appear slab-sided when not in top condition.

Combining Fleece and Carcass.

To combine a first class fleece with a first class carcass is more difficult to achieve than would appear on the surface.

The progeny-testing scheme carried out by Lincoln College with Corriedales has made this point fairly clear. There have been 30 rams tested to date and results so far have shown only two rams to leave progeny above average in respect of both wool and carcass.

The points of interest here are that:—

1. In most cases a ram tends to predominate in either wool or carcass.

2. It indicates that the principles I have tried to outline in regard to breeding the type of sheep required, are sound, as one of the two rams to predominate in both wool and carcass was bred in the high-country along these lines.

Now how far has success been obtained in the flock as a whole in combining wool and carcass?

I have shown that wool production is reasonably satisfactory in respect of quality and quantity.

I would like to quote a few facts now to show that the Corriedale, as a pure bred sheep can produce excellent results in the high-country in respect of producing even lines of good quality sheep for sale.

(a) For many years it has been possible to kill and freeze all surplus wethers straight off the high-tops in the autumn; or top off on turnips for the butchers' market.

(b) Cast for age ewes. For some years the Double Hill flock has produced annually one of the largest straight lines of ewes to be offered at any of the ewe fairs in Canterbury, as well as being one of the top priced lines to come out of the back country.

(c) Surplus lambs. It has been possible over the latter years to sell annually quite a large draft of surplus wether lambs. Being late lambs they naturally appear small compared with down-country lambs but here is an illustration to show how they respond to a change to down country conditions.

A man who has bought some of these lambs annually, recently gave me these facts.

He bought them as hold-over lambs but generally they were all killed before the end of the season. However, one lot he did keep—in September they shored 8 lb. of wool and were shorn again the following March, cutting another 6 lb. of wool, a total of 14 lb. and were then all sold as fats at Addington.

Conclusion.

To sum up briefly, I would state again that through the use of the Corriedale we can produce a most valuable sheep for high-country and hill-country generally.

Bred correctly the Corriedale:

- (a) Is active enough to make the best use of the country
- (b) Produces plenty of high quality wool
- (c) Produces excellent sheep for marketing
- (d) Has a high rate of reproduction.

Also the Corriedale is an excellent sheep to handle under high-country conditions.

As time is limited I have had to more or less ignore the question of management so will just say:—

“No amount of breeding will make up for improper feeding and conversely no amount of feeding will compensate for improper breeding.”

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BREEDS FOR HILL-COUNTRY

B. CHEVIOT

P. J. Cowin, Thorpe, Nelson.

I farm 2,500 acres of hill country in partnership with a brother. The pasture is Danthonia with some brown top. In addition to the farm we have a grazing lease of 1000 acres of what we call high country, the highest about 5,000 feet above sea level.

Our carrying capacity is from 1,600 to 1,750 ewes and replace-

ments. For many years Romney sheep were run. From 1929 Corriedale rams were used until 1940 when Romney rams replaced the Corriedales, but only as each year's requirements were bought. The reason for using Corriedales was, of course, an attempt to get more revenue from wool.

On this country neither the Romney nor Corriedale cross sheep were as satisfactory as one would wish. It is all summed up in the question whether sheep are doing on your country or not. I think the stock man has only three courses open to him:

(1) To maintain or improve his country suitable to the breed he wishes to run

(2) To run a breed suitable to his country or

(3) To run stock regardless of whether they suit his country or not.

As we were not happy as to how our sheep were doing and having read something of Cheviot sheep I decided to try the breed and five years ago bought two rams—I propose to tell you of our experience with the Cheviots since then and to compare them with the rest of the stock which are now predominantly Romney, but of course still show the effect of the use of Corriedale blood.

I do not want to give the impression that I am condemning Romneys or Corriedales; both are good sheep in their correct place.

The two Cheviot rams were put out along with Romney rams to the two-tooth ewes. They got about 50 lambs, not much of an effort, but I think that they were fought off the job to some extent by the heavier Romneys. I would say here that contrary to reports from other places we have not had any great difference between Romneys and Cheviots in their get of lambs.

When lambing time came, which with two-tooth Romneys was always a tough business, we were able to compare the two breeds. That year not one Cheviot-cross lamb had to be taken from a ewe and as far as I could tell none was born dead.

By comparison, the Romney lambs were as usual a constant trouble. Even with going round twice a day a lot of lambs had to be taken from ewes and a considerable number died at birth or soon after. It was very noticeable how much stronger the Cheviots were at birth.

I would say a Cheviot at two or three hours is equal to a Romney at as many days. It is difficult to make comparisons of lambs or the mother under store sheep farming conditions, but from the first year the Cheviots have always seemed to do better than their Romney mates.

All the first lot of wether lambs except six of the smallest were sent to the works that year. One of those kept we killed this year as a six-tooth and it weighed 86½lb. It had never had any special feed except to have been run on the high country for three summers.

Each year Cheviot rams were bought in to replace Romneys and this year we have put all Cheviot rams out. For the first two years Cheviots were kept for use on the two-tooth ewes and their use has simplified lambing considerably. We have lost some lambs and assisted ewes at birth also.

Only the best of the lambs were kept for ewes and although they were all from two-tooth ewes they, at all stages, held their own with

the Romneys. At shearing time there was a marked difference in condition. The Cheviots were forward stores and shored well while the Romneys were in much lower condition and were tough going.

Last year was the first year we were able to compare the mothering qualities of the ewes. We then had 150 Cheviot-cross ewes. Again the Cheviot came out the best. All the ewes were run together, Romney and Cheviot, and not one Cheviot had to be made to mother its lamb—quite a number of Romneys did.

No actual percentage of lambs was taken but I consider that from these ewes there was at least 10 per cent. in favour of the Cheviots.

On our country the Cheviot lambs fat off the mother compared to Romney in at least two to one. I say fat, but most of them are second grade. They can be got away early in January from a September-October lambing.

Now for the wool. They won't cut as much wool from hoggets—this year the Cheviots were down on the Romneys by 3lb. per head. We had two bales of Cheviot and two bales of Romney binned separately. There was not much difference in price. Most of the wool went in approximately the same bins.

The difference in wool weights may increase as the sheep get older as Cheviots are said to be inclined to peel. So far we have not had any do so. Where wool is the main source of revenue the Cheviot in my opinion has no place but where meat and surplus stock break about even, then the Cheviot is well worth a trial, especially on land below one sheep to the acre carrying capacity.

I think that the Cheviot is more suitable for crossing with Romneys than Corriedales or half-breds as it is not a long woolled sheep.

I have said that the Cheviot has usually done better with us than the Romney with two exceptions. We summer our two-tooths on the high-country. Two years ago when we put the sheep on the tops as we call them, the Cheviots were in better condition. It was a good year for feed and when we brought the sheep off, the Romneys had done the best; they looked better than the Cheviots.

This autumn has been an excellent one in Nelson and the Cheviots cannot compare for size or wool with the Romneys at the present time.

I would not say at present just how far we will go in the use of Cheviots. If wool weights drop too much we may have to put Romney rams back in the flock. We hope we do not have to do this as it is desirable to have some stability with the quality of the wool clip.

Another factor also comes into it, that is the demand for the Cheviot ewe from the fat-lamb farmer. He will have to be converted from his preference for the Romney. I believe that if the time comes again when quality lambs have a larger premium over heavy weights the Cheviot ewe can be one of the answers.

Also when finished with the Cheviot will give a far better quality ewe carcase.

So far we are satisfied with the Cheviots. I believe that they are the answer to our country. I would not say that revenue will be greater but I know that there is a lot more satisfaction in hand-

ling stock that always seem to be doing well, than working with those that are not just doing as one would wish.

Anyone wishing to try out Cheviots should do as we did—get a few rams at first and find out for themselves how they do with them.

There is a big difference in the type of rams and my tip is see the rams before you buy them.

Mr J. H. Grigg—I would like to support the idea that Corriedales, if bred properly, are quite suited to high-country.

Mr D. McLeod—In connection with these fine, short, come-back types I have the same experience with half-breds. How do you design your breeding policy to avoid these types?

Mr Ensor—I think the fact that our Corriedale stud was founded on the English Leicester cross has something to do with the problem of these finer types. There is also some Merino influence in the flock ewes. Sheep tend to run finer on this country so we select rams with good length of staple and reasonable fineness. I strongly advocate the Corriedale instead of the half-bred—the best Corriedale must be better than the best half-bred. Whether the use of Corriedale can be extended depends on the Corriedale breeders. They advertise that their breed will go anywhere on high country. They must breed for the market if it is going to be used universally in the back country. I see no reason why there should not be a high-country type of Corriedale which should be specially catered for in the shows. The Merinos have three classes—the Corriedales should have at least two. I do not advocate any further introduction of Merino blood. The Corriedale must be kept pure. To those who doubt that the Corriedale will go on the high tops, I can only say that I have been climbing to 7,000 feet after them for the last 20 years.

Mr D. S. Studholme, Ashburton—As a Corriedale breeder I believe we can produce the type of sheep required but they must be bred on suitable country.

Dr. I. E. Coop, Lincoln College—Are the rams used bred on the same country as the ewes are run?

Mr Ensor—Until 1945 the rams were bred on hard country near Rangiora, taken to the high country and left there with a little supplementary feed. Since 1945 they have all been bred in the high country. They could be bred down country but it must be of the right type—fairly hard.

Mr J. R. Little, Hui Hui—The Corriedale Society has discussed the question of two types for many years and decided that they are not necessary.

Mr Trotter—There is still much high country which must still be considered Merino country. It is generally believed that they are easier on the country and their extra longevity must be taken into account. Does the lower value of the cast-for-age sheep really matter?

Mr Ensor—I believe it would be a bad day for New Zealand if the Merino went out of the high country altogether. I doubt if Mr Trotter is correct when he says that Merinos are easier on the country. Put 1000 Merinos and 1000 Corriedales out together; before long you will see the Corriedales feeding down below where the lush

growth is, while the Merinos are stringing across the shingle screes—and that is where the trouble starts.

Mr McLeod—There is confusion here between Canterbury and Otago people. The depletion in Otago is due to rabbits on the lower country. The Merinos graze on the undepleted country above. In Canterbury the depletion is on the tops and tends to extend down the hill. The well-covered bottoms are available for the Corriedale and half-breeds.

Mr T. A. McKellar, Banks Peninsula—There is a big area running up to 3000 feet which, while not considered high-country, is still hill-country, especially where the rainfall tends to be high. There is everything to be said for the use of the Romney. We have experimented with the Corriedale on this type of country but foot-rot soon forced us back to the Romney.

Professod Hudson—I understand there are two types of Cheviot—the North and the South type—one long in the staple, the other shorter. Could Mr Cowin tell us whether we have both types in New Zealand?

Mr Cowin—We have some of the short, dowdy type and others with reasonably-long wool and a certain amount of lustre. This latter is the sort of ram to go for. I was a Romney man myself and, on the right country, I still believe in the Romney. For my country I would like a Cheviot that looks like a Romney. If we want increased production it must come off a lot of third-class country. If the Cheviot is the answer then we must be sure to get the strong wool type into New Zealand.

Dr. Coop—The Cheviots have been used and studied more in the North Island than down here. Cheviot-cross sheep have been run on some farms for over 20 years and Massey College have made an intensive comparative study of the Cheviot-cross sheep versus the Romney over a period of ten years. The Cheviot-cross sheep has displayed the following advantages:

Twenty per cent. higher lambing-percentages

Greater vitality and agility

Lower mortality of ewes, lambs and hoggets.

A very obvious appearance of greater thrift and health.

The main disadvantage of the Cheviot-cross sheep lies in the reduced weight of wool, averaging about two pounds lighter than the Romney. There is much hard country in Nelson and to a lesser extent in Marlborough where the breed of sheep used is very fluid and where there is a feeling that none of the breeds so far used is entirely satisfactory. The Cheviot may well have a place on such country. Where the Romney cuts 8-10 lb. of wool and has a lambing percentage greater than 90, the situation is not unsatisfactory, but where the Romney cuts only 7 lb. of wool and gives an 80 per cent. lambing, then there are good reasons for trying the Cheviot.

This College is co-operating with a Marlborough farmer in an experiment with the Cheviot. We have only been working three years. I think it will take us ten years before we can give a definite answer.

A speaker—Would you give figures relative to the percentages of fat lambs off the mother with Cheviots and Romneys?

Dr. Coop—The Cheviot-cross ewe, as a cast ewe for fat-lamb

production, shows advantages characteristic of the cross on hill-country. According to the results from Massey College, the Cheviot-cross ewe fattens more lambs off the mother than does the Romney.

Mr Ensor—When I advocated another type for the Corriedale I did not intend any fundamental change in the breed at all. My point is that in the shows and ram fairs the emphasis is all on the type that has been bred on the good country and brought out particularly well. The sires for use in the back country should be bred under hard conditions, not necessarily in the high-country.

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AERIAL TOPDRESSING AND SEEDING FROM THE AIR

D. J. Hulston, Price's Valley.

As most of you are well aware, the use of the aircraft as an agricultural implement is of very recent adaptation in New Zealand. In fact, prior to 1947 the use of this machine as an aid to agriculture had been almost nil, whereas today there are 25 firms operating 60 aircraft actively engaged in aerial topdressing and seed sowing.

In the short period I have at my disposal today, I wish to review very briefly the subject from the point of national economy, giving a summary of the official trials done to date and then to examine it more fully from the aspect of the individual farmer and from that of the small aircraft operator.

There are in New Zealand today vast areas of deteriorated hill pastures comprising largely of browntop, danthonia, flat weeds and odd annual clovers. In the state they are in, they present a major national problem of agriculture. Estimates indicate that there are roughly 10 million acres of this type of land which can be improved and of this some four or five million acres are capable of rapid improvement if suitable clover species are present or introduced, and a suitable phosphatic fertiliser is regularly applied. These areas can be readily divided into two broad classes:

1. The lowland hill-country pastures which warrant development by the owner on the basis of economic increased farm production. It is to these areas that I plan to devote most of my time today.
2. The high-country poor-quality pasture areas which would not be an economic proposition for the owner to develop himself, but which are vitally important to the country as a whole from the sustained production and especially the soil and water conservation aspects.

In the low hill-country the light aircraft is proving vastly superior to anything previously tried (hand spreading or blowers) and can, under reasonable conditions, compete with prices and results of motor-lorry topdressing on the flats. However, the development of the higher country calls for the use of larger planes working with the lighter machines, plus a comprehensive national effort to organise the finance, equipment, and to investigate the difficulties associated with such work. As a result, especially in the light of the present

world sulphur and superphosphate shortage, improvement in these areas will be probably restricted to small scale work done by progressive landowners to suitable higher-quality pasture areas.

One essential requirement to be noted is that for phosphatic fertiliser to be of benefit, there must be adequate clover in the pasture or suitable seed applied with the fertiliser.

Organisation:

Shortly after the formation of the Soil Conservation Council, the machinery for the development and improvement of hill country pastures was initiated by them. After a demonstration organised by the Council, with the co-operation of the R.N.Z.A.F., using a Grumman "Avenger" aircraft, the possibilities of aerial topdressing were realised, and an Advisory and Co-ordinating Council was formed in October, 1948. This Council consisted of representatives of—

1. Soil Conservation Council.
2. R.N.Z.A.F.
3. Civil Aviation Department.
4. Department of Agriculture.
5. Department of Scientific and Industrial Research.
6. Lands and Survey.
7. Federated Farmers.
8. Fertiliser Manufacturers.
9. (Later) Aerial Topdressing Operators.

The outcome of the formation of this Advisory Council was a series of top-dressing trials.

(Mr Hulston here briefly described the various experiments carried out.—Ed.)

Conclusions reached from Trials:

1. Topdressing and seeding from the air is practicable and superior in results to either hand-sowing or to the use of the blower.

2. Costs in the majority of cases are reasonable and compare most favourably, under better conditions, with the use of motor lorries.

3. The small plane is invaluable for precision work on smaller areas handy to landing strips, but larger planes are necessary for the bigger and more rugged areas.

4. Costs under reasonable flying conditions and within two miles of the strip, range between 6/- and 10/- per 2cwt./ac. application with small plane.

5. The fertiliser is better if granular for accurate work.

- | | |
|-----------------------------|----------------------------------------|
| (a) Granular Superphosphate | (Unobtainable.) |
| (b) Hillside | " (Limited quantities in N.Z.) |
| (c) Serpentine | " (Reasonable supply.) |
| (d) Straight | " (Reasonable supply.) |
| (e) Basic Slag | |
| (f) N.A. Phosphate | Finely ground and present big problems |
| (g) Hesketh Slag | unless weather is dead calm. |

6. Sowing of seeds is satisfactory for large scale work, but there is a great tendency to sow in strips if using a mixture.

7. The light plane can give reasonably good spread.

Future Policy and Problems.

The necessity for the maintenance and improvement of difficult hill-country is obviously of immediate national importance if production is to be upheld and soil erosion checked. The basic requirements are:

- (1) Introduction of suitable grasses and clovers.
- (2) Application of phosphatic fertilisers, and in some areas, lime.
- (3) The efficient management of improved pastures.

"If these requirements could be applied to the 10 million acres of wetter suitable hill country in New Zealand (8 million in North Island and 2 million in South Island) production from them could be doubled" (M. M. Burns, F.R.A., Report No. 2), but little has been done due to (a) limited access; (b) high costs of transport; (c) difficulty of distribution of fertilisers; (d) the shortage of farm labour.

Apart from limited lower hill areas where the bulldozing of tracks and the use of the blower is practicable, aircraft present the only recognised solution.

This is widely realised and steps are being taken to hasten the application by the sponsoring of field trials, setting out of fertiliser plots, investigation of suitable aircraft, and close liaison between all interested parties.

For the immediate future there are only two possibilities:

1. **Use of light aircraft:** Within the 2 mile limit from the strip costs range from 6/- to 10/- for 2cwt. application, compared with a 4/- to 16/- cost for other methods. Loads vary from 3½cwt to 5cwt. Operate from strips 300 yards x 30 yards. Drop 15 tons per aircraft per day easily with a record of 54 tons under ideal conditions.

Handicapped by (a) shortage of planes; (b) increased cost of planes (£400-£1000); (c) scarcity of trained pilots or facilities for training them; (d) shortage of supply of fertilisers.

(2) **Use by R.N.Z.A.F. of special planes.** At the moment they are trying out one Miles Aerovan with a 1 ton payload, whilst the conversion of a Dakota has been contemplated. There is also on order a Bristol Freighter equipped with a 6-ton hopper which will soon be available for experimental work.

For the future, however, large slow cargo-planes appear the solution, especially if used for topdressing in conjunction with normal defence work and light aircraft. Large planes such as these can operate for as low as 2/- per ton mile, making the topdressing and seeding of large inaccessible areas practicable and economic, especially if the Defence Department covers the initial depreciation and cost. For example, for Bristol Freighters it has been estimated:

- | | | |
|---------------------------------------|----------------------|--------------------------|
| (a) If all cost carried by farmer | 14/- to 15/- per ac. | } + cost
of
Super. |
| (b) If maintenance carried by farmer | 8/- per acre | |
| (c) If running only carried by farmer | 5/- per acre | |

All for 2cwt. application.

Apart from the aircraft position, such a programme will be vitally affected by the fertiliser-supply position. At the moment the maximum output of phosphatic fertilisers in New Zealand is approximately 650,000 tons, which is just sufficient to meet normal demands.

Suggested aids are:

1. Works to be encouraged to produce or save more hillside super.

2. Works should be modified or new works built handy to air-fields to produce granulated phosphate.

3. Special works should be started to produce granulated super., or in light of world sulphur shortage, to produce double or triple phosphates, which as well as being more concentrated, are in coarse granules.

4. Possibilities of wider imports of fertilisers investigated, especially double or triple phosphates, Hesketh slag and basic slag.

5. Methods of overcoming distribution problems of the latter investigated.

Obviously there are many more problems, both technical and economic, associated with this long term plan, but it appears to me to demand the full support of all progressive farmers. It provides the obvious solution to what could have been an extremely serious problem in this country.

During the interim period the work must be carried on as well as possible by the light-aircraft operators to whom the hill-country farmers owe a great deal,—for pioneering the aircraft as a farm implement, if for nothing else. (Up to July, 1950, these planes have topdressed 116,000 acres with approximately 11,600 tons of super-phosphate.)

Practical Points:

1. Does the Hill Country need Aerial Topdressing and Seeding?

My answer to that question is a very definite Yes! There is almost no hill land in New Zealand that will not benefit from topdressing in particular and seeding in most cases. If there is any suitable landing area (300 yards x 30 yards) within reasonable reach (2-4 miles for maximum) then topdressing should be given more than passing consideration. With prices as they have been for primary produce, there is almost no hill pasture that will not benefit by topdressing and/or seeding, and what is more important, will not give a reasonable net financial gain within a year or two. If, however, prices were lower, or the land sour, dry or inaccessible, the financial aspect may be a deterring feature.

2. What Fertiliser or Seed to Put On?

This presents a bigger problem, but, unless the land is very sour or very dry, some type of phosphatic fertiliser will be beneficial. Observation of results of topdressing paddocks on the flat will give a good idea, but if there is doubt, try a few sample plots. Put on Super., Serpentine Super, and Basic Slag, say at about 2cwt./acre equivalent and observe the results. A soil sample sent to the Department of Agriculture or to the College here will soon return you information as to what should be the optimum rate of application. Small applications I think you will find will be uneconomic, though they may give a short beneficial effect. Actually, of the phosphate mixtures available today, I am of the opinion that Serpentine Super. has many advantages. Of course, Basic Slag and Double or Triple Phosphates for aerial work are almost certainly vastly superior, but are unfortunately either difficult to apply or in the latter case very hard to get.

