The Proceedings of the Lincoln College Farmers' Conference 1957
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Men are never so likely to settle a question rightly as when they discuss it freely.

—Macaulay.
LINCOLN COLLEGE FARMERS’ CONFERENCE
1957

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PROGRAMME

MAY, 1957

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OPENING

The Chairman, Mr J. S. Hunt:

I wish to welcome you to the Seventh Annual Farmers' Conference at this University College. I would like to give a special welcome to our overseas guests who are amongst us today and may they take back to their own country some of our philosophy of farming in New Zealand.

Last year I spoke of the rising costs. We should keep a close watch on this side of the budget, but in no way should we reduce our total production. Prices, except for seeds, have been very buoyant during the season, but we are up against ill-thrift in our hoggets. I have endeavoured to make a survey of the losses in the South Island this autumn, and the result is rather appalling. There is a need for diagnostic stations in the South Island and it is for us to come from this Conference with a determination that we will use all our power and authority to see that two such stations are established with the necessary research organisation too. The two must go together. Only in this way can we overcome the problem of ill-thrift and other stock ills. The cost must be met from the national income and for the national well-being.

Address by Mr W. H. Gillespie, M.P., Chairman of the Board of Governors:

I do offer my congratulations to all those who are in any way connected with the running of this Conference because I think from such Conferences connected with our primary industries only good can come. And in that regard can I have the privilege of bringing to you, to those of you connected with our primary industries, the goodwill of the Government for what you are doing?

As your President has said, you have gathered together here leaders and members of our farming community as well as leaders in some other walks of life who are in some measure connected with our primary industries to consider some of the problems which face us in our age and to learn something from the experience of others that you might incorporate in your own practical farming plans. I note from the agenda that some papers in particular will be giving some consideration to the beef industry as it affects the South Island. And that, gentlemen, has been one of the outstanding problems during the past season. I cannot help thinking, as I give some thought to the future of our meat industry, that those of you who are on the producing side and those who are connected with the processing side should, and probably will, be giving some thought to the transport of meat by air in the future. It may be that air transport will enable us in New Zealand to compete on a little more even terms in the markets of the world in the future.

I want to offer a few comments on our farming economy in general. I think I can say that in the last six years we have made greater progress in our primary industry than in any previous decade in New Zealand. Perhaps one of the things that has played a major part in that is the introduction of aerial topdressing. I had a look last evening at some figures pertaining to our primary industries. First of all cattle herds in six years have increased by 164,000 cattle. In six years sheep flocks are up by seven million head. Then I looked
at the fertiliser which is being used in New Zealand. In 1956 farmers used 405,000 tons fertiliser and topdressed four million acres of country. What does all this portray?

If we are going to make the best use of farmers' efforts in this regard (and I congratulate primary producers in what they have done in the last few years) we must attract more people to the land. In the progress we have made, much of the drudgery of farming has been taken away, and it has not meant so much hard work as in the past. But nevertheless, so far as primary production is concerned, to make real progress we must take our coats off and so I turn to the other side of the picture. From what we now call the depression days to 1950 a decrease of 31,000 had taken place in regard to our farm labour force. I hope that it will give general satisfaction to farmers to know that since 1950 until the end of last year there had been an increase in New Zealand in our farm labour force of 4,500; I think that trend is going to continue. The reason for it is just this; that today the farmers of New Zealand are able to compete with secondary industry on a more equal basis in the labour markets.

During the last two months or so it has been my privilege to see many parts of New Zealand, from Whangarei in the north to Bluff in the south. What I saw going on on our farming land I believe is the best insurance that everybody in New Zealand has for our future prosperity. I want to say that the Government is sympathetic towards all that is being done on the production side of our primary industries. I am not forgetting those people engaged in our secondary industry and I hope farmers of the future will co-operate with those in secondary industries for the benefit of us all in New Zealand. . . .

There is one problem in particular which faces the farming community at the present time, and more particularly those men who want to go on the land. As far as farmers are concerned who are established on our land, it is almost fantastic the returns coming from farming operations at our present time, but to young people it is another matter. They not only have to face our present costs in relation to purchase of land but have to face our present costs of production. . . .

What a pleasure it is for me to stand before you and join with you in the opening of this Conference and I want to say again I hope you enjoy your stay here at the College. I hope that what you see going on here will give you much satisfaction because those of us who are privileged in any way to take part in the administration of this institution are very proud indeed of what the staff of Lincoln College are doing for primary production. On behalf of the Governors of the College and staff I extend a cordial welcome and hope you have a very successful Conference and that the deliberations which take place will be of considerable benefit to you all. I have much pleasure in declaring your Conference officially open.
THE FUTURE OF GRASSLAND FARMING IN NEW ZEALAND

Sir E. Bruce Levy

I am privileged and honoured to say a few words to you at the opening of this Conference.

In foreseeing the future one must needs be prophetic and statements unsupported by factual data are obviously permissible. That gives one a very big scope, but even a prophet's reputation will largely be judged by the accuracy of his forecast.

With the ever-rising population of New Zealand, and of the entire world, together with rising standards of living everywhere, the future for food and clothing looks very bright. When in London I often contemplated the prime needs of those masses of humanity and the enormous problem of feeding, clothing and sheltering them. New Zealand's own demand for food, clothing and shelter is increasing. Our standard of life and our prosperity will depend on how well we can cater for our own increase in population and in what surplus we produce for export to pay for the necessities and refinements of life from lands beyond our shores.

It is inconceivable that any worthwhile economic structure in New Zealand can continue to be built and sustained without grassland progress. Its satellites, industry and professions, but reflect its glow, and the greater the farm radiance, the more glittering and the more prosperous are its satellites. This grassland orb of ours must grow in structure and in stature and its polish must be heightened. In other words more acres must be added to our grassland area and all existing grassland must be improved. There are yet many million acres to add to our productive grasslands and there are some 30,000,000 acres to improve. This is a whole country's effort—the politician and his legislature, Departments of State, stock and station agents, banks and lending institutions, manufacturers, co-operative organisations, servicing agencies, fertiliser and chemical works, primary, secondary and university education, grassland owners, operatives and workers—all should pool their resources and direct their influence to grassland extension and grassland improvement. Grassland farming should be a calling deified by the nation and the reward to its operatives should exceed the reward of any other service in the nation.

If New Zealand is to prosper and maintain its standard of living this attitude of mind, translated into action is imperative.

The Future of Farming

There are three possible developments: (1) Subdivision of land to peasant standards, (2) the 1-2 man farm, (3) big-business farming. God forbid we ever develop the really peasant farming system and create a condition of land slavery and endless hours of work with bare hands and pick and shovel to eke out a bare existence. There is much to commend the 1-2 man farm but I would like to see a development that made every farm at least a 2-house farm. A 2-house farm will provide for three generations of farmers—either share-milker and owner, or father and son. When the son's son is old enough to require a house of his own, the grandfather should seek retirement off the farm. By this arrangement I do not mean that the
farm owner of the 1-2 man farm should live a semi-retired life on the farm, relying on the share-milker to earn a living for the two of them. I have often admired the farm wife-worker but I do not think it is a fair proposition to press this service too far. It is degrading to the calling and to the industry.

I am definitely of the opinion that the future may see more big-business in farming. Big-business already exists in processing and in disposal of our produce and it is obviously unsound to deny big-business in the production angle of our major industry. The price structure in farming alone must soon call for big-business. The taking up of a farm today is beyond the youth of the country with eyes on the land. His only chance is the good fortune of being the son of a farmer who can subdivide the farm or finance him into a piece of land of his own. Land development companies, co-operative concerns, farm-firms or an extension of the stock and station agents to finance land development and own farms may be big operatives of the future. Mr Shand, Minister of Rehabilitation, speaking at this College on the occasion of the recent graduation ceremony, advocated joint-stock-company procedure as a means of financing young men on the land; so evidently the Government, too, envisages big-business for the development of the land and for the conduct of farming as for other basic industries.

Today, really the Lands Department is usurping the real functions of co-operatives or big-business in land development. Not that the Lands Department is not making a real good job of land development and settlement but its activities are too restricted and it will take 100 years to cover the whole of New Zealand at the present rate of progress, even to the bringing in of Crown lands. There are millions of acres in the aggregate of privately-owned land well beyond the finances and labour force of the owner occupier. Some more efficient means of bringing these lands into higher production must be sought and if "big business" was encouraged to operate it would contribute greatly to the future. One's mind is cast back to the original Land Development Company of New Zealand that did, and is still doing, such yeoman service to New Zealand. Some 40-50 years ago Perpetual Forests Ltd. was established. It planted some 750,000 acres of trees by a process of bonds and debentures hawked round the country by a few enthusiasts, and today these operatives have opened up a potential industry the full outcome of which may add in the near future many millions to our overseas income. The State also did yeoman service in like direction, based also on vision, and supported by much convict and unemployed labour.

Production Itself

As for grassland production itself there are still vast potentialities if farming ever develops on a really intensive system. The future still lies in increasing supplies of available phosphates and other minerals, but phosphate is still the most important. Any action that the Government, the fertiliser industry, or the farming community, associated with "big business," can take to assure a plentiful and regular supply of raw phosphate, is a safeguard for the future. Distribution methods for getting the phosphate on to the land, and the introduction of improved legumes and grasses to more adequately exploit the phosphate are essentials. In this regard one cannot stress too profoundly the more recent development of aerial topdressing, an excellent example of big business in farming. This aid to distribution of two to three million tons of phosphate annually over the grasslands of New Zealand has ushered in a new era of grassland progress. Without this aid, and with manual labour less and less inclined to operate, the some 11,000,000 acres of New Zealand's
unploughable hills would once more gradually revert to forest. The depleting fertility of the hills meant insufficient sustenance for sufficient stock—sheep and cattle—to control secondary growths, but given a veneer of phosphate and good legumes together with some aid by manual labour, enough feed, and attractive feed, can be produced to carry the stock to swing the balance in favour of grassland by destroying the encroaching secondary growths. In this regard also, there is perhaps a much more rosy future for your 12-13,000,000 acres of tussock. Lowland development of tussock country by ploughing and reseeding to English grasses, supported by phosphates, clearly indicates vast potentialities for at least the lower-altitude tussock by surface seed-sowing and aerial topdressing with phosphate and other minerals. The process will be slow compared with the deforested hill country, and for some years it may need to be a national effort financed and conducted by the State, or long-term range development by company operators.

Plant Selection and Breeding

Our farming potential depends largely on the quality and productive capacity of our pasture plants—grasses and legumes—and I would prophesy that improvement in both these qualities depends more on selection and breeding of the plants we already possess rather than in the possibility of new species yet to be introduced. Our climate favours the New Zealand plant breeder enormously in his task of unfolding new characteristics, and more particularly in those species that lend themselves to inter-hybridisation. In this regard the Lolium family, to which all the ryegrasses belong, stands out head and shoulders above any other, and among the legumes, the Trifolium family, headed by white clover and red clover, are most important. Subterranean clover is a good pioneer clover, as are also some of the Lotus species, but these latter two groups should always be regarded as pioneers paving the way for something better to follow in their wake once the fertility of the soil has been improved through their pioneering. One fundamental fact we in New Zealand must not close our eyes to is that just so long as we can improve soil fertility, and adequately utilise all herbage produced by in situ grazing by stock, the more and more dominant the ryegrass-white clover sward becomes. There are enormous potentialities in both these species for the plant breeder, and among the hybrid swarms that can be produced a ryegrass and a white clover for almost any decent habitat and seasonal requirement could be produced. There is rather a tendency in Canterbury, and Lincoln College is not beyond criticism in this respect, to decry ryegrass and to support other plants that have habitually failed us in an intensive grassland system. There may be a place for some of these as pioneers to high production but in my opinion both ryegrass and white clover should accompany the sowing to take their place as dominants once the carrying capacity has been built up to the ryegrass-white clover demand. There is undoubtedly sufficient evidence in Canterbury today to clearly indicate your grassland progress. This will not be attained by pampering to a whole host of unsuitable grasses by a light stocking-density, but the writing is on the wall for us all to see. It is a persistent sward, dominated by a ryegrass, not necessarily the old original perennial ryegrass, and a good white clover, liberally fertilised with superphosphate and other minerals, and heavily stocked with sheep and some cattle to fully utilise all herbage, and to return animal residues to the pasture in so doing. There are many farms doing this: to my mind they are the beacons of the future, not only to Canterbury, but to all potentially high producing grasslands throughout New Zealand. The greatest boon we have over most of
the country is a benevolent climate like a goddess of plenty hovering over the land anxiously waiting for the co-operation of man with his grasses and clovers, his fertilisers and his high concentrations of stock.

How will this thesis work out in arable Canterbury? There will always be the need for some supplementary crops for stock in high-production grassland. That requirement will increase the further south we go, but perhaps of greater interest to Canterbury is how will it affect the wheat crops of the province? It is largely a matter of farm economics and national economy whether it is good business for New Zealand, a good grassland and stock producing country, to grow its own wheat. If New Zealand can produce more export value per acre from live-stock than it would cost to import the equivalent acreage of wheat from Australia or Canada then it is obviously good business to increase the acreage of grassland rather than devote land to wheat. There are so many millions of acres throughout the world that can produce wheat, but are hopeless grassland and live-stock producing areas. Practically all the land devoted to wheat in Canterbury, like the once vast area of oats in Southland now producing live-stock, is suitable for relatively-high-producing grassland with its high stock-density per acre. Such high-density stock land could produce bumper crops of wheat, and there will of course always be a need for New Zealand to grow nucleus wheat stocks to maintain continuity of seed supply should at any time war threaten to cut off overseas supplies, but these would be confined to land periodically broken up for supplementary stock crops or for the renewal of grass. It may of course be sound farm economy for Canterbury farmers to grow New Zealand’s requirement of wheat, but if the same acreage of grassland producing stock for export is sounder farm and sounder national economics, then New Zealand may be better off if we exported more meat and wool and imported our wheat. That is for the economist to determine. The potentialities of the country make either practice possible, but the more fertile the land as a result of legume and stock-induced fertility, the smaller the acreage of wheat to serve our own requirements, if we must grow wheat.

The Price Structure

The future of farming in New Zealand will of course depend on what we get for our export products, for there is no other major industry in New Zealand that can subsidise farm production like it is done in Great Britain and the U.S.A. I would place the subsidising of farm products overseas as one of the greatest perils of the future, more particularly in regard to butter, cheese, pigs, poultry and prime beef. If the world sets aside the economics of food production in countries adversely affected by climate by guaranteeing a costs-plus reward, then surpluses in food production are bound to arise, and accompanying those surpluses a reduced price value in the open markets of the world. The United States of America and Great Britain have both shown increases in food production as a direct result of subsidies, and any country having a major industry other than farming could likewise subside food production. It may be a presumption to accuse mechanical industry of the main countries of the world of deliberately setting out, through Governments, to create surpluses of food in order to reduce costs to industry at the expense of those countries whose one and only export industry is farm products. Great Britain, since World War II, has increased its own food production from 40 per cent of her requirements to 60 per cent and she could, by adopting an ad lib importation of concentrate feeding stuffs, be entirely self supporting in food—in milk, butter, cheese, pigs, poultry and prime beef. Even in 1949 when I was overseas,
producers of milk in great industrial areas in Britain did not want large areas of grassland—they wanted concentrated feeding stuffs to carry more indoor-fed cows. Pig producers wanted more to increase production of indoor-fed pigs. Poultry were already housed and maintained in huge automatically-controlled indoor batteries, and I could not help but feel that more prime beef, indoor-fed, was preferred by many farmers to the out-of-doors feeding in the cold of the long winter.

The spirit of farming in Britain is very strong. There are large numbers, provided they were guaranteed a costs-plus reward for their labour, that would love to farm and care for animals, and with automation coming to mechanical industry the world over, this number is likely to increase—it is likely to increase in mechanical industry the world over. It would not of course be good business for such subsidisation to be carried to such a point where large surpluses do actually arise, but they could easily be carried to a point where unrestricted imports would soon cause a surplus with consequent lowering in price. There are already indications of that taking place in the London market for dairy products today.

New Zealand could not subsidise food production on the same basis as in U.S.A. and Great Britain, for New Zealand has no worthwhile secondary industries to do so. Hence we must accept the price that industrial countries see fit to give us. It is the same old story—food production must be subservient to mechanical industry if costs to the industry are to be kept down. It is again the old story of the peasant slaving his guts out to supply the mechanical industries and professions of the world with cheap food. The two world wars, when stark famine faced industry, improved matters considerably, but I feel the fight is again on and it behoves food-producing countries of the world to tackle this menace of costs-plus subsidisation of food by the densely-populated manufacturing and professional countries of the world, our market for all time.

Alteration in Structure of Grassland Farming

The structure of grassland farming in New Zealand may alter in the future, dependent to a marked degree on overseas prices for our individual products. With the possibility of self-sufficiency being attained, or attained to such a degree as to cause large surpluses from imports, in overseas manufacturing countries as a direct result of subsidisation in one form or another, the swing in New Zealand may be towards beef, mutton, lamb and wool, and it is on the cards that an export industry may enlarge considerably for frozen vegetable products. Both these developments would eat into dairying land. In the past dairying has been the mainstay of our agriculture in times of low prices and in adversity in the farming industry, but such change-over from cattle and sheep to dairying has often inflicted grievous wounds in our grassland development, and more particularly where dairying had of necessity to be adopted on hill country. There is no doubt cattle and sheep farming is the only form of farming that will develop and maintain our vast areas of hills that are inclined to revert back into secondary growth. Dairying on the small flats and easy lowlands within the hill complex is prejudicial to hill-land development, and even at the present time there are many dairy herds that should be pulled off the country and replaced by sheep and cattle for the well-being of the country. There could of course be, other than for home consumption, a complete change over from dairying to sheep and cattle without prejudicing our future as far as the land is concerned, but it would be a national disaster if the trend had to be in the opposite direction, reminiscent of the depression days of the early twenties and early thirties of the present century.
The future development of New Zealand really lies in an economic expansion in cattle and sheep, and the more we can press forward to develop the country to carry double or treble the number of sheep and beef cattle the better it will be for the future development of our grasslands and towards a complete mastery over all form of secondary growths that, today, are still a real menace to progress. The more sheep and cattle we can adequately run per acre the better will be the grassland cover and the more productive it will become and the more nutritious its herbage. Most Danthonia, sweet vernal, brown-top, Yorkshire fog, crested dogstail, cocksfoot country will one day be translated to ryegrass-white clover and the main factors will be phosphates, clovers, more cattle and more sheep.

Intensive dairying will of course give the same results as far as the pasture sward is concerned, and there are still large areas of ploughable land that could be developed for dairying. Much at present in dairying could be improved, but in so doing care must be taken not to prejudice large tracts of rather-difficult to difficult hill country by picking the eyes out of the land for dairying to the detriment of the block of land as a whole. Market trends must be carefully appraised and these analyses must guide the future, and New Zealand should remain sufficiently resilient to change over from dairying to sheep and cattle, or vice versa, if market trends dictate such action. If the present trend in markets continues in wool, mutton, lamb and beef at favourable price levels, the prayer of every New Zealander should be “May this trend continue.”

Bearing Load of Turf

On much of the lowland country, particularly in areas of high rainfall, the bearing load of the turf may be the limiting factor in our progress. This is influenced by the water content of the soil and the pugging nature imparted to the soil by a high worm-population built up by high fertility through the residues of stock. Intensive systems of tile and mole drainage to remove excessive water will give a much higher bearing load to the pasture sward. It may also be possible to reduce worm activity and increase bearing load by applying sulphur to increase the acidity of the soil on special areas where a high bearing load would greatly facilitate stock movement. In practice also it is a sound procedure to feed winter supplements on one specific paddock earmarked for the plough and a crop in the spring. This will relieve the density of treading during the winter on the pastures, but even so the necessity to increase bearing load of the turf is important as we increase per acre carrying capacity.

Wool Processing and Manufacture

New Zealand may one day become a major wool-processing and woollen-goods-manufacturing country as well as a major wool-producing country. It does seem rather odd that we should export the only raw material we can muster for other countries to process and add value to. To process wool into woollen goods and to compete with other countries in the open markets of the world would indeed be a test of our national efficiency as a manufacturing country, and it would tend to cement farm and mechanical industry into a cohesive whole, the one depending more on the other for its ultimate prosperity. This course may yet apply to other products of the farming industry. By processing our major bulk products into dishes or parcels of greater delicacy and variety, a larger and more remunerative overseas trade may be forthcoming with wider markets and with increased demands on our own labour.

In the matter of foods and fabrics of animal origin, New Zealand has marked advantages over most other countries of the world. The
distance to overseas markets curtails those advantages to some extent but even so there is no animal product in the world to compare in cost of production to grassland products fed *in situ*, and of this grass we are ever assured, and the better we build the sward and the more animals we can adequately feed per acre in this way the greater are our overall profits as farmers and as a nation.

**Overhead Costs**

Perhaps the greatest real internal danger to farming as a profitable business is the steady rise in overhead costs—the purchase price of land, establishment-cost of buildings and equipment and the cost of replacement-stock. It is so easy in times of prosperity to equate income and outgo and leave insufficient margin of safety to buffer unforeseen eventualities in price movements, either for the export produce or for costs of replacement and maintenance. In consequence, farming could get to a price structure beyond the resources of the land. It is hard to legislate against optimism and foolhardiness and fingers will get burned. Economics of the situation will in itself ultimately right the situation, but it seems a pity that the industry itself does not take measures to avert these casualties among its ranks, and to insure that farming as a worthwhile way of life does not out-price itself as an economic structure. We can compete in world markets if our land and stock remain reasonably stable in turnover price, but once these rise to uneconomic levels we are undone unless we can prevail on a fictitious Government to take over and raise the internal guaranteed-price on a costs-plus basis to keep the old spiral ever soaring upward. It is a stupid thought, unworthy of the leaders who govern your future, and yet the danger is there.

To come back to realities. I see by your agenda that your programme designers have placed their fingers on some very vital aspects of development. The future of grassland is tied up with men of vision and men of progress applying themselves to the land, and with institutions such as Lincoln College that do research and provide training, and these excellent opportunities to put across advanced views and experiences to become stock-in-trade that all might benefit. I am sure our grassland future must be closely linked with research and extension, and I would like to see both these intimately integrated within the fabric of the industry on a basis of reward for service compatible with their value to that industry. Yours is one of the big industries of the world. It will forever be so but intelligent planning is necessary to highlight its importance that it may not be swamped by intrigue of competitive industry led by intelligent and able men. More parleys of the like of the present one in London will be essential.
POLICY OF THE N.Z. MEAT PRODUCERS' BOARD ON BEEF PRODUCTION IN THE SOUTH ISLAND

A. B. Baker, Cambridge (Member of the Meat Board)

I should like to congratulate your committee on its choice of subject for this symposium. Beef cattle production in the South Island is a topic that has needed discussion among practical people.

