One of the requirements of the Tussock Grasslands and Mountain Lands Institute is “To make information readily available to all interested people and organisations.”

While any information it has will be made available to newspapers, farming journals and the Broadcasting Service, the Committee of Management wishes to have a more personal contact with those farming on tussock grasslands.

The aim of this Review is to be the medium of that personal contact. But personal contacts can be really effective only on a two-way basis and the Committee hopes that run-holders will contribute to the Review by supplying information which could be of benefit to others. What we would like particularly are comments on improvement work that has been done; costs incurred, results and benefits achieved, and methods of handling problems which may have arisen from improvement.

Our initial mailing list is not complete. We would like to have the name and address of every one who is farming tussock grassland.

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A MESSAGE FROM THE CHAIRMAN

In this, the first issue of our “Review,” the Tussock Grasslands and Mountain Lands Institute is setting out its aims and objects. This publication will go to all farmers of the high and hill country in the South Island to advise them of our attempts to help solve some of their problems. For many years practically all farming research was concentrated on the lower and easier country and only recently has much interest been taken in the more difficult areas.

It is not our intention to set up a large organisation but rather to use Government Departments or other organisations wherever possible; only when absolutely necessary will we employ staff to undertake specific work.
A vast amount of information has been gained by the farmers of this area; this knowledge if it could all be gathered together would be of the greatest value. I ask you, if the opportunity occurs, to make your knowledge available to the officers of this Institute.

I hope that runholders will not think that the time has arrived for large-scale oversowing and topdressing of the high country without making an early investigation of their soil types and the responses obtainable on them. It is first necessary to find what the land needs and then how to make proper use of the extra vegetation obtained by improvement work. If it is proposed to establish beef cattle or increase the present herd, it cannot be done overnight and I do recommend that, as far as possible, they should be bred on the country or brought from some similar area. I would prefer to see any increase in stocking made with beef cattle and not sheep.

Improved management is closely tied with fencing and I realise that the cost of this item today may often be the deciding factor as to whether improvement is attempted or not.

The development of the vast area with which we are concerned is really only commencing and there are many things we know little about. The New Zealand Forest Service are now responsible for the control of noxious animals and we realise the difficult task they have to perform. Control of these animals is, of course, basic to any attempts made by the Service to establish protection forests in critical areas.

Over large areas many of the more succulent grasses have disappeared and the tougher fire-resistant species are left. In their present state they are unattractive to stock. We must look to the scientist to help us grow more palatable grasses.

The weed problem needs urgent and constant attention; it is only those who have these weeds who can appreciate how serious the position has become.

The Committee of Management realises the difficulty and complexity of the many problems with which you are faced but with the co-ordination of research which it hopes to bring about and the co-operation it hopes to receive from the runholders it is confident that many of these problems can be solved.

R. M. D. JOHNSON,
Mt. Torlesse, Springfield.
A PIECE OF HISTORY

Long before the turn of the century, the effects of over-grazing, uncontrolled burning and rabbits had shown in steadily advancing deterioration in the vegetative cover of many parts of the tussock grassland region. By 1910 the deterioration had become of major concern, surveys were made, commissions reported and scientists made investigations and carried out experiments. At various times suggestions were made that some co-ordinating authority should be established to decide on and help to implement a policy to which individual or group efforts could be related. But there was no cohesion among the run-holders themselves until, in 1940 at a public meeting at Tekapo, the High-Country Committee of Federated Farmers was formed. Its prime purpose was to represent the interests of high-country sheep farmers in the South Island in dealing with the Lands Department and the Committee was accepted by the Minister of Lands of the day, the Hon. Frank Langstone, as an advisory body on matters affecting the high country.

The Committee was extremely active in its evidence and representations to the Sheep Industry Commission which finally reported in March 1949. One of the major recommendations of the Commission was:

"A properly-equipped research station is necessary in the South Island high-country area, preferably in a low-rainfall district. In the past, various experiments have been made but their value to a great extent has been minimized because of their small, scattered nature, and because of the fact that there had not been a continuing close supervision of the areas. This can only be achieved by setting up a well-equipped research station which will be permanently staffed."

