NEW DIRECTOR

Dr K. F. O'Connor has been appointed Director of the Institute and Professor of Rangeland Management at Lincoln College. He has been Officer in Charge of the Lincoln Substation of the Grasslands Division, D.S.I.R., since 1959, and is well known for his interest in the development of the high-country region. He will take up his new position in early November.

Cover Drawing by Colin Wheeler.

Mr Wheeler is author-artist of the successful book, "Historic Sheep Stations of the South Island".

He has drawn this sketch for the Review as some appreciation of the "nothing but kindness and consideration my wife and I have met while on our travels in the high country". 
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JOHN ACLAND ON BEEF BREEDS

For five months in 1968 John Acland studied beef cattle production in the British Isles as a Nuffield Farming Scholar. Here, Graham Hughes questions him about the impressions he formed of the different breeds and their suitability for New Zealand conditions.

John, Mt Peel Station is well known for its success in the chiller beef competitions against all comers with its Aberdeen Angus carcasses. Yet you've been reported as saying that the breed is losing popularity in Britain. Are your cattle different from what you saw over there? Or what do the British beef fatteners have against their own type of Aberdeen Angus?

Yes, Graham, I did find that the British Aberdeen Angus cattle were different from what we have been breeding in New Zealand, especially those that we have at Mt Peel. I found them to be short in body length, dumpy, low set and of little commercial value, I thought, to us here. The Aberdeen Angus breed is losing its popularity in England. Perhaps the breed society figures will give you some idea of this. Aberdeen Angus breed members have dropped by 400 over the last ten years and the membership for the Hereford, which is a much bigger, longer-bodied animal, has increased by 1300 in that time.

The other reason for the Aberdeen Angus losing its popularity recently is that in the U.K. there is a very good beef recording association which has six performance-testing stations throughout the country. Aberdeen Angus breeders were at first very reluctant to send their animals to these stations, but now everybody over there talks about what weight an animal under test was at 400 days after being fed under these standard conditions where all breeds are treated the same. The testing stations have shown that the Aberdeen Angus has one of the lowest average live-weight gains of any breed in the U.K. today. Their figures were extremely interesting—the Aberdeen Angus at 400 days of age ranged from 630-1250 lbs live weight, the Hereford 610-1350 lbs and the South Devon 700-1450 lbs in 400 days. That is, if we take only the top third, the Hereford would be about 100 lbs better than the Aberdeen Angus and the South
Devon (which was a breed I had never heard of until I went to the U.K.) would be another 100 lbs heavier than the Hereford, or about 200 lbs better than the Aberdeen Angus! This has shaken a lot of people.

Do I take it then, that the British beef industry has two distinct types of farmers—the stud breeders and the beef producers—and that they may not always have the same objective?

Yes, there are definitely the two different types of farmers. Perhaps we have them in New Zealand as well. I would agree that they have different objectives. On the other hand I still think that it is in the producers’ hands to alter this. I went onto some of the Scottish Aberdeen Angus stud farms and on one I discussed with perhaps the top man in the world on this subject, why he was breeding this low-set, dumpy animal suckled on an Ayrshire cow and, I thought, of no use to us at all. His reply was that if he was getting maybe £6,000 and up to £20,000 for his bulls, he was breeding what the market demanded. Therefore it is up to the market to demand the right type of animal. I think that this is happening now, which explains why the breed numbers of the Aberdeen Angus are falling.
Just how much were you impressed by what you saw of the Friesian breed in Britain? Several New Zealand scientists rank it as our best prospect for beef production. Do you think it will become popular in our back country in its own right, or perhaps crossed with the Hereford, or the Aberdeen Angus, or the Charolais?

I was most impressed with this animal in England. Really, the outstanding thing I saw in the U.K. was the terrific amount of Friesian beef. The British beef fatteners have always been keen on crossbred animals and they are perhaps swinging even more to the Friesian for this. In fact, half the beef produced in the U.K. comes from the Friesian or its crosses, as a result of the largely Friesian dairy industry, but let us not forget that the Friesian is also one of the most efficient converters of grass into beef. I think that it has definitely got a much bigger place in New Zealand for beef production. This has already been shown in the work at Whatawhata in the North Island, but I do not think anybody in the South Island should rush into this breed until there is quite a lot more work done. It would worry me how hardy the Friesian was and whether it would climb out and I think that these questions would need to be answered before people went into it. I think it is essential that Tara Hills and Invermay, for instance, get cracking on this to give us the answers before too long.

I have read that the Friesian-Hereford cross is becoming very popular in Britain. How good an animal is it?

Yes, I would be much happier to see it used as a crossing animal and people in the lower hills could do this now. Some of the work that I have seen done showed that the Hereford-Friesian is a better converter of grass and suits the conditions better than the straight Friesian. I was very impressed with this cross and I like it better than the Aberdeen Angus-Friesian cross, even if only because of its colour mark. With the Aberdeen Angus-Friesian you still have a black animal and after the first cross what do you do?

Generally speaking the weaning weight of Hereford-Friesian calves at say 6-7 months is about 100 lbs liveweight heavier than that of the traditional Aberdeen Angus calves.

Did you form any impression of the hardiness of these Friesians and Friesian crosses?

No, I really didn’t, but I have had a few doubts about them and I think this in New Zealand too of the many Friesians that I have seen under tough conditions—that they are not as
hardy as the other beef breeds. However, I am saying this just from eye appraisal and I think that there must be research work done to show one way or the other whether they are hardy and can survive under our back-country conditions.

**What future do you see for the Charolais here?**

I do see a place for the Charolais here but at this stage only as a crossing animal whereby those people in the lower foothills country, running say 500 Aberdeen Angus cows, could cross a couple of hundred of those with the Charolais. I would say that at 18 months of age, going on what the Charolais are doing now at Mt Peel, it looks as though there could be between 70 and 100 lbs more beef, i.e. dead weight, at 18 months, from Charolais crossed with Aberdeen Angus than from straight Aberdeen Angus. This means another $20 per animal.