As you know, the primary concern of the Board is with export marketing. From the Board's point of view any policy on production should be determined in the light of market requirements. It is for the Board to report the overseas market to producers and it is then for producers to consider their farming policy in the light of that report.

My concern today therefore will be primarily with the market prospect. The practical detail of the raising of beef in the South Island—its integration into the traditional pattern of farm production—will be the subject of papers to be read at a later stage. I would, however, point out that in the North Island the raising of beef cattle has become an integral part of sheepfarming and lends considerable strength to the farm economy. I know there are very different climatic and other considerations in the South Island which you will wish to debate at this conference. But so great is the need for increase in production that it is reasonable to contemplate a future in which beef cattle will be of much greater importance in the South Island than they have been in the past.

In the light of present circumstances, with high lamb, mutton, and wool prices, it may seem to you a prospect for the rather distant future. But it should be realised that we need to increase our meat output very greatly to supply the domestic and export requirements of a third million of population within about 20 years.

The employment of beef cattle to this end can, as I have said, be complementary to sheep-raising, running alongside the necessary continued expansion of sheep flocks.

But my main concern is to explain to you the market prospect as we see it. Traditionally we have been producers of lamb and mutton. Traditionally the United Kingdom has been our great market since Britain is the world's only substantial regular importer of mutton and lamb. We have over the years developed a highly-specialised trade in lamb, which comprises half of our meat exports by weight and considerably more by value. Of this lamb trade 98½ per cent is with Britain.

To meet those requirements I have mentioned, for the support of a third million of population in New Zealand, we shall have need to find outlets for substantially increased totals of lamb each season. But we cannot assume that Britain, whose population is comparatively static and whose own sheep industry is being heavily subsidised for the express purpose of producing more meat, will be able indefinitely to take heavy increases in supplies of New Zealand lamb without some effect on values.

Last year, when we had a large carry-over from the previous season and on top of that a record kill in New Zealand, we did
glimpse some limit to the capacity of the market. This season when supplies are lighter we note the difference. By this I do not mean that we are soon to reach saturation point. But we do have to consider the long-term prospect, and plan accordingly. Our immediate concern has been to foster the development of sales in the provinces. Intensive publicity campaigns in Bristol, Leicester and Cardiff are designed to build demand.

Television advertising in the provinces supports these campaigns. We are closely concerned also in propositions for the gradual development of North American sales.

Do not conclude that we are unhappy about the prospect for the sale of our lamb. Far from it. New Zealand producers have evolved a product of even quality and grading which can command a premium in any market where lamb is imported and upon which we shall continue to thrive.

We are confident that by skilful promotion we can extend the consumption of lamb in areas of Britain to which we had in the past not had pressing need to devote special attention.

We can also look to some development of the North American market to which I have referred. But here there are various hurdles to be overcome, not the least of which is shipping, and there are political uncertainties which may continue to restrict opportunities.

We can, however, look to immediate and prospective sales of beef of all grades in markets round the world. Beef is almost universally eaten, while lamb and mutton are not.

United Kingdom Market

Let us look first at the United Kingdom market itself. It is of course true that Britain has greatly increased her own home-produced supply. Whereas in 1938 Britain produced 605,000 tons of beef and veal and imported 589,000 tons, last year she provided 790,000 herself and imported only 439,000 tons, with a population by now seven per cent greater.

This substantial increase in home output is the direct result of a policy of heavy subsidy to the livestock industries.

Two world wars have convinced Governments and people in the United Kingdom that they must develop, to the maximum, their capacity to supply their own needs. To this end the Government gives producers in Britain an annual subsidy now totalling about £250,000,000 a year. That enormous sum in guarantees promotes a level of production that home producers would not otherwise achieve.

The guarantee is apportioned annually among various farm products in such a manner as to increase or decrease the incentives to production of particular products. For instance, at the end of rationing when the concern was still to avoid a meat shortage, a substantial guarantee to pig producers brought rapid increase in meat supplies from the one source which could quickly yield it—the pig industry. Since then the emphasis has been switched to beef and mutton and lamb. This year's State guarantee to producers is specifically devised to encourage beef, mutton and lamb production.

Guarantees under the Agriculture Act, 1947, for fat stock are reckoned at more than £80,000,000 a year. This year the guaranteed prices for fat cattle have been raised by 5/- a live hundredweight to 156/- a live hundredweight for steers and heifers. The guaranteed price for fat sheep and lambs is up by 1½d a pound to £3/3½.

With this policy in operation, Britain today produces over 63 per cent of her own meat supply, whereas in pre-war years she produced only 51 per cent. Britain is able to supply a greater proportion of her own needs, and by increasing the volume of meat on the market under this subsidy system she is able to restrain prices, and without
depressing the income of her own farmers get cheaper imports than she would otherwise do. Britain gets more meat from her own land. It is expensive meat but the cost of it is offset considerably by reduction in the amount that the public has to pay for imports.

We have of course to accept that situation. But we believe there is scope for New Zealand producers to supply a larger proportion of Britain's imports than we have done, and that we can command remunerative prices. We have asked and I believe we shall eventually get the right to a greater share of this market, and we believe we can supply it.

The position last year was that Britain imported 425,000 tons of beef and veal. Of this 59 per cent came from South America, 24 per cent from Australia and 17 per cent from New Zealand. New Zealand's total should be increased. Indeed it must be if we are to conduct a balanced trade in accord with customers' requirements and at the same time get the greater returns which, as I have said, we shall need to support our increasing population.

Looking at the long-term prospect it is apparent that notwithstanding the great increase in home production there will be definite limits to the capacity for expansion in that quarter, and such expansion will always be dependent upon maintenance of a high level of subsidy. Whatever the future of the subsidy, the United Kingdom will still need substantial imports, and I am convinced that as we develop our ability to supply them, we shall get the prior right, within reason, over foreign supplies in the market, subject to a continuation of our preference for British goods.

Our concern should be to enlarge our supply and to increase the quantity of chilled beef we export to Britain. To enjoy the most remunerative portion of the market we need to present weekly, good-quality arrivals of chilled beef. That is an important objective towards which we are working.

To achieve this we seek a greater production of high-quality beef, and, most essential, a faster, more-regular delivery of chilled beef to the market. We have of course the handicap of distance between ourselves and Britain, but there are fast ships which can take our beef to London in not much more than 30 days. These particular shipments arrive in excellent condition and sell close or equal to the Argentine prices. It is when undue delays or mishaps occur that we have difficulty in landing chilled beef on the market in first-class condition. But we cannot expect to command all the shipping we would like until we can enlarge our trade.

Already, of course, very considerable progress has been made in the North Island in producing more beef for the chiller trade and for all purposes. Today our beef exports in total are more than twice pre-war quantity. They have made a large contribution to the general increase in meat export production over the last three years in particular. This is because it has become common practice to run cattle in conjunction with sheep and the use of cattle has increased with the bringing in of marginal land in which they play a vital part.

There has been a significant improvement in the quality of our beef. I believe much credit for this is due to our breeders, whose contribution to our beef standards is very considerable. It should also be noted that the processing of chilled beef at the works generally is much advanced since the trade was resumed after the war.

In the 1955-56 season beef exports reached 113,446 tons, which may be compared with 53,358 tons in 1938. Our chilled beef trade is still comparatively small. Our exports to Britain of chilled beef were only 23,700 tons out of total chilled beef imports into Britain of 258,300 tons. Our total was only the equivalent of one month's imports from Argentina. With improved transport and regular mar-
keting, we should be able to look to an assured future for our chilled beef.

I may add that we are not only concentrating attention upon getting our chilled beef more swiftly to the market but we have also, in association with the freezing companies, lately sponsored the establishment of a Meat Industry Research Institute one of whose first concerns will be the chilled beef trade.

And there is of course always a steady demand from certain sections of the trade in U.K. for frozen beef, which although at lower prices, is at present selling well.

As to the other suppliers to the British market, we know of course that there is a great potential for increased production in Argentina. But political uncertainties, the rising population in South America and the general increase in world markets for beef may yet offset that to a quite considerable extent. Australia has also a larger population to feed and her exports to Britain are another uncertain factor.

The Australian Meat Board is at present embarking on plans to sell more beef on its own local market.

If we can build our beef trade I am sure we have a sound future in the United Kingdom market, taking all factors into account.

Other Markets

As I have already noted, beef is a commodity for which there are considerable markets outside the United Kingdom. These markets cannot all be regarded as stable or assured, but in total they offer attractive opportunities.

In the 1955-56 season, under pressure of events in the United Kingdom market, New Zealand exporters placed 40.7 per cent of our total beef export, or 48,000 tons, outside the United Kingdom.

This was distributed as follows:

<table>
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<tr>
<th>Country</th>
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<tbody>
<tr>
<td>West Germany</td>
<td>13,500</td>
</tr>
<tr>
<td>Italy</td>
<td>11,500</td>
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<tr>
<td>Holland</td>
<td>8,567</td>
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<tr>
<td>West Indies</td>
<td>5,436</td>
</tr>
<tr>
<td>Belgium</td>
<td>2,598</td>
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<tr>
<td>United States</td>
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and to other destinations went various smaller amounts.

The sales made on the Continent reflect the increasing demand for meat there with rising living standards. In West Germany there was an estimated 10 per cent increase in the demand for beef during 1956. This demand enabled the exporting countries to take a weight of meat off the United Kingdom market. There is in West Germany a very active farmers' bloc known as the Green Front, whose political opposition to imports can be very considerable. In the present year, because elections are in the offing, there may be some reluctance in Government quarters to extend import licences as fully, but the general trend, with the present strong economic position of Western Germany, is toward continuing to increase in meat consumption. Of our exports to West Germany in 1955-56, 5,100 tons was quarter beef and 8,400 tons boneless beef and veal.

The demand for boneless beef and veal has indeed been very strong from the Continent. In addition to our sales of this class of meat to Western Germany we disposed of 7,000 tons to Italy, whose general level of meat imports has also greatly increased.

This year there has been a significant increase in shipments of beef to North America. By the end of April we had shipped 3,500 tons to the United States and by the end of June this total will reach
about 7,000 tons. This compares with a total of 1,400 tons shipped to the United States last year.

Since the period of the occupation of Japan a taste for meat has developed among the Japanese. Substantial imports, mainly of boneless beef and veal, are being made this year by Japanese firms. Our shipments to Japan last year were only 111 tons but this year at least 10,000 tons will be shipped and it is likely that this total will be considerably increased. This beef and veal is used primarily in the manufacture of various process meats which to some extent may be exported by Japan. It is too early to say to what extent this trade will develop. Here again a question for us will be the availability of beef enough to enable us to make the most of our opportunities.

It will be apparent to you that there are outlets for beef and veal of all classes and grades. Whether you produce top-grade chillers or boner cows there is an outlet for the product.

That brings us back to the question of how we can extend our production to meet our opportunities. That is the question which you may be interested to debate today. It does not follow that if you increase your beef cattle you must do so at the expense of sheep. As I have noted earlier, the two should be complementary. The planning of beef-cattle expansion is of course one that will need very close consideration and in the ultimate it is for the individual producer to determine what his policy will be. It is to be hoped that discussions at this conference will be of value in formulating a general opinion.

But I would like to emphasise the points I have made to demonstrate the very real need for increased production of beef, where it is economically feasible.

I cannot give you an absolute assurance about the market future, because unless you have controlled marketing and assured purchase that is not possible, and even then there is not complete certainty. But I can assure you that while conditions of reasonable prosperity continue, people round the world are going to eat more beef and the importing countries are in general going to present us with a good market, provided we can regularly and adequately supply the product that is required.
SOME ASPECTS OF THE BEEF INDUSTRY IN GREAT BRITAIN

E. G. Griffiths, Agriculture and Food Adviser to the High Commissioner for the United Kingdom.

In the 1930's home production of beef and veal contributed about 50 per cent of the total supplies available. Towards the end of the war and the immediate postwar period when imports of meat were limited for many reasons the contribution from British farms fluctuated between 50 per cent and 73 per cent. At present with increasing quantities being imported, home production is providing some 64 per cent of the total supplies. What is the story behind this changing picture? With the rapid increase in imports will home production decline to something like its prewar proportion? Is the increased output from British farms a feature which is likely to persist, or indeed expand, throwing less reliance than prewar upon imports? From the outset I must make it plain that some of these questions cannot be answered definitely. All it is possible to do is to examine the past and from the changed circumstances which now exist to attempt to predict the future.

During the inter-war years and especially the late 1920's and early 1930's, livestock husbandry on British farms was in a very depressed condition. The increase in the imports of carcase beef produced cheaply overseas did not at first affect home producers for the early trade was in frozen beef. This developed its own demand on the British market and did not really clash with the fresh meat section of the trade. With the development of the chiller trade, however, especially from South America, home production suffered. Competition was severe from a quality product which itself provided a cheap alternative to fresh meat for the large proportion of the British population who were already feeling acutely the economic effects of the national and world depressions.

I do not propose to deal in detail with the measures taken by the Government during that period to try to counteract this depression in the British fat cattle industry. For continuity, however, I will merely record briefly that a Fatstock Re-organisation Commission was set up in 1931. But before it could bring down its report the deteriorating situation forced the conference which ultimately led to the signing of the Ottawa Agreements of 1932. Now the Ottawa Agreements have been very much in the news of late and therefore all I intend to say about that part of the agreement which applies to beef and veal is to point out that the policy laid down was primarily to further the development of home production by regulating foreign imports. Shortly after the signing of the Ottawa Agreements the Fatstock Re-organisation Commission made its recommendations. These were aimed at:

(a) a more remunerative price for British fatstock producers
(b) the establishment of more orderly marketing
(c) improvement of the quality of home-produced meat.

The Government subsequently instituted a subsidy payment-scheme equivalent at the time to a rate of 5/- per live hundredweight. Qualification for this subsidy was weighted to encourage quality
production. The Government also provided for quotas on foreign beef imports.

These measures, however, did not have the effect hoped for. Between 1932 and 1938, although Argentine imports were curtailed, New Zealand and Australian supplies increased, and despite an increase in the total consumption during this period, an increase in which British producers were able to share, nevertheless their proportionate share of the total market supplies remained the same at 50 per cent.

Neither did the problem of seasonality of home production improve, but I intend to deal with that point in more detail later.

From 1939 to 1949, the beef industry was greatly influenced by the purely artificial conditions and stringent restrictions imposed of necessity under a wartime economy. Production of fatstock was drastically reduced owing to the restrictions on the home production of animal feeding-stuffs, the cuts in imports of feeding stuffs and the emphasis on milk production as a protective food. Total market supplies also fell over this period owing to greatly reduced imports, e.g.,

<table>
<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
<td>1939</td>
<td>1,203,500</td>
</tr>
<tr>
<td>1945</td>
<td>748,000</td>
</tr>
<tr>
<td>1949</td>
<td>889,500</td>
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From about 1950 fat-cattle producers were encouraged to expand production by relaxations in the restrictions of feeding stuffs for fat cattle and by increases in the guaranteed prices for beef. This brought about an increase in home production, an increase however which was not accompanied by any corresponding increase in imported supplies until 1955.

In July, 1954, fifteen years after the outbreak of war, Government bulk purchasing and consumer rationing ended. The pent-up consumer demand for fresh beef was immediately reflected in high auction prices for fatstock. This coinciding with an exceptionally bad season when farmers were facing the winter with very low reserves of home-grown feeding stuffs, resulted in heavy slaughters of cattle, many of which were immature and would normally have been carried on to fatten off grass the following summer. Total production for 1954 reached the record figure of 782,000 tons, but the heavy killings of immature cattle prejudiced the output the following year when production dropped to 690,000 tons. Since then production has again expanded, reaching a level which produced 789,000 tons in 1956.

Seasonality of Supply

An interesting and important aspect of fat cattle production is the seasonality of supply. As I pointed out earlier in this talk, one of the objectives of the Fatstock Re-organisation Commission's recommendations of 1934 was the establishment of more-orderly marketing. This problem however has always defied solution, although the seasonal supply curve of home-produced beef has altered from time to time reflecting producers' changing circumstances.

Despite the wide range in methods of feeding cattle practised prewar, these methods can be grouped very broadly into two distinct systems, winter fattening in yards and summer fattening off grass. Both these systems were based upon the general movement of store cattle eastwards and southwards from the breeding and rearing areas of the hill country of the north and west of Britain; a general movement to the kinder climate and better soils of the arable and mixed-farming areas of the lowlands. This supply of store cattle for the traditional feeding areas was supplemented by large numbers
of Irish store cattle transhipped to the fattening areas of eastern England and the famous fattening pastures of the Midlands. Although the great proportion of cattle were fattened off the summer flush of grass, coming on to the market during the autumn period of August to November, yarding and winter fattening of autumn purchased stores was widely practised in the arable fattening areas. This winter-fattening system was based upon the availability of cheap imported concentrates and supplemented by the home-produced hay, straw and roots from the arable rotation. In return, valuable farmyard manure was produced for increasing the yields of arable cash crops more especially wheat, sugar beet, and potatoes. These yarded cattle were sold fat in the spring months (early March to May).

Beef production during the prewar period, therefore, showed two distinct peaks in the production year, one such peak when the yarded cattle were marketed in spring, and a rather more pronounced peak spread over a longer period when the summer grass-fed cattle were graded off in late summer, autumn and early winter.

Between 1940 and 1954 a notable feature of fat-cattle production was the continuation and intensification of the autumn glut and in the years 1950-53 output for the four months August to November was 50 per cent of the total annual production, this despite controlled market prices seasonally weighted against marketing after July. The answer, however, was to be found in the shortage and the very high prices of animal feeding-stuffs compared with the lower costs of grazing; the greatly increased cost of labour, and the greater labour requirement for yard feeding, as well as the inconvenience of weekend work. A further important factor was the relatively higher level of profitability of other enterprises on the farm acting as a disincentive.

The practical consideration behind the supply of feeding stuffs and the seasonality of production is rather interesting and worth examining briefly. Because of this shortage of concentrated feeding stuffs and especially high-protein cake, cattle were taking longer to fatten. The prewar practice of finishing at between 2 and 2½ years old out of yards had to be changed. Instead the cattle were being stored instead of fattened during the winter and, depending upon their growth and when they were calved, they were either carried forward to be fattened off summer grass at 3-years-old or stored for a further winter, being fattened off the following summer at 3½-years-old. This resulted in much heavier cattle and cattle which were slower fattening and difficult to finish off grass before July or August.

Whether there will be a swing back to winter yarding, which in effect would relieve this very pronounced autumn glut, is very difficult to forecast with any degree of certainty. Whether it would be practical for even less seasonal production than we had prewar is even more difficult to forecast. I feel it would be dangerous to attempt to draw firm conclusions from the production trends since July, 1954, the period when free marketing was re-established and rationing ended, for the market has not yet had time to settle down. Furthermore production was temporarily affected by the then method of calculating the guaranteed fatstock price and relating it to the average market price for the previous fifty-two weeks. This method proved too insensitive to the rapid drop in market prices which dated from the spring of 1956, and many farmers sustained losses through having bought in stores at £9 per hundredweight in the spring of 1955 and being able to sell them out fat at only about £7 per hundredweight in the autumn. Nevertheless it is interesting to look briefly, even though rather warily, at the production trend since July, 1954.
and the influence consumer demand and price has had upon the seasonality of production.

Although in the long term it may be possible to even out somewhat this very pronounced seasonality of production, from the practical standpoint I cannot see how seasonality can be entirely avoided. There is no doubt to my mind that with the emphasis upon lower production costs, an emphasis which is given weight by the lower market price encouraged by increased imports, the greatest scope for beef production lies with the grass-fed animal. An expansion or even the continuation of this system, however, depends upon beef production being able to compete with what at present are more profitable alternative uses to which the land can be put either as grass or arable. With the present high level of income from crops, grass-fed cattle are likely to be confined to those grassland areas in the country where climate and inclination preclude much cash cropping. In the arable districts they will be grazed on those marginal areas such as river valleys and marshes which cannot be cropped, supplemented by a proportion of the rotational grass not used for the more profitable enterprises of dairying or sheep. Within these limits there is scope for increasing beef production from summer grass but this would tend to aggravate the autumnal peak of home production.

There is still some hope for the winter fattening of cattle, using either the traditional system of feeding solely in yards or feeding out on crop by-products such as aftermath hay-grazing and stubble-grazing in the early autumn and sugar-beet tops in the early winter, and then finishing over a shorter period with yard feeding. In any system of yard fattening, however, the prewar practice of feeding hay, roots and liberal amounts of purchased oil cake is far too expensive and it has been replaced by the use of cheaper home-produced quality foods such as hay, silage, beet pulp, cereals, supplemented nearer finishing by a little concentrate protein feed. Labour costs in a yarding system are still higher than under any grass feeding system and even with the machinery now available for cleaning out the yards plus setting a value on the farmyard manure of about £1 a ton, the margin between profit and loss under a yarding system is still very small. Furthermore this margin can be too easily swung into the red by the loss of one or two of these high-cost cattle during the fattening period.

The development of systems of winter grazing to supplement crop by-products whilst not fattening the cattle except under very favourable conditions can however, by maintaining a forward store condition during the winter period, shorten the subsequent grass-fattening period finishing some of the cattle before the commencement of the traditional autumn-production peak. Where the land will stand winter pugging, such a system reduces both feed and labour costs.

Modern Production Trends

The emphasis is now on the younger finished beast. To meet the present market requirements such animals are lighter and leaner than the 3-to-3½-year-old grass-fed animals. In some areas, market preference is for a very lean-flesh animal and some I saw last summer being slaughtered for the Midlands' market were nothing more than forward stores. This trend, however, is likely to correct itself and I am sure that in the long term the market requirements will be for the smaller type of quality animal well fleshed but not fat.

To produce this, the industry at home will have to concentrate upon two methods, one being to finish the cattle at 1½-to-2-years-old, as mature lightweight beef and the other grading at 2-to-2½-years-old, thus producing a slightly heavier beast. To produce the lighter
animal, growth must be maintained by a high level of feeding right from birth to grading. For the 2-to-2½-year-old beast, fattening can follow a store period but the classical work of Brooks and Mansfield on the Cambridge University Farm, work which has since been confirmed by farmers’ own experiences, has shown that for success it is essential to have good well-grown calves reared on a high plane of nutrition to six months only.

Beef production in Britain is at an extremely interesting stage. The national policy is to encourage beef production based upon the more efficient utilisation of better grass and home-produced foods. New methods of management not explored prewar because of the utter reliance upon cheap imported foods, make possible in practice the production of the type of animal the market requires. The economic possibilities, however, are still open to doubt in farmers’ minds, for despite the better prices now guaranteed for home-produced beef, it is still fundamental that expansion of cattle feeding on any particular farm is very closely related to the relative profitability of other production alternatives.