3. How Often Should the Area be Topdressed?

Most experts recommend topdressing at the rate of 2cwt. every two or three years. A long term policy of doing say one-third or

one-quarter of the topdressable area of the farm every year should be about the optimum, if a 2cwt. application was put on (1cwt. probably in an under 30 inch rainfall area).

4. What are the Costs?

Most of the topdressing firms charge on a per ton or per pound basis using a basic charge and adding to it for extra miles above a set limit, or height above 100 feet from the strip.

The following are basic rates for one firm:—

Basic charge: £4 per ton.

10/- per ton if seed has to be mixed.

4/- per 100 feet over initial 100 feet.

£1 per mile over first mile.

2/6 if meals are not provided.

Seeds: 3d. lb. up to 2 miles and 300 feet.

Trace Elements: 2d. lb. if mixed with fertiliser. 3d. lb. if neat.

The range of spread is 7lb.—5cwt./acre per run.

Costs vary with each firm, due largely to local weather conditions. The above are quoted by a firm operating under some of the worst conditions in New Zealand.

5. Will the Topdressing and Seeding be Worthwhile?

(a) **Materially:** As I have stated before, there is sure to be increased pasture growth if the correct materials are applied and management is reasonable. Phosphatic fertilisers benefit pasture growth by increasing the clover growth or allowing the clover to grow. The clover in turn makes more nitrogen available to the grasses and as a result a better grass growth develops. To me it appears advisable, in fact nearly essential, for the best results from this topdressing to spell the block for a month or so at the time of maximum clover growth.

(b) **Financially:** This is a problem for the individual to work out and even then it is rather complicated. The following budget on the home farm on Banks Peninsula will give a rough method. There are, however, many factors such as additional labour requirements and additional subdivision, that cannot be calculated, and there is no allowance made for the delay of from two to three years in getting increased carrying capacity from the area after the topdressing commenced, or for saving in tax through deduction for topdressing.

The area is 888 acres, assuming topdressing one-third of area with 2cwt. every year.

Actual cost (1949) was 32/6 per acre. Actual proved increased carrying capacity on similar land is 2/3 ewe/acre. I have budgeted out an improvement of half a ewe per acre.

Therefore, on actual average per ewe returns, increase of $\frac{1}{2}$ ewe/acre gave at current prices:

Wool 4½lb. @ 7/-	-	-	-	-	-	-	31/6
Lamb ½ lamb (33lb.)	-	-	-	-	-	-	20/-
Cull Ewe @ 45/- = 22/6	-	-	-	-	-	-	22/6 approx.

							74/-
Less 5% Deaths	-	-	-	-	-	-	3/8
							70/4

Costs: Total expenditure on stock purchases, goods, freight and cartage, commission, shearing and crutching, and interest on stock amounted to £1/4/6 head, i.e., Total Cost

No. of Sheep

Therefore increase for $\frac{1}{2}$ = 12/3.

Nett gain per acre = 70/4 (less the increased costs for sheep plus topdressing costs.)

70/4 — 12/3 and 32/6

= 25/7 per acre.

I must admit, however, that results on Peninsula country from correct topdressing are more spectacular than in most areas, due to three primary factors: (a) high rainfall; (b) high natural fertility; (c) sweetness of the soil.

6. How is the Work Done?

Most of the topdressing firms supply their own plane loader consisting of a drum on a hoist (truck mounted) and filled from the farmers' fertiliser dump on the edge of the landing strip. Some of these fillers can be rotated to mix seed in with manure and save hand mixing. The area to be done is usually marked around the boundary by the farmer with white or yellow marker (1ft. squares of cardboard pegged down).

One firm supplies the material and carts it to the strip in its own truck.

On the instructions of the farmer the pilot can set the outlet from his hopper to put on any range from 7lb. to 5cwt. per acre.

The farmer has to supply a man or men to fill the hopper from his dump. It is a great help to the aircraft operator if the material is always right on the spot. The hopper is filled while aircraft is away.

The pilot flying at 50ft.-100ft. above ground level drops his load in strips, pin-pointing himself as he goes as a general rule.

The farmer can assist himself and the work being done by:—

1. Have the strip as high as the road or even bulldozed tracks will allow, i.e., make the transport lorries do the work of height rather than the aircraft at 2/- to 4/- per 100 feet.

2. If no flat land is handy clear a strip if possible. Use Mr Holland's £200 tax exemption offer to your own double benefit.

3. Have material on a ramp. It saves a great deal of heavy lifting.

4. Keep the material up to the plane. Delays are expensive.

5. Keep material dry. Damp super. tends to lodge in the hoppers.

6. Co-operate with neighbouring farmers in placing combined orders and in the expense of building a "company" landing strip.

The following table gives an idea of the value of having the strip close to area of operations when it is realised that the charges made by the firms are fundamentally based on how much they can put on per hour.

Within 1 mile and 100ft.	4	tons	per	hour
" 2 miles "	3½	"	"	"
" 3 " "	3	"	"	"
" 4 " "	2½	"	"	"
" 1 mile " 200ft.	3½	"	"	"
" 1 " " 400ft.	3½	"	"	"
" 1 " " 600ft.	3	"	"	"

7. Have the Topdressing Firms Many Problems?

Yes! Quite a few, but the following are the chief ones:—

(a) **Material:** This is already putting a check on the expansion of some of the firms.

(b) **Pilots:** "B" License pilots are hard to get, especially as flying conditions are arduous. Training pilots is also hard and expensive, but I believe that the Civil Aviation Department will possibly, in view of the importance of the work, support a scheme for subsidized training for this work.

(c) **Aircraft:** Getting harder to get. Now cost in the vicinity of £1000, whereas in 1948 were about £400. There does not yet appear to be any substitute type, though one North Island firm are using a D.H. "Beaver" which takes a half-ton payload but which costs £12,000.

(d) **Insurance:** Very hard to get on planes. Used to be 12½% with 10% franchise, but now gone up to 20%, which is almost prohibitive.

(e) **Weather:** Controls flying in light aircraft to great extent. Only average about 150 days in year in Canterbury, although nearer 300 in Auckland. That is one of the reasons why costs are somewhat higher here.

Mr Studholme—Can we be sure of getting a strike if we sow grass and clover seed from the air?

Mr Hulston—Best results are likely if sowing is done in the early spring on frost-lifted ground. The break-down of the frost lift gives cover to the seed.

Mr Studholme—Seeing we have only a limited amount of super and since little response is likely without clover in the pasture, should we not confine aerial topdressing to those areas where there is a reasonable amount of clover?

Mr J. Woodcock, Department of Agriculture—The basis of the present topdressing by private operators is the Moth plane. They are now faced with the impossibility of replacement of that type. A firm has recently imported a Beaver aeroplane from Canada. This can carry one ton and may be the solution of the problem. A small amount of granulated triple superphosphate has been imported from Europe at £45 a ton. This seems expensive but the cost of transport per unit of phosphate is low and in its ultimate effects it may prove to be not much dearer than ordinary super.

Mr R. K. Ireland, North Otago—I have an area of back country running up to 2500 feet. I had the chance of topdressing in May and wanted to sow clover with it. I was told it was a waste of seed as the frost would kill the seedlings. Knowing that clover has an oily substance in the seed I thought it might lie dormant until the

spring. This is what happened. In November I noticed an excellent strike of clover seedlings.

Mr Trotter—I would like to challenge Mr Hulston's statement that aerial topdressing compares favourably in cost with other methods. I sowed 5cwt. of lime and 1½cwt. of super with machinery and an equivalent amount from the air, the latter proving much more expensive.

Mr Hulston—My remarks apply only to light applications up to 2cwt. per acre, where handy to the strip.

Mr E. Reid, Marlborough—Have you had any experience of sowing pelleted seed?

Mr Hulston—I haven't, but the Department of Agriculture is carrying out trials with seed pelleted in mud, soil, gelatine, phosphate, and other materials. One great advantage of pelleted seed is the more even distribution.

Mr Cowin—How effective is triple strength phosphate on ordinary pasture? If mixed with lime would the spread be more satisfactory?

Mr Hulston—Where you apply 2cwt. straight super and get a certain result, you could not expect more than a "here-and-there" result with two-thirds of a cwt. of triple super.

Mr T. D. J. Holderness, Motukarara—Operators prefer to spread granulated super and farmers like it because of more even distribution. Can the fertiliser companies supply more of the screenings?

Mr Hulston—We are trying to persuade the fertiliser companies to supply more screenings. It is hoped that at least one North Island company will instal equipment for making granulated super.

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THE POLICY OF THE NEW ZEALAND MEAT PRODUCERS' BOARD

G. H. Grigg, Hororata (Chairman).

(In the absence of Mr Grigg, this paper was read by Mr R. H. Bevin.)

Before dealing with the general policy of the Board, it may help if I give a brief outline of events which took place leading up to the formation of the Board by the passing, on the 11th February, 1922, of the Meat Export Control Act 1921-22 which was instituted "An Act to make provision for the appointment of a Meat Producers' Board, with power to control the Meat Export Trade."

During the 1914-18 war and for a period thereafter all exportable meat was requisitioned and sold under contract to the United Kingdom Government. This contract terminated on the 30th June, 1920. At that date over 180,000 tons of meat were in store in New Zealand, being the then-equivalent of at least one season's production of meat for export. As a result, during the ensuing season the United Kingdom market was called upon to absorb nearly two seasons' production of meat from this Dominion.

This large influx of meat depressed prices at a time when costs, if anything, were tending to rise. The producer thus found himself

taking a squeeze between rising costs and falling prices with little prospect of relief.

It is unnecessary, today, to attempt to place the responsibility for this chaotic state of affairs except to say that it was the cumulative effect of a combination of circumstances, each of which in itself was sufficiently important to register its impact on the industry.

From a long-term aspect this crisis in the industry probably turned out to be its greatest blessing, as it roused the Government of the day and the producers into vigorous action; action, which in a very short space of time was translated into the passing of legislation through which the producer was able to ensure that his interests and those of the Dominion could be adequately safeguarded.

The Constitution and Powers of the Board

The Board as now constituted comprises:

- (a) Five representatives of the producers of meat for export, holding office for two years and retiring in rotation.
- (b) Two representatives of the New Zealand Government, holding office during the pleasure of the Governor-General.
- (c) One representative of the Dairy Producers, holding office for two years.
- (d) One representative of the Stock and Station Agents, holding office for two years.

Provision was made in the Statutes to give the Board wide powers in the event of any emergency occurring which would necessitate immediate and drastic action in the interests of the industry and the economic welfare of the Dominion. It is not necessary for me to detail these—suffice to say that they are contained in the Board's own Meat Export Control Act and in the Meat Act 1939. It is a tribute to the industry that to date the Board has not been called upon to make drastic use of those very wide powers.

The Policy of the Board

In broad terms the policy of the Board could be defined as follows:

- (a) To improve the quality of our product and thereby increase the price on the overseas markets.
- (b) To improve the economic condition of the industry.
- (c) To achieve a reduction of charges accruing to the industry.

In order to elaborate upon the work the Board has done in furthering its policy, I propose to subdivide those broad policy aims and touch a little on various subheadings:—

(a) Research and Experimental Work

It is doubtful if any industry in the Dominion owes a greater debt to science than does our frozen meat industry. That this indebtedness will be enhanced as time goes on is also undoubted.

The Board has always recognised that for the industry to survive it must keep pace with scientific progression and explore every avenue that science can avail which may help to reduce costs in the industry, to reduce the incidence of disease and pests, or to improve the quality of our product. During its stewardship the Board has contributed to many projects upon which I feel there is no need to elaborate at this juncture.

I would be failing in my duty, however, if I did not draw attention to one aspect of research work that is causing concern to my Board. I refer to the apparent lack of co-ordination throughout the country. If money is to be spent wisely, then something must be done to co-ordinate research work and ensure a cessation or at least a reduction of unco-ordinated duplication of projects.

(b) Extension of Trade to Markets other than the United Kingdom

The Board has always advocated increased production but has not been blind to the fact that there could be a saturation point for imports of frozen meat into the United Kingdom. The Board consequently, as a corollary to its policy of stimulating production, endeavoured to extend the channels of distribution by the opening up of new markets.

The Board's British representative did excellent work in this field and for a period some measure of success was achieved. Frozen meat, mostly beef, was exported to several countries on the continent of Europe and later to North America and to the East. Most of these markets, however, were destined to be lost, as one by one the importing countries imposed restrictions on the importation of frozen meat either as a protective measure for their own agricultural industries or because of their inability, through lack of reciprocal trade, to find the necessary exchange to finance overseas purchases.

There is little doubt that the United Kingdom will remain the main outlet for the disposal of our export meat. The Board, however, is investigating the possibility of opening up new markets, particularly in North America.

(c) The Freezing Industry and Overseas Interests

The Board's policy has been directed towards achieving the strongest possible competition in the field in New Zealand for our export stock.

The first essential was a free and open market at Smithfield, a market where the small but sturdily independent trader could operate and, above all, a market where our meat was allowed to sell at its real value.

The other essential was to ensure that the producer as far as possible received the full value for his produce. Strong competition in the local buying-field was necessary and this was supplied in reasonable measure by several overseas interests.

As a precaution against exploitation the Board maintained the policy of the "Open Door" as an alternative outlet for the producer who desired to test the market on his own account.

Whilst welcoming the competition of overseas interests, the Board has been careful to see that these concerns did not dominate the local field and thus eliminate competition. Overseas concerns have gained ground during the period of the Board's administration but the position locally is still a reasonably healthy one.

At the moment the Board is rather concerned at the state of the Wholesale Meat Trade in the United Kingdom following on 11 years of control and rationing and is considering ways and means of ensuring an open market being available to the small independent New Zealand companies and co-operatives in the event of free trading being restored in that country.

(d) Multiplicity of Marks

This aggravating problem which had intensified with the growth of the Frozen Meat Trade, became the concern of the Board during its first year of administration. Numerous small parcels with complicated markings had threatened to become a serious handicap to the trade. Not only was it extremely difficult to sort out the marks at the port of discharge but it also resulted in damage to the meat through extra handling and exposure, and had an adverse effect on insurance and shipping freight rates. In addition these small parcels generally speaking had a depressing effect on wholesale meat prices.

The Board immediately remedied this position by standardising all grade marks throughout the Dominion and fixing the minimum number of carcasses of mutton or lamb which could be shipped in one parcel at 250 carcasses.

An immediate improvement in handling was evident, resulting in less damage to our meat with consequent better prices and reductions in freight rates and insurance.

(e) Shipping Freight Rates

The Board on assuming control of shipments of frozen meat from the Dominion entered into negotiations with the shipping companies for a new contract for the shipment of frozen meat.

The negotiations were successful and resulted in an immediate reduction in freight rates.

With the work of the Shipping Allotment Committee enabling vessels to be worked to every possible economic advantage, the Board in later years negotiated a series of contracts, each of which in turn resulted in savings to the producer. By 1933 it was estimated that the cumulative savings in shipping freight-rates amounted to £1,239,000 annually.

In addition the Board obtained reductions in shipping rates on tallow, pelts and other by-products of the industry.

Before the setting up of other producer boards the Meat Board was also successful in obtaining reductions in freight rates on dairy produce and fruit to the benefit of the respective industries.

With meat being sold f.o.b., the Board has little or no say in present negotiations for adjustment of shipping freight rates. The Board is concerned at the exceptional increases that have taken place over the last few years as these will become a direct charge to the producer in the event of free trading being restored in the United Kingdom and the Dominion.

(f) Handling Charges at Ports of Discharge

The Board's forthright policy with regard to costs is indicated by the fact that it did not confine its attention solely to those of local origin. With the setting up of the London office, due regard was given to costs incurred overseas which directly affected the net return available to the producer.

The Board, through its London office, was constantly in touch with the Port of London Authority and the controlling bodies for other large ports in the United Kingdom and early in its existence negotiated beneficial reductions in handling charges at several of the ports.

Cold storage rates in London were considered unsatisfactory

and became the subject of special attention. However, it was not until the Board had purchased a site adjacent to Smithfield with a view to building its own store that negotiations ensued, resulting in reasonable reductions in storage rates being made. The store site was later sold at no loss to the producers.

(g) Freezing Charges in New Zealand

The pre-war consolidated charge was a composite one, incorporating the charge for slaughtering and freezing, the cost of placing f.o.b., and the shipping freight-charge to the United Kingdom. The reductions in shipping freights negotiated by the Board were duly reflected in reduced consolidated freezing charges.

The net freezing charge, that is, the charge for slaughtering and freezing, allows a reasonable margin of profit after providing for the expenses of running the factory side of the business (as distinct from the trading in meat) and allowing for credits accruing from the sale of those parts of the carcase which are the perquisite of the company.

Notwithstanding the many factors complicating the adjustment of the freezing charge, the Board, in the first few years of its existence, was instrumental in obtaining substantial reductions in the net freezing charge at several freezing works. This in turn brought about reductions at other works to meet the resulting competition. To assist the beef and pig industries special reductions in freezing charges were made by most freezing companies.

The present position with regard to freezing charges is that adjustments are negotiated by the freezing companies through the Government's Marketing Advisory Council with the Board acting in an advisory capacity to the Council.

(h) Regulation of Shipments

After its constitution, the Board, in accordance with the mandate conferred upon it by statute, assumed control of all shipments of frozen meat from the Dominion and negotiated all freight contracts for the carriage by sea of this class of produce. A provision was inserted in the freight agreement with the shipping companies calling for the setting up of a Shipping Allotment Committee on which the Board was represented and through which shipments of frozen meat from the Dominion were regulated. The work of this allotment committee was beneficial not only to the industry but also to the shipping companies as it enables vessels to be worked to greater economic advantage.

The regulation of shipments entailed a great amount of work and no little responsibility. Allotments could not be made blindly and attention had to be paid to numerous cognisant factors, chief of which were:

(1) The stock position of the London market.

(2) The prospective imports into the United Kingdom of frozen meat from other exporting countries, particularly Australia and Argentine. It was essential for instance to ship the bulk of our lambs before the new season's Australian lambs reached the United Kingdom market.

(3) Seasonal demand in the United Kingdom. The demand for imported frozen lamb at Home was seasonal and became heavy after Easter.

(4) Seasonal conditions affecting production in New Zealand and in other exporting countries.

(5) Storage facilities at the local freezing works.

(6) Strikes here and elsewhere or any other factor involving delay in shipments from New Zealand or elsewhere.

It can reasonably be claimed that the regulation of shipments put a stop to violent fluctuations in price such as occurred during the 1921 season, which benefited neither producer nor consumer.

The Board also gave careful consideration to the distribution of supplies over as wide a geographical area in Great Britain as possible and negotiated shipping contracts accordingly. Whilst London remained the greatest consuming centre, care had to be taken to see that the market was not overloaded and that the markets in other centres were kept supplied. The result of this policy was a great expansion of shipments into West of England ports and Glasgow.

(i) Supervision of Grading

From the outset of its administration the Board's object was to gain the confidence of the overseas buyer by ensuring that all New Zealand meat sold on the overseas market complied strictly with the grade specified. The ultimate object was to ensure a facile and buoyant sale for our products with little fear of quality claims and all their attendant abuses.

In order to put its policy into practical operation the Board appointed supervising meat graders whose duty it was to visit all freezing works throughout the Dominion and check the standard of grading of the works' graders. In addition they also attended at ship's side to supervise the loading of meat, paying particular attention to its condition as it emerged from the rail wagons and to stowage on board ship.

As a further check to see that meat was not mutilated in transit, dock inspectors were appointed in the United Kingdom to watch the unloading of vessels. As a result of their reports many reforms in the method of handling our frozen produce were instituted to the producer's advantage.

This aspect of the Board's operations is considered to be so important that today, despite the fact that the number of freezing works in operation is considerably less than in 1922, the grading staff has been increased to ten.

The Board's grading standards have not been lowered in any way during the period of bulk purchase.

(j) Advertising in the United Kingdom

It is to the credit of the Board that it was far-seeing enough to realise that the establishment of the quality of New Zealand's frozen meat was not the end of the road and that, once established, this fact had to be kept incessantly before the consumer. From this realisation was born the Board's advertising policy in the United Kingdom, a feature of our meat marketing that has received world-wide approbation.

With the expansion of production in the Dominion, the Board decided to intensify its advertising campaign with the result that the annual appropriation for publicity gradually increased from £3,000 in 1926 until it reached a peak of £34,000 in 1939.

The Board is still carrying on a modified form of advertising with the object of keeping the quality of our product before the eyes of the consumer against the day when freedom of choice will return and of educating the new generation of meat eaters as to the advantages of eating our products.

(k) Improvement in Quality

I come now to what is the most important plank in the Board's policy—that of striving to keep the quality of our products on a plane above those of our meat-exporting rivals. The Board, of course, is not omnipotent. It can not, by any of its actions, directly improve the quality of our livestock. That is up to the producer. The Board has, however, by successful use of propaganda, the promotion of fat-stock competitions and other similar activities educated the producer as to the requirements of the overseas market. The producer has done his part and today New Zealand frozen meat enjoys a reputation second to none and the producer is reaping the benefit.

It is undoubtedly because New Zealand has only three main breeds of sheep, Romney, Corriedale (and the half-bred) and Southdown, that we have been able to build our lamb trade not only on quality but also on uniformity. This is a great achievement when one considers the many breeds of sheep that have been tried and perhaps found wanting, and can be traced directly to the tremendous increase in the use of the Southdown ram. In 1925 the Southdown ram constituted 12 per cent. in the North Island and 5 per cent. in the South Island of the respective ram flocks. In 1949 the percentages had moved to 35 per cent. in the North Island and 27 per cent. in the South Island.

In the 1920's our lamb sold pence a lb. below that of the home-killed product but during the 1930's the gap began to close. This came about mainly through our production of quality, uniform, well graded, light-weight lamb. The small joint was popular with both the consumer and the butcher and the latter could buy on grade without a preview.