The report of the Commission and the controversies it aroused resulted in much consideration being given to research and other activities in the tussock grasslands. The farm committee of the Lincoln College Board of Governors led by the late Mr Errol Reid of Marlborough, suggested that the Board should provide the research station recommended by the Sheep Industry Commission. Arising from this, the then Chairman of the Board, the late Hon. W. H. Gillespie, M.P., Minister of Agriculture, called a conference at the College in May 1951. Every Government Department and organisation interested was represented. After a full day's discussion the following resolution was passed:

"That a committee of this conference be set up to inquire into the scope of the existing research activities, to
examine avenues for expansion and to bring forward pro-
posals for the further development of high-country re-
search.”

(It could be mentioned here that the term “high coun-
try” can be confusing to the uninitiated. It is not neces-
sarily defined in terms of altitude—rather does it refer to
a class of sheep farming confined largely to tussock grass-
land.)

The committee appointed was almost identical with the
present representation on the Committee of Management
of the Tussock Grasslands and Mountain Lands Institute.
It met on several occasions from 1951 to 1955, but received
little encouragement from Government or the various
Departments concerned. During this period the South
Island Catchment Boards were becoming increasingly con-
scious of the importance of the tussock grasslands as the
catchments of so many problem rivers threatening down-
country farmland and urban areas. In January 1955 they
called a conference at Kurow to which they invited the
High-Country Committee of Federated Farmers and the
Soil Conservation and Rivers Control Council. The whole
problem was stated so fully and so clearly that even today
little of moment could be added. An inspection was made
of the Tara Hills Experiment Station and Run of the Soil
Conservation and Rivers Control Council and it was gener-
ally agreed that the Government should be urged to estab-
lish a Tussock Grassland Research Institute at Lincoln
College and that Tara Hills, together with suitable areas of
snowgrass on other properties, should be constituted as an
out-station.

In May 1955 the Soil Conservation and Rivers Control
Council called a meeting in Christchurch of 25 members of
staff of Government Departments and Catchment Boards
engaged in research in the tussock grasslands. After two
days’ discussion there was general agreement that there
was an urgent need for a co-ordinating centre, preferably at
Lincoln, with Tara Hills as a research station.

Little satisfaction was obtained but the Soil Conserva-
tion Council attempted constructive action. It asked its
Soil Conservation Committee to sit also as a co-ordinating
committee on tussock grassland research. Mr L. H. Chap-
man from the High-Country Committee and Mr R. M. D.
Johnson representing the South Island Catchment Boards
were invited to sit on this co-ordinating committee which
continued to urge the proposal for an Institute. Lincoln
College offered facilities and the Soil Conservation Council
was prepared to provide the full cost. However the Govern-
ment preferred that the industry should also participate. The Meat Producers' Board and the Wool Board each agreed to contribute and in March 1960 Cabinet approved the establishment of the present Institute.

The Cabinet minute setting up the Institute stated that its objects were to be:

“(a) To investigate the various aspects of management of the tussock grasslands and mountain lands.

(b) To develop techniques to bring about a more protective and stabilising cover of vegetation, so as to mitigate soil erosion, and the choking of river channels with detritus, to minimise flooding, and to safeguard production.

(c) To provide a centre to facilitate the co-ordination of all research aimed to protect and improve the tussock grasslands and mountain lands, and to make this information readily available to all interested people and organisations.

(d) To foster and undertake research where necessary, in any appropriate fields not otherwise covered.”

A Committee of Management of ten was set up with the following representation and membership:


Department of Agriculture: Mr S. H. Saxby.

Department of Lands and Survey: Mr T. W. Preston.

New Zealand Forest Service: Mr J. T. Holloway.

Department of Scientific and Industrial Research: Mr I. L. Baumgart.

Federated Farmers (High-Country Committee): Mr D. McLeod.