I would expect production to be maintained around its present level with increasing emphasis upon quality. I am not prepared to say nor even to hazard a guess that production will materially increase.

**DISCUSSION ON THE TWO PREVIOUS PAPERS**

**Mr M. Turton, Ashburton Forks:** (1) It is pleasing to see an increase in chilled beef. Would most of that chilled beef be going to the London market?

(2) Would there be a great market all over the world for processed meat? We could use air freight. It looks as if there could be a tremendous increase in processed meat. In the South Island capital stock is being slaughtered to export to Japan and other countries. A breeding cow today in reasonable condition is worth more in the works than to the producer. If we can produce processed meat there is a market for it in many parts of the world. At the present time those countries show preference for thin cows and bull beef because bull beef absorbs more moisture. Are we getting rid of our capital stock?

**Mr A. Baker:** (1) Certainly most of our chilled beef is going to the London market. Some goes to other markets in Great Britain. Practically all of it goes to Great Britain. Two small shipments were sent to Germany. With chilled beef we should concentrate on the British market because of the necessity of ensuring continuity of supply. We do not yet supply nearly sufficient of it to make ourselves felt on that market.

(2) Are we killing our capital stock? I do not know. If you are facing a bad winter and fat prices are good it is always a temptation to kill fattening stock. I would suggest that if you can withstand temptation, it is wisest to do so. As regards processing meat here we must remember that our cost structure is much higher. There is no prospect of our competing in the actual processing of meats. Many of the ingredients are not available here. In Italy I asked: “Would you not be wise to purchase sheep meat produced in New Zealand to go into the sausages?” The answer was: “If we put sheep meat in our sausages we would have to use more horse meat to drown the taste.”

**Mr J. N. McGregor, Southland:** I would like to ask Mr Griffiths about the trend of the beef industry in New Zealand and what we should aim at in future production? We understand the British
housewife wants leaner meat and is prepared to buy younger meat. We can produce a lighter chilled-beef weight and I think it should be fostered—I refer to the 18-months beast. It is false economy to winter a cattle beast twice. In the future we should send 18-months beasts to England, fat and prime. Do you believe we could market that light-weight beef in Britain?

Mr E. G. Griffiths: The British market is not a uniform market. The preference pattern varies very considerably. What used to be heavy industrial work in steel factories (and therefore the workers needed lots of fat) has changed with automation and physical effort has been reduced to a minimum. On the north-east side of the country they want better-finished meat. The coal-mining and ship-building industry is largely reflected in the fact that they want a little more fat there. In the south, leaner meat is wanted, but largely to provide for the catering trade. It is difficult to give a generalisation for what is wanted for so diverse a market. The trend is certainly for a smaller well-finished beast with a range between one-and-a-half and two-and-a-half years. The present chilled-beef exports are ideal. The important point is regularity of supplies. Nobody is going to look with enthusiasm on a supply of beef which is not continuous. Most supplies go to butchers who persuade the housewife to buy. If she likes it then she will come back for more. Be careful in your quests for other markets that you do not completely rock the ship and deny the possibility of supplying Great Britain.

Mr J. N. McGregor: Take the 18-months-old beast. Should we not kill it rather than winter it twice? In the Meat Board’s opinion can they foster a market for this chilled beef? Could they encourage the lowering of weight on chilled beef so as to get rid of 18-months-old animals?

Mr A. Baker: I do not think it would be wise for the Meat Board to penalise other grades of meat just for the sake of giving impetus to the production of 18-months-old beef. In many parts of New Zealand it is an economical and sensible way of producing chilled beef. In the United Kingdom there is a widely diverse market. There are many types of pastures in this country and I hope producers will not only aim at pastures suited to the production of 18-months-old cattle. At this stage I would not suggest the Meat Board would be wise to take encouragement off other weights of beef just to produce 18-months-old beef. In the Argentine, emphasis is on weights up to much the same weight as we have in New Zealand today. They are experienced and therefore we can take lessons from them. In the meantime we must also cater for the older stock.

Mr Butcher, Broadfields: Does Mr Baker think there is any possibility of beef-eating countries of the world changing to lamb eating?

Mr A. Baker: I do not hold out much hope of that. Perhaps I can give you an experience of mine. When in Holland I took a trip round the markets that are so prejudiced against lamb. I talked to one man who had recently been in New Zealand and asked him whether he tasted and enjoyed lamb in New Zealand. He thought it was very good and ate it frequently. He then added that because he enjoyed it in New Zealand in a sheep-eating environment, it did not mean that he enjoyed it in Holland. He preferred the meat he was used to there. That is one reason why we must encourage you to mix your meat production more. In New Zealand we are eating a greater proportion of beef than we used to, and in England they are eating more. The only big sheep-eating countries are British, and I cannot see much hope of increasing lamb consumption.
Mr Elliot, Southland: What is the possibility of running more cattle throughout the South Island? If we do, will we be assured of some way of handling the cattle when they are fat? We often get cattle in condition to be killed and sometimes it is at least 12 months or longer before we can get them to the freezing works.

Mr A. Baker: I know it is a very great difficulty in the South Island. It applies perhaps more in the south than in Canterbury. Facilities are available in Canterbury but even they are not adequate. We are most conscious of our responsibility to see that facilities are provided if production is increased. The Board is certainly doing its best to see that facilities for handling stock will be increased. In the North Island we have peak demands for killing space but the Board cannot make facilities equal to every peak demand, but only the overall demand. With regard to shipping, I would say the shipping companies have done a reasonably good job in providing, at very short notice over the last two years, chilling space for cattle. Chilled-beef lockers are not as we would like them to be. They are freezing lockers turned into chilled lockers and some are not completely gas proof. They are the reason for some of the meat not getting to the London market in as good order as could be. The fault lies here in the system of loading. If we insist on loading at every minor port we cannot get beef to London in under 40 days. The Board has been very active to try and get the Railways Department to order more refrigerated wagons without much success. We should be ahead with our transport facilities rather than behind.

Mr J. M. Samson, Marlborough: We feel that rather than be so worried about facilities for chilled beef we could try and get some method of processing beef into prime cuts and have them deep frozen to be sold as “packaged in New Zealand” on the London market. We feel this is a matter where the Meat Board could spend some of its funds in putting up some publicity. Some country stores throughout Marlborough are selling packaged deep-frozen meat processed by a local concern. Has the Meat Board taken notice of what Sir William Polson had to say?

Mr A. Baker: We do not agree with Sir William Polson as we think it will be a comparatively slow change over. We have spent some time in investigating this problem. We must remember that it is the exporters who are experimenting with regard to frozen cuts; then it is for the exporters to exploit that particular type of market. They are in competition and it is for them mainly to work out the way to get the best return for that meat. The Board is conscious of the possibilities but the whole thing should not be turned upside down overnight before the British housewife is ready. Deep-frozen cuts of beef and lamb are being sent to several parts of the world.

Mr Wheeler, North Otago: In this country we are now urged to increase production. We receive no Government subsidy. In the United Kingdom the Government has subsidised farmers in the vicinity of £400 million. Will the United Kingdom Government gradually reduce that subsidy until the New Zealand farmer and the United Kingdom farmer are competing on the same basis; under those circumstances, will the United Kingdom farmer still go on increasing his cattle?

Mr E. G. Griffiths: Your figures are not quite right. Subsidies to British agriculture vary. During the last few years they have varied between £200 million and £250 million. The subsidy is dependent on the market price. If the price is below the guaranteed price then the Government guarantees to pay the difference to the producer. The taxpayer makes up the difference.
The costs of production last year for the farming industry increased by £38 million; the increase in subsidy payments was only £14½ million. The fundamental reason behind subsidies is to maintain for the agricultural industry a reasonable standard of payment for the business of farming. These payments will only carry on as long as the farming industry is gradually increasing its efficiency. Each year the level of guarantees is negotiated and reduced a certain amount to induce farmers to improve their efficiency. Each year the sum total which the industry earned by improved efficiency is of the order of £30 million. Subsidies do not increase in proportion to costs. The industry has absorbed over five years over £150 million of increased costs because of more-efficient and better methods. The industry must be sustained in competition with New Zealand beef and dairy products. We have in the agricultural industry the largest single industry in the country and we must sustain it by this system of subsidies. The Food and Agriculture Organisation of the United Nations had, as a result of an investigation, said that it was the best system of support possible.

What is the policy behind beef production? Looking at the big increase from 1951 to 1954, a lot has resulted from new trends in management. The policy which was advocated for a long time was crossing dairy breeds by a beef bull to give a beef-type calf. This rapidly increased beef production considerably in spite of the fact that beef herds have dropped since pre-war and ordinary sources of supply from store cattle have dropped. How far are we going? The producer is uncertain of beef production as a long-term enterprise. Arable crops are more profitable. Also grass for sheep is more profitable. Dairying is certainly more profitable. Guaranteed prices would give more long-term security for producers. I cannot see a lot of enthusiasm in England for vastly-increased beef production. Certainly the policy is to encourage the lowering of the cost of production. There is no thought of trying to bring it down in competition with New Zealand. All we want is meat for the housewife. At present all beef produced is going into consumption and we want to produce as much more from home sources as possible. At the moment 64 per cent is being produced at home. We have a bigger market than New Zealand can supply.
SURVEY OF BEEF PRODUCTION IN THE SOUTH ISLAND

R. H. Scott and H. H. Tocker, Department of Agriculture.

When I was approached to take part in this symposium on beef production in the South Island I must have been suffering from some mental aberration, for I should have refused to have anything to do with it, firstly because the small-scale survey of beef production in the South Island had not then commenced, and the chances of obtaining information had thus not been tested, and secondly whenever possible I avoid having to attempt to eat beef—I much prefer mutton. This idiosyncrasy may possibly be due to the fact that when I request beef at an hotel or restaurant I usually obtain some substance on my plate that may have been part of a dairy cow that once gave milk, but long, long ago, and also one that had long since forgotten what good pasture looked like.

I am then reminded of an extract from a book written by a Scotsman on beef production in Scotland, which reads as follows: "Speaking historically, beef, in its origin, was a by-product of cattle used for other purposes. The cow, when her milking days were over, probably always found her final destination in the abattoir, just as she does today. Working oxen, once they had grown too old for the plough were fattened off in a hurry to be eaten by people who had leisure to chew. The early roast beef of Old England must have required a great deal of roasting and very prolonged mastication. It was a tough food of a tough race." Perhaps my aversion to beef is due to my not being tough enough to handle the type of beef it seems my lot to obtain.

To give facts about a survey means that figures have to be used, and while many farmers dislike either having to prepare or consume figures, we appeal to you to put up with them for a short while; we shall endeavour to dress them up so that they can be readily digested.

Beef Cattle in New Zealand

First we propose to look at the broad canvas of the beef industry in New Zealand before focussing attention on the South Island. In 1955 there were approximately 2.8 million beef cattle in the Dominion against 1.9 million in 1942-43, so that in 12 years, beef cattle numbers increased by about 1 million, and the tempo of the increase has been gaining momentum in recent years with the result that the increase over the five years ending in 1955 was at a rate of over six per cent per annum. The North Island with 2,340,000 cattle has 83 per cent of the total against 470,000 in the South Island, but the South Island has the consolation that most districts have shown increases of over 40 per cent during this time, whereas the nearest approach in the North Island was in North Auckland with about a 30 per cent increase. The greatest concentrations are of course in the north, particularly on the East Coast where we find in the Gisborne and Hawkes Bay districts concentrations varying from 15 to 19 beef cattle per 100 acres used for farming, and as the map shows there are considerable concentrations in parts of North Auckland, Raglan, Rangitikei and Northern Manawatu.

There are few farms in the Dominion where the main source of revenue is from the sale of beef stock, the 1950 census of farm produc-
one dot equals 1,000 cattle.
one dot equals 1,000 cattle.
tion showed that of the 90,000 farms in New Zealand, only 1,240 or 1.4 per cent could be classed as beef enterprises, and of these no less than 27 per cent were north of Auckland City. The picture is similar today.

Beef Cattle in the South Island

Looking at the South Island we find that the greatest concentration of beef cattle is on Banks Peninsula, with nine cattle per 100 acres of farmed land, and Levels County, the district around Timaru comes next with five per 100 acres. Other areas with relatively-high concentrations are the Nelson area, particularly in the Collingwood district, and parts of South Otago. Another way of looking at the picture is to consider the ratio of beef cattle to sheep, and the table shows those counties with the highest and lowest ratios.

### TABLE I

<table>
<thead>
<tr>
<th>Beef Cattle per 100 Sheep in some South Island Counties</th>
<th>County</th>
<th>100 Sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Westland</td>
<td>42.8</td>
</tr>
<tr>
<td></td>
<td>Grey</td>
<td>31.1</td>
</tr>
<tr>
<td></td>
<td>Inangahua</td>
<td>21.3</td>
</tr>
<tr>
<td></td>
<td>Collingwood</td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td>Akaroa</td>
<td>9.4</td>
</tr>
<tr>
<td></td>
<td>Maniatoto</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>Selwyn</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>Malvern</td>
<td>0.4</td>
</tr>
</tbody>
</table>

After all this is a logical picture, for it follows the annual rainfall pattern. Collingwood and the West Coast areas have their 70 inches to over 100 inches per annum, while Maniatoto has 15 inches to 20 inches and Selwyn and Malvern 20 inches to 25 inches per annum.

The survey included farms in most South Island districts from Nelson to Southland, and I am afraid that as the basis of an interesting paper, it is a disappointment. However, if it shows nothing else, it indicates how unimportant beef production really is in the South Island.

There are several minor points which arose from it, the first being to confirm the position as disclosed by the statistics collected by the Government Statistician that beef production in the South Island, as in the North Island, is a subsidiary of sheep farming. All of the farms covered in the survey were essentially sheep enterprises.

Management of Cattle

A few particulars were obtained on the management aspects, and while a recital of these may appear to be stating the obvious we shall nevertheless cover some of them. It is fairly obvious that the majority of South Island farmers running beef cattle do not give them any special treatment, or at least no preference over other stock in grazing, although there were exceptions to this. Of those farmers interviewed, 60 per cent indicated that no preference was given to cattle, but on Banks Peninsula and on the irrigated area in Mid-Canterbury where the production of fat cattle is a special feature, the position was different; here cattle were given preference in grazing.

For wintering, cattle in most cases received hay as a supplement to pasture while in South Otago and Southland both root crops and hay were the usual supplements. The table sets out broadly the methods of wintering beef stock as disclosed by the survey:
TABLE II
Methods of Wintering Beef Stock

<table>
<thead>
<tr>
<th>Percentage of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture and hay</td>
</tr>
<tr>
<td>Pasture only</td>
</tr>
<tr>
<td>Pasture, hay and crops</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

100

As in many North Island hill districts under fairly-high-rainfall conditions, so in similar climatic areas in the South Island we find cattle used as implements to help control fern and scrub. This is particularly the case in the Nelson area, the West Coast, parts of North Canterbury and to a lesser extent on Banks Peninsula and parts of Southland. However, overall some 70 per cent of the farmers in the survey did not use cattle as control implements. In the North Island the position is likely to be the reverse with about 70 per cent of the farmers using cattle for control purposes.

Breeds of Cattle

The Aberdeen Angus was the favoured breed of cow, 34 per cent of those in the survey being of this breed, 24 per cent were Herefords and 12 per cent Shorthorns, the remainder comprising crosses of various classes. The least said about some of the crosses the better. Of the bulls 54 per cent were Aberdeen Angus, 22 per cent Herefords and 21 per cent Shorthorns.

TABLE III
Breeds of Cows and Bulls

<table>
<thead>
<tr>
<th>Breeding Cows</th>
<th>Bulls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>Percentage</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>34</td>
</tr>
<tr>
<td>Herefords</td>
<td>24</td>
</tr>
<tr>
<td>Shorthorn</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>30</td>
</tr>
</tbody>
</table>

Replacement Policy

Two definite policies were apparent with respect to replacements; farmers either reared all their replacements and sold store and/or fat stock or they bought in and fattened, and had no breeding stock. Actually 60 per cent of the farmers reared replacement stock and sold stores and/or fats while 30 per cent kept no breeding stock, but bought in to turn the stock over as fats. A minority of seven per cent bred and bought in some stock. Of those running breeding cows, 37 per cent claimed they had calving percentages of over 95 per cent and 33 per cent had calving percentages between 90 and 95 per cent. Very few claimed to have calving percentages lower than 80 per cent.

Size of Enterprise

We have endeavoured to get a lead on the size of the beef enterprises, and the method we adopted was to take the turnover of beef cattle of all classes for those farmers interviewed. It appears from this that there are few who really do any large trade in beef stock. You will get a line on this from the table.
TABLE IV

Turnover of Beef Cattle

<table>
<thead>
<tr>
<th>Number of Beef Stock Sold per annum</th>
<th>Percentage of Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>18</td>
</tr>
<tr>
<td>25 and under 50</td>
<td>25</td>
</tr>
<tr>
<td>50 and under 75</td>
<td>25</td>
</tr>
<tr>
<td>75 and under 100</td>
<td>9</td>
</tr>
<tr>
<td>100 and under 150</td>
<td>12</td>
</tr>
<tr>
<td>150 and under 200</td>
<td>7</td>
</tr>
<tr>
<td>Over 200</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

From this table it appears that about 70 per cent of farmers running beef cattle sell less than 75 head per annum.

Aim of Beef Production

Possibly the most significant point of the survey is the small proportion of farmers who have as their aim the production of export beef. Catering for the store market and butchers’ trade is the predominant feature. In effect the South Island meets its own local requirements, but does little else.

TABLE V

Aim of Beef Production

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Percentage of Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butchers’ market</td>
<td>37</td>
</tr>
<tr>
<td>Store market</td>
<td>26</td>
</tr>
<tr>
<td>Butcher and Export</td>
<td>14</td>
</tr>
<tr>
<td>Export</td>
<td>8</td>
</tr>
<tr>
<td>Store and butcher market</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Those catering for the butchers’ trade sold cattle at two to three years of age, of weights about the 600 lb to 800 lb mark. While it may be fortuitous, the figures available to us indicate that the heavier-weight beasts come from the South. In the Nelson and Marlborough districts the modal weight was from 600 to 650 lb whereas in South Otago and Southland it was about the 750 lb mark. The relatively-unimportant part played by the production of export beef in the South Island can also be seen by a comparison of the killings of cattle for export in the North and South Islands. In 1956, 563,000 cattle of all classes were killed in the North Island against 57,000 in the South Island. Actually the killings in 1956 were extraordinarily high. The total killings at meat export works including cattle withdrawn for local consumption increased from 631,000 in 1954-55 to 720,000 in 1955-56. One wonders whether there have been killings of what is tantamount to capital stock. This will only be apparent when the Government Statistician has available the statistics of beef cattle for 1956.

Having seen that most of the farmers raising beef stock had for their objective the supplying of the butcher trade, we have looked back at an exercise which was carried out several years ago to ascertain the districts from which the Addington and Burnside stock markets drew their fat cattle in winter. We do not think that the
picture is much different today. So far as Addington is concerned you will see that Banks Peninsula supplied the greater proportion, with the West Coast next, followed by North Canterbury (i.e., the area between the Conway and Waimakariri Rivers). Mid-Canterbury supplied 11 per cent.

**TABLE VI**

Percentage of Beef Cattle coming to Addington Market in Winter Months—May-September

<table>
<thead>
<tr>
<th>From</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks Peninsula</td>
<td>29</td>
</tr>
<tr>
<td>West Coast</td>
<td>23</td>
</tr>
<tr>
<td>North Canterbury</td>
<td>21</td>
</tr>
<tr>
<td>Mid-Canterbury</td>
<td>11</td>
</tr>
<tr>
<td>Other Districts</td>
<td>16</td>
</tr>
<tr>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

Burnside market drew approximately 27 per cent from the area around Balclutha, Stirling and Owaka, 16 per cent from the area running through Gore, Wyndham and Edendale and 13 per cent from the Central Otago irrigation areas.

**TABLE VII**

Percentage of Beef Cattle coming to Burnside Market in Winter Months—May-September

<table>
<thead>
<tr>
<th>From</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balclutha</td>
<td>27</td>
</tr>
<tr>
<td>Southland</td>
<td>16</td>
</tr>
<tr>
<td>Central Otago (irrigation)</td>
<td>13</td>
</tr>
<tr>
<td>Coastal (Hampden-Waikouaiti)</td>
<td>11</td>
</tr>
<tr>
<td>Strath-Taieri, Maniatoto</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td>22</td>
</tr>
<tr>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>

The Future

We have endeavoured to look at the future of beef production in the South Island, and I am afraid what we see in the crystal ball is not very inspiring.

About two years ago estimates were made by our Department of the likely number of beef cattle in New Zealand by 1985 (30 years from 1955) and on looking at them now, we think they are conservative; at least we hope so. Taking the South Island we estimated that the number of beef breeding cows should increase to 260,000 against 164,000 in 1955 and other beef-stock increase to approximately 490,000 (304,000 in 1955). This is an estimated increase of 60 per cent in 30 years, an arithmetical increase of two per cent per annum, but less than that on a compounding basis; it is certainly not spectacular.

Taking individual districts, one can do little more than conjecture about them. In the northern part of the island, around Collingwood and Takaka, there are likely to be increases in beef-cattle numbers, but the area of the farmable land is restricted and consequently the total increase in numbers is not likely to be large. Coming to the West Coast the outlook may be brighter. In an unpublished report on the district prepared by the Land Utilisation Section of the Lands
and Survey Department, they estimate that some 330,000 acres in the area from Karamea to the Waiho River (and excluding the Murchison district) are suitable for farming, but only half of this area, or approximately 160,000 acres was under pasture, or had scattered pasture on it. With the development and adequate utilisation of the 330,000 acres which of course will be well in the future, part of it may be used for beef production, at least in the early stages of development.

Nearer home, we find our friend, Mr R. H. Bevin, of the New Zealand Wool and Meat Board Economic Service, giving his opinion on how the production of export beef might be increased in Canterbury, by extending irrigation, and making the Canterbury hill country and plains complementary in beef production; the hill country to breed the stock, and the irrigated pastures to fatten them. The big question mark here is when will irrigation be extended to further areas. Under present Government policy the broad principle is that irrigation will not be extended to any district unless farmers holding 75 per cent of the area to be served by a scheme vote in favour of it. The first vote taken on the extension of irrigation to a new district may well decide for many years what the irrigation pattern will be in Canterbury. If it should be an adverse vote, my personal opinion is that the extension of irrigation may be set back a number of years, unless of course several drought years succeed one another. Again my personal opinion is that an adverse vote will be unfortunate from the national point of view. (Since this paper was written a vote was taken in the Rakaia area with an adverse result.)