**Are there really calving difficulties with them?**

Any American work that I have read on crossing the Charolais with the traditional breeds (not talking about first-calving heifers) shows that there are no differences in calving difficulties compared to other crosses, say Hereford x Aberdeen Angus. We had no calving trouble with the 46 Charolais cross calves born at Mt Peel last spring.

_A Hereford/Friesian Cross Steer._

(Photograph: J. Acland)
How about the Shorthorn? Its numbers seem to be declining here although it used to be one of our best beef animals and keenly sought after by butchers.

Yes, this is so in the U.K., too—I think really it has just beaten the Aberdeen Angus to the gun in producing the small, dumpy-type animal and people went off it for that reason, but I think the Shorthorn could make a come-back. I saw some good big Milking Shorthorns in the U.K. Perhaps if some of these bulls were brought back into the beef-type Shorthorns it could have a place. There are a tremendous number of Shorthorns in Australia.

And the Galloway? If it’s found mainly in the harsh, cold highlands of Scotland, is their climate any worse than that of our New Zealand mountains? Galloways have a good reputation for looking after themselves in tough conditions here. What does the British beef industry think of them?

I won’t argue about the climate but I don’t think that it’s really much harsher in Scotland than in our true high country in the South Island. The Galloway, as with other beef breeds, is used for crossing and this is something which struck me the whole time I was away—I did not see any purebred commercial Aberdeen Angus herds at all, or for that matter, any purebred Hereford or Galloway herds either. There must be some around to start the crossing with but they must be very few compared to what we have in New Zealand.
The Galloway, as I said, is mainly used as a crossing animal, especially to breed the traditional blue/grey cow that you find all over Scotland. This blue/grey is a cross between a white Shorthorn bull and a Galloway cow.

I don’t really see that there is a place for Galloways in New Zealand as I think they are slower to mature and their daily live-weight gain is the lowest of any breed in the U.K.

Are there any other breeds which are doing well in Britain?

Yes, there are two or three other breeds which could perhaps be looked at. There is the Lincoln Red and the South Devon which all have good daily live-weight gains but I really think that the South Devon is the only one which could be a possibility for New Zealand.

A Typical Scottish Winter Scene. Galloway/Shorthorn Cross Cattle Feeding on Silage. (Photo: J. Acland)

I hear that the British go in for fattening young stock on barley in quite a big way, but I understand, too, that the lower price for beef in this country would make it uneconomic for us. However, what is your opinion about this, John? From your experience, is there any case for wintering beef cattle on grain or even concentrates in the South Island?

In the U.K. they do have this system of barley beef and this is where the Friesian shines. All barley-beef fatteners use Friesians because they are better at converting food into beef.
They are being fed on straight barley and sold at 11 months. I don’t see a place for the straight barley-beef story in New Zealand but I do see a place for using perhaps 3-4 lbs of barley per day with some other type of food for wintering and I think that this is where it would fit in very well with silage. On straight silage, weaner cattle might gain no better than \( \frac{1}{2} \) lb per day but by adding about 3 lbs barley to the silage I am sure that weaners could probably be lifted up to over 1 lb of gain per day. I think that 1 lb a day is a better level of live-weight gain for weaners over the winter than \( \frac{1}{2} \) lb a day.

**How about roots and silage then?**

From the work we have done at Mt Peel, which was a trial two years ago with silage versus swedes, we got \( \frac{1}{2} \) lb daily live-weight gain from the silage but about \( 1\frac{1}{4} \) lbs daily live-weight gain from swedes. We had hoped to use silage for our weaner cattle because we didn’t want to go on ploughing up good country for swedes. I don’t really think there is a place for feeding silage to weaner cattle unless you are prepared to feed barley as well, but I do think there is definitely a place for silage with, say, 18-months-old heifers and perhaps cows at calving time. They can be fed on self-fed silage. It is a fairly cheap product.

**Are you ready for performance testing yet on the Mt Peel cattle? Or is it just a good idea but too difficult for hill country?**

We have done quite a bit of talking about performance testing at Mt Peel, probably too much talk and not enough action, but the reason why we haven’t done it so far is that we have found it too big a job to do over our whole 1,000 cows—which is the ideal thing. We really are going to make an effort this coming year and we hope to start by selecting our best 200 cows at weaning time. By our best cows I mean based on weight of calf at weaning time, not on eye appearance. We will then isolate these cows from the main mob and breed our run bulls from these cows. From the progeny of these 200 cows we will select only the top six or eight bulls a year to use over the rest of our cows. One thing we will have to do is to keep screening, that is keep looking at our main mob of cows each year—maybe it will be 1,000 by then—to see if there are any really good cows out in the main mob which we can bring up into our nucleus herd to breed bulls from. It does create problems, however, and I don’t see too many people doing this because you really do need to know on what date the cow calved, so that you can weigh and work out the growth rate of her calf. This means we will have to freeze-brand number the whole herd.
Or perhaps we could forget about trying to note the actual date of birth and fix on a selection date, say nine months from the middle of the first cycle. Now this will penalise those cows that are late calvers but this is probably a good thing—to get rid of these cows and try and get all your cows conceiving, say, in the first two cycles at most.

John, now that you have had some months since your return to put things in perspective, what were the most important lessons you think we can learn from the British beef cattle industry?

I think what I learned best was that one must keep an open mind on all things to do with cattle breeding. Perhaps the thing which impressed me most while I was away was the work that the Beef Recording Association is doing in the U.K. It was a bigger edition of the work which is already going on in our own performance recording scheme. I think that we must get performance-testing stations as soon as possible, probably two in the South Island and two in the North Island, so that we are then selecting our best bulls on performance and breeding from these. We could really make some progress from this. Another thing is that we must look at other breeds of cattle, namely the Friesian, the Charolais and the South Devon and we must have open minds on all these three breeds. Some people have said to me that there are other breeds, say the Simental from Europe. I think that this might have a place but for the present we can import cattle only from the U.K. so I think let's try these three—bring them in, but let's not get too carried away because this does happen when everybody tries to get on the bandwagon of a new breed. Let's experiment with them and see if they have a place in our beef industry in New Zealand.

Thank you, John, you've given us much to think about.
THE EARLY YEARS

In December 1964, 492,300 acres of mountain country between the Wanaka-Haast and the Te Anau-Milford highways were gazetted as Mount Aspiring National Park.