During the war period the meat price-schedule for United Kingdom home-killed lambs and sheep was designed to encourage the production of weight. This was unpopular both with the butchers and the consumer. Recently, however, the United Kingdom Government has redesigned its buying schedules, especially insofar as beef is concerned, with the object of encouraging the production of lighter unwasteful carcasses.

If we maintain our present standards we will be in a most favourable position if or when the bulk purchase of meat ceases. Those in this country who are advocating a change of the fat-lamb sire from the Southdown to the bigger, leggier sheep are in the opinion of the Board, doing a great dis-service to the country. That some damage has already been done is fairly evident. If there was a large swing away from the present type, our lambs would become very mixed both in type and in quality and it would take many years to recover the position we would undoubtedly lose in the estimation of the trade at Home.

To get the highest price we must produce what the customer wants and to those who have had the opportunity of studying marketing conditions in the United Kingdom prior to the war, our

present type of production is very close to ideal. To illustrate my point I will quote from the report of the London judges on the 1949-50 District Fat-Lamb Competition held at Smithfield. These judges are men of integrity with many years of experience in the meat trade and their remarks can be considered as having the endorsement of the trade generally. They stated:

"It is a matter of congratulation to those who guide the policy of the New Zealand lamb trade, that the demand for a heavier carcass was not acceded to. With the slight increase in the meat ration in the United Kingdom, the housewife is again becoming selective, and fat is not a favourable feature of the ration, hence the popularity of New Zealand lamb."

"It can safely be said that the lambs this year as a whole are nearer to the requirements of the London trade than any previous shows, carcasses generally maintaining good make and shape. Excess fat (usually a feature of these shows) was not so much in evidence, and because of this feature judging was extremely difficult."

In passing it could be mentioned that another move in this country, that of delaying or not castrating lambs also meets with the strong disapproval of the trade at Home and of the Board.

Lamb of course comprises the major proportion of our export tonnage of meat—nearly 60 per cent.—but the Board has not concentrated its policy solely on that product. It would not be an overstatement to say that the remarkable growth of the pig industry can be directly attributed to the great assistance rendered by the Board in developing the overseas market. As a report issued by the Imperial Economic Committee in the United Kingdom stated:

"We have mentioned in other reports how the activities of the Meat Board have enhanced the reputation of New Zealand mutton and lamb in Great Britain. In regard to pork, it has made the Trade."

The beef industry was also dragged out of the doldrums, quarter beef production increasing by from 75 per cent. to 100 per cent. from 1922-23 to 1946-47. Since then, despite encouraging increases in price production has declined considerably. The Board considers that in the interests of New Zealand as a whole, this downward trend in beef production must be stopped. Apart from the value to our pastures beef is required in order that we may be able to sell to our customers overseas a full range of their meat requirements.

I feel that I have transgressed rather much on your time, but nevertheless trust that my historical resumé of the Board's policy has been of interest. May I state that this policy could not have been so successfully pursued without the full co-operation of the producer. That it is in his interests to co-operate and that his co-operation will be forthcoming in the future, I have not the slightest doubt.

Mr A. C. Hurst, Papakaio—Last year I sent lambs into the works, nice light-weight lambs. When drafted I was utterly ashamed of them—they weighed 30lb. and were just clear of second quality and brought £2/8/-. I paid £4 for stores later on. If the Meat Board want these light lambs they must be prepared to pay more.

Mr W. B. Trotter, Fairlie—What does the Board intend to do about the present schedule? There is one special factor—skin value. It seems to me we have today to frame a schedule to pay farmers for the meat price and then for the skin value. The woolly lamb is a great deal harder to fatten than one that is accepted as a fat lamb type. It is likely that a 30lb. lamb has a better skin than the 36lb. and by framing a schedule with the wool price based on average output, you are robbing the lamb with the heavy skin to pay for the fat lamb type which has not produced the wool.

Mr J. Gordon, Garston—According to Mr Bruce Levy, the best grassland in the world is in Southland. We have such good grazing that we find it difficult to produce the light-weight lamb. We are taxed to pay the premium on the light lamb. If the world is starving for meat we should produce maximum poundage of meat on minimum number of carcasses.

Mr Bevin—There has been a significant rise in the use of Southdown rams; this is one of the key points. Put another four to five pounds on the Southdown cross lamb and you get a tendency to fat. If we are handling the Southdown cross we have to be sure as to what we mean in connection with heavy and light-weight carcasses. We have not got thousands of rams of the larger breeds in this country. In the meantime the bulk of fat-lamb sires are Southdown rams. We know what sort of lambs they are producing. If we fatten Southdown lambs we must be careful to guard our special market; the British market is ruthless. We have to watch what the market requires—what is going to be our particular place in the whole scheme of meat. We have a niche which we must retain. In other words we are now in the Rolls-Royce class for imported meat—put more weight on and we may easily move down to the Ford class.

Mr A. Henderson, Winton—Why is there the difference in ewe schedule between the North and South Island?

Mr G. W. Scott, Timaru—The North Island pelts bring 40/- dozen better than the South.

Mr B. J. Woods, Golden Bay—To jeopardise the future for the sake of immediate gain is extremely bad farming. I am very glad we have men on the Meat Board with such long heads. If you are going to put heavy weight on the lambs you are taking a narrow view of the position and going to lose the market in the Old Country.

Mr R. G. Allen, Southbridge—Regarding the handling of frozen meat and frozen lamb for export from the hooks until the hatch is put on the boats the man in charge of freezing has a difficult job because of rising and falling temperatures on each lamb and also to some extent on the way it is stacked in the ship. From an overseas freezing expert I have learned that he considers freezing methods in local freezing works are obsolete. Could the Meat Board enlighten us on this?

Mr Bevin—I cannot reply to that question. Mr Grigg will discuss this.

Dr. Filmer—When in England I consulted butchers. They were unanimous that they wanted a small lamb from New Zealand. The consumer of course has no choice at present but he does not want fat on his meat. It is true that the English farmer produces a heavy lamb but it is of a different type from ours. The Scottish Blackface

is crossed with a Cheviot or Border Leicester. The resulting ewes are mated with heavy fat-lamb breeds such as Suffolk and Hampshire Down. The resulting lamb, sold at 40-60lb. is of a very different type from our Romney-Southdown and it is not over-fat. The Meat Board has to give a lead and we must have a policy which will enable us to make money producing the type of lamb the market wants. At Ruakura we carried out trials with rates of stocking. Four ewes to the acre run with cattle produced lambs averaging 48lb.; six ewes to the acre with cattle (which were not fattened) produced lambs averaging 36lb.; eight ewes to the acre with no cattle produced lambs averaging 33-34lb. With eight ewes to the acre we made more money on the present price schedule.

Mr L. Carpenter, Rangiora—We kill our home-bred lambs at 35-37lb. We then buy in half-bred lambs and fatten them too, also at light weights. We are sure it is better to fatten two crops of lambs at reasonable weights than only one crop at heavy weights.

Mr Trotter—I assume lambs by heavy sires require more food to produce one pound of meat.

Dr. Coop—Lambs by heavier sires do eat more but in the spring you have more grass than the ewes and lambs are capable of eating. The extra food eaten by lambs from the heavy breeds would otherwise be wasted. That is where the greater efficiency comes in.

Mr A. Grant, Waimate—I disagree with Dr. Filmer. I interviewed 120 butchers in the industrial areas and the only place where they wanted a light-weight lamb was in London. I would like to stress that it was three London butchers who judged the fat-lamb competitions.

Maj.-General Barker, Geraldine—I would like to pay a tribute to the way in which the Meat Board advertises our product in England.

Mr H. R. Scott, Ealing—Is there any information on which travels best—the light or heavy carcase?

Dr. Filmer—Undoubtedly the light lamb.

Mr G. W. Scott, Timaru—One problem to be overcome for getting heavier lambs is in the grading. Our grandfathers evolved a system of grading—2's, 8's and 4's, based on weight. If we could evolve a system of grading on conformation and proportion of meat to waste I am sure that heavier breeds would come into their own.

Mr A. Grant—Much of our foothill country should be suitable for the type of ewe we see so often used in England. A Cheviot cross ewe is mated with a Border Leicester and the half-bred put to a Suffolk ram. That type of ewe is a wonderful milker.

Dr. Coop—I agree up to a point but wool in New Zealand has some value and we must proceed cautiously with the Border-Leicester and the Cheviot. I don't know how it is possible for the Meat Board to say what the English consumer demands today. He has had no choice since 1939 and social and economic conditions have changed considerably since then. The Meat Board makes a big assumption when it says that the kind of carcase required in 1955 will be the same as that demanded in 1939. I'd like to know from the Meat Board why we don't have a Down-cross grade in the South Island.

Mr P. C. Ensor, Double Hill—If we go for the heavy weight lamb we must still be careful to pay a decent price for the light lamb,

otherwise we will tend to go for heavy sheep on light land to which they are not suited.

Mr G. W. Scott—Is there any evidence as to how the Romney ewe milks under dry conditions? It is a common belief that you must keep the feed up to them as you do with dairy cows.

Mr J. B. Hurst, South Otago—I am on typical Romney country. Using straight Romney rams we normally get 30 per cent. wether lambs fat off the mothers. This year one of the driest in history, we got the same percentage off fat.

Mr Bevin—There is today in New Zealand a new approach to production in the sheep industry. We have simplified things by relying on the Romney in the North Island and in Southland and the Corriedale and half-bred in other parts of the South Island with the Southdown ram as the fat lamb getter. It is a question of whether we have not gone too far in this simplification. In much of the North Island hill-country the reduction in soil-fertility has put the Romney out of balance with the country, hence the suggestion to move into the Cheviot. The Meat Board is well aware of the situation that is arising. The quality meat trade has been based on a 34lb. average carcase. The low-weight lamb has its place on the London market. To get that average we must have over-weights not suited to the London market. And in pre-war days the Board arranged to have this meat sold in other parts of the United Kingdom. The Board's complaint under bulk purchase is that sufficient attempt is not being made to place the meat where it is most suited.

Mr J. H. Grigg—We must remember that in any alterations we may make we have to study a great variety of country and every breeder of fat lambs must benefit from the experiments carried out by the College. We should investigate further the method of grading of lambs, but whatever we do we must remember to aim at the maximum amount of meat with the minimum amount of fat.

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FAT-LAMB SIRES

I. E. Coop, Lincoln College.

The basis of fat lamb production in New Zealand, as in most countries is crossbreeding, plus good feeding. In crossbreeding we use a fat lamb sire upon the cull or surplus ewes from the hill country. The ewes available for this purpose are mainly Romneys, half-breds, and Corriedales, which though sound breeding ewes have not themselves a sufficiently good carcase-conformation for the production of first-quality fat lambs. By crossbreeding with sires of very good carcase-conformation progeny of the desired quality are obtained. In this way we can produce first class lambs from relatively indifferent ewes.

The fat-lamb industry of New Zealand was founded in Canterbury in the 80's and 90's of last century by using Border Leicester, English Leicester and Shropshire rams on our half-bred ewes. Virtually all the lambs were rape-fattened and taken to carcase weights of about 45lb. The virtues of the Southdown ram were not appreciated

until the turn of the century when it was found that lambs by this sire could be drafted fat off the mothers or fattened in a shorter time. It is of interest to note that Mr Bayne, a former Director of this College, was responsible for some of the first experiments in this connection. Reaction to this was at first slow, but from 1920 onwards the Southdown has never looked back. Its great virtue was that it produced a carcass which was of the desired conformation and composition at the relatively light weight (28-36lb.) demanded by the pre-war London market. This virtue was rewarded by a highly-differential price-schedule based upon a grading system designed to encourage the production of small, light lambs. This policy has been successful to the point that it has practically eliminated all competition leaving the Southdown in undisputed supremacy.

At the end of the war the Department of Agriculture at Ruakura and ourselves became interested in the other fat-lamb sires. As far as we were concerned I was anxious to obtain accurate information on why the Southdown was supposedly so superior, and also, whether the heavy sires might not be used to advantage to increase carcass weight and so improve the meagre meat ration that prevailed in Britain at the time and which seemed likely to continue.

We set out, therefore, by a series of comparative trials to determine a few facts about the relative merits of the different sires.

These trials over a period of four years—during 1947 and 1948 at the Kirwee Experimental Farm and in 1949 and 1950 at Ashley Dene—have now been completed. The technique used has been essentially the same in all trials. A line of 300-400 ewes was divided into even groups of 60, and two rams of each breed were put out with each of these groups. After mating, all the ewes were run for the rest of the season as one mob. All the ewes and their lambs were ear-tagged for identification. The milk lambs were taken in one draft by an experienced lamb buyer and the carcass weights and gradings of each lamb were obtained at the freezing works. The undrafted lambs were weaned and fattened on rape, except in 1950 when pasture was used. In this final draft there were never more than half-a-dozen lambs left.

The details of the rams used are as follows:

Corriedale, Romney and Border Leicester—different rams used each year and all of them were from the College studs.

Southdown—different rams used each year, mainly College rams but representatives of two other studs were also included.

Ryeland—different rams each year, all from one stud.

Dorset Horn—different rams each year, all from one stud.

Suffolk—same rams each year, all from one stud.

South-Suffolk—two rams from one stud, used in 1950 only.

You will appreciate that the straight drafting-percentage and weight as a basis of comparison are not strictly true without some correction for the variation between the different groups in regard to the age of the lambs at drafting, the percentage of seconds, the ratio of males to females and of twins to singles. You will also appreciate that 60 ewes to each breed is not a large number, so that you should look at the trends of results over the four seasons rather than at the detail of any one season. As a result of these considerations I have expressed the drafting percentage in round figures in

terms, not of lambs drafted, but of prime-carcased lambs drafted, carcase weight of these prime lambs and finally the carcase weight of all the rape lambs irrespective of grade.

In the two years at Kirwee we mated the rams to both Romney and Corriedale ewes, using Romney, Southdown and Border rams on the Romney ewes and Corriedale, Southdown and Border rams on Corriedale ewes. The Border Leicester was chosen as being the commonest breed representative of the heavy sires.

The results of the tests are gives in Tables I and II.

TABLE I (1947)
(Average age—16 weeks)

Breed	% Primes Drafted	Carcase Wt.	Carcase Wt. (Rape lambs)
R x R . . .	40	33.0	36.3
SD x R . . .	50	35.4	37.9
BL x R . . .	60	38.5	41.5
C x C . . .	25	35.3	36.1
SD x C . . .	30	33.6	35.7
BL x C . . .	60	38.2	38.6

TABLE II (1948)
(Average age—17 weeks)

Breed	% Primes Drafted	Carcase Wt.	Carcase Wt. (Rape lambs)
B x R . . .	65	36.0	35.8
SD x R . . .	100	36.5	35.9
BL x R . . .	95	40.4	40.5
C x C . . .	45	35.0	35.2
SD x C . . .	85	34.5	35.3
BL x C . . .	75	39.0	38.9

In both years there were few twins so these have been excluded and the figures refer to single lambs only. It will be seen that in 1947 the Border gave a higher drafting percentage and a 3-5lb. carcase-weight advantage over the Southdown. In the following year the Border was not quite as good as the Southdown in drafting percentage, but it again had 4-5lb. carcase-weight advantage. This weight advantage also applies to the rape lambs in both years.

At Ashley Dene we extended the trials to cover more sire breeds but used Corriedale ewes only. The rams used were Corriedale, Southdown, Ryeland, Border Leicester, Dorset Horn and Suffolk while in the last year we included South-Suffolk rams. The two years at Ashley Dene were seasons of extremes. In 1949 the rainfall was 18 inches, following one also of 18 inches in 1948, while in 1950-51 the summer was the wettest in living memory. The results in these two years are given in Tables III and IV.

TABLE III (1949)
(Average age—14 weeks)

Sire	% Primes Drafted	Carcase Wt.	Carcase Wt. (Rape lambs)
C	30	32.0	34.0
SD	50	32.0	32.6
Rye	60	32.5	33.8
BL	50	35.5	39.1
DH	65	35.7	36.3
S	60	38.0	37.3

TABLE IV (1950)
(Average age—19 weeks)

Sire	% Primes Drafted	Carcase Wt.	Carcase Wt. (Rape lambs)
C	37	36.1	36.5
SD	56	36.2	35.6
Rye	58	38.6	38.4
BL	55	39.7	38.2
DH	65	39.5	40.7
S	50	40.6	40.2
S-S	62	37.0	36.1

In 1949 there were few twins and the figures refer to singles only. In 1950 there were more twins than singles so both are included.

Summarising the results of these trials we have the following:

(1) The Ryeland is comparable with the Southdown in drafting percentage and slightly better for weight (1-2lb. better).

(2) The South-Suffolk was very similar to the Southdown but it would be unwise to draw conclusions from one year's results only. When the necessary age and sex corrections are made it is probable that this sire would leave lambs 1-2lb. heavier than the Southdown.

(3) Most important of all, the three heavy sires—Border Leicester, Dorset Horn and Suffolk—have drafting percentages at least as good as the Southdown and their carcase weights are 4-5lb. heavier in both milk lambs and rape lambs.

The results of the trials at Ruakura which were conducted over the three years 1946-48 inclusive, may be summarised very briefly by saying that they were almost identical with ours. This is all the more interesting and important in view of the great difference in environment between the Waikato and the Canterbury Plains. At Ruakura they mated the rams to Romney ewes. The breeds of ram used were Southdown, Ryeland, Suffolk, Dorset Horn, Border Leicester, English Leicester, Cheviot and Romney. The average over the three years was as follows:

(1) Drafting percentage. Southdown 40%, Ryeland, Suffolk, Dorset Horn and Border 50%, other sires 15-35%.

(2) Carcase weight. Ryeland little heavier than Southdown but Suffolk, Dorset and Border 4-5lb. heavier than Southdown.

(3) Grading. Only the Southdown got a large percentage into

the Down Cross grade, but the heavy sires had no difficulty in getting almost all their lambs into Prime grade. The Southdown carcasses were shown to be shorter in the leg and to contain more fat but less lean meat than the crosses by the heavy sires.

The main conclusions of all this work may be stated as follows:

(1) For the light weight 32lb. lamb, the Southdown is by far the most suitable ram. The lambs by the heavy sires lack conformation and finish at this light weight.

(2) Carcase weights can be increased by about 4lb. by using the heavy sires—particularly the Border Leicester, Dorset Horn and Suffolk—without sacrificing drafting percentage and grading (prime), and without growing any extra feed.

(3) The carcasses of lambs by the heavy sires are definitely longer in the leg and body, but they contain more meat and less fat than Southdown lambs.

Let us now look at how the fat lamb price schedule affects all this. On average, most Southdown lambs go into the 2's weight grade and those by the heavy sires into 8's. At the present time the heavier 8's are penalised by $\frac{1}{2}$ d. per lb. $\frac{1}{2}$ d. difference in a pay out of 20-30d. per lb. is scarcely significant. It therefore pays definitely to produce the heavy lamb. But this has not always been the case. Before the war the schedule was so arranged that one got practically no reward for producing a lamb heavier than 36lb., while during the war and until the present season the heavy lamb producer has got about half of the extra that he should have got.

The things to be decided by the farmers are firstly, whether it is in the interests of the people of New Zealand and of Britain for us to produce this heavier lamb. Secondly if it is decided that more meat is desired, those who produce the extra meat should see to it that the price schedule enables them to do it profitably, for otherwise no extra meat will be produced. These are things which I leave you to sort out.

Lastly one word of warning. If some of you are encouraged to try the heavier sires it is my opinion that complete satisfaction may not always be achieved. The heavy sires have not been compared with the Southdown in all localities and there may be some where the Southdown will give higher drafting percentage, though I would think the heavy sires will invariably give higher carcase weights. There is a little evidence from the results obtained at Kirwee that under marginal fat-lamb conditions where only 10-25 per cent. are drafted fat off the mothers, the Southdown may give a higher drafting percentage than other rams. Conversely it is my belief, though I have no evidence for it, that the best results with heavy sires will be achieved where conditions are good and where high percentages fat off mothers are common. We ourselves have found that in one year the Southdown will give a higher drafting percentage, in the next a lower. I ask you therefore not to decide for or against the heavy sires until you have compared them with the Southdowns for two to three years. If you do this I believe that the great majority of you would obtain results similar to those which we have achieved.

The fairly consistent results we obtained over four years, including seasons of extremes, and the almost identical results obtained at Ruakura indicate that a fundamental principle is involved and that the results would have very wide and general application.

Mr Trotter—In the Fairlie district we strike at times extreme conditions of heat and under these conditions the feed disappears very quickly. Under these conditions the Southdown hung on longer than any other breed. Where other lambs are slow of recovery, put on to feed the Southdown lamb will make a more rapid recovery. Has Dr. Coop deliberately knocked his sheep to see which breed would stand up to very hard conditions?

Dr. Coop—Some were deliberately starved. We put some of the ewes and lambs on poor feed to get a high percentage of store lambs. These were fattened on rape and turnips. There was no difficulty in fattening on rape. We had them on for about six weeks and fattened all of them. The Borders killed out at 4lb. heavier than the Southdowns. In knocking lambs back the Southdown was most susceptible to a check. There is no consistent line of argument that enables us to say that one cross is worse or better than another in that respect.

Mr D. H. Butcher, Springston—Do you find any difference in lambing difficulties in using big sires on the ewes, particularly with the Corriedale ewe against the Southdown?

Dr. Coop—We have kept a record over four years of all ewes which died and all lambs which died. Of the ewes which died round about lambing, there was half a per cent. less in the Southdowns than in the others. This is not at all significant, but the thing which is significant and answers the question is the number of lambs which are born dead or die at or soon after birth. The pure Romneys and Corriedales crossed with the Southdowns lost over the four years 15 to 20 per cent. of all lambs born. With the heavy sires the percentage of lambs which died was 10 to 15 per cent. This is definitely smaller and is attributed to the fact that if you examine the head of a Romney, Corriedale or Southdown, you will find he has a short nose and wide head. With the Border, Suffolk and so on, you find that the head shape is quite different, although the lambs are definitely bigger. I think it is quite possible that the ewes find it easier to lamb with the heavy type of lamb.