An area in the south which, from recent performances, may make a significant contribution to beef production is part of South Otago. Actually over a four-year period ending in 1955, beef cattle numbers in the district around Milton, Balclutha and Gore increased by over 70 per cent and as further land-development and land-improvement work are undertaken, further increases may occur.

However, looking at the broad canvas for the South Island, we cannot see any major increases occurring in beef cattle numbers, at least for a number of years. South Island farmers are firmly wedded to sheep and are really not cattle-conscious. If we had been asked to speak about sheep farming we could have painted a much rosier picture, in fact we could predict with some degree of certainty that in a few years the South Island would head off the North Island in sheep numbers and again become the dominant sheep raising island.

In the paper we have gone no further than to look at the position as it obtains at present, and our picture of the future does not indicate that beef production is likely to play a very significant role in South Island farm production. However, a few years can often change a picture considerably. I don't suppose it is impossible that completely new methods of keeping and handling meat may be placed in our hands which could well place New Zealand at a greater advantage in competing in the overseas beef market and more South Island farmers may then find that their pockets will dictate that they become more beef conscious. We shall therefore leave you with a large question mark beside the word “beef.” You may be able to give us some ideas if and how beef production can be increased in the south.

DISCUSSION

Chairman: In the survey of cattle in the South Island did you find many farmers who were using cattle purely to control pasture to give better mutton, lamb and wool? If so, what were some of the results?
Mr Scott: The survey was not very extensive. In the farms we surveyed we found no cases.

Mr Downes Roberts: What percentage of farmers returned forms?

Mr Scott: I got instructors throughout the South Island to visit farmers. The percentage was not large but every district was covered and the results should be a very fair picture.

Mr McKenzie, Southland: The trouble has been that we have not been able to get beef killed when we wanted it. Extra freezing facilities are most important.

Mr A. Baker: It is the Board's policy today to be right behind the meat freezing works in Southland and it is spending your money on a project at a low rate of interest. The Board is conscious of the necessity for meat-killing facilities in Southland.

Chairman: There are vast areas in the North Island which have been broken in by the use of cattle. Did you come across any large areas of such scrub country in the South Island?

Mr Scott: The only area was in part of Nelson. Cattle are not used for this purpose in other places, except in a few isolated spots.
Before turning to consider fertility in beef cattle it is important to decide what part beef cattle have to play on the individual farm. Such a decision is made more difficult by the widely fluctuating prices that have obtained for beef in recent years. I think it would be fair to say, that the steep rise in price followed by a decided fall has made most of the farmers in the Gisborne area reconsider the whole question of beef farming. Apart from the prevailing prices offered for beef, the main reasons for farming beef cattle are:

1. The presence on the farm of areas which can only be cleaned up or controlled by cattle grazing.
2. The presence on the farm of good feed which cannot be put through sheep.
3. Pasture development or maintenance demanding cattle for adequate management, i.e., to produce good sheep feed for sheep.
4. Shortage of labour or of the finance so frequently necessary to provide the housing, etc., demanded by the extra staff required to handle increased sheep numbers.

While sheep returns continue to be so much better than beef returns, the best advice that can be given is to farm as few cattle as are compatible with efficient sheep farming and with maintaining or improving the land farmed. This advice may not agree with the national policy on beef production. Experience, however, shows that a substantial proportion of farmers "chase the market." If they propose to do so they may as well do it efficiently and at the same time retain their ability to change back to beef if this becomes desirable. This flexibility within meat-and-wool farming is highly important.

Another vital question that has to be answered once it has been decided to farm beef cattle, is the class of stock to be farmed. There probably are in New Zealand a number of areas so rough and with such a poor climate that it would be impossible to farm the country effectively with anything other than bullocks. However, with progress in aerial topdressing and in sub-division, such areas are becoming progressively fewer. In addition our knowledge of handling breeding herds has improved to a considerable extent, and it appears that for most purposes the breeding herd will do all the work on the farm that is necessary, and at the same time will produce much more profit and higher quality animals for sale. If it is accepted that wherever possible the maximal proportion of breeding cows will be farmed, it is obvious that if the total beef cattle herd is to remain static, the surplus stock sold and the ability to select superior animals depends solely on the fertility of the breeding cows. On the other hand the profitability of cattle farming depends not only upon the fertility, but also on the amount of pasture eaten by non-productive animals. The main non-productive animals are breeding replacements, dry cows and bullocks. The question of reducing to a minimum the proportion of breeding replacements and dry cows will be dealt with later. The bullock is considered to be non-productive, because after the age of about three and a half his value increases little, the beef produced is of inferior quality, and he is replacing a cow which annually produces a calf. At this stage it can be postulated that
the efficient breeding herd should winter no empty cows, carry no
fattening stock of over three to three and a half years, and a mini-
mum number of breeding replacements.

Fertility Service
In the Gisborne area where beef cattle are a major part of farm-
ing, we have developed a service which in the first instance ensures
the farmer that for every 100 breeding cows wintered 95 calves will
be marked. At the same time this service by eliminating shy breeders
and recognising and controlling disease, aims at raising the propor-
tion of cows that get in calf so that the number of replacements
required, is reduced and the ability to select superior animals is
maximal, i.e., a small number of replacements are selected from a
large number of calves.

The key to this system is mating a sufficient excess of cows and
heifers, so that when the animals are pregnancy-diagnosed before
winter, the empty cows can be sold and the herd reduced to its normal
winter carrying, all cows guaranteed in calf. To achieve this, the
farmer entering the scheme is asked in the first year to mate all his
cows and replacements before culling, and then to cull his cows once
he knows the result of pregnancy diagnosis. At the same time he is
asked to rear a sufficient number of heifers so that he will have an
adequate number for excess mating. The actual number depends on
the proportion of cows and heifers that he normally gets in calf.
Thus a man with a 90 per cent calving would have to mate 12 per cent
excess of cows to ensure that he will have 100 per cent of his
winter carrying in calf. Similarly a man with 80 per cent calving
would have to mate a 25 per cent excess of cows. A man on 70 per
cent calving would have to mate 45 per cent excess of cows, an
obvious impossibility with 70 per cent calving. A man with such a
low percentage would take several years of building up his efficiency
through pregnancy diagnosis to reach the desired 95 calves marked
per 100 cows wintered. When such a system has been in operation
for a few years all the cows in the herd will be guaranteed 100 per
cent breeders, and in this way the shy breeder or cow of poor inherited
fertility will ultimately be eliminated.

Infectious Diseases
In any herd showing 80 per cent or less in calf cows the disease
situation is investigated at the time of pregnancy diagnosis by
taking samples from the empty cows and an equivalent number of
similarly aged in-calf cows. Specimens from these are sent to diagno-
sic laboratories and based on their findings a variety of disease con-
trol measures are applied. There are four main diseases affecting
fertility of beef cattle in New Zealand.

Contagious abortion is by far the commonest and it cannot be
repeated too frequently or too emphatically that all heifers should be
vaccinated, as a preventive measure. So far as we know this confers
a life-time immunity and does no harm whatsoever to the inoculated
cattle. Any herd whose calving is reduced because of this disease
achieves complete control by vaccination of the whole herd, followed
by annual vaccination of the heifer replacements.

Leptospirosis. This more recently recognised disease appears
to be common in beef cattle. First reports of a vaccine produced in
this country indicate that this disease can also be controlled by
vaccination.

Vibriosis. This condition recognised in most parts of the world
is causing the veterinary profession some concern. There can be
little doubt from world literature that a herd seriously affected with vibriosis performs poorly. On the other hand it does appear that vibriosis can be present in a herd without affecting the breeding performance of that herd. We have records of several such herds. This makes diagnosis and interpretations of findings very difficult. Vibriosis is a venereal infection and there are no vaccination control methods available. Treatment of individual cows, while possible in a dairy herd, is not possible in a beef cattle herd, so that any control would have to be based on management in which young presumably clean bulls are mated with young, presumably clean cows in such a way that in a period of years a herd free from the disease will be reared. There are many obvious difficulties in following such a management system, but it appears to be the only way in which this disease can be controlled.

**Trichomoniasis.** This venereal infection leading to sterility and abortion has not been commonly found in beef cattle surveys. Principles of control of this disease are similar to those mentioned in vibriosis.

**The Bull and Infertility**

Examination of infertility problems in beef cattle herds has shown that in some instances an infertile bull is to blame. There is no convenient method of testing bulls prior to the mating season and provided that the herd is free from venereal infection the best advice that can be given is to change the bulls around at about three-weekly intervals; this will at least limit the effects of a "dud" bull.

**Pregnancy Diagnosis**

It is desirable at this stage to make a few comments on pregnancy diagnosis. Veterinary surgeons can, with virtually 100 per cent accuracy, tell a cow that is more than two months in calf. All that is necessary for the job are standard cattle yards with a good strong race. A small gate just behind the actual bail is a great help—it enables the veterinary surgeon to get in behind the cow easily to insert his arm into the rectum and feel the breeding organs for signs of pregnancy. From 200 to 250 cattle would be considered a good day's work.

As already mentioned the biggest overhead in a breeding herd farmed under the system described consists of the replacement stock. It has been shown that by eliminating the shy breeder and controlling disease the number of replacements required to be raised can be reduced. There is another way in which the overhead costs of rearing young stock can be reduced, that is by reducing the age at which a heifer first calves. On some farms with adequate sub-division where the young heifers are moved frequently on to spelled pastures it is possible to mate them as yearlings to calve down as two-year-olds. In effect this is rearing heifers at chiller levels of feeding.

On the majority of farms in the Gisborne area, however, the heifers are mated as two-year-olds to calve down as three-year-olds. In this instance not only have the replacements to be carried an extra year, but because they are larger they are consuming greater quantities of grass. On a proportion of properties heifers are not mated until they are three years old and will not calve until they are four. Although this might be quite acceptable on some of the very large high country properties, overhead is increased to a very great extent and on smaller properties, where lack of sub-division is the main factor limiting the efficiency with which young stock can be reared, it is probably much more economic when mature replacements are available to sell all young stock as weaners rather than to try and
rear them with almost certainly poor performances as two or three year old to the bull.

In the early part of this paper it was stated that an improvement in fertility or the proportion of cows getting in calf does three things. In a static herd it increases the number of stock to be sold, it reduces the number of replacements that have to be carried, and because a large number of calves are born and few required for replacements, it enables a high degree of selection to be obtained. It may be worthwhile indicating where we are going in the matter of selection. In America it has been shown that if a number of bulls are weighed from birth to maturity and, in particular, their weight gain on a known food intake is measured in feed lots, some are superior performers. They pass this superiority on to their progeny with a high degree of efficiency.

Following this work up, Ruakura are at present investigating the situation in respect of free-grazing bulls, that is they are trying to determine if young bulls which show superior weight gains on free grazing will pass this characteristic on to their progeny. The outcome of this work could be of the greatest importance to New Zealand if results confirm the American work.

In Gisborne with the assistance of the Meat Board, Wool Board and Veterinary Services Council, I hope to be able to take this work into a slightly different field. By using scales produced by Ruakura, I hope to carry out three types of experiment. In the first experiment, young heifers will be weighed sufficiently often to show their weight-gain characteristics. These and their actual weights at 15 and 27 months, i.e., the ages at which they could be put to the bull to calve down as two-year-old or three-year-old will be compared with their breeding efficiency. In this way it might be possible to tell a farmer how best to handle his breeding replacements. In the second experiment by studying the weight gains within beef studs, it should be possible to show whether superior strains of animals exist and to what extent the sire and the dam pass on this superiority to the young. In the third experiment by using scales on stations where cattle are bred and fattened, it should be possible to see if there is any economic justification for selecting those superior animals because it will be possible to compare on the hooks, the weight of the progeny of groups of cows which themselves were good weight-gainers and poor weight-gainers.

The main points that have been stressed can be summarised. A breeding herd can do most of the work required of beef cattle on the farm and their profitability is much higher than that of any other class of stock. Young heifers should be fed at the highest possible level with an ultimate view to mating them to calve down as two-year-olds. A system of mating a sufficient excess of cows so that when the empty cows and late calvers are removed by pregnancy diagnosis, the farmer enters the winter with 100 per cent of his breeding cows in calf. Of the infectious diseases, contagious abortion should be routinely controlled by vaccination of the heifers annually. Pregnancy diagnosis offers an opportunity to establish the disease state of a herd and control measures can be initiated immediately. In herds in which venereal infection is absent, bulls should be changed from one mating mob of cows to another in order to limit the effect of a "dud" bull.

I am very conscious that all of my experience with beef cattle has been in the North Island, and in particular in a very intensive beef area. It may surprise some of you to learn that within the Veterinary Club area in Gisborne there are almost as many beef cattle as there are in the whole of the South Island. It could well be that the system I have described to you will not be applicable in parts of this
country. In particular I can visualise a situation where bulls are put out a great deal later than they are in the Gisborne area, and it may be that there are no suitable markets for animals culled as dry. However, several principles of raising beef cattle have been stressed: even if it is not possible to mate an excess, pregnancy diagnose, and cull empty cows; use pregnancy diagnosis to divide the cows up into in-calf and empty cows; establish the existence of disease; and to help the farmer quit his shy breeders as soon as possible, must help the beef cattle farmer to farm more efficiently and profitably.

**DISCUSSION**

**Chairman:** Can you tell us anything about bloat and how to prevent it?

**Mr McFarlane:** Bloat in beef cattle has just arrived in Gisborne. Sir Bruce Levy would know about it; his Department is somewhat to blame. The control of bloat in beef cattle depends on the period of the year. If there are any rough pastures with only a little clover, these paddocks should be saved to put calves on at periods of peak clover-growth.

**Sir Bruce Levy:** The question of bloat, like facial eczema in the North Island and pulpy kidney in lambs in the South Island, is a problem related to high-class farming. You do not get much bloat when you feed on scrub, nor do you get any facial eczema. If the sheep have miles of country to travel over to get food there is not much pulpy kidney. It would appear that the farmer who is becoming an efficient producer as a result of efficient plants to produce from, has more problems to overcome than the range grazier. We as producers of plants (particularly legumes) make no apologies for producing them because, without their production, improved production would virtually cease. We throw the challenge over to the animal man to look after the animals after we have produced sufficient food for their sustenance. I have not been working on bloat since I retired six years ago and there have been a good many fields covered by bloat experiments. They have varied from restricting the amount of intake of the animal to the spraying of the pasture with peanut oil or butterfat. These methods are only applicable to intensive dairying where you can use electric fences. Even though we produce a good deal more legumes on hills with aerial topdressing and oversowing of clovers, I do not think bloat will ever be a very serious matter with cattle on hill country.

**Mr McFarlane:** We'll just have to wait and see. We have had reports from Waikato of beef cattle and sheep affected by bloat. This is basically dairy country and the cattle are getting dairy-class feed.

**Mr Hart, Lincoln College:** Would you care to comment on the apparent discrepancy of the conception rate of North Island cattle with Mr Scott's figures for the South Island cattle?

**Mr McFarlane:** I like to think I am comparing similar things. My figures in terms of sheep are in the Gisborne hills and nearly as fertile as Southland. We diagnose herds from 100 to 800 cattle. There is no system of culling cows not performing well. We can cull those with obvious signs of disease showing. Because there is no culling against infertility, on the whole our herds carry a lot of passengers. Secondly, we are completely grassland farmers and do not grow supplementary feeds. A farmer guesses carrying capacity
and then decides how much stock to carry. If he does not forecast the season correctly, he may finish up with the stock going hungry. Quite a lot of infertility occurs because cattle are so reduced in condition that they are unable to produce calves. In the south you have much higher calving rates than we do because herds are small and culling is better. I hope a group down here will produce some figures on pregnancy diagnosis.

**Question:** How long before the bulls are put out would underfeeding reduce fertility and at what age would you cull a breeding cow?

**Mr McFarlane:** (1) I have no figures at all. (2) Age of culling—I would suggest any cow that reared a calf last year and is in calf this year and is in good condition should have another go next year.

**Mr Wheeler:** Have you had any experience with artificial insemination in the North Island? What is the rate of conception compared with straight out bulls?

**Mr McFarlane:** I do not think any artificial insemination has been used in beef cattle except in more or less experimental work. At Newstead they used Aberdeen Angus bulls on dairy cows.
FARMERS’ EXPERIENCES WITH BEEF CATTLE

(a) C. N. Mackenzie, Happy Valley, North Canterbury.

Happy Valley is situated on the East Coast of North Canterbury, 68 miles north of Christchurch by road. The map area is a little over 5,000 acres of which about 3,000 is used, roughly 2,000 in paddocks and 1,000 native, the remaining area being taken up by deep ravines, gorse and manuka scrub. The average rainfall is around 34 inches but is not well spread throughout the year. The winters are reasonably mild but through an adverse sub-soil the paddocks in the winter get very wet and are therefore liable to pugging by heavy cattle, while in dry weather they dry out fairly quickly. The paddock water supply is reasonable but in dry conditions (as in the autumn of 1956) causes inconvenience.

This property was bought in 1934 by my father, and so the cattle story starts from that time. There were no cattle on the place when the stock were taken over, and believing that cattle should be run, a line of about 60 mixed two and three-year-old steers of various breeding was bought that autumn for about £3/10/- each. Our experience with them was not encouraging. The pastures at that time were not highly improved and the sheep fences were regarded as trifling obstacles when the cattle decided it was time for a change of paddock, and even the tussock country didn’t satisfy them. And so they were sold for a few shillings more than they cost and we decided to conform to what could then be called a typical Canterbury attitude to cattle—they were a nuisance, unnecessary and a doubtful source of income.

In the next few years no cattle were run and the tussock country was kept in order by fairly constant burning. Then in 1938 at a Young Farmers’ Club field day, a Nasella tussock plant was exhibited and we were told of the menace to our farm land if this tussock was allowed to come in. As a result of this talk and further advice gained it was decided that the best insurance against the invasion of Nasella tussock was good ground cover, and from early 1939 no tussock has been burned.

Cattle thus became a necessity, and 30 Aberdeen Angus heifers and heifer calves were bought. These were registered animals and more stud cows were added in 1943 and 1944. In addition calves were also bought to bring the total to 250. After the war most of the stud cows were sold as heavy cattle were damaging the pastures, approximately 60 of their progeny being left to form the basis of a run herd.

The next step was to increase the herd to as many as could be comfortably carried all the year on the tussock, rearing their calves which were sold at weaning time. Later, about 1950, with improving pastures and the build of fertility this practice was modified and all calves were kept, the cull heifers being either sold for breeding purposes at two years or fattened at the same time as the steers, i.e., at two to two and a half years.

For the past three years approximately 500 head have been wintered, 125 breeding cows, 180 calves, 180 eighteen-months and a few two and a half years, additional steer calves having been bought in. This increase in cattle has not been at the expense of sheep which
have also been increased. I should add at this point that the tussock country has been topdressed annually for five years and has improved very much.

The management of cattle is fairly straightforward. The cows are brought in in late October for marking the calves, and are put to the bull in November in the paddocks and are left there to control pastures as long as they are needed. They are turned out on the hill again in January or February and only brought in for a few days again for weaning the calves in May.

The calves are left on grass for a while after weaning, are wintered on swedes and chou moellier in breaks with an electric fence, and are given plenty of ryegrass straw. In the spring when the ewes are set-stocked as they lamb, the calves are moved round to control the pastures. In December or January the best are taken out and given the best feed as they will be ready to go off fat as two-year-old from September on. The rest of the 18-months are wintered on a small tussock block which is spelled from January onwards for the purpose. The steers are mostly finished on one 35-acre paddock which has a mixture of cocksfoot, timothy and white clover and originally had lucerne as well. A big dam gives adequate water and there is plenty of shade and dry ground. Usually 35 of the best are put on this paddock and as 18-20 go away, the next 20 best are put in and so on.

The calving is usually above 90 per cent but last year it was slightly under 80 per cent. The dry cows were put to the bull together and on veterinary examination one cow and two heifers were rejected empty and will be sold. The other cows will be examined at weaning time and any dry will also be fattened. The examination doesn’t take long and will become normal practice.

Therefore under the present management the cows are used as working cattle, the yearlings semi-working, and the two-year onwards as fattening cattle which come into direct competition economically with the sheep as they should not only have good pasture but should not be run with sheep. All cattle are sold as chillers or to the local trade.

A greater effort will now be made to sell about 60 per cent of the steers as chillers before the second winter and the results of this year’s chiller beef competition proved that it can be done. The quality of the finished article is higher—which is very desirable. Instead of ryegrass straw the calves will get good hay and, in dry conditions, silage and hay. A quicker turnover would make cattle more profitable and allow more cows to be carried. A comparison could be made as follows: Supposing, broadly, 100 cows were bred from and reared 95 calves. In the winter, under present management, there would be 100 cows, 95 calves, 95 18-months. Supposing 60 per cent of the 18-months were autumn-fattened to kill at between 550 and 600 lb the winter tally would be 100 cows, 95 calves and 40 18-months. In January-February the tallies would be as at present, 100 cows with 95 calves, 95 16-months and 60 24-year-olds, which could under early fattening be 100 cows, with 95 calves, 95 16-months-old.

Apart from other advantages, the reduction in numbers of the heavier cattle in paddocks in the winter is a big consideration. If this earlier fattening of cattle becomes the pattern of cattle management in Canterbury, as well it might, particularly on the irrigated areas with their guarantee of summer feed, it would mean that the demand for beef killing and shipping would be heavy in the March, April, May period, and we would be aiming at beef killed to reach the United Kingdom market before the end of June. The 40 per cent carry-over should be fattened in the October, November, December period.
One final point on stock policy. The importance of selection for breeding cannot be overstressed if we are to produce quick-maturing, high-quality cattle. Whereas lambs are fattened when a few months old, cattle take longer and breeding therefore has more effect. Breeders should get every encouragement and even finance if necessary to import sires from the best herds in the world. But all things considered the milking ability of the dam is paramount. The certification of seeds is now taken for granted and recognised as a guarantee of quality. If stud-cattle breeders in conjunction with a recognised authority such as Lincoln College could work out a scheme for determination and certification of quality under test, bulls of good milking strains could be bought with confidence. It should be possible to get finance from the Meat Board for any such project.

In conclusion, I share the opinion of many others that beef production will gradually assume greater importance if for no other reason than the United Kingdom’s inability to take increasing supplies of lamb indefinitely. In England, too, sheep numbers are increasing and although subsidies can reverse the position, I would think from observation in the United Kingdom recently, that a steady increase in lamb produced will be maintained there.