In 1936 interest was first shown in having part of this area set aside as a national park. Several adjoining pastoral runs included steep mountain slopes up to 9,000 ft above sea level which were of no use for pastoral purposes. Subsequently, as leases were renewed, these slopes were excluded with a view to adding them to a nucleus park area. In some cases provision had been made for the release, without compensation, of land required for national park purposes. The Crown could have arbitrarily enforced this provision but it preferred to negotiate with lessees. In other cases, the granting of formal occupation rights on small enclaves of Crown land was deferred but there was no objection to continued grazing in the meantime.

The formation of a national park was considered by the National Parks Authority in 1959 but it was thought that there was too little public interest in the area.

Improved access soon increased this and justified greater efforts to protect natural values by giving the area national park protection. Highway 6 from Wanaka to Haast was completed in November 1960. Until this happened much of this scenically outstanding country was accessible only to hardier sportsmen. In November 1962, Glenorchy was linked to Queenstown by a new road up the east side of Lake Wakatipu, thus ending isolation of the country at the head of this lake. Improvements were made to the road up the Matukituki Valley from Wanaka. Increasing numbers of aircraft and jet boats were giving access to the more remote areas.

When gazetted in December, 1964, the nucleus area consisted of unoccupied Crown land astride the Main Divide, some unused portions of pastoral runs and the Routeburn and Haast Pass Scenic Reserves. The irregular boundary was due to valley re-entrants of State Forests in Otago and open valleys under pastoral licence in Westland. This boundary made the park an incomplete ecological unit with too few natural boundaries that could be clearly defined on the ground and easily described for gazettal purposes. A more workable boundary between the park and surrounding production grasslands and production forests was needed.
The Lower Dart Valley from Paradise.

(N.Z. Forest Service photo by J. H. Johns, A.R.P.S.)
DECIDING BOUNDARIES—Grazing Land

When an investigation of the boundaries was commenced in 1966, problems relating to neighbouring run management and public rights of access by land, water and air were kept in mind. The main concern was not to water-down the quality of the existing park by adding previously unoccupied land lacking outstanding scenic values. To do so would be to ignore the basic objective for which the park was established. National Park status was not used as a means of correcting misuse of lands, especially land which did not qualify as national park in the first place. Thus in several areas, land already in the park was excluded for these reasons although, in order to prevent farming of deer, adjoining grassland not used for sheep or cattle grazing should not be under pastoral licence. Also, adjoining forests within a predominantly grazing zone were not included in the park just because they were forests.

The transfer to national park of State forests of high scenic value in valleys was agreed to by the New Zealand Forest Service. After this, further discussions were held with adjoining runholders. Throughout there was no desire to take pastoral land out of production. The present park boundary is not the most desirable one but the ultimate boundary should include further recreation and scenic land capable of being included without interference with grazing and production-forest lands. It would not be included solely for the sake of larger acreage but rather to form a more convenient administrative unit. This will in itself avoid duplicating management by other departments.

DECIDING BOUNDARIES—Timber and Mineral Resources

The new park area of approximately 713,000 acres includes State forests in the lower Dart Valley. Here farms, forests and rivers combine to form an attractive foreground to the spectacular mountain scenery. The New Zealand Forest Service had recognised the high scenic and recreational values of these red beech forests by not releasing post-splitting areas during the previous twelve years. They have now delegated administration and recreational development to the Park Board. In an area such as this, with so many national park features, what benefits the eye will benefit the economy of the area. I venture to suggest that in future the area will benefit more from keeping the scene as near as possible as it is today than from royalties on the remaining red beech. Indiscriminate cutting can be considered an uneconomic competing interest.
A different problem existed on the northern boundaries between the Haast and Waitoto rivers where there were private and unoccupied Crown lands with merchantable timber on them. The new boundary follows natural features above the upper limit of merchantable timber. This eliminates mid-slope and lower-slope non-topographical boundaries which are too difficult to describe and locate on the ground. It is also the reason for using ridge boundaries which have excluded the ends of some mountain ranges. Possibly after the timber has been cut on adjoining lands some slopes could be reconsidered for inclusion in the park if the land has no farming potential. Enclaves and re-entrants of pastoral licences remain in valleys but are more accurately defined around the bush edges. In places the new boundary necessarily implies give and take between grazing and recreation rather than no toleration of sheep and cattle. The question one often asked was, “How much will it interfere with present grazing if a particular area is added to the park?”
The exclusion of mineral areas west of the Livingstone Fault from the initial gazetted partly solved the problem of lands with another form of economic potential. However, prospecting applications are received for other areas within the park and maximum safeguards are recommended to the National Parks Authority.

The boundary changes mainly concerned State Forest areas and now provide a park with a full range of resources of the highest national park quality. There will be increasing demands
on these resources, the values of some of which can only be pre­
erved by remoteness and special protection for unique wilder­
ness areas. I believe that the adjustments provide an outstand­
ing and large enough ecological unit in which a balance can 
be found between recreation and preservation.

MAPPING THE NEW PARK

The starting point for achieving balanced use was necessar­
ily an inventory of vegetation types and information on the con­
dition of the vegetation in terms of animal influence, current 
erosion and topography. No doubt some types were satisfac­
torily preserved by being in the park. But there were com­
unities around the park which were in danger of extinction 
and were included after survey information was received. Whilst 
the boundary investigation progressed, an ecological reconnais­
sance was carried out by Dr A. F. Mark of the University of 
Otago. By using helicopter and fixed-wing aircraft it was 
started in the summer of 1967-68 and completed in 1968-69. 
Financial support was given by a University Research Grant 
and the Miss E. L. Hellaby Indigenous Grasslands Research 
Trust.

The Ecological Reconnaissance was also the key to Master 
Planning, as it was to open the door to classifying the park into 
Scientific, Wilderness, Natural Environment and Development 
zones. The Master Plan is a plan for preservation and develop­
ment—it proposes action but is also an instrument of control 
and restraint. Before zoning was finalised, discussions were held 
with County planning consultants, the Botany Department of 
the University of Otago, officers of the Geological Survey, and 
climbing and tramping clubs.