Mr A. J. Hurst, Waimate—If the general policy is to encourage the use of the light sire, we are doing a great disservice to a world that is short of meat.

(Mr Grigg attended on the following day and made the following comment on the discussion and the questions asked.)

Mr Grigg—You ask why we insist on the light lamb when Britain is so short of meat? We must look to the future and the Board has decided to encourage the type of lamb required before the war. The Trade has impressed this on us whenever we have visited Britain. Some of you may have been in butchers' shops in England recently and been told that they wanted a heavy weight lamb. May I remind you that many of those butchers have never sold meat?

Right since the beginning of the war they have just handed meat over the counter on the ration. Before the war we had the best lamb in the world and received a premium over all other countries exporting to Britain. Is it wise now to run away and experiment by changing our type and standards? I say "No," and the Board agrees. There is a probability of the retail price of lamb being put up considerably in Britain. The higher the price the more we should ensure that we produce what the consumer wants—if we are to get that price. During the war our lamb has spread all over Britain. We have a favourable name. We must be ready to reap the benefit. In reply to Mr Hurst saying that we could produce light lamb in any number if the Board would pay for them, I would say that it would probably pay him on his irrigation country to put his lambs in early. We don't want them all light. We want some light and some heavy.

You ask why don't we have a Down-cross grade in the South Island? In the North Island we have three grades: down-cross, cross-bred and seconds, the cross-bred getting 4d. per lb. less than the down-cross. In the South Island we have only two grades—prime and second, but you get down-cross price for all the primes. If you want a down-cross grade you can have it, but you must be prepared to take 4d. per lb. less for a proportion of what is now graded prime.

You ask if the world is starving should we not ship the maximum amount of meat from the minimum number of carcasses? I say it is essential to keep the Southdown ram going. If we get the early lambs away it gives us the chance to fatten the lambs from the store country.

As regards grading on conformation, I agree that if we get too many over-fat lambs we would have to consider altering the schedule. Today there does not seem to be any need for this.

You say if the Board wants a light lamb it must be prepared to pay. In the past the average of 34-35lb. has been the ideal. There is room for some light and some heavy. Some districts are suited to produce light lambs, others to produce heavy lambs. We will get out of balance if we pay too big a premium for light lambs.

As to whether we are satisfied with the handling of the meat from the hooks to the hold, I would say that things will be much better now that telescoping has stopped, but we must look at the question of insulating railway waggons, most of which are very old.

The difference in schedule prices for North Island and South Island ewes and wethers was mainly in pelt value. There had always been a difference, and the higher prices recently had accentuated the difference. Wool values had similarly increased, and where the wool pulled had been worth about 17d. per lb. under the commandeering, it was now worth about 100d. It was a big difference, and it was a question whether halfbred and Romney wool was getting a fair price against Down-cross wool on lamb skins. The ewe and wether schedules had been arranged to allow for this, and something might be done for lambs in the same way. Lighter and second lambs would then get the same increases for wool as heavier lambs. He undertook to see that the Board took this point up with the companies. It might mean a further premium for Down-cross lambs to ensure that the Down-cross was retained and that there was not a move towards the wool breeds.

Mr P. J. Cowin, Thorpe—What is the Board's policy regarding the stabilisation funds? I think we should fix a limit and pay the balance to the farmer rather than let the fund go on increasing.

Mr Grigg—There has been a change of Government and the whole price is being paid out to the farmer this season.

Mr Shand, Kaikoura—Do you think the dairy farmers are adequately represented on the Meat Board?

Mr Grigg—The Dairy Industry is well represented on the Meat Board by the Chairman of the Dairy Board. The amount of pig meat is small but the Board always endeavours to make what increases it can. The National Pig Council arranged the new pig schedule which was designed to encourage a good grade of porker pig.

In conclusion I would like to stress that I cannot agree with the policy of changing fat-lamb breeds as suggested by Dr. Coop. The experiments were carried out on only two farms and in any case it would take a very long time to get sufficient rams of the suggested breeds.

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PROBLEMS OF LAMB FATTENING (a)

Melville Turton, Ashburton Forks

I have been asked to give a paper on "Fat Lamb Production." I do not claim to be an authority on the question and I feel I am speaking to many who have had more experience and are better able to give their experience than I am.

To begin with I am firmly of the opinion that a farm must be run on scientific lines. It is a case of advancing with the new ideas or being caught in the back-wash. The new and improved strains of grasses together with lime and super can give us the best pastures in the world. We must set out to leave our pastures better than they were handed to us.

To my mind, improved pastures together with the results of research into many sheep problems have changed the whole outlook of fat-lamb production in some localities. But we must not allow the changing methods of production to interfere with the production of a quality lamb. We must at least hold the quality of the lamb we have founded our reputation on—if we can improve it so much the better. The lamb I refer to is the premium 32-36lb. lamb. The basis of my paper is the production of this light-weight, early-maturing prime lamb.

Although there are many factors which might be given consideration, the two main points in the economic production of this light-weight lamb are:

(1) Lambing percentage.

(2) The proportion of lambs drafted fat off the ewes.

High lambing-percentages are essential for economic production. Although nobody would question this, we cannot claim to have raised lambing percentages appreciably during recent years. It is worth while reviewing just what we can do to get some improvement.

In the first place I am definitely of the opinion that our ram fairs are held too late. Rams are bought in the middle of March and in many cases are turned out with the ewes one or two weeks later. Most of these rams have been fed on concentrates and have had little exercise in preparation for the fair. When they reach their new home this treatment comes to a sudden stop. Not only this, but they are probably turned in with the older rams already on the farm and the mature and hardened rams waste no time in demonstrating to the new arrivals just who is boss. The young rams lose condition rapidly and research has shown that sudden changes such as those described can interfere seriously, for the time being, with the lamb-getting ability, or fertility, of these bought-in rams. I do not think it is possible to over-emphasise this.

I suggest that the difficulties can be overcome by buying rams earlier. This would allow them to be fed to suit the conditions of the property and to settle down. Most people do buy rams to suit the property but there are still many who chase fashion—like the ladies and their hats.

To buy earlier would mean holding the fairs earlier and I see no objection to this. The extra young rams on the farm are not going to inconvenience the buyer, and the ram breeders would be only too happy to get their rams off the property early. By March they are having plenty of worry with the ram lambs—their next season's sale rams. When the young rams arrive on the farm, put them on a small paddock of well-controlled grass and feed them some dry feed.

All rams ought to be dipped early in January. If they have missed do not take any risks by dipping later but use an ordinary spray pump. Crutching and the removal of belly wool should be done at the same time. At all costs avoid upsetting them as the tupping season approaches.

Meanwhile the ewes must receive attention so that they are ready in good time for mating. Dipping and crutching should be carried out as early as possible, and certainly not later than three weeks before it is intended to turn out the rams.

If the ewes have been put on short rations after weaning—and this is a sound policy—they must be prepared for mating by flushing. For this purpose a saved pasture or a few hours daily on second-growth rape will prove effective, but exercise must not be overlooked.

I find it best not to put out too many rams when tupping commences. It is a better plan to hold some in reserve so that an occasional spell can be given. If the ewes are flushed properly and the rams managed correctly, most of the lambs will be dropped in the first week or two of lambing.

Management after mating is important and for some weeks the ewes should be handled with care. This point is all too frequently overlooked.

With the approach of lambing, I save my best feed for the early-lambing ewes. Before lambing commences I yard all the ewes quietly and mark those close to lambing. This can be successful only if the work is done without the fuss and bother usually associated with sheep in the yards. For marking I use a raddle bag on the end of a stick and I find I can do the job without unduly disturbing

the ewes. The raddled ewes are run off from the rest of the mob and are given the pick of the feed available. Another advantage is that, if the weather breaks, the ewes close to lambing are in a handy-sized mob and can be given adequate shelter and care. You can concentrate your energies on the small mob instead of wasting it on the whole flock.

Instead of raddling the ewes just before lambing, you can raddle the briskets of the rams during tupping and draft off the marked ewes every few days. This means a lot of work but it does result in a saving of tupping feed and valuable winter feed.

Most farms have plenty of sheep netting—probably much more than is ever used. Much of this can be put to good use during lambing. Split some paddocks which have good feed on them and fence off sheltered spots in others. Make the netting work and don't be content to leave it resting in the yard. If the job is done before lambing starts, the divided paddocks and the sheltered spots all help to make lambing management efficient and the work easy.

I believe in set stocking for the spring grazing and as lambing progresses I build each paddock up to its carrying capacity. I like to run cattle with the sheep and carry a yearling beast to two acres on the heavy-land pastures and to four acres on the medium-land pastures. There is no question that the sheep do better with the help of the cattle.

The lambs should be drafted prior to shearing. This is difficult I know, but I think it the best way. But whatever you do, draft when the lambs are at their peak. When the lambs are showing wax plainly in the flank and are full of bloom they are at their peak and it is time to draft.

With a draft of lambs off the farm, sort out the ewes which have lost their lambs. They no longer require the good feed which can be far better used by the ewes which still have lambs to feed. This early drafting gives the ewes a longer summer spell. I believe it results in earlier tupping and better lambing-percentages.

Weaning must be prepared for. A well-controlled and clean pasture will give good results. In fact the lambs will do better on this than on some kinds of rape. I have had disappointing results with the "Giant" variety.

Draft off the cull lambs and keep in small mobs away from the main mob. They will do much better away from the competition of the big fellows.

Dry ewes are the bugbear of high lambing-percentages. The two-tooth dry ewes are sold off early as maiden ewes in the fat pens and the older ewes meet the same fate in September while prices are still high. The few bad mothers that lose their lambs and refuse to foster, or lose their lambs too late to foster, go to the freezing works.

Pasture control is an important feature in the fat lamb production I have described. I find grazing twelve to eighteen months' old cattle with the sheep pays in more than one way—they are a profitable side line themselves. If the cattle are in sexed mobs they are more settled and easier to manage.

With the swing towards topdressing (and liming is in its infancy in Canterbury) it is essential that pastures be kept under control during the periods of vigorous growth. This is very important with

perennial rye-grass and white clover. If these get out of control they appear to be semi-poisonous, but whatever the cause, there will be no chance of getting fat lambs.

Perhaps we have reached a stage in our pasture improvement when perennial rye-grass and white clover are too predominant. I know a lot of money has been made out of seed crops from these pastures but, from the lamb production point of view, greater use might be made of red clover—both Broad and Montgomery—as a basis of temporary pastures.

However, there is no doubt that perennial rye-white clover dominant pastures are capable of heavy production. With the help of DDT in controlling grass grub (science helping us again) I can visualise even greater production from perennial pastures. I can see a great belt of our marginal land (sadly depleted in the past by wheat growing) built up in fertility by better grasses, topdressing and heavy stocking. I hope that in the future, Canterbury will not be regarded as the granary of New Zealand. There is no reason why other parts of New Zealand should not play a share in the production of the essential wheat crop. New varieties of wheat and modern methods of harvesting make it possible to grow wheat in most parts of New Zealand. My reason for even mentioning wheat is that in Canterbury many farmers on marginal land have improved their pastures by topdressing with lime and super and by sowing better grasses. But cropping could again reduce this land to its former low-producing capacity.

To return to our lambs. Nothing pays better than the lamb off the mother in December or early in January and on most farms many more could be drafted during that time. Too many farmers are too cautious with this early draft and allow the lambs to run on. The lambs get a check, lose their bloom and then have to be held over. The December milk fat-lamb is not only the one which maintains our reputation on the overseas market, but is the cheapest to produce. The cost of getting held-over lambs to the works is something like this. The increased April-May price is based on increased wool pull—on the average 1½lb. at 9/- per lb—amounting to approximately 11/6 a head. Against this put the cost of fattening (rent of land, cost of cultivation, seed and manure) dipping, crutching, the risk of losses, and the total will be little short of 10/- a head.

No matter which way you look at it, nothing pays like the lamb off the mother and this is the lamb the market wants. A higher price for this lamb might stimulate production but I feel sure that even without this, many thousands of lambs could be profitably drafted earlier than they are now and the land they occupied used for some other purpose.

In summarising my ideas on profitable fat lamb production I emphasise:

- (1) The preparation of rams for mating by suitable feeding and, where necessary, exercise, together with early dipping, crutching and removal of bellies.
- (2) The preparation of ewes for mating by dipping and crutching early and then flushing and exercising.
- (3) The careful handling of ewes during the few weeks after mating.

- (4) The marking and drafting of the first lambing ewes just prior to lambing.
- (5) The use of sheep netting for dividing paddocks and fencing shelter for use during lambing.
- (6) The complete control of pastures during the spring flush by (a) set stocking, (b) the use of yearling cattle.
- (7) The early drafting of lambs while they carry their milk-fat bloom.
- (8) After weaning, the drafting of the small lambs into a separate mob.
- (9) The finishing of weaned lambs on controlled, clean pasture, or a fattening crop.

In conclusion I take this opportunity to pay a tribute to Professor Hudson and the staff of Lincoln College for the assistance they have given in improving South Island farming.

Mr Hart, Timaru—I have used the ram-raddling system for over seven years with up to 3000 ewes. I make my own mixture which I think is far superior to those advertised and is removed from the wool much sooner. I am prepared to supply the recipe.

Mr Turton—I would like to stress the importance of care in handling the flock when raddling the rams. Too many farmers have dogs a bit on the rough side.

Mr Little—The Americans have a harness to carry a raddle pad containing a special preparation. This lasts for the duration of the tupping period. Because of the dollar shortage we cannot import them.

Mr P. G. Stevens, Lincoln College—The harness has been made in New Zealand for a number of years and we are constantly lending ours to be copied. We will willingly show a set to anyone interested.

Mr R. C. Buckenham, Dunsandel—It is probable that in buying 4-5 year ewes from the back country we are getting a low percentage of twin-bearing ewes as these are more likely to die in rough weather when lambing in the back country. Would we not get a better percentage of lambs by breeding our own ewes?

Mr Turton—We should certainly get a better percentage from ewes bred on our own farms. If you get your lambs away early the ewe has a longer spell—this tends to increase lambing. In selecting hoggets I don't condemn them on small size if conformation is right. Many of these small ones are twin lambs.

Mr Woods—If you were short of feed would you use available feed before or after lambing?

Mr Turton—That is a difficult one. I like to use swedes or turnips before lambing, keeping the new grass to turn the ewes on to as they lamb.

Mr Woods—If your ewes are a bit down in condition there is a danger in putting them on to a flush of feed after lambing. The lamb will probably be small and cannot consume all the milk. The ewe gets a sore udder or goes off her milk and as the lamb grows it is likely to be short of milk later.

Mr E. C. Topp, Waipara—I tried raddling but finally turned it

down in favour of "springing" the ewes. I found I could get closer by this method than with raddling.

Mr Studholme—Do you think shearing in November gives lambs a serious check?

Mr Turton—I tried to draft my lambs before shearing. In my flock I put so many to the Down ram and so many to the Romney. If I shear before I draft the lambs, then I shed the Romneys. Those ewes put to the Down ram are not brought into the shed until the morning.

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PROBLEMS OF LAMB FATTENING (b)

W. B. Trotter

In reading this paper to the Conference, I wish to present evidence which has been gathered from personal experience, and, in closing, to present what I consider to be the solution to the problem, work which must be done, if our industry of fat-lamb raising is to survive.

Fat-lamb raising became a major problem on my property in 1938. From 1938 until 1945 to be successful I used the drenching gun at regular intervals. In 1945 I determined to try to strengthen the bloodstream of my sheep in order to avoid so much drenching. I combined copper and iron in lick form and had complete success. I have not needed to drench a lamb bred on this property since 1945.

There is a third mineral which plays a major part in the formation of the red cell in the blood—it is cobalt. Fortunately for me this property had a sufficiency of cobalt, otherwise my results would have been disappointing.

In 1947 I laid down the first topdressing trials, using 6lb. bluestone to 12lb. limonite, 6 bluestone to 12 sulphate of iron, and 6lb. bluestone, all trials with lime and superphosphate. Not only did I retain stock health; but obtained an increased growth response of 70 per cent. as measured by carrying capacity.

These results, obtained by myself and others, have led me to contradict what our scientists have been telling us about worms in our sheep. The scientists say that worm attack is the natural result of better farming—the growing of two blades of grass where one grew before, and the carrying of two sheep where one was carried before.

I have said that worm attack is caused by a weakness in the blood stream of the sheep, that before the worm can affect the sheep, this weakness of the bloodstream, or anaemic condition, must be present. Consequently, that it is better farming to attend to nutrition of the bloodstream than to drench for worm.

Scientists have recognised that nutrition plays a major part in the prevention of worm attack. I have pinned down the particular type of nutrition.

There are three ways of administering the necessary minerals to stock—drenching—lick—or topdressing. All have their advantages and weaknesses. The drench mix is: 2lb. sulphate of iron, 1lb. bluestone and 1oz. cobalt. Mix in solution, build to 5 gallons of drench and give at this time of year 1oz. to 1½oz.

In the lick use 3lb. of bluestone, 5lb. sulphate of iron and 3oz. cobalt per 100lb. of lick.

In topdressing use 5 to 10lb. of bluestone per acre, 5oz. cobalt, according to carrying capacity.

Possibly the drenching method is the surest of all, but it entails a considerable amount of work, as to be completely successful it would be necessary to repeat at regular intervals.

The lick method has proved very successful on my property and on others in my district; but the quantity of bluestone should be based on the amount eaten per week each week, otherwise copper poisoning is possible.

The topdressing method is only sure provided that no major deficiency exists among supporting minerals (such as potash), but will give a terrific growth-response as well as giving results with stock health.

The Department of Animal Research are trying to discredit these results. Here we see a curious clash between science and practice. Science says I am wrong; but my pastures and stock are responding. Argue as it may, science cannot get past results, so science should be examined critically to find why my stock and pastures are responding. I have asked for the privilege of examining the scientific work (ten years of which should have been done) which enabled scientists to tell farmers why the "worm" became a major stock problem, and have been ignored.

Was the work ever done, or did some senior scientist of the Department make a guess and guess wrongly?

No work has been done on my findings by the Animal Research Department, though they were invited to overlook my first topdressing trials in 1947. Further, Dr. Filmer visited me in July, 1949. Why such a negative attitude? why not, if they cannot prove me wrong, admit that I am right? It is remarkable how many misleading statements have been made to farmers by responsible departmental officers, and it is time that the correct story was told. Copper and molybdenum are deadly enemies. Both are very dangerous to stock when taken in excess. Each controls the other. Copper in excess causes yellow jaundice, an excess of molybdenum produces what are called "Teart" pastures. (Twenty parts per million of dry matter of molybdenum in pasture will cause stock to scour to death.)

What is necessary is that a correct balance between these two minerals is obtained, and maintained. One controls the other and dictates how much the plants can supply to the animals. Even if molybdenum is short in the soil, it is necessary to have present in the pasture such plants as will accept too much copper, before copper poisoning is possible. Farmers again have protection given by the plants. So far as I am aware there are only two plants which accept too much copper in New Zealand. They are cats-ear and St. John's wort. So that, on ordinary pasture, it is virtually impossible to get copper poisoning, even if a too liberal hand be used in applying bluestone.

The Department of Agriculture recommend a dressing of 5lb. of bluestone per acre; but this is insufficient to raise pastures up to the optimum level of copper, which is so necessary if we are to make full use of the lime and super which we apply. Dr. Cunningham has

established that the good level of copper in pasture is from 11 to 18 parts per million. Why recommend a dressing which, though it provides a sufficiency of copper under moderate production, supplies only deficiency amounts when some of the minerals (such as calcium and phosphorus) have been raised to optimum levels?

It would appear likely that molybdenum is stimulated in the soil by the constant application of lime and super. This in turn would mean that the soil copper was depressed. This fits the results obtained by my application of copper too well to be lightly dismissed. Nobody knows how many worms are necessary to cause death to stock; it would be a major disaster if our scientists ever produce a worm remedy which is 100 per cent. effective.

The worms (stomach and intestinal alike) were provided by nature to assist the digestion and metabolism of the animal, and my results prove that they do not become a menace until the animal becomes unhealthy. As an example of this, take an animal which loses its appetite, and in which normal blood-formation ceases. The worms would have insufficient legitimate work to do—but must work—even if to do this they must attack the organs of the animal; doing such serious harm as to cause death. Such a theory would account for the results which I have obtained by restoring the functions of appetite and blood-formation to the sheep, and also account for the fact that the worm-count in healthy sheep shows too little variation from the worm-count in unhealthy sheep as to make it possible for our scientists to tell farmers when danger is imminent.

I have not found the perfect manure. If I had, then the results would be the same everywhere. This has not happened. I know of three properties which have shown no response to topdressing with bluestone. I feel that I have brushed the outside of the solution to the ever-increasing problem which confronts our sheep industry today.

Of the 92 known elements science tells us that a certain number are necessary in production. Science is not too certain of the number, and new minerals are being added to the list from time to time. For the basis of this paper I shall use the following list of 19 minerals:

Calcium, phosphorus, potassium, nitrogen, sodium, chlorine, magnesium, iron, boron, sulphur, manganese, copper, iodine, cobalt, molybdenum, zinc, nickel, arsenic, fluorine.

If those 19 minerals are entitled to be on that list the reason is that they have a particular function to perform.

Undoubtedly, it is possible to find the correct amount of these minerals which are necessary to our stock, so that the functions of the animal body may be carried out correctly, and also to draw up a graph showing the ratio of requirement.

Professor Comber of Leeds University wrote a book, "The Scientific Study of the Soil," in which he states that it is impossible to alter one soil condition and keep existing minerals constant. When minerals are added to the soil there are all sorts of inter-actions and re-actions. Some minerals are depressed—some stimulated.