We need to explore more markets with the utmost vigour and whether these are found through joining the European Free Trade Area or through trade agreements in the Far East, the demand will be almost entirely for beef.

In North Canterbury from Amberley to Kaikoura is a stretch of country admirably suited to the breeding of beef cattle. The area is probably in the vicinity of 350,000 acres along the coast, and it enjoys a climate which compares favourably with any in New Zealand.

We have found that using breeding cows on Happy Valley we have achieved an all-round improvement in pastures on both the hills and the flats without in any degree lowering the sheep carrying capacity. In fact, on the tussock hills the strengthening of the turf consequent on the abandonment of burning and the substitution of cattle, plus aerial topdressing, has resulted in our hill grazing improving steadily over the years. If the young 18-months to two-year cattle were to constitute the output of the plains, we could in this section alone of North Canterbury possibly run 20,000 breeding cows with no reduction of our sheep numbers. What is needed is a stable market for the yearly output of calves. As we have reached a high standard of quality with our lamb, so too we could aim at a similar position with our beef for export. Farmers require a standard to aim at—embracing age, weight, and quality. When these become generally accepted and form the basis of our cattle-breeding and fattening policy in Canterbury, we could see a steady annual demand from the plains fattener to the hill breeder with the fattener in a position to sell his output at a premium on the world market. With the necessary organisation and advertising we should be able to face competition from any quarter and I see no reason why, in due course, Canterbury beef should not rank in the meat world with our highly-regarded Canterbury lamb.

(b) J. Acland, Mt. Peel, South Canterbury.

Before I tell you of our experiences at Mount Peel with beef cattle, I think it would be helpful if I described the type of country they run on and the climate.

There is an old Scotch saying: “On a station nature does the
work, on a farm man does the work." On a station you must work with nature, you must watch and know her every mood, and if you do that and if you work with her, she, on her part will save you a tremendous amount of unnecessary work and will give you the results you desire.

On the other hand if you do not go with nature, if you try and make her do what she is not capable of doing, she will go against you and undo all your work with dire results to you, your stock and your country. Therefore what one does on one type of country will not necessarily apply on another.

Just over half of Mount Peel is above 2,400 feet, and the balance is between 1,000 and 2,400 feet, of which about 800 acres have been ploughed and 2,000 acres of boulder flats and terraces have been top-dressed from the air. Our lowest rainfall is 33 inches and our highest is 57 inches. The average rainfall is 45 inches; the wettest months are November, December and January; and the driest months June, July and August. We have heavy frosts and many cold, windy days with snow in the winter.

The station area is 18,000 acres (chiefly leasehold) divided into paddocks, ranging in size from 15 to 300 acres, and eight hill blocks of 700 to 2,000 acres; each hill block runs up to the main ridge, that is the highest point which is at least 4,000 feet.

The Mount Peel hills are steep and covered in the main with silver and fescue tussock, snow grass, cotton plant, sweet vernal, browntop, clover and a little cocksfoot and dogstail. The clover, cocksfoot and dogtail are increasing with the running of cattle.

Until 1935 we carried very few cattle at Mount Peel, and with over-wet summers great difficulty was experienced in controlling the rank growth, burning being the only means of control.

In 1935 I made two wise decisions—I married and I decided to carry cattle.

Having decided that cattle would be worthwhile at Mount Peel we bought Aberdeen Angus bulls which we mated with a few of our own Hereford and Shorthorn cows, the progeny of which we later sold. We bought during the first eight years about 100 purebred Aberdeen Angus cows and heifers of Gwavas stock.

Today we are wintering 450 cows, 70 18-month heifers, 190 heifer calves, 70 steer calves, 40 18-month steers and a dozen bulls.

And now I will give you a brief picture of our year's work with the cattle, beginning towards the end of winter, i.e., mid-August.

At this time of the year (I mean the end of the winter) all the cows are out on the hill, most of them grazing between 2,000 and 3,500 feet; during August we bring in about half of the cows and distribute them round the grass paddocks and tussock flats in mobs of between 40 and 70. These mobs are easily handled and are of the right size for the bull.

The cows left on the hill are on blocks adjacent to paddocks so that it is comparatively easy to work them through when the feed position demands it and they have young calves at foot.

We begin calving during the second week in September and are considering calving earlier as the cows that calve in November have more milk than the calves can cope with.

At the end of November we mark the calves, bringing in two mobs a day, having previously brought all mobs to within about two miles of the stockyard. We have three-way drafting gates in our stockyards, and these enable us to draft off the calves and the dry cows. We then put about twenty calves into a small pen earmarking and castrating the calves. The calves are standing up and are held against rails by two men, a third man doing the castrating; in this way three men can easily castrate and earmark 50 calves an hour.
The bulls go out during the first week in December, one bull to each mob whether that mob be 40 or 70; we exchange the bulls frequently not having one bull with a mob for more than a month at the most. All these cows are on the flats from December to March.

At the end of March all the calves are weaned; we bring in about 150 cows, that is two or three mobs, to the stockyard and draft off the calves taking them down the road about three miles. I should have said earlier, that the fenced road from Peel Forest to Mesopotamia runs right through the station and our stockyard is built just off the road. Having taken the calves down the road we have them in a long and narrow paddock which has a good fence at the narrow end nearest the stockyard. We have about 40 cows on the other side of this fence (which is only about six chains long), and this means that the calves do not try any fence other than the good one.

The next day we wean another 150 and the remainder the following day. The reason we do it in these three lots is that we have to take the calves over a longish, narrow bridge and could easily get into trouble were the mobs larger.

Two days after the last mob of calves go down we take the 40 decoy cows back to the other cows which have been in the stockyard paddock. There they have caused no trouble as they are able to bellow round the stockyard where they have last seen their calves. We now put all these cows into the stockyard, drafting off the culls for the sale, our own being taken right away to a distant paddock.

The day after we get rid of the cows we start working the calves with a quiet heading dog. We do this every day for a week after which time they are very quiet and easily handled. We then draft off the steer calves and a week or so later sell about three-quarters of them at Temuka. The balance of the steer calves and the heifer calves, about 260 in all, are put on good grass and kept on autumn-saved grass until July when we feed them on lucerne hay (about 7 lb per day). During August they go on turnips and chou moellier, and there they often stay until the end of September, cleaning up the butts and chou stalks. Then they go back on to good grass until February when they are about 16 or 17 months when we pick out the best of the heifers for ourselves; these we put out on the hill where they learn to climb and fend for themselves and in so doing develop a good muscle and a good heart.

The balance of the heifers are sold either fat or to breed from.

The cows are usually wintered in one or two mobs, on the hill. We find it better for the country to have a large number of cows on a block for a short time, than a small number for a long time.

The 21-year-old heifers, which have been to the bull for the first time, are put out on the hill in February, and well up on the hill. They are shifted again early in the winter and in the late winter we bring them down to the flats to calve.

The 18 month steers that we have not fattened are wintered on some rough feed in one or two of the larger paddocks. If there are turnips in September we give them these to clean up; we then fatten them.

To summarise our work with the cattle at Mount Peel:

The cows and heifers are on the hill from April to August, two-thirds calve in paddocks, grass or tussock; one-third calve on the hill.

All our cows are in paddocks from December to April and we wean at the end of March.

The calves are on good grass, then hay and turnips (if any) and again on good grass until they are 17-months-old.

The 18-month heifers are on the hill for the autumn, winter and spring, until they are two-years-old when they go to the bull.
Each autumn our cattle sales comprise:

The pick of the steer calves—but no heifer calves; the 18-month heifers not required for herd replacements; the annual draft of cull cows from the breeding herd.

As fats we sell the dry cows which are in good condition and the 18-months or 2½-year steers as they are fit to kill.

From the records I have taken out the following figures which may be of interest:

- Our calving for 14 years averaged 90.8 per cent.
- We have had in that time—
  - 2,242 steer calves.
  - 2,097 heifer calves.
- That is 52 steer calves to 48 heifer calves.
- Cows kill—650 lb to 800 lb.
- Our 18-month steers kill—500 lb.
- The ones we sell as calves up to 620 lb average 530 to 540 lb.
- Medium 18-month heifers—440 to 500 lb.
- Live weight good steer calves at weaning (after 24 hours without feed)—410 lb.
- Medium heifer calves dead weight—210 lb.

### Average Price Steer Calves since 1946

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And now having summarised our work for the year, I will tell you some of our experiences with the cattle at Mount Peel.

First of all I must make it clear that because of our rainfall the steep country is not good sheep country; the Romney does not like the hills; the Merino does not like the wet. But it is good cattle country and that is why we are in the cattle game—to make money, not just, as so many people say, to provide a cheap form of mowing machine.

Certainly our cattle have improved our country. We have not burnt for many years, and because of the cattle our sheep have improved; but what we want is a money-making mowing machine.

Many cattlemen advise us to be breeders only, but if one can fatten too, it does mean a more stable income.

We switched from selling heifer calves for three main reasons.

1. It is much easier to pick our own breeding heifers at 18 months than as calves.
2. We wanted young light cattle to control our new grass paddocks.
3. The price, at the time, was very low for heifer calves and, as I have said, we did not want all our eggs in one basket.

You will realise that the breeder is at the mercy of the fattener who is, naturally, influenced not only by the export price of beef but by drought conditions as well; so that if we fatten our heifers we eliminate the risk of drought by having an alternative market.

In time, of course, irrigation will help to eliminate this fear of drought which so affects the price of stock in Canterbury.

There is still another point as to why we retain our heifers and that is there is not quite the money in breeding as might appear at first sight.

Some people say that because one sells calves at £10, a cow returns £10 a year. These people forget that only 90 per cent of cows
calve and to breed 90 calves one has to carry 100 cows, 15 18-month heifers, 15 calves and three bulls; a total of 133 cattle beasts.

If we sell, say 75 calves and 13 cows, allowing two per cent death-rate, this would bring in a return of about £1,000, which is not £10 a year for each cattle beast as suggested but rather £7/10/-.

And if one goes so far as to include the cost of bulls, which means about £1 a calf, the return would be barely £7 a year, as a bull on an average only serves between 100 and 140 cows, and because of this, and our new grass paddocks, we are now contemplating fattening all our steer calves at either 18 months or 2½ years. If we carry this idea out, when the steers are 12 months old we will take out the best of them, say about two-thirds, and keep them going on the best of feed. By the autumn, these cattle beasts should kill out at between 500 lb and 550 lb.

I have checked these figures with the Winchmore Irrigation Farm; they sold 16 to 17-month steers weighing 540 lb on an average.

We ourselves have killed the best of our cull steer calves at 18 months, these, on an average, have weighed out at 500 lb.

If we carry out this plan, we will not feed the balance of steer calves as well as the others. In the summer and winter we will use them to control the feed and then in the following summer we will sell them as fats and they should then weigh between 600 and 650 lb.

And now I would like to discuss with you, one of the reasons why we wean in March and not later. It is so that the cows can be made to work and clean up the roughage both on the hills and in the paddocks while the calves go on to really good feed. One of the things that always gives me pleasure is the way the cows go right out on to the hills, then climb away up to between 3,000 and 4,000 feet and stay there until the snow comes; even then they do not come right down to the lower country but are quite happy feeding on snowgrass and whatever else they can find; They stay there as long as they can get shelter from the wind in the gullies or in odd patches of scrub or bush.

We have found, too, that if the cattle are carried in large mobs and shifted as soon as they have cleaned up the roughage, very little (if any) damage is done to the snowgrass or the tussock.

Now for fencing. In my opinion it is not the problem which at first it might appear. In the North Island they have a kind climate which means many sheep and cattle to the acre; this warrants good fences. Our fences match our land. Many of them are old five-wire Merino fences with a barb hung between posts 20 yards apart; the remainder, in the main, are standard-and-wire fences with a barb and posts put in to strengthen them. So you see it is necessary that we should breed quiet, contented, non-jumping cattle; therefore we are most particular never to let our calves realise they can get through a fence. As I have said before, we work our calves a lot when young, using a quiet dog; we only use a whip with the cows and calves when force is absolutely necessary; we keep amongst the calves on horseback and on foot; we put them into a paddock by which passes all types of vehicles; we put them through the race whenever near the stockyard; and we even get them used to people sitting on the rails of the stockyard.

Another way of protecting the fences round good grass paddocks is to have included in that paddock an area of roughage. This is easy for us as we have terraces, gullies and heavier boulder areas which can always be included in our grass paddocks. This means that our cattle are not always pushing through the fences for a bite of something different to eat; they can get whatever they want in the paddock they are in. If however, there are no trees or rocks in
the paddocks we put in rubbing posts, both for the benefit of the cattle and for the sake of the fences.

Tied up with fences, too, is water. Water as you all know, is essential for cattle, and if the water is dirty, cattle will push through a fence to find clean water. We overcome this by fencing off a spring or creek on the topside of a fence and piping the water through the fence into a trough allowing the trough to overflow back into the creek.

Again when fencing, if we can include some natural shelter, it is an advantage. Cattle only graze for about eight hours in 24, and they do like shelter for their backs from frosts and cold winds. If there is no natural shelter in a paddock, such as bush, gullies or rocks, it is wise to fence so that odd corners can be planted in trees.

And now for some experiences with stockyards. If any of you are building a race or a crush keep it narrow—27 inches is enough in my opinion. We have two drafting gates which we work from the ground, and we have two light pipes about 15 feet long with a light gate-dog in the end of each. These fit into a pipe at the head of each gate; this enables the man who is drafting to stand back about 15 feet and have a good view of the beast as it comes through the race. This is particularly helpful when sexing cattle.

When building a cattle ramp it is wise to have the centre of earth and the outside and walls of concrete or timber; the width needs to be about 36 inches, and it should be built so that it projects at least a foot beyond the yards as so many motor trucks today load from the side.

And now, finally, as regards the breeding of cattle. There are many here, including Mr Downes Roberts, much more qualified to speak on this subject than I am.

All we do at Mount Peel is to breed the types of cattle beast that does well on our country.

We do cull our cows, but not for age. I once asked Major Johnson of Raincliff at what age to cull a cow and he replied, "If you have a good wife do you get rid of her?" Quite a few of our cows must be 18 years or more and they are still producing good calves. We sell all the cows we don't like and all dry cows other than a very attractive heifer or a good cow we know has lost a calf.

We aim at having a cattle beast which has length, a good head, a good behind, a beast which will do well on our country; this means they must climb on to the tops and fend for themselves, and most important, they must be quiet and contented.

If we succeed in what we are aiming at we will produce a sturdy, healthy, quick-maturing beast, which will satisfy both ourselves and the consumer.

(c) J. E. D. Roberts, Middlemarch, Otago.

The property we are discussing in this paper comprises 18,000 acres—situated 50 miles from Dunedin in the Taieri County. The average rainfall at the homestead is 30 inches. The station consists of a fat-lamb-producing farm of 1,200 acres with a height of 600 feet to 1,200 feet above sea level and on this farm we grow enough swedes and hay to winter 1,800 hoggets and 4,000 ewes—also it carries a herd of 80 stud Aberdeen Angus cattle.

There are 7,000 acres of low, rolling, hill country with a height above sea level again of 600 feet to 1,200 feet. Also in this property
is 10,000 acres of run country which is tussock country running from 1,200 feet to 3,600 feet. The lower portion is surface-sown with clover and cocksfoot and the higher part, approximately 6,000 acres, is purely summer country. We do not run cattle on this owing to the peat bogs and swampy nature of the country.

The country that the cattle run on is mainly the 7,000 acres of low-lying hill country of tussock and native grasses which has been surface sown with cocksfoot and clover. Some of it has been top-dressed by air. There is also a considerable amount of browntop on the warmer parts of this country.

We carry a herd of 120 Aberdeen Angus cows which we use to keep the roughage down to such an extent that we practically have been able to eliminate all burning.

There is no doubt that cattle have been very helpful in spreading the white clover and this has helped considerably in improving the hill country referred to. Also the cattle make tracks through all the gullies which is very helpful for mustering the sheep. The 7,000 acres is divided into eight blocks and is watered by permanent streams.

The Aberdeen Angus cows are of pure Aberdeen Angus blood and have been built up over the years from cows culled from the stud (this policy has been going on since the early 1890's).

The type of cattle we find does best in this country is the modern Scottish type, a short-legged thick cattle with good heads and constitution. We have paid particular attention to good coats and have maintained good-boned, sound-footed cattle. Also over the years, through using bulls of docile temperament we have considerably improved the temperament of the cattle—which is a very important point for ease of handling and mustering.

We sell all the heifer calves with the exception of 20 a year that we pick out for replacement of the herd. I am very careful in selecting these heifer calves. I try to pick them all of the same type, good heads, deep thick calves with good quarters as short in the cannon bone as possible, and with good coats. Some farmers tend to select all the big heifers to retain and to give little consideration to type and quality, and when those heifers reach two-years-old they find they have not selected a good even line for themselves. Some years we retain the steer calves and some years will sell them as weaners off their mothers in April.

The heifer calves retained in the herd are wintered on the farm with hay and do not go out into the hill country until the spring and are not put to the bull till they are two-years old; we find that by doing this the heifers become very quiet and are easy to handle.

Also it gives them a good build up for their future. Those heifers retained are inoculated with strain 19 for the prevention of contagious abortion and we find that our calving percentage is always above 90 per cent. I would suggest too, that it is very wise at intervals to have your cow herd tested for T.B.; also to remember that the house cows are usually the greatest danger to the spread of T.B. and should be tested each year.

I feel that T.B. is a real danger and the sooner we can follow the example set by overseas countries and have compulsory T.B. testing for both dairy and beef cattle with the object of eliminating T.B. altogether from New Zealand the better it will be for all.

The cows are wintered entirely on the hill country and are moved about during the year from block to block to eat down the roughage and keep the country in good order for the sheep; also in the spring and summer, if the paddocks on the farm are getting too rough for the sheep, we bring cattle into the farm to help control the pastures there.
This last year they were running on the farm for two to three months, and without these additional cattle the feed would have got far too rank for fat-lamb production.

The bulls are put out early in December which means the cows start calving in September.

We always have the cows in a fairly small block when the bulls go out. After a month we take the first two bulls and put two fresh bulls with the cows; this I find helps to get a fairly even calving.

Any cows that are dry, I have examined by the veterinary surgeon; some are able to be put in calf and any that there is any doubt about of getting in calf, are usually fattened and sold to the butcher.

Farmers should make sure the cows are free from contagious abortion or have been inoculated with Strain 19. If this is not done, many a good bull has been blamed for having a bad percentage of calves when it is not really the bull’s fault.

Any farmer considering running cattle for the control of hill country and farm pastures must realise that his fencing costs will be higher than if he just runs sheep. He must also have adequate cattle yards for the handling of cattle, which at today’s costs is quite a considerable sum; on the other hand we have always found that cattle have been very profitable and have gone a long way to paying the wages of the permanent staff.

With regard to the breed of cattle that a farmer should run, my view is that he should select the breed of his own choice and then buy as good a strain of that breed for his foundation stock as possible.

He should follow the system that has proved most successful in cattle-raising countries all over the world.

I refer to the system of maintaining his cow herd of pure-bred cows of that particular breed he has chosen to run. If he wishes to cross his cows with a purebred bull of another breed, he must first select his best females to put to a bull of his own breed, so as to have enough pure-bred heifer calves to maintain his cow herd.

This I consider is of the greatest importance. You have only to go about the South Island to see in so many properties a nondescript type and breed of beef cattle that cannot give much satisfaction to their owners or return a profit equal to a cow herd that is retained 100 per cent pure.

There may be, however, some advantage gained by crossing some cows with quality bulls that are going to improve the quality and maturity of the progeny—always remembering they are to be slaughtered for beef and not retained.

Any of you who have been in the United States and Canadian cattle-raising areas or in South America, I am sure must have come away impressed with the very high proportion of pure-bred cows of the three main beef breeds that are to be seen in these countries. Many of these herds are pure or very nearly pure—bred by many generations of pure breeding.

New Zealand today is doing its best to develop the chilled-beef industry. I have over the years taken a particular interest in this trade both from the farmers’ point of view and that of the exporters.

I had a consignment in the first shipment of chilled beef that went from the South Island, just before the outbreak of war, and would like to give my impressions of the improvement that has been made, and still has to be made, if we are going to develop this trade and really compete with South America.

Firstly we must greatly increase our beef cattle so as to have shipments arriving at Smithfield market all the year round at regular intervals.

Also of the greatest importance is the time taken from the freezing works to Smithfield market. It is very desirable that this
time does not exceed 40 days. You notice a tremendous deterioration in colour and attractiveness of the beef when this period is extended and in some shipments which have considerably exceeded this time the deterioration in colour has been so bad that it has often been a wonder to me that there are any buyers in the United Kingdom for this meat, it has become so unattractive.

The best of our beef is quite comparable with the best Argentine for bloom, but a lot of our beef is considered in Smithfield to be too heavy and tends to be too fat and too old.

If we could produce our chilled beef at under 640 lb and under 28-months old we could compete with any country.

Another fault that the farmer could eliminate is the complaint that some carcases are too “staggy.” This would not occur if farmers would castrate the calves at a young age and do it with the knife. Also breeders of beef cattle must pay more attention to improving the plates and second thighs of their cattle, always remembering that it is the hind quarters that are the most valuable and therefore as much relative weight as possible must be got into the hindquarters as against the foreshanks. Too many foreshanks are too strong in the shoulders.

We must endeavour to improve and shorten the shanks of our cattle for the chilled-beef trade. One thing that cannot but impress the New Zealander who visits Smithfield, is the shortness of the shanks and well-filled second thighs of the best of the Argentine chilled beef in comparison with our beef which in the main is considerably longer in the shanks.

For those sheepfarmers who feel inclined to start beef-cattle production, I am sure they will find satisfaction in breeding and watching the improvement in their cattle.

Also I am sure, from many years of experience, they will find the running of a herd of beef cattle in conjunction with the sheep, both a financial help to them and also will find that the cattle will play their part in improving the fertility of their properties.

In conclusion, I cannot but help again stressing the importance of maintaining the cow herd pure, irrespective of what breed the farmer decides to run. The amount of cross breeding that can be seen in the South Island today and the nondescript herds of beef cattle that are the outcome of this crossbreeding is in my opinion, one of the worst features of beef cattle in the South Island today. Anyone who doubts this statement should visit any of the chief markets in the South Island and see for himself.

DISCUSSION ON THE THREE PREVIOUS PAPERS

Mr A. Grant, Waimate: How many cattle beasts should one carry to the number of sheep to keep the sheep healthy? I carry one cattle beast for every five acres on the farm. I carry 900 stud ewes and their hoggets. Before I carried cattle I had continual trouble with hoggets. Now we have no trouble and have not drenched a hogget for the last eight years. I would remind you of the old Scottish saying: “A cow’s mouth grazing keeps sheep healthy.”