This brings readers up to date with some of what has been 
happening at Mount Aspiring National Park during the past 
three years. Towards the end of this year it is hoped that Master 
Planning will be completed and then we can tell you how pre­
servation and development have been planned for the next 
twenty years.

QUESTION
—Will the establishment of this 10th national park help the 
public to feel more strongly that in the national park sys­

tem they possess something of the original New Zealand? Will it help to foster a national sense of park values?

ANSWER—Yes, I believe it will.
1. If we remember it is a New Zealand park and we jealously 
guard its New Zealand characteristics. It saves a lot of
work to imitate United States' methods of preservation development but our problems are indigenous and we must learn to solve most of them ourselves.

2. **If we prevent some of the things that have happened in other New Zealand parks from being allowed to happen here.**

3. **If the park is not spoiled by too many intrusions.** Within the existing park there are none of the following—townships, tourist hotels, railways, organised ski-fields, organised motor camps, major private land holdings, major grazing areas or lakes likely to become working lakes for hydro-electric purposes. I believe that Mount Aspiring has a better chance than any of remaining a near natural area because the above-mentioned can remain outside the park.

4. **If we realise how we are hampered by lack of knowledge and encourage research projects which focus on park protection.** There should be a closer link with F.R.E.S. which is one organisation that understands mountain problems. Although several years of hunting pressure on red deer by meat recovery firms has resulted in the populations being considerably reduced, I often ask, "What is actually happening to the animals and the vegetation? Does anybody have the facts?"

5. **If the park is properly staffed for protection work as well as development and can provide full time information services.** At present there is a Chief Ranger at Wanaka and a Senior Ranger at Glenorchy.

6. **If rangers continue to take a pride in their park management since being transferred to the Public Service and the regional interest of Boards is not jeopardised.**

**The challenge is to keep Mount Aspiring the least-modified national park in New Zealand for as long as we can.** Although some see progress only in sophisticated structures, services and sporting amenities, scenery is still more important than such facilities. I personally believe that good tracks, bridges and huts are all that are required for the enjoyment of this park—but not forgetting rubbish receptacles. All of these and picnic and camping facilities are essential—many others would be better placed elsewhere.

**Most park problems stem from not realising how little is needed for national park enjoyment.**
THE NEW ZEALAND FALCON
By Peter Child
Alexandra

Sometimes called the Bush Hawk or Sparrow Hawk, the Falcon is a back-country bird which deserves the attention of all those concerned with the protection of our native fauna. Nowhere common, every year a few are shot or otherwise molested, often probably by persons who do not distinguish it from the ubiquitous Harrier.

The Falcon, however, is a bird averaging about six inches shorter in length than the Harrier, with much smaller wing area, quite different habitat, habits of flight and predatory behaviour. Whereas the harrier moves with slow, deliberate soaring, methodically searching the terrain, the falcon is a trim, fast, non-soaring raptor, full of dash and aerial acrobatics. Nowadays the harrier is largely a scavenger along the roads and elsewhere, while the falcon remains a true predator, chasing its prey on the wing or "stooping" upon it from above, in the air or on the ground. Also, while the harrier is rather a quiet bird, the high-pitched, repeated whistle of the falcon is one of
its chief characteristics, and often enables the observer to detect its whereabouts before sighting it against the bush. Most falcons are darker than harriers and the blackish "drooping moustache" and rufous "trousers" are distinctive features of the plumage.

In the South Island for most of the year its chief haunts lie along the bush edge of the montane valley-floors, in scrubby gullies and above the bush in the subalpine scrub zone or higher, sometimes to 6,000 ft or so. In late autumn and winter it is not uncommon to find the odd falcon descend to lower hill country and even the vicinity of townships—this winter we saw a pair on the airfield at Frankton, their normal territory probably being up on the steep faces of the Remarkables.

Their diet consists chiefly of other birds, although it is said that occasionally rats, mice and lizards are taken. In most of the tussock lands, pipits and skylarks form a large part of the prey, but elsewhere all kinds are pursued, including nowadays yellowhammers, blackbirds, etc., around the forest fringes, and thrushes, hedgesparrows and various introduced finches among the scrublands. I was told by a former Government deershooter that in his particular valley in Northwest Otago, wood pigeons were frequently attacked. In level flight in the open the falcon is not as swift as some other birds and I once saw it outmanouvred by a tui while flying over a lake. When diving or stooping, however, it achieves remarkable speeds. It is itself chased off their breeding grounds by magpies and oystercatchers.

It is a fearless and rather inquisitive bird, and even in the non-breeding season will plane down towards the observer, to bank away and land about twenty yards off. (It is an unnerving experience to view the slim head-on silhouette looming rapidly larger through the binoculars.) The prey is impaled securely in the talons and carried off to a rock or post where it is held under one foot and methodically dismembered—considerable numbers of feathers being discarded in the process. These can be used if necessary to identify the prey.

Nesting occurs from October to December, usually on rather inaccessible ledges or bluffs but occasionally in a tree or on the ground; the clutch is 2 to 4 eggs, rich reddish-brown with chocolate blotchings. During the breeding season the mated pair are particularly aggressive towards intruders.

Their geographic distribution ranges as far south as the Auckland Islands, but they are now reported rare north of Rotorua. There are many areas where falcons have become scarcer and people who live in or visit the high country have a special responsibility to afford protection to this interesting and unique member of our avifauna.
When the traveller on the main highway from Timaru to the Hermitage emerges from the western end of Burke's Pass over the 2,200 ft high Long Cutting and enters the Mackenzie Country, the road drops gently down for three or four miles until a point is reached where the road branches. The left branch, the Haldon Road, continues approximately southward past Glenrock, the Grampians, Curraghmore, Streamlands, and Gray's Hills stations to Haldon and Black Forest. The right branch passes over the wind-swept Sawdon Plains, past Sawdon and Holbrook stations, over Dead Man's Creek and Cowan's Hill to Tekapo on the long zigzag trail to Mt Cook. The point where the two roads diverge is known as the historic Dog Kennel Corner or originally just the Dog Kennel.