In view of this statement by Professor Comber, I am forced to the conclusion that the manurial policy as recommended by our Department of Agriculture is costly, careless, wasteful and dangerous.

There is no need for me to enlarge upon the cost at a farmers' conference. The policy is **careless**, because of their failure to study the effects of adding minerals to the soil (mainly lime and super) and their failure to counteract the depressing effects of these applications on some of the necessary soil minerals which are so vital to our stock health. This study would appear to be fundamental in any manurial policy. The policy is **wasteful** in that the quality and quantity of our production will be dictated by the lowest balance of necessary minerals—not by the highest. Consequently the stock cannot possibly use all the calcium and phosphorus which we make available because of the lack of supporting minerals. The farmers are paying for manures which cannot possibly be used. The policy is **dangerous** on three counts. The stock are being fed on unbalanced food, which means that they have had to deal with excesses which cannot be used. They cannot do this without cost to themselves. The least they will have is constant indigestion; they will have poor health, which will lower their resistance to disease. Then through the deficiencies which the policy creates, the animals are deprived of the opportunity of carrying out the normal functions of the body, with the same result as in the first instance.

Also this manurial policy, if continued, will ruin the balance of mineral in the soil and destroy our agriculture. Our plants and animals will become so unhealthy as to make it impossible to carry on. The using up or tying up of one necessary mineral will create a desert out of the richest farm in New Zealand.

Waksman tells, in his book "Microbial Antagonisms and Antibiotic Substances," how a healthy-balanced soil creates conditions wherein health-giving bacteria thrive and wherein there is no room for bacteria causing disease. These are attacked and killed by the health-giving variety and, vice versa, if this balance is destroyed the disease bacteria replace the health-giving variety.

Does this account for the fact that, while some farms are for ever in trouble with such bacterial disease as blackleg, pulpy kidney and arthritis, other properties have immunity? In 1950 I exposed 4000 sheep to "blackleg" by dipping in an infected dip. Twenty-five per cent. of the sheep dipped before mine were lost with "blackleg." I followed with 1600 ewes. Then I had a break of two days and in this interval 2000 sheep were dipped. Sixty deaths were recorded. I followed on with 2400 merino wethers. Of the 4000 sheep I dipped none were lost. Did my sheep then have more resistance? Somewhere to be found, is perfection in mineral balance, and the answer to our problem is to be found there.

We need—

- (1) Soil testing, to prove that the minerals are present.
- (2) Pasture testing to prove that the stock are receiving the necessary minerals.
- (3) Plant selection to prove that our pastures are capable of giving the animals their requirements. Plants are very selective, and some of those which today are regarded as weeds may be of particular importance in conveying some necessary minerals to our animals. Such plants as cats-ear, yarrow, and chickweed are examples.

(4) A new approach to pastures, judgment by usefulness rather than beauty.

The Conference will perhaps have noticed several things in particular. In drenching it is necessary to combine copper, iron and cobalt. This is the correct treatment for anaemia, but does not affect the worm. The same applies to the lick method.

When topdressing with copper we also receive the benefit of the stimulating effect of copper on its particular friends. So far as I can tell iron is in this category.

I have tried to show that if our stock is to be healthy we must start from the soil. Start with healthy soil, follow with healthy plants, and follow with healthy animals. These things are within our grasp if our scientists will do their job.

Two ways which I suggest this could be done are—

(i) Try to grow pastures which correspond as nearly as possible in mineral content to a milk analysis, making special allowances for copper and manganese, which are absent in milk.

(ii) When any farm shows outstanding results (such as from 250 to 300lb. of lamb-meat per acre) take pasture tests to find out just what mineral balance produced these results. Note also pasture species present to find what type of pasture gave the results. (Avoid properties which needed the drenching gun or the injection needle.) Our scientists caused this trouble, so let the scientists correct their mistakes.

The solution to our stock problem does not lie with the drenching gun and the injection needle, which seems to be the only approach the Animal Research Department have made. It lies in finding the cause of the disease and removing that cause. New Zealand is the envy of the world, a producers' paradise with the richest soil, and the best climate. Therefore we should lead the world in stock husbandry. This stock problem is world wide. If our scientists are lazy enough the solution may be found elsewhere.

It is in the hands of this Conference whether the search for perfection is worth while. Will we do it now or will we pass our farms to the next generation of farmers in an unhealthy state? I would like to point out that, though our scientists state that it is possible to analyse pasture samples for every known mineral, the mineral content of a good pasture is unknown. This knowledge is necessary to farmers and scientists alike. Why not work on it?

Personally I hope to live to see the animals which are fed on balanced minerals. They will be a sight worth seeing and a pleasure to all concerned.

I am pleased to be able to announce to the Conference that Lincoln College has agreed to supervise some experimental work in the Fairlie district. Two areas have been selected and sub-divided. It is proposed to apply bluestone to half of each block together with lime and super, and check results as against lime and super. The College has agreed to be responsible for all the technical work entailed. Nothing but good to our industry can result. May I express my sincere thanks to the College?

Some time ago I promised a report on the season's working. The season in Fairlie has been one of extremes and of doubtful value for experimental work with pastures. My ewes took a bad knock

after the 15 inches of snow on 18th August. Two hundred slipped their lambs. Owing to heavy frosts in early September I was short of feed, which meant that my lambs received a check just after birth. This frosty period was followed by a month of rain, followed again by a period of drought. From 9th November to 23rd December we had three dews, with record temperatures. Four inches of rain fell from 23rd December till New Year. Then until the end of April, 22 inches of rain, accompanied by an all time record for lack of sunshine.

My lambs were not nearly as good as they were last year. At the end of October I had 1580 ewes and their lambs, 520 hoggets, and 400 cattle on 400 acres of grass. The dry period which followed forced me to draft on 22nd December. 574 lambs were killed at 32lb. average. Nearly all my cattle had to be put out grazing. After the rains began I had plenty of feed so I did not draft again until weaning. On 9th February 670 lambs were killed at 34.6 average. On 22nd March 328 were killed at 33.85 average. 36 show lambs sold at 95/-, leaving 8 lambs. Though the weights are down, stock health remained good.

At the end of February I bought at Addington 700 cull lambs for experimental purposes at an average cost of 47/-. These ran about on grass until mid-April. I drafted 128 at 24.06 and then drenched. Ten days ago I killed 182 at 28.92. The important point is that these lambs killed at all—not what they killed.

I had topdressed one paddock with serpentine super 1½cwt. per acre, 300lb. lime, 5lb. bluestone, 5oz. cobalt. This paddock has been outstanding.

Another part of the property was treated with 300lb. lime, 70lb. super, and 70lb. of Wonder manure, which contains 6 per cent. of bluestone. Both dressings appeared to give growth responses, greater than lime—super—bluestone.

Mr E. Totty, Ashburton—My problem is not that of growing feed but of keeping my stock healthy. I have done extensive liming and carry up to five ewes per acre in the summer. I had had considerable trouble with scour in lambs. Since topdressing with one cwt. of super with bluestone and cobalt I have had much healthier stock with heavier weight in lambs. Bluestone is going to play a big part in maintaining healthy stock.

Dr. J. F. Filmer, Department of Agriculture—Anyone would gain the impression from Mr Trotter's paper that no scientist has done any work with copper in New Zealand. I would like to pay a tribute to the work of Dr. Cunningham of my Department who has been working on the problem of copper deficiency for over 20 years. He is recognised all over the world as an authority on the role of copper in animal nutrition. As regards iron, a great deal of work has also been done in New Zealand commencing with Aston's researches about 1900. Hundreds of analyses have shown that our pastures and fodder crops contain four times as much iron as sheep can use. I notice that Mr Trotter includes three per cent. bluestone in his lick. Dr. Cunningham states that a half per cent. is adequate—more is likely to be dangerous and unfortunately we have had plenty of examples of copper poisoning.

New Zealand has been mapped in conjunction with the Soil Bureau and we now have an idea of the distribution of the copper-deficiency areas. We are learning to recognise symptoms of copper deficiency in sheep. For instance mature Romneys show no symptoms except an effect on the crimp in the wool. As far as lambs are concerned, some will show fragile bones and sway-back or ataxia as we call it in New Zealand.

The cobalt-deficient areas have also been mapped and the use of cobalt sulphate (50 tons before the war) has increased until at present we are importing 200 tons a year. This cannot go on because there is a world shortage of cobalt so we must be careful that we use it only in cobalt-deficient areas and then at not more than five ounces per acre. I would say to all farmers that if you believe you have a mineral deficiency in your stock, ask your inspector of stock or local veterinarian. He may be able to put you right straight away. One injection of copper given intra-venously can supply an animal with all that is necessary for a period of several weeks.

Mr Trotter—Dr. Filmer has been talking about what the scientists know. I am talking about what they don't know. Do they know if these deficiencies are created by an over-supply of other minerals? Scientists must find out the correct ratio of the various minerals.

Dr. Coop—The basic difference between the attitude of the Department of Agriculture and that of Mr Trotter seems to be that, until recently, the Department has not recognised such a thing as sub-clinical deficiency. I have known a number of farmers who claim useful results from topdressing with copper. We must establish beyond doubt, by proper controls, that they are getting response. The first thing to do seems to be to prove that Mr Trotter is right or wrong and that is what we are trying to do at Fairlie. As far as the Department is concerned, Dr. Cunningham knows his job and is getting on with it but we would like to see more of his work being done in the South Island.

Mr Trotter—All I am concerned with is the good of the sheep industry of New Zealand. I am grateful to the College for carrying out the test.

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RECENT DEVELOPMENTS IN THE CONTROL OF DISEASES OF SHEEP

Dr. J. F. Filmer, Director, Animal Research Division,
Department of Agriculture.

Recent developments—now just what do we mean by recent? To a geologist, an event which occurred 5000 years ago is very recent. But to a journalist, the happenings of last week are stale news. Well, as I am neither a geologist nor a journalist, I have decided to allow myself a little latitude and to talk about methods of disease control which are old enough to be available to New Zealand farmers, but are apparently too recent for some sheep farmers to have made full use of them.

For control purposes, sheep diseases in New Zealand fall more or less naturally into four classes:

- (1) Infectious diseases.
- (2) Parasitic diseases.
- (3) Nutritional diseases.
- (4) Sterility and abortion.

Controlling infectious diseases

These may be controlled by preventing susceptible sheep from coming into contact with infection, or by making sheep resistant to infection.

Preventing Contact with Infection

If sheep never come into contact with the germs of infectious diseases, they will never suffer from those diseases. That is axiomatic, but it is none-the-less very important. Three methods for preventing contact with infection may be used:

- (i) Quarantine.
- (ii) Hygiene.
- (iii) Segregation and cure.

Quarantine

New Zealand is free from such devastating animal plagues as foot and mouth disease, rinderpest, swine fever, rabies, and a host of others, because animals are not permitted to enter New Zealand from any area in which such diseases occur. The increase in rapid air communications between New Zealand and other countries where infectious diseases are prevalent will make quarantine more difficult. The authorities will need an increasing measure of intelligent support from New Zealand stock owners, who should strenuously oppose any slackening of the quarantine regulations which protect their live-stock. If any disease occurs in recently imported stock, it should be reported to the nearest inspector of stock immediately. This is of the utmost importance, as early detection makes disease control much more feasible.

Every farmer should use the quarantine method himself when he buys sheep. It often takes a few days for symptoms of an infectious disease to appear, so put those new rams or that new line of ewes into a paddock by themselves for at least a week, and inspect them carefully before you allow contact with other sheep. This simple precaution would often prevent a spread of pink eye, scabby mouth, and foot rot, not to mention keds and lice.

Hygiene

Strict hygiene as seen in hospitals cannot be practised under farming conditions. Some procedures, however, are both feasible and effective. The germs which cause blood poisoning and tetanus thrive in sheep droppings, blood, and decaying flesh and bone, and they can live in them for very long periods. For this reason, old sheep yards should never be used for marking. Lambs should be marked in clean temporary yards, and the same area should not be used again.

Shearing sheds would certainly benefit from an annual spring clean, and there would be less trouble after dipping if dips were emptied and cleaned occasionally. Cleanliness is probably of more

importance than disinfectants, which are of no value when sprinkled on to a coating of filth.

When assisting a ewe to lamb, always wash your hands in a reliable disinfectant first. This is especially important if you have skinned a dead ewe on the same day. It may not be possible to carry a bucket around, but it is possible to carry a bottle of dettol or some similar disinfectant.

Segregation and Cure

This method can only be used for controlling infectious diseases which can be readily diagnosed and cured with certainty. It gives excellent results in the control of foot rot, which can be diagnosed by careful inspection of every foot of every sheep. All infected sheep must be removed from the flock and kept in a hospital paddock until cured. They should then be kept for a fortnight in a convalescent paddock before being returned to the flock. Time will not permit of a detailed description of the method of eradicating foot rot. It is not easy, but it can be done, and it has been done. A Department of Agriculture bulletin is available free to anyone who is interested.

Attempts are sometimes made to control pink eye and scabby mouth by the segregation and cure method, but results are usually disappointing. Both of these are very infectious diseases, which run a course of a few weeks and usually end in complete recovery without treatment. It is doubtful if treatment shortens the course of either disease, and yarding assists in the spread of pink eye.

Vaccination

Recovery from an attack of some infectious diseases renders an animal immune to further attacks of the same disease. This is because the animal's defence systems have been stimulated and strengthened. Unfortunately many infectious diseases of sheep are so severe that there are few recoveries. A vaccine is made from the germ which causes the disease, but to prevent killing the animal, the germ is either killed or weakened by growing it under special conditions. The dead or weakly germ still possesses the power of stimulating the defence systems of the body, and these can then deal effectively with live germs when they come along. Unfortunately, immunity is very specific, and a vaccine only confers immunity against the germ from which it has been made, or against very closely related germs. It takes about ten days for the body's defences to be properly mobilised, and hence sheep must be vaccinated at least that long before an outbreak of disease is expected. We call the immunity produced by vaccines active immunity because the sheep actively combats infection.

If a horse is injected at short intervals with gradually-increasing doses of dead tetanus germs, its defence systems pour into the blood stream an increasing quantity of anti-toxin which neutralises the toxin of the tetanus germs. The blood serum from such a horse can be injected into a sheep which has been exposed to tetanus infection and it will neutralise any tetanus toxin in the sheep's blood. This is called passive immunity because it is due to the introduced serum, and not to any activity by the sheep's own defence systems. Such an immunity is immediate, but does not persist very long.

A number of sheep diseases in New Zealand can be controlled by vaccination, but a vaccine will only prevent the disease caused by the germs from which it has been prepared. Therefore correct diagnosis is very important, and veterinary advice should always be sought before using any vaccine. Vaccination is a very simple procedure, but some precautions are necessary. Always use a clean yard, preferably a temporary yard erected in a clean grassy paddock. Avoid both dust and mud, and never vaccinate wet sheep. If you have not vaccinated sheep before, get a veterinarian or inspector of stock to show you how to do it the first time.

Just a few words about the diseases which can be controlled by vaccination in New Zealand.

Pulpy Kidney

Vaccine is not by any means 100 per cent. effective against this disease, but it does confer some protection. If the disease usually occurs in lambs over six weeks of age, the lambs should be vaccinated at least a fortnight before the time when deaths usually occur. The most feasible procedure is to vaccinate at marking time. Where deaths from pulpy kidney usually occur in lambs under six weeks of age, the ewe should be vaccinated. This is because anti-toxin is transferred from the ewe to the lamb in the colostrum, or first milk. This is a passive immunity, and will not last more than a few weeks. Ewes must be vaccinated at least twice. The first dose may be given at any convenient time more than two months before lambing. The second dose must be given as close to lambing as possible, to ensure that there is a good concentration of anti-toxin in the first milk. If a ewe has been vaccinated in previous years, only the pre-lambing dose is necessary.

Black Disease

This disease is caused by a germ which infects livers of injured by liver fluke. It therefore occurs only in districts where liver fluke are found. Immunity is very good. Vaccination should be carried out in November or December, as the disease usually occurs in late summer or autumn, when sheep tend to graze swampy, snail-infected areas, and so become infected with young liver flukes.

Black-leg or Blood Poisoning

This is an entirely different disease, and is caused by the same germ which causes black-leg in calves. It gains entry through a wound or bruise, and deaths therefore usually follow marking (including marking with emasculators or rubber rings), shearing, dipping, or lambing. In Otago and Southland, hoggets wintered on turnips are frequently affected, probably through small wounds in the mouth. Immunity is very good. Sheep should be vaccinated about a month before deaths are expected. To protect lambs at marking time, the ewe must be vaccinated. The programme is the same as for pulpy kidney; at least two vaccinations, the last as close to lambing as possible. To ensure this, it is worth dividing ewes into early and late lambers, which should be vaccinated separately about ten days before the first lambs are expected. Lambs should be marked early, before the immunity has had time to wane. Where this dis-

ease is prevalent, extra care must be taken in vaccination, as the disease can occur at the site of vaccination.

If black disease occurs in unvaccinated sheep, penicillin gives some protection, and it is worth while injecting valuable sheep which have suffered an injury such as dog bite, difficult lambing, or bearing trouble. Large doses must be used, at least 300,000 units, and they must be given immediately the injury occurs. Penicillin is not very effective when blood-poisoning symptoms have set in.

Tetanus

This disease causes considerable trouble in some districts. It too follows infection of injuries, but there is usually a delay of one to two weeks after the injury before symptoms appear. A very good vaccine is available, and should be given a month before shearing in districts where losses occur. Unvaccinated sheep can be protected by giving a dose of anti-tetanic serum immediately after an injury. Investigations are being conducted to determine if lambs can be protected at marking time by vaccinating the ewes.

Scabby Mouth

This disease causes serious loss of condition in lambs in some districts. An excellent vaccine is available, and lambs should be vaccinated at marking time. As the vaccine is a live virus, it is issued in the form of a powder, which must be mixed with sterile water before use. The virus dies quickly after mixing, and any mixed vaccine left over should be discarded.

Distemper in Dogs

Sheep dogs are so important in New Zealand that I make no apology for referring to them. Every sheep farmer should know that an excellent vaccine is available for the prevention of distemper. Because it is a live vaccine, it must be used within a few weeks of manufacture, and it is therefore necessary to notify your veterinarian at least a month before the dogs are to be vaccinated. This is best done when they are about three months old. There is really no excuse for losing valuable sheep dogs from distemper.

Contagious Abortion

Cattle are perhaps not used on South Island sheep farms as much as they might be, and it is not sufficiently realised by sheep farmers in either island that beef cattle suffer from contagious abortion as badly as do dairy cattle. Strain 19 vaccine has reduced the incidence of contagious abortion in New Zealand dairy cows from five to one per cent, and in some herds has reduced the abortion rate from 20 per cent. to less than three per cent. If heifers are mated to calve as two-year-olds, they should be vaccinated as calves at from four to eight months of age. If they are mated to calve first as three-year-olds, vaccine is best delayed until they are one to two years old, but it should be done before mating. The vaccine is a live one, and must be ordered in advance from veterinarians or inspectors of stock.

Parasitic Diseases

First a few words about external parasites. Modern dips are so efficient against keds and lice that these parasites could certainly be completely eradicated from New Zealand. The task would be no

more difficult than the eradication of scab which was successfully accomplished by our forefathers, with much less potent drugs. The annual, costly, laborious and irritating task of dipping could then be eliminated. Until then, a few precautions should be taken. Many modern dips containing "Gammexane" do not contain antiseptics, and it is necessary to add bluestone or some similar substance. Failure to do this can result in lameness or even illness and death following dipping.

Another peculiarity of some dips is the phenomenon known as "stripping." Where the active ingredient is not dissolved, but is present in suspension or emulsion, it can be removed by the sheep's wool, and the concentration falls during dipping. To counteract this, it is necessary to replenish the dip frequently, and more dip must be added than is required for the added water.

Dip manufacturers always issue full instructions with each packet of dip, and these instructions have been approved by the Stock Remedies Board. They should be carefully followed in all cases.

Recently another important external parasite was discovered affecting New Zealand sheep. Rams were found with a fairly easily detachable scurfy type of scab covering the skin over the testicles. This has been shown to be due to mange mite. It is important because, if left untreated, the ram may become sterile. The mites are also found in a ring just above the hooves where they appear to cause little trouble. "Lorexane" cream is quite effective in removing the mites from the skin covering the testicles.

Internal Parasites

When sheep farmers talk about internal parasites, they generally refer to stomach and bowel worms, and worms have been very much in Canterbury sheep farmers' thoughts this year.

In order to control worms, we must know a few things about worms. Worms do not multiply inside sheep. They are picked up from the pastures as young worms which had hatched from eggs laid inside a sheep, but hatched on the pasture. Usually worms do not lay eggs until they have been inside a sheep for three weeks. Young worms seldom live for more than a month on pasture. All sheep carry a few worms, and in most cases they do no harm. In New Zealand, well-fed lambs seldom carry enough worms to do them any harm before they are weaned. However, from the time a lamb starts to eat grass the numbers gradually increase, and especially in a wet summer, by weaning time they may be quite numerous. The three months following weaning are the ones in which worms do most damage. From then on, if a lamb is in reasonable condition, it becomes resistant to worms, and under normal conditions never again suffers badly from them.

Now how can we make use of these facts in controlling worms? One of the first ideas was to drench lambs every three weeks with the idea of killing the worms before they were old enough to lay eggs. If worm drenches killed all the worms, this might work. Unfortunately even phenothiazine does not do this, and other drenches seldom kill even half the worms in a flock of lambs, though they may kill a bigger percentage in some individual lambs. This method reminds me of the old sums we used to do at school about water running

into a tank at the top and out at the bottom. If you kill the worms more slowly than the lamb picks them up off the pasture, the lamb gradually gets full of worms. Even if you kill them a little faster than the lamb picks them up, it will take a long time to get the lamb empty of worms.