N.Z. Meat Producers' Board: Mr C. J. Speight.


Lincoln College: Dr. M. M. Burns.

The grants for the first year were as follows:

<table>
<thead>
<tr>
<th>Organization</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Conservation and Rivers Control Council</td>
<td>£8000</td>
</tr>
<tr>
<td>New Zealand Meat Producers' Board</td>
<td>£1000</td>
</tr>
<tr>
<td>New Zealand Wool Board</td>
<td>£1000</td>
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</tbody>
</table>

| Total                                             | £10,000 |
The Soil Conservation and Rivers Control Council agreed in addition to meet the costs of establishment of the Institute.

The Committee of Management at its inaugural meeting in May 1960 set out to survey, on broad lines, the field of endeavour and the existing research programme. In July 1960, it decided to adopt the following as the general policy of the Institute:

“(a) To examine the present state of the tussock grasslands region, the available scientific information, the administration of the region and the farming practices in use.

(b) To determine what additional information is required to devise the optimum utilization of the full range of tussock grasslands and to take steps to secure such information—through existing organisations, and where necessary, through its own research unit.

(c) To disseminate the information gained and to make recommendations on its application.

(d) To keep the objectives of the Institute and its progress towards them clearly before the participating bodies, especially the high country runholders.”

In the light of this decision on policy the Committee of Management advertised in all English-speaking countries the position of Director. At their third meeting on 6 November 1960 they decided to appoint Mr L. W. McCaskill who at that time held the position of Associate Professor of Rural Education at Lincoln College. He took up his duties on 7 February 1961 and proceeded to establish offices in a building made available to the Institute by the Department of Scientific and Industrial Research. This building originally built to house the Wheat Research Institute is situated in the College grounds.

The finances of the Institute are administered through the Accounts Department of Lincoln College and its annual programme is subject to the approval of the Soil Conservation and Rivers Control Council.

The postal address of the Tussock Grasslands and Mountain Lands Institute is:

P.O. Box 56,
Lincoln College,
Christchurch

and the telephone number is:

62-839 Christchurch.
POLICY DECISIONS

The Committee of Management has made the following policy decisions.

Research

The policy on research has been defined as follows:

i. The encouragement of individual research programmes of State Departments and other organisations where such work is of assistance to the attainment of the general objectives of the Institute.

ii. Recommendation of suitable projects in fields not already covered but deemed to be of importance.

iii. The sponsoring and funding of individual research projects of definite interest to the Institute.

iv. The initiating of research by Institute staff on projects deemed to be important but which cannot be adequately carried out by other organisations.

Retirement of Land

The Committee has expressed the opinion that where it is considered desirable to retire land permanently from grazing, the whole cost of the erection of the fences should be borne by the State and the land occupier should be responsible for normal maintenance.

Aerial Photography and Mapping, and Land Capability

As accurate maps are the basis of land capability surveys which in turn are essential to the planning of modifications of land use, the Institute has urged the Department of Lands to expedite the aerial photography and production of maps of the mountain lands. It has also supported the efforts being made by the Soil Conservation and Rivers Control Council to provide increased numbers of soil conservation officers for Catchment Boards so that land capability surveys can be completed in reasonable time.

Weeds

Because physical conditions impose practical limitations to the application of chemical methods of weed control in tussock grasslands and mountain lands, the Committee has urged the Department of Scientific and Industrial Research to intensify its programme of investigations into the biological control of weeds of importance in this region.

Noxious Animals

Believing that the effect of noxious animals on the vital catchment areas has been one of the major factors in causing accelerated erosion and aggradation of riverbeds, that complete eradication from these areas is essential, and that shooting is inadequate for the purpose, the Committee has urged the New Zealand Forest Service to adopt a policy
of poisoning and to continue to use it until eradication in these areas is achieved.