The boundary dog was a product of prevalent conditions at that time. Before the runs were completely fenced, a dog would be tied at a strategic place to prevent the sheep from straying from an unfenced portion of a block. Also, before the roads were fenced, where the roadway cut through a boundary fence a dog would be used to guard the gap.

The dog so used would naturally not be the most useful or most promising dog on the station and it must have given him much pleasure to be able to bark at liberty, without the interruption of a strongly worded order to "get inside!" or the familiar rattle of a stone bouncing off his kennel. It is possible too that his feeding times may have occasionally been somewhat irregular.

The name Dog Kennel Corner, or the Dog Kennel, had been almost forgotten until a number of older residents, past and present, requested Mrs P. R. Woodhouse, the chairman of the South Canterbury Regional Committee of the N.Z. Historic Places Trust, to endeavour to have the historic name revived.

Considerable research was undertaken to ascertain historic details of this particular boundary dog and even though it was a comparatively recent subject the usual contradictory statements were forthcoming.

However, it was authentically established by Mrs Woodhouse that the dog was at his kennel on 16th August, 1888. Many people can remember the dog and remains of the kennel which outlasted him, but the actual approximate time of the discontinuation of the institution is uncertain.
T. D. Burnett in a letter to Johannes Anderson, in 1909, referring to the Dog Kennel, states, “... until recently a boundary dog was kept here”.

The weight of evidence appears to be that in more recent years at least, the dog’s job was to prevent sheep crossing from Sawdon Hill to Sawdon Flat.

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The old name was ultimately re-established and through the efforts of three historically-minded women, who prefer to remain anonymous, an appropriate greywacke boulder from the Hooker River, with a bronze plaque attached, was installed in a beautified triangle where the road turns west to the higher Mackenzie hills.

The plaque, which was unveiled on the 14th December, 1968, by Mrs H. W. Fisher, the wife of the chairman of the Mackenzie County Council, assisted by Mrs P. R. Woodhouse, bears the inscription: “In early times, before these roads were fenced, a boundary dog was kennelled here to hold back station sheep.”

REPORT ON THE PROGRESS OF THE MACKENZIE COUNTY COUNCIL ADVISORY COMMITTEE FOR ERADICATION OF BROOM

By A. A. Innes
Black Forest Station

Some six or more years ago, our Department of Agriculture Advisory Officer tried hard to awaken the interest of the Mackenzie Federated Farmers to the menace of broom infestation. At that time it was very light compared to what it is now.

As we had not long emerged from the rabbit era, many of us thought anything green and marginally edible must be good, although many farmers did make considerable efforts to keep their land clean.

More recently the Waitaki Catchment Commission has become concerned with the rapid increase of broom in many of our waterways and its spread onto open country, due largely to lighter stocking and to spelling from grazing.

During a visit to the Mackenzie Country last year, the Commission met representatives of the County Council, the president of the local branch of Federated Farmers and officials of the Department of Agriculture. It was decided that action should be taken first in the Mackenzie area as it is the headwaters of the Waitaki River and could be a source of infestation for the rivers and lakes lower down.

To this end a special meeting was called of the Mackenzie Federated Farmers in March of this year. At this well-attended
discussion it was unanimously agreed that action was urgent and that broom was our number one weed problem.

A committee was formed of five runholders, a County Councillor, and representatives from the Department of Agriculture, Lands and Survey, Ministry of Works and the Waitaki Catchment Commission. A meeting of this committee was held immediately and an initial plan of action drawn up. It decided:

1. To apply to the Mackenzie County Council to become an advisory committee of the Council.

2. To allow two months for a map of the region to be prepared marking all areas infested with broom, and to make an assessment of what eradication methods should be adopted in each case and what equipment was locally available.

3. To confine the boundaries of the committee’s activities to the area of the Waitaki Catchment Commission lying within the Mackenzie County.

The committee has now been accepted by the Mackenzie County Council, which is the local noxious weeds authority, as a Noxious Weeds Advisory Committee.

The broom in this area is not as extensive as in many parts of the country but at its present rapid rate of spread will soon become so, especially as there is now a great deal of mechanical activity in the district. Wherever a ‘dozer works, noxious weeds soon appear.

So much for the facts—this is a very interesting and rewarding organisation to be a part of as we have little power and no money and hope to have no use for either. To date we have not caused the death (as a committee) of a single broom bush unless its demise has gone unnoticed.

On the other side of the ledger we have a band of enthusiasts with the backing of the district and County Council—men who intend to get this job of broom eradication cleaned up as soon as possible within the physical and financial ability of each individual who has a broom problem. This also includes the Government Departments active in the area. The committee’s job is to give publicity to the broom-eradication campaign, to give advice on spraying methods, to coordinate the activities of the farmers, the departments and the contractors, if required, and to advise the County Council on progress.

We hope to complete a large part of the job in two or three years, especially the destruction of broom infesting waterways and flood channels.
It must be understood that all costs of eradication will be borne by the lessee or land holder and that no special subsidy (over and above the one announced in the Budget) or Government assistance is being asked for at this stage. The several Government departments such as the Ministry of Works, the Department of Lands and Survey and the Electricity Department will each be cooperating with the Committee to clear broom from land for which they are responsible and to keep it clear.

It is intended this year to do a large amount of spraying from ground and air with Tordon and to 'doze access tracks to difficult areas.

Investigations are being carried out by the Department of Agriculture into the effectiveness of dormant-season spraying which if successful will be of great value.

As a footnote I suggest that anyone who sees a broom bush over Burke's Pass digs, cuts, grubs or chews it out. If you don't, next time you return there might be an acre of the stuff.

WOODEN FARM BRIDGE PLANS

The New Zealand Forest Service has designed a farm bridge which can be built almost entirely from treated Pinus Radiata. The specifications for other common timbers are also given.

Stringers up to a 16 ft span can be round-section poles but the correct sizes of hardwood or laminated timber to use for longer spans up to 31 ft are also shown.

The bridge, if built of good quality wood, will carry a truck with a total loaded weight of six tons (maximum 4½ tons on rear axle). Inferior materials will, of course, reduce the weight it can safely carry. It is intended for crossing streams on farm roads and tracks and must not be built on a public road.