This surely means that we must try and stop the lamb picking up worms. This can be done quite easily by using a paddock on which no lambs, and if possible no sheep, have grazed for a month or preferably two months.

Now we have seen that the critical time is weaning, so we must start our campaign against worms then. Give the lambs one dose of phenothiazine at weaning, and be sure to give the full recommended dose. After drenching, put the lambs into a clean spelled paddock. Crops of rape, kale, chou-moellier, or lupins are good. So is hay or silage aftermath. If none of these is available, a pasture paddock should have been specially prepared. This is best done by grazing it bare six to eight weeks before weaning with cattle or dry sheep, and then spelling it. Do not be afraid of a little length in this paddock. Freshly grown pasture up to six inches in length, provided it is not rusty, will not harm hoggets.

If there is a bad tail to the lambs at weaning, draft off the poorest of them and put them into a paddock by themselves. They will be carrying more worms than the stronger lambs. After three weeks, drench them again and move them to another clean paddock.

In most years no further action is needed to control worms, but in very wet seasons worms can be troublesome right through the summer and autumn, but even then, regular drenching alone is of little value. You must stop the lambs picking up the worms. This can be done in two ways. If you can rotate the lambs through clean spelled paddocks, that is ideal. For the best results, the lambs should not stop more than a week in a paddock, which should then be grazed for a few days by cattle or older sheep, and then shut up for a month before being grazed again by lambs. If you cannot rotate the lambs through clean spelled paddocks, then give them all the room you can, and keep them off young, lush pasture.

A word about the time of weaning. Lambs often suffer a bad check in Canterbury and other South Island districts in December. When the feed dries up, the ewes dry up, and dry ewes keep lambs hungry. If food is short and ewes are dry, wean the lambs and give them the best food available. The ewes are generally in good condition, and you can well afford to do them hard. Even in wet years, early weaning may pay, provided you wean on to a good spelled paddock.

Nutritional Diseases

No paper on disease control would be complete which did not mention nutritional diseases.

Mineral Deficiencies

There are only three mineral deficiencies to worry about in New Zealand: cobalt, copper, and iodine.

Cobalt deficiency causes unthriftiness in lambs, and if it is acute, lambs die before they are a year old. They recover rapidly if transferred to sound country.

Copper deficiency causes fragile bones and spinal damage which

makes lambs stagger. The longer the ewes are kept on copper-deficient country, the bigger the percentage of affected lambs. Symptoms appear from birth to about three months, and affected lambs do not recover. If they do not become affected as lambs, Romney sheep show no symptoms of copper deficiency. The wool of Merino sheep, half-breds, and some cross-breds, loses its crimp on copper deficient country.

Iodine deficiency causes goitre and lambs may be born dead.

Copper and cobalt deficiencies are best controlled by topdressing, though licks are effective where sheep eat adequate quantities. They should eat one-third of an ounce per sheep per day. Iodine cannot be applied as topdressing, and must be fed as a lick. In dealing with mineral deficiencies, first get a reliable diagnosis. Veterinarians and inspectors of stock will help you in this. When the deficiency is diagnosed, apply the right topdressing in the right quantity. Increasing the quantity is not beneficial, and cobalt in particular is in very short supply.

Rickets

Hoggets wintered on green oats, green barley, and sometimes on other green feeds, may suffer from rickets, and often do not grow as well as they should. One dose of a million units of calciferol (Vitamin D) before going on to the winter green feed, will prevent rickets and will increase the growth rate.

Sleepy Sickness

Every year a number of ewes die from sleepy sickness. The disease generally affects ewes in good condition which are carrying twins or a large single lamb, and it is brought on by a sudden check a few weeks before lambing. It can be prevented by not letting ewes get too fat after tupping, and by making sure that they are adequately fed for the last month prior to lambing.

Sterility and Abortion

Recently two different forms of infectious abortion in ewes have been discovered in New Zealand, and the germ which causes one of these also appears to cause damage to the testicles of rams with consequent sterility. The work is still in the early experimental stages, and is mentioned here because we want your help in studying these diseases. If you have had trouble from abortion in ewes, please notify your veterinarian, and he will pass on the information to the research workers.

Now I realise that many of you may have learnt nothing new from this paper. That is as it should be, and means that you know about the disease-control measures available to you, and I hope it means that you are using them effectively. If by any chance you are not using any of the control measures which have been mentioned, ask your veterinarian for further information, for I am sure we could control a lot of sheep disease at present going uncontrolled in New Zealand.

Mr A. C. Hurst—I wish to pay a tribute to Dr. Filmer and his Division for their advice on the control of foot-rot. Following his instructions I have completely cleaned out foot-rot on my farm. I

would like to ask him: Can the vaccine for blackleg and pulpy kidney be used at the same time?

Dr. Filmer—It is now possible to use a combined vaccine for both diseases.

Mr Hurst—Is rust in ryegrass harmful to sheep?

Dr. Filmer—I don't know of any actual harm it causes but it does make the grass unpalatable and we must have palatable fodder, especially for hoggets.

Mr Trotter—What steps are your Department taking to establish the root cause of pulpy kidney?

Dr. Filmer—The root cause, a germ, was established in Western Australia years ago, but a great variety of circumstances may determine whether the germ becomes active.

Mr Trotter—How many worms are necessary to kill a lamb?

Dr. Filmer—This depends on the kind of worm, the size and condition of the lamb, the climatic conditions, and whether the lamb gets the worms all at once or in successive doses. The information is available from laboratory trials. Lambs reared completely free of worms have been dosed with known numbers of worms and the effects noted.

Mr Trotter—I have enough drench in my car for 66,000 lambs. The College is going to take part in an experiment to see if the drench is satisfactory. Will your Department join in?

Dr. Filmer—No. We receive hundreds of similar requests and we could not possibly cope with them all. Our job is to diagnose individual causes of trouble and prescribe tried remedies.

Mr Turton—Have you a vaccine available for the condition in ewes which we call blackbag?

Dr. Filmer—I'm afraid no suitable vaccine is yet available. I would say to all farmers, if you have any stock troubles, approach your inspector of stock or veterinarian. If he cannot diagnose the trouble he can call on the Wallaceville Research Station which is available to all farmers. The only restriction is that the specimens must be sent in by the veterinarian. The number of specimens sent in depend, not on the distance from Wallaceville, but on the number and enthusiasm of the veterinarians in the district. There is no place in New Zealand from which specimens cannot reach Wallaceville in under two days. We are hoping to develop out-stations to help the work at Wallaceville. Wallaceville can serve you better only if you will make more use of it.

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IMPROVEMENTS OF LAMBING PERCENTAGES

E. Topp, Waipara.

I have been invited to talk to you about the improvement of lambing percentages and I take it that I am expected to deal principally with the breeding aspect of the problem.

There are of course several factors that influence the fertility of a flock of ewes and as is well known by all sheep farmers, the one that has the greatest influence and probably an all-governing influence is the condition and health of the flock at the time of mating.

The chances of a poor and anaemic ewe conceiving twins are very remote no matter what her breeding might be. I believe that lambing percentages have been improved generally through a better understanding of the requirements of breeding ewes as regards their proper feeding, consequent on the research and advice of our agricultural institutions and also by the intelligent observations of farmers themselves.

I am speaking to you about the influence of breeding on fertility as an ordinary farmer. I have not given any time to the study of the genetics of sheep husbandry, so I approach the subject from the standpoint of practical experience and observations.

Perhaps I should tell you here of a circumstance that impressed me greatly and gave me the idea that fertility could be bred into our flock. Among the two-tooths bought for replacements about twelve years ago, were two very different ewes, one was small and insignificant, with tight wool and fine bone; the other, very big and bold, rather an outsize in sheep with a heavy open fleece and altogether a very good ewe. They lived under identical conditions and were well fed for the five years they were on the farm. The small ewe produced five sets of twins while the bigger ewe produced a single lamb each year. According to all outward appearances, it should have been the other way round and the only feasible explanation seemed to me that it was due to some hereditary influence.

And so the idea forced itself upon me that there was a way to obtain some cheap lambs, a way to increase production and, consequently, our profit, without any extra outlay. Why not go a step further than Mr Bruce Levy? If he evolved twin blades of grass why not produce the extra lamb to eat the extra blade?

Well I put the idea into practice and commenced six years ago to build up a flock of ewes sired solely by twin rams, a flock which would ultimately contain only twin ewes. The goal will not be achieved for five or six years yet as so far, in calling for replacements, I could not afford to sacrifice over much the other essential qualities. Commencing next year and during the following years we should have a wide enough selection from twin hoggets alone to maintain a reasonably high-standard flock. So far results have been very pleasing and encouraging, the over-all percentage of lambs is steadily increasing and certain incidents during our lambing seasons point to breeding influence.

I would like to say here that in the initial stages I discussed my plans with Mr P. G. Stevens, the breeding expert at Lincoln College, and made arrangements to purchase our Corriedale twin rams from the College stud. Of course Mr Stevens was very interested and is very helpful to me. I feel I would like here to pay a tribute to the quality of the College Corriedales. Our killing sheets over the last two years have been, to say the least, extraordinary and wool-weights have gradually increased until this year they reached 12lb., which surely proves the rams to be great dual-purpose sheep.

According to Mr Stevens I was to expect the greater influence from the ram through his progeny than from the twin ewe herself and from our experience so far that probably is true. One incident points strongly to that being so.

Two years ago the autumn was very dry and a shortage of feed

was threatening, so I culled a further 100 two-tooths from our replacements leaving 220 to go into the flock. Incidentally the double culling left a very well grown line of two-tooths. At lambing time twelve proved to be barren and when tailed there were 203 ewes mothering 311 lambs. I attribute that very high percentage for two-tooths principally to the fact that approximately 90 per cent would be the progeny of twin rams.

But I was curious to get some indication of the degree of influence the twin mother possessed, so I decided to keep a record of the lambs dropped each year by the line of two-tooths put into the flock three years ago. From the following figures it would seem that the twin ewe has a tendency to conceive twin lambs more so than the single ewe and that tendency increases with age.

There are now 288 ewes of the original replacement of 340 remaining in the flock, 190 of them being twin sheep and 98 being single sheep. Although the utmost attention and watchfulness is exercised during lambing there are always a few dead lambs whose mothers and twin mates are impossible to identify. So although the number of lambs recorded has dropped slightly less than the correct number, the law of averages should keep the comparative percentages reasonably reliable.

Now as two-tooths the twin mothers dropped 129 per cent. as against 125 per cent. for the single mothers. As four-tooth the twin mothers dropped 138 per cent. as against 134 per cent. for the single mothers, and as six-tooth the twin mothers dropped 168 per cent. as against 147 per cent. for the single mothers. It is our practice to take five crops of lambs from our ewes before drafting them out so I await the next two lambings of this particular line with a great deal of interest. There are also other interesting comparisons which can be made from these records. Eight and a half per cent. of the twin mothers have produced twins each year as against six per cent. from the single ewes. Eighteen per cent. of the twin mothers produced single lambs each year as against 32 per cent. for the single mothers. It seems that whatever comparison is made, the twin ewe shows a tendency to produce twin lambs. These figures surely indicate that the establishment of a twin ewe flock should prove a very worthwhile endeavour.

As for the influence of the twin ram, that in our case, can only be estimated by results. The measuring of fertility in the case of ewes as we are doing is quite practical, but in the case of the rams, it would be necessary to set up two flocks and breed for twins in one flock and for singles in the other flock. That is obviously not practicable on a farm. But results do point to the twin ram exercising his expected influence. The over-all percentages are gradually increasing and as our selection of hoggets for replacements has been governed principally by wool and bone and little notice has been taken of whether a hogget was a twin or a single, the twin ram can claim most of the credit for those increased percentages. This record that occurred last lambing, points to the twin ram exercising considerable influence. In one period of 24 hours during the main drop of lambs, 78 ewes lambed; 62 had twins, 8 had singles, and 8 had triplets. At least 80 per cent of those ewes were the progeny of twin rams.

Now for the economics of twin breeding. I have heard some farmers say that they don't like to see twins coming, that the single lamb fat off the mother is a better proposition than two store lambs left on the farm, but that is not really so. They do not have to stay on the farm, and the two stores will return considerably more in the yards than the single fat lamb at the works. I believe every sheep farmer in his heart wishes to obtain as high a percentage as possible and as for size and constitution there is no danger of making sacrifices in that direction if adequate feed is provided. I have some proof of that in these two sets of records of recent date. In the second week of January last we shored 600 selected ewe lambs. The average birthdays would be about the 10th August and there were 428 twin lambs in the mob. They shored 4.29lb. of wool. There surely is nothing wrong with constitution there. The remaining 390 wether lambs left on the ewes after the draft off the mothers, were weaned and put on rape about the middle of January. They were brought in for drafting on April 12th, and 48 of the smallest were run off through the race without handling. The agent marked every lamb of the remaining 342. There were no seconds and no lambs under 36lb. At least two thirds of the number were twin lambs. Constitution was evidently right with those twins.

If it is a desirable thing to increase lambing percentages, and I certainly believe it is where ewes are fed on a reasonably fair plane, then more regard should be paid to this quality of fertility than has hitherto been the case. Single lambs generally furnish quicker than twin lambs and as the common practice is to select by visual examination then, at the fountain-head at least, we tend to breed away from high fertility.

Mr A. Grant, Waimate—We have increased our percentages by keeping our rams inside and hand-feeding them for three weeks before using them for hand service. This has increased our percentages and it is said to have something to do with the effect of sunlight on fertility.

Mr Hart, Lincoln College—Sheep breed most freely during periods of short days and long nights. A low peak of fertility in rams can be raised by giving them a reduced ration of light.

Mr Studholme—Can Mr Topp complete his picture by describing his type of country and his carrying capacity?

Mr Topp—I farm 1125 acres of light land, most of it rather stony, with some riverbed. I carry 1250 ewes, 400 hoggets and 100 odds and ends. Until eight years ago I bought in two-tooths and put them to the Southdown ram. I was paying a lot out and decided to breed my own. I put a Romney ram to the best 200 Corriedales and have bred their progeny to Corriedale rams ever since. I never have hungry sheep; I believe in understocking. Because of the ravages of grub and Porina I decided to experiment with lucerne and I have found my land to be ideally suited to it. I sow a paddock a year and now have 500 acres. I will continue until I have 650 acres of lucerne.

Mr J. H. Grigg—What system do you use in grazing lucerne?

Mr Topp—My main care is to give it time to recover after grazing. In dry years I have grazed paddocks until they have looked

like the road and yet they have recovered as soon as the rain comes. I think some of my lambing percentage may be due to my use of lucerne but I think it is because it enables me to feed my sheep well. I think feeding is basic to fertility.

Mr Turton—As a defender of the Romney I am pleased to hear the Romney was used in the foundation of the flock. What is your topdressing programme?

Mr Topp—I used to put on a lot of lime but I saw no result at all until I started to use super. I now use both regularly. When sowing a paddock down I put $1\frac{1}{2}$ tons of lime on the surface in the autumn and then $1\frac{1}{2}$ cwt. of super in the spring.

Dr. Coop—I think in New Zealand we have tended to accept the breeds we have as the only breeds. Our lambing percentages are very low compared with those in England. The Cheviot-Border Leicester cross is far superior as a fat-lamb mother to any we have and their fertility is higher. I think we should try the Border Leicester on other breeds to get higher fertility and rapid growth of lamb without sacrificing wool.

Mr Trotter—I would like to speak in defence of the Romney as a mother. Border Leicesters certainly have a high percentage of twins but they travel so much that they often leave one lamb behind them, whereas the Romney will stay with hers.

Mr C. W. Mackenzie, Scargill—How many ewes does Mr Topp put to the ram?

Mr Topp—Just the normal number of 40 to 50. The two-tooth rams run with the young ewes for a fortnight, then all are put together in the one mob.

Mr Hart, Lincoln College—The whole question of fertility is a mixed one. Mr Topp has dealt with breeding and feeding and we have discussed the effect of light. Another aspect is that of age. As a ewe increases in age her fertility goes up. For instance at the College, the two-tooth Corriedales produce 120 per cent. of lambs, at seven years they produce 170 per cent. It is thus possible to improve the fertility of a flock by up to 50 per cent. by cutting down the number of two-tooths.

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THE FUTURE OF IRRIGATION AND ITS EFFECT ON SHEEP FARMING (a)

A. C. Hurst, Papakaio.

Stock Management

Most of Canterbury has been farmed for almost a century without irrigation. A milestone in the progress of the province was the introduction of water races for stock.

When it is realised that plant growth is equally dependent on water as stock, then as a general rule, at some time each year, crops and pastures over a vast area go short of water. This insufficiency of water is not realised by a great many farmers, and it is not until the position is becoming serious that any notice is taken. Personally, I have been irrigating for 22 years and during that period it paid us

to use water every year except one, and that year we had a rainfall of 39 inches. These intermittent dry spells when the yield from crops and pastures drops and the shortage is passed on to the stock, is the principal reason why Canterbury farms compared with Southland have a relatively much lower carrying capacity. No part of New Zealand suffers more than Canterbury from the parching effect of the hot, dry, north-west winds, whose heat has a very damaging effect on plants that have no access to moisture. But where irrigation applies this heat enables a luxuriant growth.

Canterbury farmers face two bottle-necks annually, firstly when growth ceases in the winter, and secondly when the pastures dry out in January and February which sometimes extends into April and May. These dry summers and autumns play havoc with high-producing grasses and clovers; many die outright, many are injured, and their places are usurped by low producing grasses such as sweet vernal, hairgrass, brown top and suckling clover.

The keynote to good crops and good pastures is soil fertility. Fertility is hard to define, but no soil be it ever so rich in plant food, can be regarded as fertile if it lacks moisture.

Stock Management of Irrigated Pastures

Water applied to high producing grasses and clovers with adequate dressing in spring, summer and autumn, means a luscious growth and the simplest method of turning this vegetation into £ s. d. is the dairy cow.

Practice rotational grazing with the addition of a small amount of hay especially in the early spring to keep their bowels right (and it is surprising how small a quantity of dry matter is required) to keep them in perfect condition; more cocksfoot and timothy in the mixture and less clover (to avoid bloat). Given these essentials, and perhaps more shelter and shade plantations, would turn a large area of Canterbury into a dairyman's paradise. But with wool 10/- per lb., I cannot see many farmers resorting to dairying.

Breeding and fattening cattle are also safe and simple.

A combination of sheep and cattle is very profitable, and gives excellent results in pasture control. The cattle are kept in one or two mobs and if rotational grazing is adopted, they are used to clean up pastures after the ewes and lambs. If set grazing, the cattle are either spread all over the farm so many in each paddock, or better still kept in one mob and used to control the grass in any paddock that is getting out of hand.

Without cattle great care is necessary to keep the sheep healthy. The old saying "a sheep's worst enemy is another sheep" is exemplified on good pastures summering 10 or more sheep per acre and sound stock management and care are needed to get big drafts of lambs fat off their mothers. This heavy concentration fouls paddocks and increases the risk of internal parasites and possibly produces other disorders when sheep are present exclusively, but these risks appear to be largely eliminated if additional cattle are also grazed on the same areas.

As soon as the spring grass comes away and the lambs are only a few weeks old good lucerne hay should be fed out at intervals. This not only prevents scour in the ewes, but the lambs are trained to eat hay, which they remember all their lives. Not much hay is required,

one bale to 200 lambs is sufficient say three or four times per week.

When the lambs are about four months old or before, they should all be weaned and put on to a good pasture such as the aftermath of hay or lucerne. Covered racks of good lucerne should be in each paddock and it is possible to fatten all lambs by this means. But nevertheless it is a wise precaution to have a few acres of rape; just in case.

The ewes should be drafted into two mobs. The culls which are to be fattened and sold, are put on to good pasture. The main flock are scavengers and these follow the culls, cleaning up each paddock in rotation. These sheep are not starved, but kept in healthy store condition. An occasional sheep may be noticed losing condition unduly—such sheep should be drafted out and regarded with suspicion.

Two weeks before the rams are turned out, the ewes are all lightly crutched and put on to good, succulent pasture, of which there is ample. This ability to practice autumnal flushing is the prime reason why irrigators regularly get such a high percentage of lambs.

During the winter, the ewes are kept in good store condition till about six weeks before lambing when they are gradually given an increased ration so as to gain weight.

When lambing commences, all early lambers are drafted out and shifted daily. The ewes with lambs are left behind and every few days these are put on to good pasture. The advantage of this system is that all the lambs in any one paddock are the same age and can be docked at the most suitable age. All late lambs and dry ewes are in separate mobs.

Because a late lamb is better than no lamb, some rams are left out till September. Lambs born as late as Christmas will go away fat in April.

The bottle neck and anxious time is just before the grass comes in the spring and it is advisable to have a paddock of short rotation Italian or greenfeed to tide over the difficult period. A small area of chou moellier say one acre per 100 sheep with hay makes a good balanced ration.

With elderly ewes carrying twin lambs it is a good plan to put out a few troughs with neat molasses about three weeks before lambing commences.

Pasture Management with Irrigation

Preparation: Before border-dykeing, land should be cleaned of all perennial weeds such as brown top, old man couch, etc. Leave gates open so sheep can clean up all weeds, etc., in head races and round fences.

Border Dykes: Our experience is that the dykes are sometimes much too high and wide especially where there is a good fall. These high dykes dry out and the high producing grasses die, their place being taken by sweet-vernal, barley grass, hair grass, goose grass and sorrel.

Height: When finally consolidated, I don't think these dykes should exceed 6-7 inches high.

Preparation of Seed-Bed: After border-dykeing is completed, and all head races installed, the ground should be repeatedly harrowed and rolled to consolidate and destroy all annual weeds such as

fat hen, yarr. Run the tractor wheels close to dykes and finally on them and roll at least twice.