**Improvement Work**

As one of its aims is increasing the cover and thus the stability of the high-altitude grasslands, and as decreased use by domestic animals of those areas is dependent on higher-carrying-capacity of the lower-altitude grasslands, the Institute has decided that it will aim at encouraging the maximum possible improvement of areas of fescue tussock and low-altitude snowgrass as soon as possible by:

1. Fostering further plot trials to define areas of response by the Farm Advisory Division of the Department of Agriculture and by land occupiers.
2. Fostering and instituting studies of the economics of improvement and of modifications of management resulting therefrom.
3. Advocating the maximum possible financial assistance to those wishing to undertake improvement.

**Fertiliser Trials**

The Institute decided to support the offer of Dr T. W. Walker, Professor of Soil Science, Lincoln College, to supply a plan and the materials necessary to enable farmers to find for themselves the most likely soil deficiencies influencing the establishment and growth of clovers in tussock country. (Full details are supplied in an insert in this Review.)

**Management Officer**

The Institute is calling applications for the position of Management Officer who will be expected to be a major link between the Institute and run-holders. He will investigate and advise on problems of management such as:

1. Management of improved country and the economics of improvement.
2. Methods of grazing management on unimproved country to enable the development of better cover and obtain full benefit from the improved country.
3. Stock management including balance of sheep and cattle, special feeding, and age, sex and breed of stock for varying types of country.
4. Methods of management which will enable adjustments of grazing pressure on problem country without upsetting the general economy of the run.
It is expected that the Management Officer will co-operate with Pastoral Lands Officers in the preparation of Run Improvement Plans and in addition with Soil Conservators in the preparation of Run Conservation Plans.

He will also co-operate with workers in the field of economics in their studies of high-country properties.

Where unoccupied lands adjoin runs, the Management Officer will be the liaison between the Institute and the authority administering the unoccupied land, e.g., New Zealand Forest Service, Department of Lands and National Parks Authority.

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**MATAGOURI**

As mentioned elsewhere in this Review, it is hoped that occupiers of tussock grassland will assist the editor by supplying items of interest, expressing opinions or commenting on problems of the tussock country. For the next issue we invite comments on matagouri, a plant which is of outstanding interest to botanists throughout the world.

The Maoris knew the plant as tumatakuru; the botanist called it *Discaria toumatou*, the second name being a modification of the Maori; the settlers quite early corrupted the Maori name to the harsh-sounding matagouri (it is sometimes spelt matagowrie); the name Wild Irishman seems to have no meaning at all.

The plant grows only in New Zealand but a close relation is found in Australia. In the North Island it grows on coastal dunes from north of the mouth of the Waikato River down to Cook Straight and it also occurs in scattered localities inland. Nowhere in the North Island is it very common. Its real home is the South Island tussock grasslands up to about 3000 feet but it is also found occasionally on the western side of the Southern Alps.

On the sand dunes, the stony river beds, on light stony soils, or the dry and rocky hillsides, matagouri is usually found as a small shrub with intertangled, wiry branches. In the cooler upper river valleys it may still be found as a small tree, up to 20 feet high, and with a trunk up to a foot through. Such trees were quite common in the early days and provided firewood and occasionally building material.
If a bush is examined in the spring, especially if it grows in a damp or shady spot, it will be found to have plenty of leaves, small and soft, in clusters of two to six, usually just below the spines but sometimes in the axils. As the season advances and conditions become drier these leaves get fewer and fewer until we may have a completely leafless shrub which has to rely on the green spines and branchlets to carry on the process of starch-making.
The flowers appear in late spring and early summer. They arise in the axils of the leaves, singly or in small clusters. Though only about an eighth of an inch in diameter, close examination will show that there are four or five parts to the calyx, no petals, and four or five stamens. For such a small flower the amount of scent is remarkable. The ovary develops into a fruit dividing into three parts. The fact that the ovary stands on a broad, flat disk, gives the plant its first botanical name from a Greek word meaning "a disk."