Copies of the plans can be bought from the Tussock Grasslands and Mountain Lands Institute at a total cost of $1.50 for the set of two sheets of drawings, including postage.
THE INAUGURAL MEETING OF THE INSTITUTE,
24th MAY, 1960

Foundation members of the Committee of Management with representatives of the Government, the Soil Conservation and Rivers Control Council and Lincoln College Council.

Back row:
S. H. Saxby (Dept. of Agriculture)  B. Ivory (Sec. of S.C. & R.C.C.)  H. G. Hunt (Registrar, Lincoln College)

Second row:

Dr M. M. Burns (Lincoln College)  C. J. Speight (N.Z. Meat Producers' Board)  L. P. Chapman (N.Z. Wool Board)

Front row:

Hon. C. F. Skinner (Act, Prime Minister)  C. Hilgendorf (Lincoln College Council)  J. T. Holloway (N.Z. Forest Service)
THE FUTURE OF THE HIGH COUNTRY – AN ECONOMIC VIEWPOINT

by R. W. M. Johnson
Senior Research Officer, Agricultural Economics Research Unit, Lincoln College.

In general, I do not see any vast changes occurring in the New Zealand high country in the next decade or so. Some are bound to come, but I feel they will be small relative to the whole picture and will merely represent shifts in directions with which we are already familiar. Let's discuss wool prices, cattle, forestry, soil conservation, electricity and tourism and see what is likely to emerge from present trends in each.

WOOL

Wool prices are naturally the single most important indicator of the economic health of runholders. Without a doubt, the world seems to have moved into a period of relatively lower prices for natural fibres, caused by the competition of synthetic fibres in many traditional wool-using fields. The world picture is very much worse than we in New Zealand perceive, because the 1967 devaluation of the New Zealand dollar by 20 per cent has effectively compensated for part of the tremendous decline which took place in world wool price levels through 1966 and 1967.

Overseas research into future wool prices is tending to indicate that crossbred wools will rise again towards their old levels more quickly than fine wools. The demand for carpets is felt to be more responsive to changes in income than the demand for suiting materials. Present fine-wool prices in the country are therefore likely to be with us for some time as long as open hostilities do not break out on some war front or other.

But the available evidence would not be sufficiently strong to persuade me to change the count and quality of my wool if I were a runholder. I don't see the point of moving into finer wool at present, and any move to coarser wool would of course reduce average returns per sheep, unless compensated for by increased sales of stock.

CATTLE

Plenty has been written about cattle in the high country lately. But prices have been steadily improving for a number of years and this has been reflected in weaner and store prices to runholders. Devaluation in 1967 has made a considerable difference as well. With the majority of New Zealand's beef sold
in the U.S.A., the full 20 per cent of devaluation means that we actually get 25 per cent more for our exports to the States.

It is only a couple of years ago that Don Crump was comparing sheep and cattle in this Review with steer calf prices of $20-$40. Only the poor end of a draft of steer calves would now bring $40 per head and a reasonable expectation for well-grown weaners is now $55 to $60. It will be remembered that Don Crump showed that cattle were already quite competitive with sheep in terms of gross margins in 1967, and only where wool was taken at 30 cents and steer calves low at $20 did sheep appear to be a better marginal proposition than cattle.

Now things have moved along quite a bit. Medium to fine wool prices have not improved at all since 1967 but cattle prices have. Even a well-grown cull cow could fetch up to $80 at today's schedule prices. Recent calculations by my colleague, Don McClatchy, show that fine wool prices need to be around 40 cents to match present weaner and cull cow price levels.

On a lot of the high country, wool prices would have to rise to 50 cents to match weaner prices rising above $65, which has been recorded in a number of cases.

On hill country, on the other hand, the level of prices can come down to 35 cents (assuming Corriedales or Halfbreds
sheep) before weaner prices make cattle look a better proposition.

On the easy hill country, cross-bred wool prices of 30 cents are needed to break even with a $55 steer; here the advantage is clearly with a cattle proposition as these sort of properties can often turn off the heavier type of weaner which fetches over $60.

I think cattle provide one of the most interesting and significant changes to be expected in the next decade. Clearly not all properties are suited to them, and a number of management problems remain to be solved. But what is significant is that on present trends, cattle in the high country are here to stay. Furthermore, they are justified on economic grounds and there is no need to justify their presence for any soil conservation reasons there might be.

Cattle could play an important role in another sense. John Morris has spoken at meetings and written in this *Review* about the cost-price squeeze. Most runholders are familiar with the see-saw effect of static wool prices and rising prices of farm inputs. It seems clear that cattle could enable many runs to be managed with less labour, especially casual labour, so that the change to cattle contributes to an overall reduction of costs. Other changes in high-country management will probably be needed to counteract the cost-price squeeze but the change to cattle could help many runholders.

**FORESTRY AND SOIL CONSERVATION**

I want to discuss forestry and soil conservation together. I believe there are many better sites for forestry than in the high country, since its presence needs to be justified either on conservation grounds or on other sets of values like recreation appeal. Soil conservation is really the number one problem in all the higher sheep country in the South Island. It is a problem because it raises all sorts of technical and social problems in its wake.

On the technical side, there are a large number of problems concerned with hydrology, surface cover, the effect of animals, geological ages, etc., which require a great deal of investigation before definite action can be taken. It is not that we have lacked scientific investigation in the past so much as the size of the problems to be investigated. Recent articles in this *Review* testify to the work being done on water, insects, rabbits, and forest ecology. But a lot remains to be done; the T.G.M.L.I.'s review of problems in the Waimakariri basin is a good indication of the preliminary kind of investigation which needs to take place and the probable lines of further investigation that are required.
The social aspect of soil conservation is tied up with land tenure and the leasing system. As New Zealand passes from a frontier system where the available land is divided up as equally as possible among everybody who wants it, to a conservation system where the land is regarded as a scarce resource belonging to the whole community, our attitude to high-country tenure also changes. A number of recent writers, in the U.S.A. particularly, have stressed that the lessee is very much the custodian of the land on behalf of the community as a whole. This viewpoint stresses that the management of the land must reflect the wishes of the community to some extent.