Mr Roberts: It depends on the amount of grass and clover you have on your farm. You must have sufficient cattle to keep your pastures in order for sheep. There is a tremendous difference in the growing rate of grass over the South Island so any specified number per five or per ten acres of farm land could be quite wrong in another area. This last year the farmers who run cattle must have seen the benefit of cattle in controlling pastures for sheep.

Mr Mackenzie: I have carried more than one cattle beast to five
acres and still use the drenching gun. Seasonal differences are very great. The possible answer could be that we should all carry more cattle. It depends on how you regard them. If fattening steers or heifers, by the time they are 18-or-20-months-old you must treat them decently and not just keep the pastures right for sheep. Whether cattle do keep grass right for sheep or whether it is something they do to the soil I am not sure, but apparently they do both with emphasis on the latter.

Mr Murray, Marlborough: (1) Can you give us the increased percentage in the number of cattle run either in North Canterbury or the South Island since aerial topdressing has started?
(2) Would you agree with Mr Scott’s estimated figure of two per cent increase in cattle numbers in Canterbury for the next six years?
(3) Mr Scott’s map yesterday showed the great number of cattle run in Hawkes Bay which we understand suffers drought as Canterbury does. How do they manage to run so many when we cannot manage to run them in Canterbury?

Mr McKenzie: (1) I do not know but there has been a very large increase in cattle in Canterbury during the last five or six years since aerial topdressing has been carried out.
(2) I do not think anybody can forecast with any degree of accuracy whatever. Mr Scott’s estimate I consider to be on the low side. Farmers have proved in the past very resilient and can adapt their farming methods to the market demands. If we go on with our present rate of increasing sheep as well, cattle will still increase in the South Island by about five times as much as Mr Scott’s estimate.
(3) Our attitude to cattle is to blame. In the old days the average pasture in Canterbury was extremely poor. A slight drought took the bottom out of the paddock in a few days. When the pasture was knocked out we gave up running cattle.

Mr Baker: I also have noted the attitude of Canterbury farmers towards cattle as compared with Hawkes Bay farmers. In Hawkes Bay they take awful hidings with cattle and during droughts send them out of Hawkes Bay to kill them, but they stock up with cattle again later. South Island farmers generally, as they use more fertiliser for aerial topdressing and other topdressing will find the necessity to run more cattle. When touring the South Island I was astounded at the amount of hay wasted. For every bale of hay in the shed, I saw six bales rotting through not being covered. If you had the Hawkes Bay attitude to cattle you would put this aside carefully for drought times.

Mr McGregor: Increased carrying-capacity has resulted from aerial topdressing as far as Southland is concerned. Since 1950 I have increased cattle five times because of aerial farming. In the South Island we have not the veterinary facilities they have in Hawkes Bay and we have had to apply the practical method of culling dry cows. I sacrifice the dry cows to the butcher. It gives us a younger herd. Nature culls out the old ones.

Mr A. Sim, Ashburton: Could the panel please give an indication of their views on the trend of farmers having country on the plains breeding their own cattle. Should we ever settle down to the pattern of people breeding cattle on the plains or do they feel the breeding should be confined to the hill and foothill country?
Mr Acland: As a hill-country man I would say it all depends on the farm. It is a waste of time to breed if you have good fattening land. If the neighbour has a Jersey bull you will still have to buy calves. So your fences must be good. On the other hand if you have a suitable place, say two different types of country, it gives you great satisfaction to carry your own calves as they do better if you carry them on the same place. I think it is a good system where second- and third-class country produces the fattening stock and the good country does the fattening.

Mr Mackenzie: Thousands of tons of ryegrass straw are wasted every year. It is not good cattle feed but I have wintered calves on ryegrass straw alone. It depends on the farm, but if you have some river bed or dry ground, or a rough part on the farm it will probably be worthwhile running a few cows and feeding them some ryegrass straw. The easiest way for anybody to get cattle is to buy calves as the trouble is over by then.

Mr Roberts: Two farmers at Wyndham were first in the chiller-beef competition. Those calves were reared on hill country, taken on to Wyndham Ridges, well wintered and they were sold and chilled at the time of the chilled-beef competition. They were no older than 20 months, and weighed about 590 lb each. The man on a fat-lamb farm should show a bigger profit by fattening bought-in cattle than he would by carrying cows and breeding calves.

Mr M. Turton, Ashburton Forks: You mentioned calving earlier. I am interested in 18-months beef. During the last few years there has been heavy topdressing making the winter shorter and the spring earlier. Would Mr Acland think it advisable where suitable for calves to be much earlier?

Mr Acland: We have different problems in that we have fairly severe winters. The cows are out on the hill; if we bring them in from the hill in August there is going to be no growth. There is no growth until the end of September. What would the cows eat? We do find that the cows calving in November now have got too big bags and calves cannot cope. We are going to start calving earlier to try to get 18-month steers away fat. We used to put the bulls out at Christmas; now we put them out the first week in December.

Mr Mackenzie: We are on the coast and with us spring comes a little earlier. We must get calves a bit earlier to get them fat before the second winter.
AERIAL FARMING IN THE SOUTH ISLAND

I. Farmers' Experiences

(a) J. N. McGregor, "Mt. Linton Station," Southland.

I think it would be appropriate if, first of all, I gave you a brief thumbnail sketch of the Southland land district. It consists of the Southland, Wallace and Fiord Counties and of Stewart Island.

Fiord County—the western third of the province—is a National Park, mountainous, largely unexplored, and practically uninhabited. It is the habitat of deer and wild pigs, and any national effort to eradicate these animals would provide many difficulties possibly restricting the efforts there to a policy of those borders nearer settled lands.

The remainder of Southland consists of Southland and Wallace Counties and a small portion of Lake County not in the land district.

In the Southern and Western Counties, there is an unoccupied area of about 1,500,000 acres. This area is situated mainly in the north-west portion towards the Sounds and is perhaps half bush and half bare land. On the west of the Waiau River are vast areas of bush stretched towards the Sounds and some clearing is taking place there. This area does constitute an extensive "reserve" farming area that will in future years follow the normal pattern of development of heavy bush.

Bush was once very extensive in the province and covered most of the richest land being farmed today.

The province's present tussock country lies chiefly in the north in the region approaching and around the lakes. Generally speaking they are: (1) a ring four or five miles wide round the Hokonuis and (2) and outer ring starting at Waikawa on the coast and with only short breaks running up the eastern side of the Southland County passing outside Waikaia, Lumsden, Dipton, Nightcaps and so to near the mouth of the Waiau.

The sown grasslands—more than 1,119,600 acres—are mainly in three classes.

(1) Heavy grazing land: chiefly permanent grass, extensively top-dressed and limed. There are three main areas: (a) from Waikaka along the Waikaka River to its junction of the Mataura River; through Gore, Mataura, Edendale, Waimahaka to Fortrose at the mouth of the Mataura River; approximately 45 miles along and averaging 10 miles wide.

(b) A rectangular block approximately 15 miles by 20 miles covering the lower portions of the Oreti and Aparima Rivers.

(c) An irregular piece west of the Longwoods and both sides of the mouth of the Waiau River, roughly 50,000 acres.

(2) Brown-top land: fertility lower. There are three main areas: (a) with Riversdale in the centre and running from Lumsden to Gore; (b) from Hedgehope to near Mataura on the south of the Hokonuis; (c) a similar sized strip on the Lilburn, west of the Waiau River.

(3) Light grazing land: short-rotational grasslands. Again there are three definable areas: (a) on the upper waters of the Oreti and Aparima Rivers; (b) on the middle course of these rivers embracing Nightcaps and Dipton; (c) a Y-shaped area, the stem of the Y on...
Invercargill, and the forks running towards Hedgehope and Edendale respectively.

The statistician may find these figures interesting. Total area occupied in Southland, 3,211,825 acres; total number of breeding ewes, 3,291,887; total number of sheep, 4,502,376; total cattle, 168,097; total pigs, 5,382.

So far the province’s potential has merely been scratched. Figures show that about 93,585 acres are at present being developed by the State, and that a further 80,000 acres are being developed privately.

Several points have contributed to Southland’s increased production. Intensive drainage has possibly played as big a part as anything in improving the farmlands of Southland. Also, Southland’s soils have required—and have responded to—heavy applications of lime. Fortunately, there are extensive lime deposits in the province. Approximately 400,000 tons of lime are used annually in Southland.

As far as aerial top-dressing in Southland is concerned, it is difficult to obtain any definite figures as to the quantity of fertiliser applied in this fashion. But interest in aerial top-dressing is increasing rapidly, and it is estimated that about 35,000 to 40,000 tons of fertiliser are now spread annually by this method.

I have already mentioned the estimated areas at present being developed by the state and by private individuals in the province. In the future, a lot of that country now being brought in will be top-dressed from the air. Aerial top-dressing is also being used to increase production on our tussock blocks which have never been ploughed nor worked. And as the result, stocking on those blocks has increased considerably, in many cases very considerably, as I will endeavour to show in the following report.

Mount Linton is possibly an interesting case showing how much aerial work has become part of everyday life in modern farming practice in Southland. This can be more clearly understood if I quote you some of the work I have done and am doing. Thus you will see how rapidly the aeroplane has come to stay.

I would have you understand very clearly that this is not the history of Mount Linton; rather just an illustration showing you what is taking place all over Southland, both hill and dale, from the sea to the mountain tops. Just as the horse has been abandoned for the tractor, so is the tractor in many cases giving way to the plane. This effort which I show you is only one of hundreds in our province, so I am using my property merely as a simple way of bringing before your notice just what part the plane is doing, and further, going to do. Many people can produce even more outstanding results than I can but all of us are striving to increase our farm production to the utmost of our resources so are naturally confined to £ s. d. The climatic conditions so often hamper our work through fog and rain thus prohibiting the spread of fertiliser. Again another handicap which hampers the operation where large quantities of manures are being handled, is the demurrage on trucks and the lack of co-operation from the Railways Department. It is bad enough having to contend with the weather but we should be able to get along more smoothly with the railways. It is regrettable that pressure from the railways often forces an already over-worked pilot into the air against his better judgment in adverse conditions, in order that his farmer client may be saved from both heavy and unjust charges.

About 1949 I first used the plane to sow two hundredweight of superphosphate to the acre in February, approximately a 100-ton lot. The price was in my way of thinking, more satisfactory than the tractor and spreader method, and also the distribution was good.

Before I go any further I will give you a description of my property. It comprises approximately 29,000 acres of land. In 1948,
approximately 2,000 acres were in grass and another 11,000 acres in heavy scrub, red tussock and swamp lands, and the remainder of the property which is good silver tussock, running into snow tussock up to 4,000 odd feet, the majority of this tussock country running into the vicinity of 1,000 to 3,000 feet. This property is on the southern slopes of the Takitimu Mountains in the county of Wallace, Southland, approximately 45 degrees south by 168 degrees longitude.

After the war in 1946 when I commenced development of present grass areas I was breaking in approximately 300 to 400 acres of fresh country per annum, of this scrub and red tussock country, gradually increasing to the present rate of approximately 800 to 1,000 acres of ground per annum. In order to facilitate the work the aeroplane was brought into ever-increasing uses, from the sowing of fertiliser to seeding the areas in grass and turnips, with increasingly good results. All the hill country had been over-sown by hand with grass and clover seeds at various times over a period of fifty years or more, thus we had the basis of a fair sole of grass amongst our silver tussock by 1948, but at the same time we were fighting an everlasting battle with the rabbit. I was running approximately 500 breeding cows and 200 dry cattle (Black Poll-Hereford cross), and 14,000 Romneys. Our flock has been pure Romney for 53 years now, a low-set compact sheep, not too woolly over the head, giving around the 50 count wool. Our lambing was fair from 8,000 ewes and the wool clip approximately 7 lb per head. After the 1949 sowing, I gradually increased my tonnage as the areas of land which I was developing increased, until I had reached the stage in 1954 when I was sowing up to 1,000 tons of aerial fertiliser. Included in this annually were 50 tons of basic slag at the rate of three hundredweight per acre. I try to cover all the pastures with slag once every five years. I experimented with 300 acres per annum with July sowing of one hundredweight nitro-lime or nitro-chalk or urea, to get early-spring feed and prevent the winter burn. The result of this winter top-dressing has led me to believe and find out that it gives better results if applied in the late autumn, and thus continues the grass growth longer and further stimulates root growth and helps prevent frost burn.

In 1950 I commenced to treat by air a block of silver tussock hill country which already had a fair sole of white clover and cocksfoot. I did this at the rate of two hundredweight per acre and after three years I altered the time of sowing to the spring months when I got much better results. I find this higher and poorer country untreated by lime, requires the longest growing season possible to establish the clovers and English grasses. In 1954 I used two hundredweight of molybdenized super to the acre on the same block and on a further 300-acre area as well, using two and a half ounces of molybdenum to the acre. The result was outstanding on the 300-acre block which was sown in the spring. The growth was nearly equal to the first area which had had three seasons of straight super. I also noticed that the molybdenum killed the Bunga ferns at one dressing. Likewise it was very severe on bracken ferns. These areas in the dark faces are full of Bunga ferns and a fair amount of hard fern on the warmer faces. Naturally the darker country will be sourer; the vegetation there felt the impact of molybdenum much more than on the warmer faces.

One of the first jobs I gave the planes to do was the task of over-sowing large areas of the run country with white clover and cocksfoot principally, with some dogstail and ryegrass. With the follow-up of phosphate from the air on this country the results have been outstanding, plus the virtual disappearance of the rabbit and the heavy stocking with cattle right up to the snow-line.

Perhaps the rabbit problem should be mentioned here. The
Wairaki Rabbit Board was formed in 1951, comprising an area of 150,000 acres, approximately 95 per cent tussock country, some of which was very badly infested. The Board's first success was through a large-scale, aerial, phosphorized-pollard poison, spread in the autumn, giving a terrific kill. Next year was a bad kill. Then we shifted on to carrots and arsenic. Two successful years of this treatment, through the co-operation of skilled pilots and keen rabbit board foremen and staff, terminated the necessity of ever using the plane on rabbits on our back country again, I am happy to say.

Each year I over-sow my swede crop areas, approximately 600 acre paddocks, with 15 lb of Borax to the acre, a fortnight before we start ridging this region. To do this area without a plane could possibly take us a month, whereas it is done literally in a matter of hours by plane, thus enabling us to get on the ground the very moment it is most suitable for us to commence ridging operations. It also allows the tractors to be free to work up other ground in preparation for sowing out turnips and grass, which again will be sown by plane (this year an area of approximately 1,500 acres).

Another interesting kill I had from the air was with two tons D.D.T. at the rate of two and a half pounds to the acre, on second and third year grass country badly infested with porina moth. I was completely stuck as to how to sow this large quantity, so I finally decided with the co-operation of the pilot, Mr Hewitt, to sow at the extraordinarily low rate of two and a half pounds to the acre without any filling whatsoever. The result was truly amazing, with practically a 100 per cent kill.

We have also sprayed gorse and thistles from the air with liquid poison, done supply dropping, and I use the plane a lot for aerial supervision of the property. As you can see from all these operations, the plane tends to speed up our work of production on all classes of land. Finally to give you some idea of how this production has increased I will give you my comparative figures, 1948, 1956.

1948: 14,000 sheep.
6,000 lambs
500 breeding cows.
300 calves.
Average weight of wool, 7 lb per head.

1956: 25,000 sheep.
18,000 lambs.
3,000 cattle.
1,200 calves.
Average weight of wool, 10½ lb per head.

1957: I will be wintering 30,000 sheep, or in other words I am on the way to trebling my sheep carrying capacity. I have put the cattle up six times and I also shear my lambs now owing to the feed position and my wool clip is on its fifth time over and above the original clip. My increase in production is not less than 10 per cent per annum.

Given another ten years, I shall be able to double most of these figures, so you can see the plane is bringing manna from heaven to these virgin pastures of our Province of Southland.

I would like to add to these remarks a report from my aerial contractor, Mr Wm. Hewitt of Hewitt's Aviation Ltd.

"Since 12 September, 1950, this company has sown 3,366 tons of superphosphate on Mount Linton Station, Ohai.

"With the exception of this year two hundredweight to the acre has been the application rate. Applied in the autumn month of March, this operation takes one Cessna and two DH82 aircraft about
two and a half weeks to finalize the sowing of 550-600 tons, being the bulk of top-dressing; the exception being new ground which is sown out later in the year.

"This year an experiment is to be carried out re-sowing one hundredweight to the acre in the autumn and one hundredweight again in the spring.

"This company has taken special interest in the sowing-out of grass and super on newly worked-up ground.

"In October, 1953, we sowed seed at Mount Linton on approximately 800 acres. To our best of knowledge this was the first large scale seed sowing job of this nature to be carried out in New Zealand. The result was satisfactory and now a very large amount of sowing of this type is now carried out throughout Southland by ourselves—on steep ground and also on the flat. Provided the pilot of the aircraft keeps at least 200 feet above the ground and double crosses his runs, a perfect spread is assured. A point worth mentioning at this stage is that as clover and turnip seed does not spread as well as other lighter seeds, it pays to mix only half the required turnip and clover seed with the main bulk of seed and the remainder put in with the super. This guarantees a thoroughly even spread of all seeds.

"We find that contrary to popular belief, the finer the material to be sown, the better the spread. For instance granulated super was at one stage strongly proposed by various people. We do not agree, as the pellets, unaffected by the prop wash, drop straight to the ground, therefore giving no swath whatsoever.

"Strips in aerial top-dressing are becoming all too prevalent around the countryside and too much of this is caused by operators either not taking the time to get enough height, or not taking a long enough run with the super, or both. This is not a good advertisement as far as the individual operator is concerned nor for the aviation industry as a whole.

"It may be worth mentioning as well, our sowing of two tons (approximately) D.D.T. on the Downs and Jibs. On this calm day we found D.D.T. both simple to sow and that it gave a very good spread.

"Another controversy we discovered is that the fertiliser companies recommend the low height in sowing; this is definitely not right. Once again we had to keep above 200 feet, no drift in dust was experienced and finally the grass grub was destroyed. Borax is always sown on worked-up ground prior to planting turnips at Mount Linton, and this works very well, sown above 200 feet.

"On Mount Linton we have the choice of 10 landing strips, and we find our sowing rate is averaging out at four tons an hour for the D.H.82 and six tons an hour for the Cessna 180.

"The advent of bulk super is creating a considerable advantage to the farmer, with no labour and cheaper prices. Although the operator will be faced with loading-equipment costs considerably more solid than at present used, it is going to eventually be advantageous to all parties concerned."

(b) W. J. Whalan, "Te Akatarawa," Kurow.

We have been told that for various reasons it will be necessary to greatly increase our population in the very near future. Two things become immediately apparent: (a) the necessity to grow more food for this increased population, and (b) to still export
enough to provide funds to buy those things from overseas that we cannot ourselves produce.

While I have no intention of entering into any argument as to where the greatest increase is to be expected from, I believe a very large contribution can come from the hill country in the South Island. In fact, from that land that is too steep for cultivation or where it is undesirable to cultivate. This means that production on this type of country will be limited to wool and meat. To grow these it is first necessary to grow grass and secondly to see that no undesirable animals rob us of this grass.

It is my intention to endeavour to point out the part I feel sure the aeroplane can play in these things, but first I would like to draw your attention to the topography of the South Island. It is in fact a long narrow island with a very high backbone. The land falls away quickly from 12,000 feet to sea level. This means our rate of water run-off is very rapid, which again means it is absolutely necessary to keep a good mat of vegetative cover if we are to prevent rapid deterioration of the land itself. This leads some authorities with narrower views to give the opinion that much of our grazing country should be closed up. I believe that it is both unnecessary and undesirable to do so. In fact, I believe our economy demands that we make greater use of it and with the advent of the aeroplane there is no shadow of doubt that this can be done.

Now let us look at the type of vegetative cover with which the best of our hills is clothed. We are really still in a transitory stage. The stage between the vegetation that grew and flourished in a land of birds only and the vegetation that is suitable for grazing animals. There is undoubtedly a good deal of grazing in a number of the native species, but these must be allowed to seed freely and this can only be accomplished by complete spelling as frequently as possible. Partial spelling is not good enough as the more palatable species are the ones that are grazed hardest and therefore not allowed to seed as freely as the unpalatable ones.

These long periods of spelling can be best obtained by the extra grazing provided in smaller areas by oversowing and the spreading of fertiliser from the air.

Now I suppose the only value a paper of this type has, is for the actual verified facts it contains and as the facts I know best are the ones pertaining to my own property I propose to go into certain findings in more detail.

The property known as "The Akatarawa" is situated in the Waitaki Valley. It was taken over by me in 1942 and was in a very bad way indeed, having been eaten out with rabbits and over-grazed with sheep during those drastic slump years.

The rainfall is low, being between 15 and 18 inches annually. Authorities on topdressing believed that very little could be accomplished by top-dressing in such a low rainfall, but subsequent results have proved beyond doubt that top-dressing and over-sowing consistent with other farm management can be a very sound economic proposition.

The property runs from an altitude of 800 feet to 5,000 feet. The snow grass level is at approximately 3,000 feet and it is below this level that the top-dressing has been done, mostly at between 1,200 and 2,500 feet. The stock have free access from the lower to the higher levels and it is very noticeable that after grazing on the softer clover growth they eat the snow tussock freely. It seems the fibrous snow tussock provides something they need. This may obviate the necessity to burn this to prevent too rank growth.

This cap of snowgrass is in my opinion a very important factor in the success of my top-dressing campaign in such a low rainfall
area. The heavy cover of vegetation attracts fog which condenses on it providing a good deal of moisture and also keeping the country immediately below much cooler than otherwise would be the case, thus preventing such rapid evaporation as would normally occur.

Ask any one who has mustered this type of country on a foggy morning about the wetting propensities of it, but your rain gauge would have shown nil.

Now let us go back to the beginning when I took over in 1942. The first job was to at least control the rabbits and under the old system of rabbiting for profit we were dependent on manpower alone, the men knowing full well that if the job was too well done, next year’s profit would be reduced. Now with the advent of the aeroplane a new era dawned. Not only had we an added labour force but we had an alternative. Those inaccessible gorges were now of easy access, and trips that took us a day’s journey by pack horse to even get on the job could be accomplished in twenty minutes and the feed or poison-bait laid as well.

New techniques were evolved. A start was made with the laying of phosphorised pollard and it was proved beyond doubt that the bait laid from the air was more freely taken than that laid by hand, because it was not actually handled by human hands or made unpalatable by being packed on sweaty pack horses, or in any other of the many ways that it could be tainted in transit.