Just as the spiny leaves of the speargrass or Spaniard puzzled the early botanists, so did the spines of matagouri. Dr Leonard Cockayne helped to clear up the puzzle by growing plants from seed. The seedling is leafy and without spines. If the young plant is left exposed to sun and wind, the leaves get smaller and fewer and some spines gradually develop. If, on the other hand, a seedling is kept in a moist place, such as a cool greenhouse, the juvenile, spineless tumatatuku will remain in that condition indefinitely. Give it only a week in dry air and the spines will begin to develop. Look at a plant growing in shade with a trickle of moisture near its roots and you will probably find some leafy shoots with no spines at all.

Cockayne concluded that matagouri was originally a spineless, leafy plant adapted to life in moister air than we now normally experience; as the climate has become drier the leaf surface has been reduced to reduce the plant's demand for water. But in spring when it is leafy, and in the seedling stage, it reminds us of its past history.

It is well known that legumes have root nodules which contain bacteria capable of fixing atmospheric nitrogen. But non-leguminous plants may also fix nitrogen in nodules, the tree tutu doing this in substantial amounts. Recently it has been shown that the nodules which occur on matagouri make the plant partly, if not wholly, self-sufficient as far as nitrogen is concerned.

Opinions differ as to the significance of matagouri as a weed. Some say it is of no consequence; others say it seriously interferes with mustering, it reduces the grazing area and it is one of the main reasons why burning is necessary. Some say it can be controlled readily by a hot fire in the spring. Others again say that burning eventually increases the problem.

Please let the editor have your views and experiences. An article incorporating the information supplied will appear in the next Review.
IMPROVEMENT IN THE MACKENZIE

(On 16 March 1961 a conference of run-holders, organised by Mr D. G. Reynolds of the Department of Agriculture, was held at Lake Tekapo. Two of the papers read by run-holders have wide application and we are privileged to print them.)

IMPROVEMENT OF A HOGGET BLOCK

I. K. Ivey, Glentanner

One of the problems which concerned early investigators in high-country farming was the almost chronic condition of malnutrition which affected many or most of the flocks of fine-woolled sheep. This was characterised by broken wool, poor constitution and poor hogget-rearing and added to the uncertainty of the climate. It made the maintenance of flock numbers a perpetual challenge and left little room for improvement by culling. Further, culling under such circumstances was of doubtful benefit for long-term improvement.

Glentanner has suffered these natural shortcomings as severely as most and it was obvious that if anything was to be done to obtain better sheep performance there would have to be some improvement in feed supply both in quantity and quality throughout the 12 months of the year. How best to achieve this was the problem.

There were a number of possibilities. Feeding with bought-in hay was one. Growing more hay on the available land was another. Concentrates with or without hay were also considered. These all suffered the disadvantages of being too costly, labour demanding and giving no long-term improvement. There were a number of ways of tackling the hill ground.

The methods finally used are by no means conclusive but they have, however, achieved the triple object of:

1. Improving the cover of the country both from the point of view of sheep feed and soil conservation.
2. Improving the consequent production of wool and meat.
3. Providing an economic return.

Glentanner lies along the Ben Ohau range and is divided into a hogget block, three ewe blocks and a subdivided wether block. Ninety per cent of the country used for sheep is very steep. There are extensive areas of river flats which are being developed mainly for cattle. Rainfall varies be-
tween 40 and 100 inches. The length and severity of the winter are well known.

Obviously, any improvement in the sheep flock would have to start with the hoggets and accordingly, it is to this block that attention was first directed. This hogget block is reasonably similar to the other blocks in that it is steep and was covered in dense, waving snowgrass over much of the area which allowed no alternative tussock growth and was impossible for sheep to penetrate either for feed or mustering. The gullies were badly overgrown with scrub—matagouri and manuka. Each of these was shoulder high and rapidly getting worse, the effect of which was to make large areas of the blocks unavailable to sheep.

The effect of this was two-fold. The scrub areas became more rank, killing useful tussock cover and the remaining areas were overgrazed by the same number of sheep; an intolerable situation. It followed, naturally, that the only tool for improving this country was fire and accordingly the whole hogget block was burnt in the spring of 1957. This achieved at once a good clearance of scrub and snowgrass. Letting light into the ground surface of this once-useless cover, has allowed the re-establishment of useful native species. Where there is a dominance of snowgrass in the area to be burnt, to do as little damage as possible to the snowgrass, it is essential to burn late. Early burning is definitely harmful.