As I wrote in the Review last year, if soil conservation objectives are rated highly enough by the community, then the officials administering the tenure system in the high country will have to see that the necessary reorganisation is carried out. Since 1940 there certainly has been an increased awareness of soil and other forms of conservation in New Zealand and a great deal of formal legislation has been introduced in Parliament to this end.

Of particular concern to the high country have been the
Soil Conservation and Rivers’ Control Act and 1948 Land Act. The first introduced subsidies for bona fide soil conservation practices and land retirement plans and laid down the framework which governs a great deal of the most useful conservation work on runs which is going on at the present time. In my view this programme could be greatly stepped up with larger subsidies if it was clear that on technical grounds the objectives of the Act could be achieved more quickly. It is possible, too, that greater public pressure could bring this about, but the average New Zealander does not seem particularly conscious of such a need at the present time. The Government is the ultimate custodian of the land for the people and in some circumstances the objectives of administration could be really more conservation-minded than the general public appreciate.

Mr Coad wrote in the 1965 Review about some of the benefits which flowed from the Land Act of 1948.

“The Act provided a new deal for runholders and indeed its passing marked a turning point in the history of run country. It brought to an end the era of high rents and uncertain tenure, which it replaced with a system of reasonable rentals based on the safe carrying capacity of the country, and it gave permanent tenure and perpetual right.”

In return for this greater security of tenure the Government clearly hoped that the high-country runholders would take the implementation of an improved farming system into their own hands and would readily co-operate with the State agencies which were concerned with soil conservation. With the help of higher wool prices in the early 1950s and again in the earlier 1960s, this improvement has indeed come about and indicates that a reasonably sound compromise has been achieved between the requirements of the individual and the needs of the nation as a whole.

Returning to forestry, it is now clear that its role in the high country must be related to our soil conservation objectives; if direct planting of exotics is going to be necessary, we must do it; but if forestry is going to mean the taking over of the wardenship of retired country and other natural areas which were never leased then this might be the most fruitful role for forestry to play. Perhaps these brief notes might even stimulate someone to write in to the Review on what forestry could achieve in the high country?

ELECTRICITY AND TOURISM

I haven’t strong views on either electricity or tourism. These are specific problems which affect parts of the high country but
not all of it. Hydro-electricity generation is clearly going to affect the main valleys of the South Island, especially the upper Waitaki and Clutha basins. I think the Upper Clutha plan appears disastrous at first sight but I would like to have more facts to judge the matter more clearly. If tourism is to develop in the Queenstown area in the future (and I discuss below what this might mean) then an economic case may still be made out for the retention of the natural scenery of the valley as it is.

While the argument is between extensive sheep grazing and electricity it is very difficult to produce economic reasons for preventing hydro-electricity development.

I think tourism for individual runholders is over-rated. A few runs will benefit by reason of their access to a prominent tourist centre or by reason of their unique position in the headwaters of some valley but for the majority this is out. Perhaps improved roads is the most the majority can expect. But at a more general level I wonder if there is not scope for the specific development of tourist centres in New Zealand? One could envisage Rotorua and Queenstown, for example, built up as the main centres of tourism in New Zealand. This would cut down the amount of time people spent going from one isolated tourist spot to another and would bring together hotels, shopping facilities, golf courses, bowling alleys and even gambling casinos to keep the visitors happy and occupied for a week or more. This would have little impact on runholders as a whole, but in certain localities it would be quite clear that benefits would spread outwards from these centres and some more properties could get into the tea and scones game.

THE PROSPECT

What then of the future? For the average runholder it is a question of holding his own with present wool prices and finding methods of incorporating a cattle-breeding herd into his management. At the same time there will be considerable pressure to consolidate his operations on the better parts of his holding and to reduce his more extensive operations on Class VII hill country. Strong social pressure would be required to accelerate this process of retirement, but this appears unlikely at the present. Electricity requirements will affect a few more runholders and consolidation of leases is likely to follow in such areas. Tourism will affect the fortunes of a few but certainly not the majority of runholders in the high country of New Zealand.
WHAT'S TOPS?
By J. C. Simpson
Lecturer in Wool Science, Lincoln College.

By the title, teenagers will expect this to be a review of the most popular tunes of the hit parade. Well, I'm sorry to disappoint them, but it's about wool.

Actually this article was prompted by reading one with a similar title in an old "New Zealand Farmer" of 1924. It made the point that it was unlikely that the average manufacturer could explain the exact meaning of some terms used by pastoralists. On the other hand many technical terms used in the combing, spinning and manufacturing sections of the wool-using industry may be even more baffling to the wool grower.

For instance, to most people all garments made from wool are woollen. They would be hard put to tell the real difference between woollen and worsted material, although each is made by a quite different process from basically different kinds of wool.

In this article I will explain some of these differences. Many advances have been made in the processing of wool since those early days but the principles are still essentially the same.

WOOLLEN FABRIC
The woollen manufacturer produces a thick fluffy yarn to make up generally into a heavier-weight fabric which has good insulating properties. Such fabric is used to make goods like blankets, rugs, and duffle coats. Carpet yarn is also made by this process.

For the heavier woollen type of fabric the manufacturer usually instructs his buyers to bid for shorter wools known as "clothing" wools, but may also buy several different lengths, finenesses and types to blend for different effects. The long wools he will use to give strength to his yarn and the short, by its criss cross effect, mixed in with the long wools to give density, fluffiness and sometimes softness of handle.

The stages in woollen processing are comparatively simple. First, the raw wool of various lengths is blended together then scoured to remove all impurities in the wool as it comes from the sheep. This clean wool is then "carded" on a machine with cylinders covered in fine wire teeth. It opens the tangled fibres, removes any remaining vegetable matter, and at the same time completes the blending by efficiently "ironing out" any differences in length, fineness or colour. The term "carding" has been said to come from the Latin carduus or thistle and relates to the teazle plant. It is likely that the prickly heads of teazles
Blending. The blender feeds wool of different types into the hopper in the right proportion for the desired fabric. (Photo: J. C. Simpson)

were used for teasing or carding the scoured wool when the process was primitively done by hand hundreds of years ago in the cottages of England.