From phosphorised pollard the next move was to distribute carrots from the air. With the necessity to retrieve the skins gone other poisons were used and arsenic, which of course had been used before but the use of which had been discontinued because very few skins could be saved, was very successfully again brought into use. This added impetus to the rabbit destruction campaign given by the aeroplane brought the rabbits under control and of course the next logical step was to get some seeds on to the depleted country.

Our first attempt at sowing seed from the air had been carried out much earlier than this, but this proved that destruction of rabbits was first priority, because the rate of establishment was slow where rabbits were present. This first seeding was carried out by Mr Pritchard using a Ministry of Works plane. The seed was simply poured out and the slip stream scattered it. There were no hoppers then and incidentally I believe Pritchard designed the first hopper used later.

No one had visualised the sowing of fertilisers from the air, nor was there any way of doing so. So of necessity the seed was sown without.

Eight species were sown on a bare slipping shingle face. Cocksfoot, yarrow, ryegrass, dogstail, Montgomery red, white clover, subterranean clover and browntop. Although the distribution was patchy, all species struck, but the only ones to really persist under prevailing conditions were in order of their merit, cocksfoot, yarrow and ryegrass, and in the stable places, Montgomery red clover. The other species did not stand up to the surface movement of the soil and shingle and were destroyed as seedlings. However there were encouraging signs in these results so we decided to give a trial to the top-dressing with superphosphate and oversowing on the easier slopes. We really were astounded by the transformation of the top-dressed areas. Even in our rosier dreams we had not visualised the change that actually took place.

The best way to arrive at a decision as to whether it is desirable or otherwise to destroy rabbits and top-dress and oversow is to study the increase in production obtained.

The first wool clip in 1942 was 101 bales.

By 1949 this had by ordinary rabbiting methods plus a bit of extra management risen to 134 bales.
In 1949 modern methods of rabbit destruction were applied and the clip rose until in 1952 176 bales were obtained.

In this year super and seed were spread and in each succeeding year the practice has been continued. The amounts spread have been between 50 and 100 tons per year. This past year the wool clip was 235 bales, making an increase of 101 bales since the aeroplane was first used in the rabbit destruction campaign or an increase of 134 bales since the property was taken over.

To analyze further, the increase since top-dressing has been done has risen to 59 bales annually.

The increase in wool is not the only increase, because a greater reserve of cover has been built up each year and there would be no doubt about being able to maintain production at this level with an application of 50 tons of super per year.

Now even if we had a sharp recession in prices even down to the level where the Wool Disposal Commission might come in say at 30d per lb, the increase of 59 bales would return in the vicinity of £45 per bale or £2,655 gross. The economics of this must be apparent to all.

The lambing percentages have also risen spectacularly from 20 per cent to 85 per cent. These have possibly reached peak level as the sheep run on the property are Merinos. From having to buy in to keep up the flock, we are now able to sell 1,000 cast-for-age sheep per year and 200 or so lambs as well. A few cattle are also run on the property, these being used chiefly for the spreading of clovers.

No more than 2 lb of clover seed has been sown on any of the country but a very thick sward has resulted and I believe cattle have been responsible largely for this spreading.

In an attempt to obtain cattle that will do this job better, I have made importations of the Galloway breed and already the halfbreds are showing great promise of being of real value in this work. However, we must give the aeroplane the credit of having started all this; in fact it has rolled out a magic carpet on thousands of acres of hill country and will continue to do so over much of our South Island.

May I in conclusion pay a tribute to that pioneer of top-dressing, the Tiger Moth, and to that gallant band of pilots who took risks and lost lives to make possible a new era in hill country farming. New Zealanders will look back in a decade or two and realise how much they owe to this intrepid band.

(c) A. A. Macfarlane, “Ngawiro,” Rotherham.

I was very pleased to receive an invitation to read a paper here today on “Aerial Farming in the South Island.” I find having written it, that it consists of the story of the aerial top-dressing that I myself have done, and my opinion as to what the results have been.

My place lies along the Waiau River and there are about 3,300 acres of tussock country on it and it varies in height from 300 to 1,500 feet. It is mostly easy country with a good coating of top soil which has been blown on to it by nor'-westerly winds from the Waiau riverbed. Going by the quantity of dust that we get in the house I would estimate that it gets at least one hundredweight of silt to the acre with each decent nor'-wester. It is well grassed and there is plenty of cocksfoot and white clover on it. The rainfall is about 33 inches a year.

The hill country is divided into four ewe blocks and a hogget block. My method of stocking has always been to put a set number of

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sheep on each block at dipping time and to leave them there until the following weaning. The numbers that the blocks were carrying before we started top-dressing had not been altered over the last 35 years. Cattle have been moved according to the feed from block to block.

I started aerial top-dressing in 1950 and my policy has been to do three of the ewe blocks and the hogget block once every three years. I have left the fourth ewe block untop-dressed to give me something to compare the other country with.

I will now take each block in turn. We started in the autumn of 1950 with the Battery Rock which is a block of about 575 acres and which had been carrying 500 ewes. On 12 April, 1950, we put on 15 tons of super, three sacks of subterranean clover and five sacks of cocksfoot. In May, 1951, we put on 18 tons of reverted super and 10 sacks of ryegrass seed. The seed in nearly every case has been what we have harvested ourselves and what we have put on has depended on what we have had at the time.

We got quite a good strike with the sub., but as there was quite a fair covering of cocksfoot on the country already we could not tell if the seed had done any good.

The next top-dressing of this block was in the spring of 1954. We had a very good fire on the cold faces in August, and then put on 24 tons of reverted super with molybdenum and also three pounds of red clover to the acre. The red clover was very disappointing as it has only shown up on the burned country, and then only about one plant to the square yard.

We are now carrying 600 ewes on this block and at this it is lightly stocked.

The next block we started on was the Near Block, a block of about 500 acres. First top-dressed in spring 1950 with 25 tons of super; it was given a second top-dressing in the spring of 1953 with 10 tons of super/nauru and 15 tons of reverted super, both having molybdenum added. The third top-dressing in the spring of 1956 was with 20 tons of reverted super.

The results here have been our best. The sheep have gone up from 325 to 525 and it carries about five times as many cattle. No seed was sown on this block.

The third ewe block, the Sugar Loaf of about 450 acres, was top-dressed in March, 1952, with 20 tons of super and again in September, 1954, with 20 tons of reverted super and molybdenum. We also put on three pounds of red clover to the acre. I do not think that any of this red clover grew.

The sheep on this block have gone up from 350 to 525.

The last block to be top-dressed was the Hogget Block, a block of about 1,000 acres of steep nor'-west faces which get very dry. It was first top-dressed in March, 1952, with 40 tons of super. Then in October, 1954, we sprayed the broom along the river frontage by air. We used 24 gallons of 2-4-5.T. The following August we burned all the broom that we could get to burn and then in September we put on 33 tons of reverted super plus molybdenum and a lot of seed. We followed this up with another 44 gallons of 2-4-5.T in October.

We had a very successful kill of all the broom that was burned and had two sprayings. We were not able to do much burning in the spring of 1956 and the broom that got only the one spraying was rather a failure. A portion was killed but the most of it came away again.

Well that is the work that I have done and now for the results that I have got.
I have increased the ewes from 1,150 to 1,650 and the hoggets by 100 and I have put the cattle from 30 to 200. The sheep increase has not been large and is no indication of how the country has improved, but the drought in 1956 was very severe in this area and did not encourage me to increase the sheep numbers too much. I have needed the extra cattle to keep the country in order.

The sheep on the top-dressed country have not been doing any better than the sheep on the untop-dressed country. In fact the lambs off the country that has not had any top-dressing have been better than those off the country that had been manured. I do not know the reason for this as the feed on the top-dressed country looks so much better, with a fair predominance of clovers and cocksfoot.

With the exception of subterranean clover, the seed that I have sown appears to have been a waste of money. The Near Block, which has had no seed sown on it at all, has a better cover of cocksfoot and clover than any of the other blocks, but the subterranean clover which has now been sown over nearly all the places is showing up well.

I had hoped that the extra cattle that I was carrying would make it unnecessary to do any burning, but unfortunately it is not only the grasses and clovers that have responded to the manure. The mata-gouri, lawyer and tawhini have given an equal response and the only way that I have been able to keep the country open has been to still do a certain amount of burning. What we try to do now is only to burn the country that we intend to manure straight away. As I consider that the best time for burning is in August, I therefore like to do all my top-dressing in the spring. Also I think that the spring top-dressing has given me very much better results than the autumn top-dressing, not only on the newly-burned country but over the whole lot. It has brought away the cocksfoot and the white clover in sufficient quantities to allow them to seed and I think that this has helped a lot towards the thickening up of the cover. I may be wrong but I also have the feeling that the heavy rain in the winter has the tendency to wash the manure right out of the steeper country.

I seem to have used a lot of different sorts of manure. I have used 150 tons of super, 86 tons of reverted super, ten tons of super/nauru and four tons of serpentine super (102 tons of this has had molybdenum mixed with it). It has been a case of taking what I could get rather than having any particular preference, but I have preferred reverted super when I could get it.

I do not like the type of super that we are getting now as I think that it is far too fine for dropping from an aeroplane and that it is inclined to drift too far. It is not always possible for an aircraft to get lower than about 300 feet on steep country and with the present type of super the drift could easily be over half a mile. I am sure that there is a sufficiently large demand from aerial top-dressing to make it worth while for the manure companies to produce material of a granular nature which would have a quicker rate of drop.

I very seldom use aircraft for top-dressing my flat country as I do not consider that it is economical. I usually top-dress 500 acres of flats each year and this is all done by tractor.

I will conclude by stating how much I appreciate what a wonderfully good job that the pilots who have been doing both my top-dressing and spraying have done. It is both a dangerous and tiring job, but it has always been carried out most efficiently and conscientiously. I have seen a lot of flying both in England and in New Zealand but the best flying that I have ever seen was done by a pilot spraying nasella tussock in the Waiau Gorge.
The farm is in the Wairau Valley at Hillersden, Marlborough, about 30 miles from Blenheim and it is on the southern side of Wairau River fronting on to the Blenheim-West Coast road.

The area is 1,740 acres and is made up of approximately 190 acres of flat and fairly broken but ploughable terrace and 1,500 of fairly steep hill. The altitude of the homestead is about 700 feet, and it rises to 3,400 feet on the hills at the back.

The rainfall is about 40 inches, and summers are dry.

It is a long narrow property in the form of a valley with a narrow and broken floor and fairly steep hill-country on either side and extending back five miles from the road frontage with an average width of just over half a mile.

The hill soil is a stony-silt loam and it responds to phosphates. The flat and terraces when broken in carry a good pasture.

The hill cover in its unimproved state consists of silver tussock, sweet vernal, browntop, and danthonia and there is matagouri in some areas as well as a tendency to revert to fern and some tutu on the shady faces with some manuka. The hill, particularly on the higher portions, carried practically no clover.

The farm was bought in 1942 and at that time carried 1,170 sheep and as it was not overstocked it could have carried a few more. The farm was regarded in the district as being quite a good one.

The first job tackled was to improve the land near the homestead, and this was drained and sown to pasture.

In the 1945-46 season a start was made with breaking in land up the gully, starting at the bottom end. Turnips were grown first and then pasture sown in the following season and the area taken in each year ranged from 13 to 19 acres.

Year by year further progress was made up the gully until now all the available areas have been brought in and the only land likely to be brought in in the future by cultivation is possible small extensions of paddock areas.

As a result of this work the stock numbers had increased and in 1950 1,500 sheep were shorn.

At this stage it seemed that other methods would have to be used if stock numbers were to be further increased. To this date (1949-50) all the build-up had been a result of the cultivation and re-sowing programme which was limited owing to the restricted area available.

The hill country was still in its same state and it seemed an obvious potential if it could be developed.

The sheep numbers and production was quite good at this stage for this class of country, but the hill country was rather a challenge.

In 1949 as a trial a small area of the front hill was top-dressed with superphosphate and sub. clover was sown by hand. Results were very encouraging and it was decided to treat a larger area. At this time there had been practically no aerial top-dressing done in Marlborough but it seemed an obvious method of doing the job.

In 1949-50 season a hill block on the front country of 160 acres was top-dressed by air with superphosphate but no seed was sown. The result again was definitely encouraging—the block had a poor cover of danthonia and browntop and very little white clover. The effect of the top-dressing was to stimulate the white clover.

This was really the starting point of the hill country improvement because it was realised that to get adequate results it would be necessary to include a clover in the aerial sowing.
The aerial top-dressing and oversowing programme since that time has been as follows:

**TABLE I**

**Top-dressing and Oversowing.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Time</th>
<th>Area (acres) approx.</th>
<th>Quantity Superphosphate tons</th>
<th>Seed Clover (lbs)</th>
<th>Grass (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I—</td>
<td>1949-50</td>
<td>January</td>
<td>160</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>Stage II—</td>
<td>1950-51</td>
<td>January</td>
<td>1000</td>
<td>100</td>
<td>1400 Sub.</td>
</tr>
<tr>
<td></td>
<td>1950-51</td>
<td>&quot;</td>
<td>1300</td>
<td>85</td>
<td>1960 &quot;</td>
</tr>
<tr>
<td></td>
<td>1952-53</td>
<td>&quot;</td>
<td>1000</td>
<td>75</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>1953-54</td>
<td>Jan. &amp; March</td>
<td>1000</td>
<td>*91</td>
<td>—</td>
</tr>
<tr>
<td>Stage III—</td>
<td>1954-55</td>
<td>January</td>
<td>1700</td>
<td>130</td>
<td>2240 Red</td>
</tr>
<tr>
<td></td>
<td>1955-56</td>
<td>&quot;</td>
<td>1700</td>
<td>130</td>
<td>4000 &quot;</td>
</tr>
<tr>
<td></td>
<td>1956-57</td>
<td>&quot;</td>
<td>1700</td>
<td>130</td>
<td>1717 Sub.</td>
</tr>
</tbody>
</table>

*Includes 15 tons of molybdic super.

**Note.**—Also in August, 1956, a spring sowing of seed was made on the ewe and wether blocks using 5,000 lb perennial rye, 1,000 lb red clover, and 1,000 lb H1 rye.

The spread of the ryegrass was not satisfactory without a spreading agent such as superphosphate. It was too thick but it germinated well and is now well established. The normal procedure of putting the seed in with each plane load of super seems to give the best results and covers more ground. In any case it is doubtful if it would have succeeded at all had it not been for the past record of top-dressing and the raised fertility.

Note that the area top-dressed and oversown has been increased in later years to cover the whole farm and includes the relatively small quantity spread on the cultivated area.

You could describe the top-dressing and oversowing as being done in three stages (see Table I and the map).

Stage I—where only a small area was treated in 1949-50.

Stage II—in the following years where the area was extended to cover up to two-thirds of the farm.

Stage III—as from 1954-55 the whole of the property has been treated.

During the period over which this top-dressing and oversowing has been taking place it was very obvious that the hill country was improving rapidly and where previously there had been many bare patches among the low-fertility grasses and the tussock, now vigorous subterranean clover, white clover and cocksfoot have established.

Stock numbers were not increased so as to keep pace with the feed as it was felt that it was desirable to spell these oversown and top-dressed blocks in their long term interest.

Actually the stock have never caught up with the feed supply and further means of utilization will have to be sought.

At this stage in the story it would perhaps be of interest to quote stock numbers and flock composition and then production throughout this period.
The flock is Corriedale and at 1956-57 shearing was composed of

700 hoggets
904 wethers
39 rams
802 ewes

2445

The ewes and hoggets have the use of the front country while the wethers run on the back hill block. Some of the stock are wintered on turnips (hoggets for six weeks) but the main flock is wintered on grass.

TABLE II

Wool Weights and Averages 1942 to 1957

<table>
<thead>
<tr>
<th>Season</th>
<th>No. of Bales</th>
<th>Wool Weight (lbs)</th>
<th>No. of Sheep Shorn</th>
<th>Average Weight per head</th>
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<tbody>
<tr>
<td>1942-43</td>
<td>29</td>
<td>9272</td>
<td>1172</td>
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<tr>
<td>1943-44</td>
<td>31</td>
<td>9794</td>
<td>1211</td>
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<td>46</td>
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<td>1500</td>
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<td>47</td>
<td>13995</td>
<td>1568</td>
<td>8.92</td>
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<td>1955-56</td>
<td>80</td>
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<tr>
<td>1956-57</td>
<td>90</td>
<td>29890</td>
<td>2445</td>
<td>12.2</td>
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</tbody>
</table>

You will note that there has been a steady increase in sheep numbers and production since 1942-43 but the increase from this date until 1949-50 was due to the gradual breaking in of the terrace and valley country.

The increase from that date (1949-50) is due to the build-up on the hills with super and oversowing.

Since 1942-43 the stock numbers have been more than doubled and the wool production has more than trebled itself.

The wool weight per head which is always a barometer of feed conditions, shows that the stock are adequately fed and doing well.

Lambing Percentages are as follows:

<table>
<thead>
<tr>
<th>Season</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>95.7</td>
</tr>
<tr>
<td>1951-52</td>
<td>101.1</td>
</tr>
<tr>
<td>1952-53</td>
<td>122.8</td>
</tr>
<tr>
<td>1953-54</td>
<td>123.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Season</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954-55</td>
<td>107.2</td>
</tr>
<tr>
<td>1955-56</td>
<td>119.2</td>
</tr>
<tr>
<td>1956-57</td>
<td>115.3</td>
</tr>
</tbody>
</table>

Here the increases from 95 per cent to 120 per cent again confirms the story of the wool weights in indicating the adequacy of the feed supply.

Stock sales consist of cast ewes and wethers and a proportion of fat lambs.
The wethers sold are mainly off the wether block (which I'll mention again later), but of the 232 culled at shearing last year all but nine were sold fat off the shears.

The fat lambs are Southdown cross and 200 to 230 are sold each year.

No wether lambs are sold from the main flock as they are kept for the wether flock.

These stock sales of between 500 and 700 are lower than would be expected from the stock numbers and lambing percentage, but here the story is that increasing numbers have had to be held back from sale owing to the flock build-up.

The stock story is not complete without cattle. It was felt that sheep alone could not cope with the feed available and so cattle were brought in in 1954-55 and bought as weaners and one and a half-year-olds (18) to be sold fat. The first sale of fats took place in 1955-56 (12 head) and a further 51 were purchased.

In 1956-57 50 fat cattle were sold and purchases to date this year total 51 with another 15 to 20 to be bought before the end of June. (The cattle bought were 18-month-olds, yearlings and calves.) The cattle story is just beginning and numbers will be increased and management procedure adjusted as and when necessary.

It is certain that cattle will have to be put out on the back country as the sheep here too do not seem to be able to keep up with the feed.

It is worth mentioning that a further indication of the improvement in the hill country can be gauged from the following:

A small block—the front hill about 80 acres—in 1942-43 did not carry any stock at all except at shearing and crutching time. Since topdressing and oversowing it carries 140 dry sheep constantly and is still improving.

The wether block of 1,000 acres ranging from 1,300 feet to 3,400 feet at the back used to carry 350 wethers in 1942-43 and now carries 850.

The back country used to be burned but this has not been done for some time and it does not burn easily now owing to the great build-up of clover and cocksfoot. With top-dressing and seeding the fern is getting less. The tussock is increasing so much that it is taking up ground that could be growing better feed.

With regard to winter feed all the land that can be brought in is now in pasture and it may be that in the future turnips will not be grown and that there will be full dependence on pasture with perhaps some hay if it is needed.

To sum up I feel that it is safe to say that although production has increased greatly during recent years the limit has not been reached.

These increased stock numbers and their stepped-up production bring additional work and problems. New methods of management have to be considered and increased water supplies have to be made available as well as further sub-divisions.

There is no doubt that this type of country has been waiting for superphosphate and clover oversowing for a long time but until the top-dressing aircraft came along it was just not possible to get the seed and manure on the ground.
DISCUSSION ON THE FOUR PREVIOUS PAPERS

Mr Menzies, Banks Peninsula: Thistles are a problem with us. Have you any experience with the control of thistles by the use of 2-4-D in the dry form with superphosphate?

Mr McGregor: I have used it both wet and dry. Many fertiliser people put out 2-4-D in super but they are not yet very sure of it. I tried some. It was a partial success but unfortunately we had bad weather. It was dry weather with a high wind. Good conditions are damp weather with no wind. I will continue experimenting.

Question: (1) You say you apply nitro-lime in July. Why do you prefer to put it on then rather than in the autumn? (2) When do you sow grass seed from the air?

Mr McGregor: (1) In a favourable climate July is a good month. But in hills subject to heavy frosts applying in the first week in May will get the grass started before the frosts come. The nitro-lime will harden the grass and enable it to stand up to frosts. (2) Early sowing of grass seed is recommended for cultivated ground. I prefer the early spring with a falling glass and the possibility of rain. Autumn-sown grass suffers from frost lift in winter time in Southland.

Chairman: Why in 1953-54 and 1954-55 did Mr Scherp have a drop in wool weight per head?

Mr Scherp: The reason was inadequate feed. I put too many stock on to the improved pastures too soon.

Mr Maxwell, North Canterbury: (1) Will Mr Scherp be able in the future to run ewes where he now runs wethers? (2) With top-dressing on hill country with superphosphate each year, we shall soon have to put lime on. Is there any scheme to assist getting lime on hill country?

Mr Scherp: (1) As regards putting ewes on the wether block, I do not propose to do this because I am too tired to climb up and look after them. It is roughly five and a half miles from the homestead to the back country. There would be big losses at lambing time because one could not keep watch on them.

Mr W. Whalan: What we want to know is what to put on, when to put it on and how much. I think we should leave that question to people of the calibre of Dr Walker. You must ask the opinion of the experienced men. Being a practical farmer I would like direction from men who have the “know how.”

Mr McGregor: In South Otago and Southland it is quite a practice to put lime on the hill country. We do it in the off season. Aerial top-dressing is now a seasonal demand for autumn and spring. There is a lean period from November to the end of February and again in the winter. The normal charge is £3/5/- per ton; they are sowing lime for 30/- a ton in some districts in the off season.

Mr L. Chapman, Mt. Somers: Any lime carried by air should be subject to the same transport assistance as that carried by road. This should not be lost sight of.

Mr Baker: Did you sow basic slag successfully by air? We have had trouble with it.

Mr McGregor: Yes, we did, but I am not so keen on it. There is an art in handling basic slag by air. There are a lot of accidents caused by sowing basic slag by air because it packs very quickly in the hopper. You must get the plane up immediately and have as short a run as possible. Putting in 50 lb of super in the bottom of the hopper will help.
Mr McKenzie, Waimate: The speakers here refrained from mentioning alternative methods of stocking tussock country improved by top-dressing. Mr Macfarlane still set stocks his place. Does not he consider that his sheep tend to graze selectively?