Oversowing followed rapidly on the track of the burn and 2,000 acres were treated with 1 cwt of fortified super containing 400 lb sulphur per ton.

A mixture of clovers comprising red, white and alsike was sown together with cocksfoot, timothy and dogstail. The result has been a very good establishment of legumes, and the grasses are slowly assuming some significance. One of the notable effects of burning has been the improvement of the density and vigour of the more palatable tussock species, which after three years have come in very strongly where previously there was only dense scrub. This has also occurred on the river flats where the use of burning, oversowing and cattle has reduced the amount of swamp roughage to a point where clovers and grasses are coming in.

The sequence of events has proved to be well worthwhile and follow-ups of topdressing will improve the situation still further. The same principles will now be applied to the new blocks in succeeding years. The only change so far is that a period of one year will elapse between burning and oversowing. This will allow the useful tussock plants
to improve in density and vigour and afford a better seed bed for the germinating seedlings of clover and grass. It will also give a better initial dominance of natives in the improved swards besides making for more economical use of seed and manure.

Management after sowing is critical. Seed and fertiliser are sown in July or August and for the first six growing months grazing is kept as light as possible. Preferably there should be no grazing, but this is impossible in our case. Thereafter, full use can be made of the block and topdressings applied every two or three years. So far improvement has come from existing carrying capacities and only after these have maintained reasonable levels will an endeavour be made to increase the flock.

The practice of burning and oversowing with judicious grazing was one aspect of the improvement. The other important item was fencing. An endeavour has been made to separate the higher areas from the better type of country. This has improved not only the intensity of the grazing but also made very worthwhile savings in the time taken to muster and has allowed the very high, steep country to be virtually removed from grazing by sheep except for very short seasons of the year. Much of the worthwhile effect of this is being nullified by the concentration of chamois, thar and deer.

Inevitably the improvement in the tussock block will have an influence on the type of sheep we breed. Importance must be given to breeding a type having constitution and true-breeding characteristics. It is essential to have hoggets of a type which will contend with the limiting factors of the country.

Time does not permit a full discussion of the economics of this work but you will be able to judge for yourselves when I say that the hogget wool clip increased by 70 to 80 per cent in the first year and the death rate dropped by 20 per cent, allowing some effective culling.

To sum up, improvement work has combined three separate entities:

1. Burning and oversowing:
   (a) To improve the quantity of feed to avoid malnutrition.
   (b) To improve the quality of feed in order to eliminate such problems as rickets.
   (c) To extend the duration of feeding as far as possible throughout the year.
2. Fencing:
   (a) Better fencing requires less labour and mustering.
   (b) Control of feeding over the vital spring weeks and the rest of the year.
   (c) Forcing sheep into blocks where they are not naturally drawn and by control grazing eliminating snow risk.

3. Stock Type:
   Consideration must be given from time to time to reassessment of the stock type as the amount of improvement increases.

The indications from this are that for this class of country there is an extremely bright future as long as our primary produce markets return us a useful sum, and we are permitted the complete use of the country to its betterment and our own.

THE PLACE OF CATTLE

J. Moir, Glenlyon.

Glenlyon is situated at the head of Lake Ohau and takes in both sides of the Dobson Valley. The valley floor is about 1,750 feet above sea level at the lake and rises to approximately 2,500 feet at the head of the valley, some 25 miles from the lake. In this valley the 600 odd cows and replacements are run. The cattle are mainly Herefords. The aim, however, is to have a straight line of Hereford cows and run perhaps a third of the cows with a black bull to achieve that very popular and most saleable beast, the black with the white face. One man recently quoted figures to the effect that the beast of this cross at about eighteen months went off a month earlier and killed out up to 50 lb heavier than the straight Black Poll or Hereford.