First Irrigation: If the soil is very dry, water before sowing and as soon as the ground is fit to work, it should be lightly grubbed and harrowed, care being taken not to spoil the level of or damage the dykes. We do not disc as these are likely to leave ridges.

Lime: At least 1 ton per acre.

Seed Mixture:	Perennial Ryegrass	8lb.
	H. 1	8lb.
	Timothy	2lb.
	Cocksfoot	3lb.
	White Clover	2lb.
	Mont. Clover	2lb.
	Total	25lb.

If high, wide dykes are put in, I recommend that on these drought-resisting grass be sown such as cocksfoot, sub-clover, and ryegrass. A double sowing down these high and wide dykes (one standard and one special mixture) is well worth the time and expense.

Manure: 1cwt. of super to be drilled in with seed.

Date of sowing: End of January or first week in February lightly harrowed after drilling and then rolled.

To be Fed Off Quickly: As soon as grass is about three inches high it should be fed off with a big mob of sheep. This encourages the clover. Rotational grazing carried out until first week in April when a strong autumn growth of at least four inches should be left until July.

Second Irrigation: The pastures are never allowed to dry out and burn up and must be always kept moist. Quickly on and quickly off should be the motto.

Stones: If the ground is stony, it should be rolled with a heavy roller and all stones pushed under. This is very necessary where hay or small seeds are saved.

Rotational Grazing is the most satisfactory way of establishing a dense sward and in seasons of good rainfall and an abundance of feed, strict control of all irrigated pastures is necessary. If it is impossible to obtain enough stock to keep the pastures in control, certain paddocks are closed up for hay or seed, but as far as possible, do not do this on young pastures.

Autumn Grazing Second Year and After: Heavy stocking at 100 to 200 sheep per acre is advisable to clean up any undesirable weeds and grass stalks. Heavy stocking means an even spread of dung and urine all over the field. When sheep are folded at this rate they spread out all over the field at night time.

All paddocks should be cleaned up in rotation. As soon as each is completed, they should be watered, topdressed and then allowed to make a good autumn growth of about six inches. Most grasses renew their root system every year and the greater the amount of leafage a corresponding increase of roots are formed, which ensures an earlier and more vigorous growth of grass the following spring. Pastures in autumn should have the appearance of a well kept lawn and should be green for ten months of the year. Given a good mixed pasture of ryegrass and white clover with adequate lime and

phosphate, the clover through the nodules on the roots get from the air enormous quantity of nitrogen. A good crop of clover can get the equivalent of 2,500lb. of sulphate of ammonia in one year. A fertile soil rich in nitrogen will grow ryegrass nearly all winter and come again early in the spring.

Urine is rich in nitrogen and dung in phosphates and lime. The phosphates and lime feed the clover, the nitrogen the ryegrass, and the grass and clover the sheep and cattle.

Therefore the greater the clover and grass, the more stock. More stock, more dung and urine and more dung and urine still more grass, and given water and sunshine it grows like a snowball—every round getting bigger.

The more stock you "do" carry, the more stock you "can" carry.

The Future of Irrigation

Certainly irrigation requires a major change in farm practice and to many farmers, the change is distasteful. It means a change from extensive light stocking to intensive heavy stocking. But the aim of all good progressive farmers is surely to increase production and at the same time improve the fertility of the soil. Irrigation makes the land use more versatile, with the use of water, land only used for store stock can be converted into fattening land, dairying and small seeds.

A change to irrigation means more and more sub-division. This is not a necessity, but is very convenient and permits more stock to be carried. Also more labour is required. The Progress League's irrigation farm on the Waitaki Plains of light, shingly land, with 88 acres border-dyked demonstrated firstly, that 187 acres was an economic unit and that one man could do all the work except casuals. Secondly, that it was very profitable. Thirdly, the pastures did not "run out" or deteriorate.

Farmers as a rule are averse to employing more men, as it entails more work for the household, but this latter objection can be overcome by employing married men.

I think the time ripe for the Housing Department to build houses in the country for our big primary industry. Either in little hamlets, or else on individual farms.

The steading and sheepyards, and woolsheds may require some alteration and perhaps more modern mowers, side-rakes, but the profits for only one average year will take care of all these.

To Summarise

(1) We can now sow down with full confidence and knowledge that this pasture is sown down for a great many years, and it is absolutely safe to use the highest producing certified grass and clover knowing for certain that it will not be destroyed by attacks of grass grub.

(2) Irrigation takes the gamble out of farming, and permits farming on sound business lines. We now have no dread or risk of drought, no risk of ruined pastures, with absolute assurance we can stock to the hilt with safety, and fatten all lambs and cast ewes every year, and also save sufficient hay or ensilage to carry all stock through the winter.

(3) The longer growing-period and better pastures mean less area under the plough, with more fields of grass. More stock can

be carried, which means more grass so the farm will continue to improve on a progressive ratio.

(4) The prophet Isaiah said 3,000 years ago "All flesh is as grass" and what was true in those times is equally true today. An increase in the prosperity and productivity of the land will be followed by an increase in the population and our hamlets will grow into villages, villages into towns and towns into cities. It has happened in other countries and will happen here. Canterbury has a super-abundance of water, ideal flat land, a warm, sunny climate and some of the best agricultural farmers in New Zealand. Canterbury and North Otago have a rosy future when farmers realise the possibilities and potentialities, and the steady profits that can be made by the use of water.

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THE FUTURE OF IRRIGATION AND ITS EFFECT ON SHEEP FARMING (b)

W. C. Stafford, Department of Agriculture, Timaru.

There are two main centres of irrigation and irrigation-development in the South Island—Central Otago and Canterbury. It is not possible to discuss these two areas as one, since the conditions are entirely dissimilar. Further, in order to attempt to assess the future, some idea of what has happened from the early beginnings up to the present, must be taken into consideration. This introduction has therefore been divided into two parts, with the almost certain feeling that the discussion will eventually confine itself to the future of irrigation in Canterbury.

Irrigation in Central Otago began with the utilization of the old mining areas when the gold rush petered out. In 1908-1909 an officer of the Public Works Department and one of the Department of Agriculture investigated the possibilities of systematic irrigation in this dry region. They came to the conclusion that over a quarter of a million acres of land were capable of being irrigated. Today this area seems very conservative and the area is probably nearer a million under present-day development. Conditions are such in Central Otago that no one questions the value or necessity for irrigation in this area. The questions to be solved are engineering problems of water storage and transportation. However even here it is a fact that extensive irrigation as carried out in other countries except in fruit growing is not practised to the extent that one would think it should be, where the nature of the soil and the response to irrigation is so marked. Further in the past, there have been many developmental failures admittedly, mostly private (Ripponvale being the most notable).

It can safely be said that with a few exceptions, irrigation in Central Otago, as far as its influence on stock-carrying capacity is concerned, is still confined to the provision of winter feed in the form of hay. In such country however, this influence is by no means a small one when compared with Canterbury conditions. It would seem that although irrigation in Central Otago up to the present has seen failures and apparently slow progress, there is to my mind no

other future for Central Otago other than the determination of the land owners to develop fully the possibilities of irrigation.

Here there are two alternatives affecting both the individual and the community—stagnation or prosperity. In a time probably shorter than we realise there is no doubt which will be chosen. The future of Central Otago lies in the development of irrigation and it will be a great one.

Before passing on to Canterbury, I would like to make it quite clear that the principle of artificially applying water to plants at a time when soil moisture is insufficient is absolutely sound. Much the greater part of the world's population lives or exists from the products of irrigated lands. Water is the blood stream of every plant; all the necessities for growth are circulated with it. Growth and development slow down, or increase proportionately with the moisture supply. Maximum production is only possible where moisture supply is adequate and continuous throughout the growth period of any plant.

Any discussion on this or any question of irrigated products to feed and fatten under good management is superfluous. The evidence both in New Zealand and overseas is too conclusive to bother to pit against it prejudice and superstition.

In Canterbury irrigation has been talked about and attempted since 1870. About this time irrigation was being carried out at Eyrewell quite successfully, but with a change of owners the project wilted. In the 1880's the Ashburton County Council investigated the possibilities for the Ashburton County but interest lapsed and it was not until 1930 that irrigation experimental work was begun in the Ashburton County by Lincoln College and the Lands Department. The work done proved that the principles of irrigation are as sound here as in any other country. From 1933 to 1936 two irrigation schemes of 5,000 and 13,000 acres respectively were completed in South Canterbury at Redcliff and Levels. Since this time the Lyndhurst scheme in Ashburton County of 70,000 acres has been completed. In this scheme the Winchmore Irrigation Experimental Station has been established by the Department of Agriculture. This comprises 750 acres divided into a Research Station of 250 acres, a Mixed Farm of 350 acres and a Dairy Farm of 150 acres. The Mayfield-Hinds Scheme is partially completed, while ultimate plans are under way to irrigate nearly a further half million acres in Canterbury.

Experimental work done and being done by Government Departments and practical work done by enthusiastic individual farmers, keeps on proving the possibilities of increased returns from the irrigation of this class of land. Despite this, it is a fact that irrigation practice has made little or no contribution to the prosperity of the province during the last 50 years. Up to the present, the best that can be said is that, on occasions, it has been used quite successfully in drought periods.

To me, therefore, the "future of irrigation" is the most important subject of discussion on the agenda of this Conference. To date, over a million pounds has been spent on irrigation in Canterbury and only a very few farms are benefiting. There is prospect of another

five or six millions being spent. In view of the past any thinking individual may well ask—what of the future?

At this stage because of the foregoing statements it is necessary to consider the reasons why irrigation development was contemplated and attempted up to the present; these reasons are best put shortly in sequence.

1. It was contemplated and is being developed on a national scale. While individuals may benefit, the ultimate aim is the benefit to the community and nation.

2. An adequate suitable water supply is available without the erection of costly dams. Reticulation, compared with other projects, is simple and easily accomplished, giving the cheapest water in the world at the delivery points.

3. The greatest part of the land commanded is suitable for border-dykeing at a cost that is low by overseas standards.

4. Frequently-occurring periods of drought with high evaporation causing losses and preventing maximum production.

5. The knowledge that excellent responses in growth were assured.

6. The knowledge that with the raising of the land's productivity there follows increased settlement, increased prosperity and increased population so necessary to a nation.

If these statements are true, and I believe they are; and if irrigation is so good and I believe it is, why is it not being more extensively carried out, and more quickly developed by land owners? I will give reasons and leave the rest to your discussion. But before doing this I want to emphasise that I think that taking everything into consideration the land is best held by individuals for they will care for it better. This, however, is a privilege which must be paid for with maximum development, maximum returns and maximum service to the community, if the land is to be retained.

1. On areas of moderate rainfall in other countries irrigation has been slow to develop, because the land, provided it is held in sufficient quantity, can be farmed to give a return sufficient to the holder. This generally is the situation in Canterbury.

2. The inadequacy of rural housing coupled with the farm labour position and the knowledge of labour demands of irrigation.

3. The improvement that most farmers have already effected in this class of land with good seed, lime and fertilisers and good management.

4. The increasing prosperity of the farmer over at least the past six years.

5. The prevailing conditions in towns and cities.

6. Taxation.

7. Seepage.

The future prosperity and duty of New Zealand however, is plain when the world situation regarding future food supplies is so precarious. There are no new lands to depend upon. The world's increasing population must be fed from land already in production. This can only be done by further potential development. Irrigation is the next step in Canterbury. We must secure our markets with adequate supplies.

Mr T. D. J. Holderness, Motukarara—I was most interested in an area that is being irrigated in the Mackenzie country between Burkes Pass and Tekapo. The owner has literally changed the face of the country. Where previously there was sparse tussock with bare ground between, carrying less than one ewe to four acres, there are now high-producing pastures of ryegrass, white clover and red clover. The whole thing is a credit to the farmer concerned.

Mr Chapman, Ashburton—It is the practice of many high-country stations to send sheep out for the winter. The decreasing quantity of turnips available is becoming a serious problem. Irrigation could give us a permanent supply of lucerne hay. At an economical price this would be a big insurance to them.

Mr H. R. Scott, Ealing—I am on light stony ground and am a keen irrigator. Prior to irrigation, my pastures might last only two to three years owing to drought, grass grub and Porina. Now I can retain my pastures for an indefinite period. I still get plenty of grass grub, but have got almost complete control by the use of DDT super.

Mr Scott, Burnham—I farm on the dry part of a county which is wet below me. I am keen on irrigation but am worried about the damage we may do to the lower country through seepage.

Mr Stafford—There is likely to be a seepage problem with any irrigation scheme. Where you have irrigation at the top, provision must be made for drainage at the bottom.

Mr W. B. Trotter, Fairlie—Since irrigation, have stock health problems increased? Mr Hurst seems to have ideal conditions for growth but has he retained quality?

Mr Hurst—I admit that we have an increasing number of sheep troubles, particularly with lambs scouring about mid-December. The problem becomes worse the more sheep you carry, but if you run cattle with the sheep there is little trouble. Feeding a little peas together with some hay is a big help in keeping the sheep right.

Mr R. K. Ireland, North Otago—The irrigation farm on the shingly land near Papakaio seems to have been successful. Can Mr Hurst explain why the farmers in the Stewart Settlement have not taken it on?

Mr Hurst—I don't know. When we first took over the irrigation farm we raised £2000. In the first year we lost £1000; the next year we picked up £500. The lease ran out last December and when it's all cleaned up we will have paid back all the subscribers and paid £1500 to the funds of the North Otago Progress League. When we started there were 10 per cent. in favour, 80 per cent. opposed, and 10 per cent. rail sitters. Today 90 per cent. are in favour.

Mr L. Carpenter, Rangiora—Would DDT affect the casting worms?

A speaker—Trials in Ashburton county showed that it had no serious effect.

Mr R. G. Allen, Southbridge—What was the increase in carrying capacity on the irrigation farm?

Mr Hurst—We used to starve between a half and one ewe to the acre on land which was described as totally unsuited for irrigation. Finally we carried 700 sheep on 187 acres.

Mr H. R. Scott—I think one of the reasons that farmers are not sufficiently interested is that they are not receiving enough informa-

tion about the results from the experimental farms at Winchmore.

Mr Turton—I would like to pay a tribute to the wonderful work Mr Stafford has done. You heard me condemn wheat-growing yesterday. I would like to see irrigation put in place of wheat.

Mr J. O. Riddell, Winchmore—The Ashburton-Lyndhurst scheme provided for 30,000 acres. We have been going six years and have 10,000 acres being watered. I think that is good progress when you consider the expense incurred before you get a profit. Six years ago there were 30 irrigators, now there are 100. There are only 10 to 12 famers who could irrigate who do not have part of their land under irrigation.

Mr Stafford—All I can say in conclusion is that if irrigation has anything to it, let us go ahead with it rather than just talk about it.

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CONTOUR FURROWING (a)

D. R. Wilkie, Soil Conservation and River Control Council.

I propose to give this short general talk on contouring in what may be a rather unusual manner in that I shall present it in a series of questions which I will answer myself.

In dealing with the question of contour furrowing for pasture improvement, it is necessary to understand more than just the technique of pasture furrowing, for after all this is but one specialised phase of what has come to be known as the contour system of farming.

In opening the subject, therefore, I wish to give an outline of what the contour system of farming is, how far we have progressed in New Zealand and what results have been achieved. I will add my opinion, after having some little experience in this work, as to the probable future usage here. As Mr Holderness will be dealing with the particular subject of pasture furrowing for hill-country improvement as applied on his farm in practice, I will only touch on that subject in passing.

My first question, therefore, is what is the contour system of working land?

This is a means of working land so that as far as is practicable the soil does not move off sloping country. All cultivation whether by plough, harrow, cultivator or other implement, is done across the slope, that is, following the true contour of the land. Never is this work done up and down. The principle is a simple one which is literally as old as the hills, having been practiced by numerous ancient and modern civilisations, but the technique as applied to modern power-farming is very recent. Many New Zealand farmers imagine that by working paddocks round and round they are contour-working their land. This is incorrect, as work to be at all effective must be on the true level for soil and water retention, and as anyone with experience of levelling will testify, in this connection the eye is a most unreliable guide.

So the contour system of farming involves in essence obtaining the true levels of the land and working around these levels in all

cultivation and sowing practices. Incidentally once these levels have been established they can be retained indefinitely so that only the initial survey is necessary.

As I have mentioned, this conception of working sloping land is old—very old. The Inca civilisation used it extensively and supported large populations on otherwise inhospitable land. Numerous other peoples have used this means of making the soil a permanently-productive unit, but in most instances these works were achieved by prodigious hand labour on very steep country as can be seen today on the terrace farms of Japan and Java. The obvious advantages of the contour system so freely drawn on by other countries have now been made available to every farmer with sloping land, by means of mechanisation. This mechanisation of contouring started about 20 years ago in the United States of America. Today, through a process of trial and error, it has become a relatively-exact science so that, given a set of conditions of rainfall, slope, vegetation, soil and incidence of rainfall, definite protection to the soil can be afforded and the maximum water storage for grass and crop growth obtained by the provision of appropriate contour structures. These structures can be built rapidly with a minimum of labour and at low cost.

My next question—Where is this system of use?

My reply is that it has a value and practical application on land from 2° - 20° and a limited application to country above that slope. Maybe such a reply does not convey very much—at least it did not to me when I first became acquainted with degrees of slope. But a 2° slope is one which is scarcely discernible, which would probably be called “flat” by most farmers—while a 22° slope is one on which you feel decidedly uncomfortable in a wheeled tractor on the sidling, even when the wheels are extended to their utmost.

Within these slope limits (and all land in these categories has the problem of water run-off and some already has the problem of soil loss) the contouring of land is a practical proposition. It can do much to give better pastures, better crops, improved orchards and market gardens. Above all, it can help very considerably in keeping these lands in permanent high-production which, after all, is the aim of every worthwhile farmer.

What are the symptoms of the need for contouring?

Although I have been told that it is decidedly rude to answer one question with another, I propose to answer this one with a further series.

1. Have you ever seen rilling or sheet wash on a newly-sown paddock on your farm following heavy rain?

2. Are there any open gullies developing in your fields?

3. Is there any evidence of drying out of land on the ridges with too much moisture with rushes at the foot of the hill?

4. Do your creeks flowing from cultivated lands contain even small amounts of soil?

5. Are there boggy areas on your farm?

All of these circumstances can be, if not eliminated, at least alleviated by appropriate contouring methods—and I leave it to you to decide the question: Is there a need for contouring on your land?

Next: How is contouring done?

It is necessary to have a levelling instrument and a staff. The

normal method for, say, contour ploughing, is to lay out level lines round the slope at intervals. These lines are then ploughed in the manner of a strike-out, and are used for just that purpose. Contour lines formed in this manner are known as guide lines. Ploughing proceeds round and round the second-top guide line until the ploughed area is half way to the next guide at the narrowest point. The next guide line is then operated as before and finally any irregular-shaped areas which are left are ploughed out. In this way the finish is as near as possible on the true contour and the short furrows are together. Of course once the raised guide lines or strike outs are in position these can be retained for future ploughing so that a re-survey is unnecessary. If the concept of contour ploughing is understood the numerous other methods of contouring can be followed quite readily as they are with modifications of the principle as explained in contour ploughing. The other methods are adapted to specific jobs. On the improvement of pasture on hill lands for instance, pasture furrows are used while broad-based terraces hold soil and water on gently sloping land which may be adapted to crops.

A brief description of these methods:

1. **Pasture Furrows.** These are raised guide-lines set at appropriate spacing down the hills to cope with expected rainfall and run-off. Generally these are quite small furrows set fairly close together and are used mostly on permanent hill pasture.

2. **Contour Banks or Ridges**—used for the same purpose as pasture furrows but are much larger mounds and set further apart. These are designed for use on land where a cropping rotation means fairly frequent renewal of pasture. Spacing of mounds is so designed that, while they are efficient water-retainers, they allow turning of implements between mounds. These can be used on country almost as steep as that where pasture furrows go.

3. **Broad Based Terraces.** This type of contour structure has its uses on gently-sloping land from 1-5°. They are 30 to 40 feet wide, rising to one foot at the highest point. The water-retaining and disposal capacity is great and the mounds are so imperceptible as to allow the passage of any implement including a header.

4. **Bench Terraces**—for use on intensively-cultivated market gardens or orchards on steep country. These, the counterpart of the hand-made terrace, are constructed with a bulldozer, are expensive to construct, and are of economic use only where land has a high capital value. A New Zealand example is to be found in the Heathcote Valley.

5. **Strip Cropping**—a method of utilisation of the principle of contouring on cropping land. No mounds are constructed, but strips of an open and a close-growing crop are alternated around the contour of the land. Strips may be a chain wide or more depending on the slope. By this means run off from the open crop (wheat) is held in the close crop (red clover) and utilised. This means has been tried at Adair, Timaru.

6. **Grassed Waterways** are an essential part of the contour system as during excess rains, water must be led off the contours without damage.

What has been done in New Zealand?

In view of the great soil-saving potentialities of this method of working land, the Soil Conservation and Rivers Control Council almost from its inception has taken a great interest in the contour method of working. Through the Council, finance and staff have been made available to study the overseas experience in this connection and test out its possible use in New Zealand. Thus it came about that the first full-scale contour work in New Zealand was done on one of the Council's reserves (Wither Hills, Marlborough) towards the end of 1946. Here 85 acres of steep badly-eroded land was contour banked, worked up and sown to new pasture. This initial trial was utilised to test overseas figures regarding spacing and size of banks taking into account the soil, rainfall, slope and incidence of rainfall. From this and other trials, it was found that the basic overseas data was essentially correct for New Zealand conditions and as the work spread into other districts, this has been confirmed many times. This was a big step forward and enabled the Council and its staff to initiate the work with greater confidence.