Mr Macfarlane: We have been giving some thought to this. Professor Flay advised that instead of putting a set number of sheep on a block for a year we should put all sheep together and move them from block to block. This involves a lot more work and we have not yet got round to trying it.

Question: Have any of you tried Chewings fescue as a first cover on bare country?

Mr Whalan: I do not like it anyway, so have not tried it. It is the last thing I would think of putting on my hill country. Once there you cannot get rid of it unless you cultivate pretty thoroughly. I like to try and keep what I put on to the country as palatable a species as possible. If I put on Chewings fescue I would be faced with the problem of getting rid of it. I do not put anything on I really do not want. As far as cover for anything slipping goes, I think yarrow is good. On the high country a bit of yarrow in the pasture is good for the health of the stock and it grows very freely in loose country.

Mr McGregor: After fescue came into prominence in 1903-04, my father sowed cocksfoot and fescue on a big bushburn. The fescue choked out the cocksfoot at the lower levels. It did stop erosion. The cocksfoot held on above the fescue; it went up to the snowline.

II. Some Aspects of Aerial Top-dressing and Seeding in the Tussock Country from the Waitaki to the Rakaia Rivers.

H. Sievwright, Department of Agriculture.

When Acland took up the first high-country run in South Canterbury he wrote: “Sept. 18th, 1855, burned tussocks and snowgrass on flats. Sept. 20th, 1855, sowed clover on ashes up flats.” Today the Aclands sow clover, with superphosphate, up the flats, and on the hills, from the air.

In any study of the tussock grasslands we must be careful not to divorce the mountain peaks from the valley floors, nor must we subdivide the soil-vegetation-animal complex. Let us, very briefly, look at our Canterbury mountains from the limit of vegetation at over 9,000 feet, to the valley floors, where we can expect much improvement now at the present state of our knowledge.

I. Vegetation from the Mountain Tops to the Valley Floors

1. On the mountain peaks and precipices, up to just over 9,000 feet, we have Ranunculi, Veronicas and Senecios, along with a very hardy Poa grass. The Balaclava Basins of Mesopotamia Station are representative of this association.

2. On running shingle, at 6,500 feet to 8,000 feet, we have family representatives of Buttercups, Lobelias, Daisies, Forgetmenots, Pinks and another Poa grass. Sorrel has invaded this environment. The roots, leaves, stems and flowers of these plants are all specially adapted to live in shingle-slips. The Wren’s Nest country of Mount Possession has an example of this association.
3. In the alpine grassland, or Fellfield, at 5,000 feet to 6,500 feet, we have a much wider variety of plants. Of the herbs, we have Senecios, Celmisias, Euphrasias, Creeping Fox-Gloves, Forgetmenots and Gentians; of the creeping shrubs, we have Coprosmas, Heaths, Snowberries, and Daphnes; of the grasses, we have Snowgrass and Blue Tussock. The Neutral Basins of Old Richmond Station are typical Fellfields.

4. In the areas from 3,000 to 4,500 feet, we have, predominantly Snowgrass and Celmisias, together with Blue Tussock, Carpet Grass, other Danthonias, herbs and small shrubs. The famous Valley Country of Mesopotamia is representative of this association.

These four broad associations of plants are all subject to extremes of weathering—ice, snow, cold, frost-heave, heat, heavy rain, high winds, steep slopes, and varying soil types. At present we know little that could help these communities by seed and fertiliser from the air. Carpet Grass, in the high basins—Creeping Totara on the scree—Blue Tussock at 2,000 feet to 5,000 feet—Spiked Wheatgrass and Mountain Twitch in drier areas—and sorrel everywhere—are all doing excellent volunteer jobs.

5. It is on the fescue-tussock grasslands in Canterbury from 1,200 feet to 3,000 feet, that extremely encouraging improvement can be done, and is being done, with seed and fertiliser. Where the rainfall is over 25 inches a year, and spread over the growing season, good results can be expected by the application of superphosphate and clover seed from the air. It is the effective, not the total rainfall that is important. Very often when the rainfall is right for seed-germination, strike and growth, the temperature is wrong (winter), and when the temperature is right the rainfall is wrong and aggravated by drying winds (summer). Where the rainfall is below 25 inches a year, it is sounder practice to drill, so that the fertiliser and the seed are together, just under the surface of the ground, while consolidation is retained and a beneficial microclimate is provided by the tussocks. In any improvement work we aim to retain the tussocks because of the microclimate they provide, because of their valuable roots holding the soil and making humus, and their ability to “break” the snow in winter.

II. Trials by Runholder and Scientist

Over the past 10 years I have found some runholders eager to try new practices on a large scale. They are prepared to manage the stock, and spend money on seed, fertiliser, and fencing, especially if the expenditure can be guided by the financially important date, 31 March each year.

Let us look at some runholder trials:

1. In the spring of 1947, before hoppers were designed for aerial work, a runholder spread out on a very steep face of moving shale, at 1,700 feet to 2,000 feet, in 17 inches rainfall, seed of eight species of grass, clovers and yarrow. He had faith in the future of the aircraft as a station implement, and aimed to test if broadcast seed would germinate and establish under these conditions. The results today are that cocksfoot and yarrow, along with some ryegrass and red clover, are providing a protective cover to, and spreading along, the face that was moving at the start. Vegetation analyses of this area will be given later in this paper.

2. In 1938, a runholder, in conjunction with a fertiliser firm, laid down a trial to see which fertiliser would give best results at 1,500 to 2,000 feet on mixed silver and fescue tussock, with some
volunteer white clover, cocksfoot and browntop. World War II interrupted, but the response from superphosphate was still seen in 1949 when the Department of Agriculture laid down further trials with fertilisers without seed; two hundredweight of reverted super gave best results. In March, 1950, 1,700 acres were aerial top-dressed with two hundredweight of reverted super (no seed), and in December, 1950, the remaining 1,500 acres of the property were treated the same. It was the threat of the browntop smothering the tussocks and better species, that made the runholder top-dress to stimulate the clovers and cocksfoot. The stimulus was outstanding! This response was in keeping with the results in the pilot trials of 1938 and 1949. Today the clovers and cocksfoot are producing the best; browntop has not increased and is being eaten by cattle and sheep. There has been a change from Merinos to Romneys. Cattle have been increased.

3. To introduce a legume into a sunny face. After the frosts set in in May, 1950, 1,000 acres of fescue tussock, 2,000 to 2,400 feet, were aerially treated with two hundredweight reverted super and 10 lb of seconds of certified white, suckling, subterranean and Montgomery red clovers. The clover production was outstanding for three years, then came a marked slump in the clovers. The browntop was eaten, and the tussocks remained very healthy. Today there is clover through the block and the runholder has further top-dressed and over­sown to a height of 4,000 feet on the sunny side. The Merino ewes are kept for another year, mated with Romney rams, and both ewes and lambs sold. Breeding cows are increased, and all calves kept. After the 1950 top-dressing the stock increase was not sufficient to control extra growth; this resulted in lack of vigour of the high-producing plants, and loss of dung and urine.

4. In 1952 a trial of 500 acres was put down at 2,300 feet in 35 inches of rainfall, on fescue tussock with no legume to see the effects of one and a half hundredweight of super compound. There was no visible response but the hoggets, and deer, wintered well on the top-dressed part of the block, keeping out of a corner dangerous for snow. Where two loads were jettisoned because of the risk of approaching the steep face in high wind, the volunteer white clover could have been cut for hay. Though the runholder has not done much top-dressing since, he has built roads and telephones to all huts, which are provisioned in autumn, and are self-contained in winter, spring and summer when the rivers are high. Airstrips are being built for the next generation.

5. Another trial of 400 acres of clovers and grass, without fertiliser, in a dry area on running shingle at 2,400 feet, shows cocksfoot and yarrow thriving in the open, but unthrifty clovers only in areas sheltered by the tussocks.

Let us look at some of my Department’s trials:

(a) To see if legumes will grow and persist in tussock country. This was a drilled trial. Lucerne where not grazed for 12 months, was best, with alsike and white clover next. Cocksfoot and tall oat grass were well established after two years. Zigzag clover, which spreads by underground stems, is promising.

(b) To establish clover using pelleted seed. Pellets, with the seed inside the pelleting material, were unsuccess­ful in that they either destroyed the germination of the seed, or failed to disintegrate. Pellets, with the seed stuck on the outside of the pelleting materials, were very encouraging. White clover struck where subterranean failed. In view of the uneven spread of seed and fertiliser, I believe pelleting of seed with fertiliser should command more research.

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(c) To compare molybdenum alone, and in association with various combinations of phosphate, potash, and lime.

No responses have been seen to lime, potash, or molybdenum.

(d) Application of gypsum and sulphur to see if sulphur is deficient rather than phosphorus.

In different degrees, this series of five trials, shows one hundredweight of gypsum equal to two hundredweight of superphosphate, equal to one hundredweight of gypsum plus one hundredweight of double super. One hundredweight of double super gave little response, if any. Twenty-eight pounds of flowers of sulphur gave little response the first year—better response the second year—and in the third year was almost equal to the first three treatments. It appears that a top-dressing plan might well be: two hundredweight of super to ensure establishment; one hundredweight of gypsum for two repeat top-dressings; and subsequent topdressings of 28 lb of flowers of sulphur.

(e) To assist recovery of tussock severely damaged by insects.

Two hundredweight of reverted super and two pounds of pedigree white clover and two pounds of alsike, broadcast, gave half the production of the same mixture drilled in but the latter smothered tussock regrowth when closed from grazing. Where open to grazing from the start, tussock recovery was best in the drilled area, next best in the broadcast area, and next in the untreated area. Under normal grazing the tussock recovered over the whole block in four years in this 25 inches of rainfall.

(f) To note effect of re-top-dressing with two hundredweight of superphosphate, five years after establishment, by drilling in lucerne (2 lb) and cocksfoot (10 lb) with one and a half hundredweight of reverted super.

The area was unproductive when treated, but now, three years after re-top-dressing, lucerne, cocksfoot, and vigorous tussock are producing well (especially in dry seasons) under periodic mob stocking.

(g) To find out the frequency and rate of application of phosphate and lime to maintain production on improved tussock.

Little response to lime has been found on uncultivated land. Initial top-dressing of two hundredweight of superphosphate per acre ensures vigorous establishment. Follow up top-dressings of half a hundredweight of super per acre per annum give excellent results. Follow up top-dressings of one hundredweight per acre at two-year and three-year intervals gave satisfactory results, but not as good as the annual ones.

From observations on all these trials, I advise:

i. Application of seed alone is not worth while.

ii. The initial top-dressing must be heavy, e.g., two hundredweight super per acre.

iii. The legume must thrive to stimulate those grasses which provide the bulk of the feed in July-August.

iv. Burning first is bad practice—it destroys the mulch and the microclimate.

v. Most important, the increased growth must be grazed to improve the tussock lands—it is no good growing legumes to look at.

III. Analyses of some Results of Aerial Oversowing and Top-dressing

These analyses were taken in March, 1957, by the use of the point-step method of measuring total ground cover, and the vegetative species present; there is a close relationship between this method and eye estimation. In tussock grasslands where the application of
superphosphate and clovers give increases in production of 300 to 400 per cent, there is not the necessity for precision that would be required in the measuring of say five per cent increases.

The point-step method of sampling is quick, statistically accurate and very suitable for measuring improvement.

Let us study an example of drilling into native tussock at Lake Pukaki:

71 per cent of the ground was covered by living vegetation in the drilled; 52 per cent in the native.
23 per cent of the ground was covered by litter in the drilled; 15 per cent in the native. (Litter means detached, undecomposed plant material.)
44 per cent of the living vegetation in the native was herbs (Senecios, plantains, sorrel). There were no clovers.
10 per cent of the living vegetation in the native was catsear; in the drilled there was no catsear.
7 per cent of the living vegetation in the drilled area was herbs and 73 per cent introduced clovers, which had replaced herbs to a very large extent.

There was two per cent less tussock in the drilled area than in the native area.
5 per cent of the living vegetation in the native area was sorrel; three per cent in the drilled.
50 per cent of the perennial grasses in the native had been replaced by clovers.
13 per cent of the living vegetation in the native was mosses and mat plants; in the drilled there was only one per cent.

Now for the very steep face of moving shale mentioned earlier in this paper.
25 per cent of the ground was covered by living vegetation in the air-sown area; eight per cent in the native area.
There was no litter on either area.

Yarrow was estimated as 17 per cent of the living vegetation.
Hawkbit was estimated as 42 per cent of the living vegetation in the native, and nine per cent in the air-sown—a good example of a herb playing an important part.
Of sorrel there was 11 per cent in the native, with three per cent in the air-sown.
In this drier area there was 32 per cent annual grasses, mostly feather brome, in the native; and nine per cent in the air-sown. There was three per cent perennial grasses in the native, and 48 per cent in the air-sown, mostly cocksfoot and perennial ryegrass.

Now, an area drilled compared with one air-sown:
48 per cent of the ground was covered by living vegetation in the drilled area compared with 54 per cent on the air-sown area.
41 per cent of the ground was covered by litter in the drilled area compared with 28 per cent in the air-sown area.
32 per cent of the living vegetation in the drilled area was herbs compared with 34 per cent in the air-sown area.
15 per cent of the living vegetation in the drilled area was tussocks compared with 24 per cent in the air-sown area—a loss of nine per cent.

There was eight per cent of perennial grasses in each case.
Of the living vegetation on all drilled areas, clovers were estimated as 47 per cent compared with 33 per cent on all the air-sown areas.
### IV. What of the Future?

Though there are dust and snow on the winds that moan down the gorges today, I see no reason to be “windy,” or to moan about the future of the high country. With a resilient partnership of practice and science, harvesting with livestock, while always aiming at improving the soil and its vegetation, we can, and are, playing the tune of “The High Country March to Restoration,” which was the battle-cry of the Mackenzie Country runholders at their Highland Show in 1957. These runholders, besides having a splendid display tent at the show are running their own Tussock Improvement Competition, are making with assistance from the Soil Conservation and Rivers Control Council, their own implement for drilling seed and fertiliser directly into the tussock and run a Seeds Production Sub-Committee, whose aims are:

(a) To stimulate action in recovery of the tussock-land.
(b) To bulk up seed of species known to be useful.
(c) To test species showing promise.
(d) To help the Department of Agriculture from their plots to the tussock country concerned.

How can we manage soil, vegetation, and stock to restore the high country?

Here are a few thoughts on the matter:

(i) More shepherding with a view to spelling blocks rotationally during flowering and seed setting. When moving stock for rabbit poisoning, plan for this. (And at this stage I want to pay an enthusiastic tribute to the Rabbit Destruction Council.) One station in a dry area, has airsown 3,000 acres as the rabbits have lessened, the seed is tested for purity and germination—they do not want weeds! Today, these hillsides hold the water before it gets to the creek-beds—no repairs have been needed to flood gates for three years—and no dust flies in high winds! Pre-lamb shearing on to an airsown block, can
spell a winter block that has been heavily grazed. Let us think not only in terms of summer and winter country, but also of spring, summer, autumn and winter country. By staggering the grazing periods within these seasons, we may be able to lessen, or even do without, the high, steep, exposed, snowgrass slopes. Many of the shepherding huts could be provisioned by air, to be more self-contained working units. Rock salt and top-dressing can hold sheep on to a block.

(ii) Seed and fertiliser. Seed mixtures could be improved with emphasis on the grass as well as the legume. Perhaps pelleting will assist in the establishment of grasses. Autumn-saved, and early-spring grass are worthwhile. We must be careful not to make the mistake that bulk feed is a true indication of carrying capacity. The profuse growth this autumn does not mean necessarily that the stock have done better than ever. At Lake Pukaki, an improved hill produced prolific growth and attracted large numbers of cattle and sheep, with the result that deterioration set in because of the steep slope of over 30 degrees, lack of humus in the soil, and weight of treading. An effective way of storing feed for winter is by stimulating the danthonias, blue tussocks, and blue grass with vigorous clover. Winter airsowing of creeping lucerns and zig-zag clover, may be effective with a pellet which includes an inoculum. Direct sunlight kills inoculum, but winter may have a refrigeration effect. Providing of bees for seed-setting is important. Plants which do not die, but go dormant in summer would be useful. Is a frost-resistant strain of subterranean clover an impossibility?

The mixing of seed with the fertiliser could be done much more thoroughly. One top-dressing with D.D.T. super would be worthwhile every three years as an insurance.

Management of the high country is simplified if the homestead is a home with gardens and young replacements coming on.

In the Waitaki watershed, 1,800 acres have been drilled into the tussock with specially designed points. In the 1954-55 season 900 tons of super and seed were airdropped on 10,000 acres.

In the 1955-56 season 1,100 tons of super and seed were air-dropped on 12,000 acres.

In the 1956-57 season 2,400 tons of super and seed were air-dropped on 25,000 acres.

It is estimated that there is an area of over 500,000 acres in the watershed that would respond to airsowing and top-dressing.

Finally let us study wool and stock production from a group of Mackenzie runs—period 1949-50 to 1956-57 (eight years).

Total weight of wool—The total weight of wool has in the main increased steadily and wool production total is up 12 per cent in 1956-57 as compared with 1949-50.

Wool weight per head—1949-50, 7.7 lb, as compared with 1956-57, 8.7 lb.

This is a clear indication of the improvement in production, and, as there has been a steady increase, it is a very encouraging one. It shows that the stock must be doing well to produce this quantity of wool.

Lambing percentages—1949-50, 70 per cent. 1956-57, 82 per cent.

Again, a steady rise is indicated, which, again, is confirmation that stock are doing well.

Stock sales: With reference to the runs in this group, again the picture is a good one. If we take 1949-50 as a base year we can show a steady increase in numbers sold over the eight years under review—1949-50 to 1956-57. These figures show that there has been a 34 per cent increase in stock sales from these runs from 1949-50, to the
present date. We point out that there has been no bad snow year in
the period under review. Most significant, however, is a steady
increase in production with little increase in stock numbers.
Aerial top-dressing and seeding has played no small part in this
improvement in the tussock country.
Acknowledgments are made to the Economic Service of the New
Zealand Wool and Meat Boards for data, and to runholders in my
instructorate for nine years of sincere co-operation, and to my col-
league, Dr Kevin O'Connor for guidance.

DISCUSSION
Chairman: You mentioned that burning is bad practice. Some-
times it is difficult to know what to do with heavy bracken-fern before
aerial top-dressing?
Mr Sievwright: There is no bracken in my instructorate. We
have noticed in areas that have been top-dressed in the Albury dis-
trict that bracken fern is increasing because of top-dressing; it does
respond to superphosphate. There is an experience that Mr Scherp
has provided; burn in the spring, get your seed and super and stock
on as soon as you can. Under that system burning is beneficial.
Mr Hurst, Waimate: Where is the dividing line between tussock
as a provider of microclimate and as a weed taking the place of good
grass and clover?
Mr Sievwright: Under normal management I have not found
tussock a weed in any case in my district. In the Rakaia Valley an
area top-dressed every year with two hundredweight of reverted
super has given a mat of clover which could be regarded as a bit of
a nuisance because of the ground being completely bare in the winter.
If the tussock is killed out by clover, frost lift can be serious.
Mr Hayman, Waimate: How about the use of reverted super?
Why not straight super?
Mr Sievwright: Reverted super was referred to as it was used
in the early trials when we had no clues about lime. Because of the
extra calcium available in reverted super we thought it would be an
improvement over the straight super. Our recommendation now is
straight super every time.
Mr H. Studholme, Christchurch: Can the development of a prop-
erty go far enough to cause a change from very fine-wool sheep to
strong-wool sheep?
Mr Sievwright: Whether we like it or not runholders who
improve their river-valley floors will have to change the breed of
sheep. We may have to run a halfbred or Corriedale flock in the
valleys and a hill flock of Merinos.
Chairman: Should we carry on as we are with Merinos and no
top-dressing or would it pay better to top-dress and change the breed
of sheep?
Mr Sievwright: I am a Merino man and like Merinos but I
think definitely the Merino is on the way out. By this aerial top-
dressing and oversowing and the subdivision of the lower flats there
are examples where they are getting much more wool and more sale-
able wool. Instead of getting rid of cast-for-age sheep at low prices
we can fatten them.
Mr Griffiths: Is it so much a question of the pure £ s. d. of the
economics of the change-over or is it more a case of if you do not
do this improvement then erosion is going to become more aggres-
sive?
Mr Sievwright: One thing about improvement on the valley floor is that you can ease your high country to help combat serious erosion. Much country must be spelled to recuperate. This is the answer we have at present to those people who say “shut up the high country.”

Mr Mackenzie: Have they tried sowing seed on tussock country in the Mackenzie after using the bush-and-bog discs?

Mr Sievwright: Our soils are lacking in humus; there is not enough growing season to develop a root and leaf system sufficient to build up humus. If we put the bush-and-bog discs on the country it would start frost lift and serious wind erosion. We can get a frost heave of 9 to 15 inches. We must keep the consolidation we have. We are getting good results from the Blackmore tip which introduces seed and super below the surface of ground without disturbing the consolidation. In cultivated areas I advocate lucerne; it lasts for at least ten years and then can be ploughed up and resown.

Mr Owen, Wales: It is a recognised fact that sheep are selective grazers. Do you think improving a portion of the runs is going to lead to sheep concentrating on the improved portions and leaving the others? And is there a chance of clovers being eaten out? Improvement must lead to increased fencing or the sheep will concentrate on the improved areas.

Mr Sievwright: The control of these improved pastures would be a very costly business if you had to rely on fencing, but I did mention that rock salt and differential top-dressing can be used as implements for control. I mentioned shepherding, too. That is what I had in mind when I mentioned if you pre-lamb shear and get the ewes off the river flats where they had wintered from April to September on to a top-dressed area on the top block, the ewes go to the top of the block to lamb and are there for keeps. Any subdivision by fences should be done up-and-down instead of across. You can control grazing by aerial top-dressing. Sheep concentrate on the lower, improved area for a while and then head up into snowgrass again. You can use aerial sowing as an implement to control stock.
CLOSING SPEECHES

Dr Burns expressed appreciation to those who had presented papers of such a very high standard. He particularly thanked the visitors, Sir Bruce Levy, Mr E. G. Griffiths, Mr D. McFarlane and Mr H. Sievwright, who had participated in the discussions in the evenings in Hudson Hall.

The Chairman thanked the Press and Radio for their assistance, and the Committee and staff of the College for their co-operation. He announced that the Chairman for the ensuing year would be Mr S. C. Bowmar, of Gore.

(Suggestions for papers to be read at the next conference in May, 1958, will be welcomed by the Hon. Secretary.)