The area is subject to a fairly-short growing season and full use of the head of the valley must be made during summer and autumn months. Snow in May usually puts cattle down on to winter country where they calve. In December the bulls go out and the whole mob goes into the head of the valley. Some encouragement to keep them there is necessary and salt is used for that purpose. Small blocks of topdressed country would do the same job and the cattle would spread the better clovers and grasses to advantage. A man stays with the cattle for a week or so until they settle down, there being no fences across the valley for its entire length.
The next muster is for marking, about the end of January, the calves being about three months old. The practice recently has been to dehorn the steer calves to cater for popular demand. A simple cup-type disbudder is effective.

Some will ask, why not use a polled bull? It is our belief that the Hereford is able to hold its own in most conditions, is a docile animal, milks well, is heavy boned and holds its size better than some breeds when under hard conditions.

Constitution, character and colour are main points in any breed and the Hereford, being an old breed, is very uniform. It is interesting to note that the main beef-eating countries—Australia, America and Argentine—all run a very large proportion of Herefords.

Troubles are few with the Hereford; cancer eye is one, and can be eliminated to a large extent by culling beasts with little or no pigment round the eye. This point should also be remembered when selecting a bull. Having good bone and feet the Hereford can travel and if a beast cannot travel, he just won't do.

Contagious abortion is a very real trouble amongst any cattle, but is effectively cancelled out today by vaccinating heifers at weaning.

Herefords are good to handle, answering a dog well, provided he's not the teasing type. On one occasion (in fact, it's the only time I remember timing drafting) one man on the gates and two in the yard put through just under a thousand in 55 minutes.

On Glenlyon, galloping horses and stockwhips are "out" and patience is the password. The cattle handle well for a man on foot and he has no need to be nervous. Remember, it is lack of handling or the way they are handled that makes cattle wild.

After marking, cattle go into the head of the valley again, until six or seven weeks later they come out for weaning. Replacement heifers are taken off and the balance of the calves are driven to a paddock at the homestead, some seven miles from the yards. From there they are driven on the hoof to Temuka, the trip taking about a fortnight and sold in truck lots at an unreserved private sale.

At a convenient time after weaning, the cows are culled and the remainder of the mob are returned to the head of the valley until snow puts them out. An area of about 1,500 acres is saved for late winter and early spring and when
cows are in hand at this time, some cows are taken off to go to the black bull.

Wintering the cattle is no problem. Mostly they are run on flats and islands that are inclined to be swampy, and they do a good job improving the quality of those pastures with clovers, cocksfoot and timothy to the detriment of rushes and sedges. The ratio of cattle to sheep on Glenlyon is at present, one beast to ten sheep and at this level, no supplementary feed is required. The cattle at the end of an average winter are in fairly good condition, but as with all stock in back country, a late spring does set them back to some extent.

Now let us consider the farmer who wants to run cows in a small way. The best practice could be to buy in a straight line of heifers or cows and cross them with a bull that gives a popular and saleable calf. Where calves are being sold off annually, a major consideration in buying cows is to look for a good milking strain and where possible to buy stock from harder country than that on which they will be grazing in future.

On good country, a smaller property is perhaps better to buy and fatten rather than breed. The keeping of replacement heifers and buying bulls eats into the possible profit.

Some farmers are put off the idea of running cattle because of stories they have heard about cattle being hard on fences. This may be the case where poor fences have taught bad habits. Generally, cattle can be kept where they belong with an ordinary fence of six plain wires and a hog barb on the top. In fact a fence that will hold Romneys is quite good enough to hold cattle. In extreme cases one electric wire is useful.

Weaning is one time when fences can be knocked about and a method that works is to run two mobs of cows, one at each end of the farm. At weaning time one lot of calves is drafted into the other mob of cows and vice versa. Thus the cows are too busy looking for their respective calves amongst the strangers to trouble the fences.