It is a far cry, therefore, from the early trials in 1946 to the position today. All the practices outlined (except strip cropping, which is inconclusive as yet) have been tested and put into practice under New Zealand conditions in areas ranging from Gisborne in the north to Invercargill in the south. At the moment the Council has four mobile works-units comprising tractor and necessary implements, engaged continuously on this work. Already it is obvious that these units cannot cope with the position, so great is the demand for their services.

In all 1000 acres of pasture furrows have been constructed together with 442 acres of contour mounds, 100 acres of broad-based terraces, three miles of waterways, two acres of bench terraces and 10 acres of strip crops.

Farmers have been quick to recognise the advantages and have followed the progress of this work with great interest. The last three years have seen mechanised contouring emerge from the experimental to the practical stage in New Zealand and already numerous farmers on sloping lands are undertaking this work. While the Council has been most liberal in initiating this work both in finance and equipment, it is apparent from the decided advantages which accrue to the farmer that the stage has been reached when the work must stand on its own feet, and be recognised as an additional good farm-practice. This has been the case overseas for many years where hundreds of thousands of acres are contoured by the farmer at his own expense for his own benefit and production.

Results:

I will not bore you with details of all the results that have accrued from this work; suffice to say that quite definitely soil and water are held in position, crops and stock benefit and the land and the farmer's pocket too are not forgotten.

I would commend to you the study and practice of the contour method of farming on all its applicable phases for the maintenance of permanent high production on sloping country.

CONTOUR FURROWING (b)

T. D. J. Holderness, Motukarara.

Pasture furrowing is designed as a simple means of moisture conservation on hill country, and Lincoln College, aware of the possibilities of this work on the Peninsula and foothill country of Canterbury, laid down an experimental area on my property. A hill paddock of 25 acres was selected, which was unaffected by any catchment area above it so that the area would be unaffected by run off from above. The major portion of this paddock has a northerly aspect and is exposed to the very drying effects of a prevailing nor'-east wind. It is a paddock that dries up badly in summer and had become partially denuded during the exceedingly dry seasons experienced in 1948-49-50. The job took just over a day. Mr A. W. Riddolls of this College supervised the work and he was assisted by Mr A. Rowell of the Soil Conservation Council. Together they came out with two Cowley Automatic Levels, and assisted by myself and an employee, they marked out contour lines about 20 feet apart. A Ferguson tractor then drew the furrows throwing downhill. A double-furrow mounted plough was used, the first furrow cutting very shallow. This thin slice acted as a wedge on the steeper slopes to support the second furrow which was six inches deep. The plough was lifted briefly at chain intervals to provide a break which would serve to prevent any great volume of water flowing out at any low points which could cause scouring. The tractor worked on slopes varying between 10° and 30° and showed no sign of tipping over. This was due to the wide wheel setting and the low centre of gravity.

So much for the work involved; it is a very simple operation and the cost is not high—about 6/- per acre—the surveying representing slightly over half of this. The most common questions I have been asked since the furrows have been in have been "How did the furrows stand up to the last rain?" "Has there been any scouring?" and "Have you had any sheep cast in them?" In my experience the furrows have stood up to the weather and the trampling of stock splendidly and there has been no evidence of scouring. I mentioned earlier that the plough was lifted at chain intervals. This means that at no place can any great volume of water be involved should the water flow out at low points so that scouring is not a problem. As for sheep getting cast, I have not had one. I believe it is almost impossible for sheep to get cast in such a shallow depression on hill country. They will lie down in the furrow but any attempt to roll immediately takes them out of the furrow.

This particular season has been one that has favoured grass production on hill-country so that any material benefit attributable to this experiment is difficult to assess from a casual glance as all the hills have been green. However, I am convinced that the benefit is there to a very marked degree and these are the reasons for my conviction. After the furrows had had a chance to consolidate I put a mob of 100 ewes on the paddock (that is four ewes to the acre). At the same time I put four ewes per acre on an adjoining hill that is

almost exactly similar to the furrowed hill. The two mobs lambed on these paddocks but in early November I had to take the ewes off the unfurrowed hill. They had it well chewed down and it subsequently seeded very poorly. At this stage the furrowed hill was carrying an excellent sole of grass and was seeding prolifically. The ewes and lambs stayed there until February when I took a draft of lambs off the area. It was still carrying a great deal of surplus feed. The fact that it seeded itself down so well seems to me to be of just as great significance as the growth of grass and is of course a result of that growth.

The failure of much of our Port Hills and foothill country generally to reseed itself annually, because of lack of moisture or consistently heavy stocking, has led to the deterioration of much of that class of country and anything that can be done to arrest that deterioration must pay dividends. In pasture furrowing I think we have one of the answers, for though I have not had a dry season to enable me to speak with confidence, I feel that the extra moisture retained in and around the furrows would be sufficient to ensure the grass reseeded and germinating with the autumn rains. If it can do that, then even if it does turn up badly later, it will prove a very cheap and effective corrective and one which has a practical possibility on thousands of acres on Canterbury foothill country—and indeed on hill-country throughout New Zealand.

A subsidiary effect of pasture furrowing is the checking of run off and the alleviation of wet conditions at the foot of slopes. This has been very evident to me this year. In wet seasons the paddock at the foot of my hill always used to be very boggy and I could not drive a rubber-tyred tractor round the foot of the hill itself without running the risk of bogging. This year in spite of a record rainfall, with the year's average already passed in our area, there has been little sign of this. Up until our most recent rain early this month, there had been no sign of boggiess at all but I must confess it is getting pretty wet now. The hill must be well saturated because I notice the water lies in the furrows now for about a week whereas previously it was absorbed in one or two days at most.

In dry hot summers when the ground is baked hard and the vegetative cover is poor and the need to conserve what rainfall does occur is greatest, then unfortunately the run off is greatest. It is under such conditions that I am sure pasture furrowing would show to greatest advantage. These are the conditions which prevailed when my furrows were put in. When I tell you that up until August our rainfall amounted to only eight inches you will appreciate how dry it was. Fortunately two inches of that fell in July and the furrows were filled for the first time. Soon after this there appeared a dark green strip on either side of the furrows. The sheep of course grazed on these strips constantly but in spite of this the growth on them kept ahead of the rest of the paddock. As time went on the strips widened until of course with the normal spring growth the whole paddock greened up and since then the growth has remained far in excess of stock requirements. I don't pretend that four ewes per acre could be carried on this paddock in a normal season. But it would seem to me to be highly satisfactory to be able to carry that number even in such a favourable season as this. One of the most

noticeable features of the type of cover has been the increase among the clovers particularly in the vicinity of the furrows while in the furrows themselves clover forms about 75 per cent. of the cover.

In conclusion I would say that this type of work opens up possibilities on thousands of acres of hill country particularly in the low-rainfall areas. By contour furrowing above areas showing signs of erosion, and thus checking the run off which causes it, we have a means of arresting that erosion. Also those farmers who have land suffering from excess water at the foot of hills can overcome that and keep the rainfall where it falls and where it is usually needed.

Mr W. B. Trotter—Do you not think that on our clay country which is inclined to produce greasy backs that contour furrowing may not increase the slipping?

Mr Wilkie—I think it will cause an improvement. It is possible to design the contours so that they do not retain all the moisture by grading slightly the excess water can be run off.

Mr A. C. Hurst—I think one big furrow, unless dead level, will cause water to run off too rapidly. We have used the bush and bog discs following the sheep tracks. Instead of one deep furrow we had thousands of cups each holding water.

Mr Wilkie—An area at the Wither was worked up with the bush and bogs and sown with great success.

Mr P. J. Cowin—I have done a lot of hillside ploughing on the contour. Sometimes I have been unable to sow down and the run-out browntop and Danthonia was left in the rough furrow. In a few years this carried better pasture than hillsides worked down finely and sown to English grasses. Frost gradually worked the top down. Scouring on this country was very little compared with the worked down seed bed.

CAN CANTERBURY CARRY MORE STOCK? (a)

C. E. Iversen, Lincoln College.

During the last 20 years we have entered a new area in grass-land farming. Important changes have occurred which should have resulted in an increase in stock numbers. It is disappointing to find that in Canterbury, stock numbers do not reflect these changes. Perhaps climate and farm-use factors prevent these improved practices from realising their potential in Canterbury. I consider the changes were revolutionary and should have had far-reaching effects, and therefore it is worth while giving some attention to this matter.

What were the changes that make this 20-year period so important? The first came in 1930 with the release of certified seeds. A truly-perennial ryegrass instead of the former false perennial which grew well for one season but failed sadly to see out the six to eight year life of the average pasture; a high grade white clover to take

the place of the low-producing annual types commonly in use; an improved type of cocksfoot, and finally short rotation ryegrass.

These grasses alone could be expected to have given rise to greatly increased pasture production with consequent increase in stock numbers. Criticisms are sometimes levelled at the palatability and nutritive value of these strains, but they have been tested and found valuable not only in New Zealand but also in Australia, the United States and England.

Three further changes followed. Having paid high prices for certified strains and foreseeing the possibility of equally high returns from seed, the Canterbury farmer was prepared to give a great deal more attention to pasture establishment and management than had been the practice beforehand.

1. Establishment. Prior to 1930 very few pastures were established on a fallow. Fifty-seven per cent of all pastures sown were undersown with a crop. Today sowing on fallow is becoming increasingly common, and the figure for under-sowing has fallen to 50 per cent. In the heavier-rainfall districts of the foothills, undersowing can be satisfactory but on the lower-rainfall areas of the plains such practice is of doubtful value.

2. The second change was in the use of lime. Reference to Table I shows that over this period there has been a nine-fold increase in lime used on pasture and in some of the counties of the plains the increase has been nearly twenty-fold.

3. A considerable increase in the use of superphosphate for pasture topdressing is the third important change of this period. A major development occurred also on the lighter land, viz., subterranean clover. Introduced to Canterbury by several progressive farmers in the late 'twenties, its use and management was popularised by the work of Hudson and Bevin at Ashley Dene. The full influence of this clover has not yet been felt, but individual farms have made great progress with its use.

Other factors tending towards increased stock numbers are:

1. Over 100,000 acres less in crop. The drop has been mainly in wheat acreage. I do not wish to suggest that this drop is either permanent or desirable. It has occurred for a variety of reasons but during its occurrence one would expect an increase in stock numbers.

2. Largely as a result of this there is an increase in the area of sown grass of 77,000 acres, on which we could anticipate carrying upwards of 250,000 extra sheep.

3. The area of lucerne for hay has increased from 4,000 to 19,000 acres while the amount of pasture-hay saved is nearly double that of 1930. This increase, however, is offset by a reduction in the area of forage crops.

These changes suggest a greatly increased stock potential. When one remembers the pastures of the 'twenties, sown on quickly worked stubble without lime or super, with false-perennial strains of ryegrass and white clover producing a good flush in the first season, but quickly degenerating to brown top, sweet vernal, hairgrass, and hares-foot trefoil, 50 per cent. plus seems a reasonable increase to suggest.

On light land at Ashley Dene we have a fairly exact comparison

of stock numbers and production in terms of wool for the pre- and post-subterranean-clover period.

1930-35	Ewe equivalents	865
	Wool	9000lb.
1945-50	Ewe equivalents	1900
	Wool	19000lb.

These figures are affected by seasonal variation but for this period they represent 100 per cent. increase.

What is the position for Canterbury as a whole?

The relative figures for the two periods are shown in Table II.

These figures require a certain amount of interpretation. In the high-country where the improvement factors listed play little or no part there have been considerable decreases in stock numbers. In the counties on the plains there have been increases. In Table III corresponding figures are given for four counties with little or no high country.

In these, increases are to be found, but not of the order one might expect.

In terms of fat lamb and mutton, Canterbury pastures are producing 14 per cent. more in 1950 than in 1930. This is a fair increase, but, is it adequate? The figure for New Zealand as a whole shows an increase of 70 per cent. in stock products for the same period.

Can we find any explanation of this disparity? Is it climate? Fear of drought is a potent factor in determining the stocking programme.

Apart from irrigation, can we do more to overcome the effects of both dry weather and winter cold? If we require higher stocking should we have more and not less supplementary feed? Is it because the Canterbury farmer understands more about the production of grass than its utilisation?

Is it because the various phases of improvement have not yet been adopted sufficiently widely? Is there still a considerable area of light land to be improved by the use of subterranean clover properly established and adequately topdressed? Is an annual area of 110,000 acres adequate topdressing for two million acres of sown pasture? Many lay the blame for low stock numbers on seed production.

Seed production.

Seed production is profitable. It also affords a useful buffer against drought but it can cause a severe check to grazing pastures. Are all our efforts towards improved pastures nullified by seed production? Can the check be lessened by modifying management or should we consider partly adopting the English practice of growing pasture seeds as a one year crop?

Grass grub and Porina.

Frequently following seed production, pastures are severely infested by these pests and carrying capacity may be seriously affected in the early spring. Experimental work in Ashburton has offered hopeful lines of attack on these pests.

Is it because we use too much perennial ryegrass to the exclusion of other species? Should we make greater use of summer-growing species such as lucerne and cocksfoot, red clover and timothy and winter growing species such as short rotation ryegrass and *Phalaris*?

If we accept the thesis that Canterbury stock numbers have not kept pace with improvements in field-husbandry practices then these are some of the questions for which we should find the answers.

TABLE I.
CROPPING CHANGES IN CANTERBURY

During the periods 1927-32 and 1944-49.

Crop		1927-32 Average	1944-49 Average	Change
Cash Crops	acres	418,000	300,000	-118,000 -
Forage Crops	"	247,000	211,000	- 36,000
Sown Grass	"	2,051,000	2,128,000	+ 77,000 ~
Lucerne	"	4,000	19,000	+ 15,000 ~
Pasture Hay	"	23,000	45,000	+ 22,000 ~
Small Seeds	"	30,000	107,000	+ 77,000
Pasture Limed	"	23,000	197,000	+174,000
Pasture Topdressed	"	80,000	110,000	+ 30,000

TABLE II
LIVESTOCK CHANGES IN CANTERBURY

During the periods 1927-32 and 1944-49.

Class of Stock		1927-32 Average	1944-49 Average	Change
Horses	-	56,000	26,000	- 30,000 <
Total Cattle	-	180,000	191,000	+ 11,000
Dairy Cows	-	78,000	61,000	- 17,000 <
Breeding Ewes	-	3,457,000	3,504,000	+ 47,000
Lambs tailed	-	2,940,000	3,235,000	+295,000
Sheep shorn	-	4,550,000	4,630,000	+ 80,000
Sheep Units	-	5,946,000	5,912,000	- 34,000

TABLE III.
LIVE STOCK AND CROPPING IN FOUR COUNTIES

For the periods 1929-32 and 1946-49.

County		Cash Crops Acres	Small Seeds Acres	Sown Pasture Acres	Forage Crops Acres	Sheep Units	Sheep Units per acre feed
Springs							
1929-32	-	8,900	800	30,400	2,600	70,200	2.1
1946-49	-	5,800	2,100	34,200	1,600	79,200	2.2
Ellesmere							
1929-32	-	29,000	2,800	58,000	5,300	155,000	2.4
1946-49	-	21,000	7,400	73,000	2,400	158,000	2.1
Eyre							
1929-32	-	17,000	400	45,000	7,000	91,000	1.7
1946-49	-	10,400	2,300	51,000	4,600	102,000	1.8
Levels							
1929-32	-	29,000	1,100	97,000	14,000	251,000	2.2
1946-49	-	16,000	8,000	103,000	13,000	289,000	2.5

CAN CANTERBURY CARRY MORE SHEEP?

(b)

C. C. Leitch, Department of Agriculture.

With the progress that has been made over the last twenty years in the improvement of grasses and clovers in common use for the sowing of pastures, and the greatly extended use of superphosphate and lime, it does seem strange that the stock-carrying capacity of Canterbury farms has not improved to the degree one would expect.

Mr Iversen has shown the trends over five year periods for several counties in Canterbury, and whilst there is an upward trend, the figures are not very substantial. One might ask why is this so? Is it that there are not as many farmers using these improved grasses and clovers, or is it that there has been a swing in the direction of more seed production?

There are some who would say that the saving of small seeds has been responsible for the small increase in stock numbers and the figures given would confirm this contention. To show that there is another side to the picture, I have figures here taken from eight farms in South Canterbury over the period 1941-42, 1944-45, 1950-51. These figures were obtained in a survey in 1945 for the purpose of finding out if small-seed production had resulted in a decline in stock numbers.

It will be seen from the figures that the saving of seeds on these farms has not resulted in any decrease in carrying capacity.

The programme of these farms is one of having some new grass each year, and this has resulted in a substantial increase in stock-carrying without affecting to any degree the forage or cash-crop programme.

I might mention, in confirmation of what other speakers have said at this conference, that the farmers under review are finding that cattle have a definite place in their programme.

The other significant thing in this review is the increase in the supplementary feed for the winter and for fattening, it being realised that to have increased carrying capacity in one period means the provision of feed in the winter for the extra stock.

This brings me to say that I firmly believe that it is the inherent conservatism of most Canterbury farmers that is responsible for the rather slow progress that has been made in increasing stock numbers. The fear of droughts and feed shortage does tend to make a farmer under-estimate rather than over-estimate the stocking capacity of his farm.

I would venture to say that the progress that has been made with subterranean clover is due to the fact that Lincoln College pursued their programme of proving its ability to improve light land, knowing full well the hazards that were ahead. The results you all know. The drought conditions that all Canterbury farmers fear, occurred only twice in the ten years of their efforts, and to me it showed that this fear of drought can be overcome by courage and initiative.

On the other hand, any prudent farmer setting out on a programme of increased stock carrying would ensure that provision was made to meet dry periods when they occur.

I will conclude by saying that Canterbury can carry more stock and the reason why it is not carrying more at the moment is that the Canterbury farmer up to now has been busy mastering the art of pasture establishment. Over the next ten years I hope he will be mastering the art of its utilisation by increasing stock numbers.

8 FARMS IN SOUTH CANTERBURY: TOTAL AREA 2,663 ACRES

STOCK CARRIED					
Years	Ewes Wintered	Hoggets Wintered	Lambs Tailed	Lambs Bought	Fat Lambs Sold
1941-42 -	2,914	1,090	2,991	688	3,163
1944-45 -	3,285	1,200	3,700	1,194	3,780
1950-51 -	5,078	1,480	5,731	797	4,571

CASH CROPS

	Wheat	Total Cash Crops
1941-42	343 acres	502 acres
1944-45	330 "	406 "
1950-51	245 "	257 "

SUPPLEMENTARY CROPS

	Rape, Turnips Chou Moellier	Fallow	Lucerne
1941-42 -	- 261 acres	—	9 acres
1944-45 -	- 128 "	193 acres	13 "
1950-51 -	- 344 "	227 "	59 "

GRASS AND CLOVER SEED

1941-42 -	-	-	245 acres
1944-45 -	-	-	410 "
1950-51 -	-	-	307 "

Mr J. H. Grigg—In defence of Canterbury I would like to remind you that over the past 20 years we have produced two-thirds of the wheat grown in New Zealand. Our fertility has suffered by growing white crops on land more suited to sheep.

Mr W. C. Mackenzie—I think it is a pity we don't have the figures for the total wool and meat production. I have found that a decrease in stock carried may mean a rise in total production.

Mr D. G. Scott, Burnham—I would like to point out that the Ashley Dene farm is hardly a fair sample. It has dry land but also medium land which grows good lucerne. In the last drought the dry land was a sorry-looking mess. They could not have carried the stock they did without lucerne on the medium land.

Mr W. B. Trotter—I would just list housing, labour, and taxation as three of the factors which have prevented an increase in stock numbers.

A speaker—I would say to those farmers who say they could produce more if they had more labour and less taxation that they should sell some of their land for the rehabilitation of ex-servicemen.

Mr Hurst, South Otago—Taxation is the same in the south as it is in Canterbury. Our wives work just as hard as yours do. The difference is that we have a goal to aim at. In Canterbury you switch from one thing to another.

Mr R. H. Bevin—Certified seeds came in about 1930. It was not until 1940 that we saw much result. I think the next ten years may tell a different story from that described in Mr Iversen's paper. We must, however, have an insurance policy against the dry spell when it comes. We need more and more lucerne to tide us over the bad times.

Mr J. R. Little—With the improved pastures we have increased the number of Romneys. This increased number of Romneys has increased our fear of drought.

Mr A. C. Hurst—Irrigation is the answer to your fear of drought. Irrigation, lucerne and sub clover.

Mr H. P. Schapper, Lincoln College—I do not think the extra area in seeds has caused the decrease in stock units. The main thing I am concerned with is the gap between expert knowledge and the general level of farm practice. I would like to stress the necessity for the extension officers to give their instruction individually in the field rather than by the bulletin and the radio.

Mr G. H. Grigg—The answer is more lucerne and more lucerne. The perturbing thing to me this year has been the amount of hay left out in the paddock in bale form to spoil and rot. If fit to bale, hay is fit to cart.

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BUSINESS MEETING

At the conclusion of the discussion on the last paper, the Chairman of the Committee, Mr D. S. Studholme, took the chair.

Stating that the effect of the Conference on himself had been that of a mental cold bath, Mr Studholme expressed the opinion that the meetings had been of inestimable value to all participating. He specially thanked those who had prepared the papers with a view to initiating the discussion and the College authorities for making its facilities available. He asked for an expression of opinion as to whether there should be similar conferences in the future and if so how should they be organised.

After a brief discussion the following motions were carried unanimously:

"That the Lincoln College Farmers' Conference should be made an annual affair."

"That the system used in the organisation of the 1951 Conference should be followed in 1952."

The Chairman announced that the Proceedings of the Conference, comprising the papers read and a summary of the discussions, would be published and would be obtainable from the Hon. Secretary for the sum of seven shillings and sixpence.

Mr Studholme then declared the Conference closed.