The potential of cattle in Canterbury, and in the Mackenzie in particular, is great, and apart from being profitable, they do considerable good (the Catchment Boards say so); but it is a fact that roughage in the form of a cow pad is much more profitable than a cloud of smoke. Cattle keep country open and healthy for sheep and it is noticeable that any property running a number of cattle has very little
trouble with ill-thrift and many of these properties do not even possess a drenching gun.

We were interested to learn from the Department of Scientific and Industrial Research that they had proved cattle a factor in the control of grass grub. Grass grub had been controlled to the extent of 60 per cent with cattle, as against 30 per cent with sheep and 12 per cent with a heavy roller. The weight of a beast on its cloven hoof has killed grubs more than an inch and a half below the surface, which in this age of aerial topdressing and improved pastures could mean a great saving on DDT.

The amount of labour on Glenlyon is not great and generally this applies with cattle. For instance, one man running a beef-fattening property in North Canterbury puts off 400 fats per year and says it takes a third of his time. On Glenlyon, apart from the calf drive to Temuka, which two men can handle after leaving Pukaki, two men take the cattle up the valley in two days and the same time to bring them down. Marking is the one time when some vigorous help is appreciated. Four men have done the job in a day more than once; six or seven men make it an enjoyable day.

The work with the cattle thus amounts to about a month for two men and you have no worry about shearers.

To summarise a few points:

1. Management:
   (a) Cattle don’t interfere with sheep work.
   (b) You make fuller use of existing labour.
   (c) Cattle improve sheep country and utilize feed otherwise wasted.

2. Fencing:
   Nothing elaborate is required.

3. Wintering:
   On run country no supplementary feed is required if ratio with sheep is right.

4. Breed:
   Herefords are hardy and excellent for crossing.

To conclude, I would mention that the demand for beef throughout the world is growing and while this trend continues, the place of cattle is assured.
CO-ORDINATION

As a co-ordinating agency the Tussock Grasslands and Mountain Lands Institute must consider the interests and research and action programmes of the following:

1. The Botany Division, Grasslands Division, Crop Research Division, Entomology Division and Soil Bureau of the Department of Scientific and Industrial Research.

2. New Zealand Forest Service, especially its Forest and Range Experiment Station.

3. Department of Agriculture, especially its Farm Advisory Division.

4. Department of Lands and Survey.

5. Department of Internal Affairs.

6. State Electricity Department.


9. The Universities and Agricultural Colleges.

10. New Zealand Meat Producers' Board.

11. New Zealand Wool Board.

Commencing at the top right-hand corner and moving clockwise the plants illustrated are as follows:

**New Zealand Blue-bell** (*Wahlenbergia albo-marginata*).
G. Wahlenberg was a Professor of Botany at Upsala, Sweden. The second name means “white-margined” and refers to the markings on the leaves.

**Mountain Buttercup** (*Ranunculus lyallii*).
Ranunculus is the name for a small frog and was given to the genus of buttercups because so many grow in swamps or the margins of ponds, the habitat of frogs. Dr David Lyall was a surgeon-botanist on the survey ship H.M.S. Acheron.

**New Zealand Gentian** (*Gentiana corymbifera*).
The first gentians were named from Gentius, an ancient king who used them medicinally. The second name refers to the structure of the cluster of flowers.

**Matagouri** (*Discaria toumatou*).
The names are explained in a special article in this Review.

**Coprosma petriei**.
The first name is Greek for “dung smell” and refers to the unpleasant smell of some species of which the New Zealand Stinkwood is well-known to bushmen. Mr Donald Petrie was a school-inspector in Otago who was a leading authority on the botany of the tussock grasslands.

**Large Mountain Daisy** (*Celmisia coriacea*).
The first botanical name is the classical name of an ancient priest and is given to a genus with 58 species found in our tussock grasslands and mountain lands. The second name means “leathery” and refers to the very tough, silvery leaves.

The centre panel will be changed with each issue of the Review. In the present panel the artist has shown a Merino ewe and lamb, the breed which was basic to the development of our present system of animal husbandry in the tussock grasslands.