From the carding machine the wool passes to a spinning machine where it is drawn out and twisted into yarn. The yarn is then converted into fabric by weaving, knitting, tufting or carpet weaving. If good wools are used, reasonably smooth-surfaced materials can be produced.

Thus woollen processing converts the raw wool into fabric quickly at comparatively low cost.

WORSTED FABRIC

In worsted processing the objective is usually to produce a fabric which is light in weight, has a smooth surface and a “dressy” appearance.

Therefore the manufacturer selects wools with a fairly long staple; wools of quality, soundness and character, long enough to pass through a combing process and hence known as “combing” wools. Short or weak fibres are generally of little use to him.

By the way, the name worsted comes from the quiet East Anglian village of Worstead, once famous for the products of its combs and hand looms.

After purchase, the wool may be sorted over again then
scoured and carded as in the woollen process, except that the carding machine for the worsted process has a gentler action to reduce fibre breakage and at the same time carries out some straightening of the fibres.

The wool comes off the carding machine in a thick sliver, rather like a loose pliable rope. It passes to the backwashing machine which removes any traces of dirt and is then dried by hot air and fed into the gilling machine. In this machine the fibres of the sliver are straightened and drops of lubricant added.

Then comes the most important stage in the whole worsted process. It is "combing", when the long fibres are further straightened, and all short, weak fibres removed. There are several different types of combs, of which perhaps the best known is the circular or "Noble" comb, named after James Noble, a working mechanic who invented it in 1853.

From the comb two distinct types of wool emerge—the "Noils" and the "Tops". Noils (a dialect word for waste products) or short rejected fibres, are seldom of further use in worsted manufacture although quite suitable for the woollen process. "Top" is the raw material of the worsted spinner. It is a sliver of longer parallel fibres, comprising usually the finest, soundest wools, although wools of many other finenesses can also be prepared in this way.

Apparently the name "Tops" also comes from the early
days of hand work when the wool comber used to hang his wool on a post and comb it with a downward motion. Short wool came out in the comb and long wool remained on top of the post.

The wool top, after leaving the comb, is taken through several stages of drawing or finishing to make the sliver uniform in every way. It is then ready for spinning into yarn and weaving into the smooth, usually light-weight, worsted fabric.

Many improvements have been made over the years to improve and speed up "top" production and no doubt there will be more, but the principles will remain the same.

Obviously worsted fabric costs more to make than woollen fabric because the longer, better wool usually costs more to buy and because it has to pass through more processes.

CONCLUSION

From this article you will see that there is more than one side to the wool-using industry. Woollen manufacture and worsted manufacture are two of the most common. Each uses mainly different types of wool and each produces a different type of material.

Once wool has left the shearing shed, or even the sheep, the grower cannot alter its characteristics. The manufacturer decides its final end-use.
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THE CASE FOR A NEW LOOK AT LEASEHOLD TENURE

By John Wardell
Mt Dasher Station

Most of the South Island tussock country is held in the form of Crown Lease, either Pastoral or Renewable. Now that we realise the potential for development which some of these areas have, it is time that we looked closely at the effect these present forms of tenure may have on this development in the future. Both forms must be considered together as the dividing line between them is so vague as to be useless. Basically, of course, the Renewable Lease has been granted in the past over land the Crown considered to be farmland or mainly arable, and the Pastoral Lease granted over grazing land with little or no arable potential.

FREEHOLD OR LEASEHOLD

Some recent renewals of Renewable Leases have carried sharp increases in rent. This has led many lessees with freeholding rights to consider freeholding as a measure of self-defence. Pastoral lessees are also uneasy at current trends and in some cases are considering whether freeholding may be possible by reclassification of their leases now that pasture improvement has increased the production from their tussock country.

It is not many years since lessees were strongly advised against freeholding by many experts, including those in Government departments. It now seems that this advice could not have been more mistaken. This is not pointed out to apportion blame for our present situation, rather to emphasize the unforeseen changes that have taken place over the last few years in leasehold conditions.

Twenty years have gone by since the passing of the Land Act, 1948. In some respects it has become out of date, out of touch with reality and leaseholders no longer face the future with confidence. Certainly when the Act was passed no one could foresee the extent of the rise in land values due to advances in technical knowledge, inflation, scarcity of land and the effect these factors would have on rentals.

The present method of assessing rents is that the lessee is allowed only the value of his improvements at the time of assessment and all the rest of the value is said to belong to the Crown. This far from encourages a man to spend money in development when he knows that at the end of his lease a great deal of the total increase in value will be lost to him.
"The farmers' interest in land lies in making a good living, in having something to show for his life's work and in being able to pass the land on to his family."

Lamb marking in the Upper Rakaia.

CROWN INTEREST OR PRIVATE INTEREST

In considering this problem we must look at some basic principles:

1. The Crown's interest in all farming land in New Zealand, under whatever tenure it is held, is in the production of that land—the overseas exchange it earns, the jobs it provides, either directly on farms or indirectly in industry, and the revenue from taxation it supplies. This puts the Crown in a unique position—it is the only landlord that has a direct and major interest in the business carried on by its tenants.

   The farmer's interest in land lies in making a good living, in having something to show for his life's work and in being able to pass the land on to his family.

2. Every farmer has the use of land under some form of tenure whether it be leasehold or freehold. But land is a national asset and no man may really own it in the sense that he can own chattels which he may burn, bury, lose, break, or otherwise play the fool with. The holding of a
tenure has become a privilege in New Zealand today, due to the fact that there is less land available than there are aspiring farmers. Because of this farmers have a duty to make the best possible use of land in the national interest. This does not, however, in any way justify the application of financial pressure in the form of high rents on only a small section of the farming community—the leaseholders.

WHO GETS THE INCREASE IN VALUE?

If a man purchases a freehold tenure for a sum of money, from that time on all the increase in value in that land is his, whether he has created it all or only in part. In other words the Crown places a value on the land when it sells it and has no further interest in its rising value, only in what it produces.

In my opinion, if a man elects to take leasehold tenure instead of freehold, his rent should be the present rate of interest (say 6 per cent) on the value of the land when he took up the lease. This rental could be reviewed every five years to allow for changes in the interest rate. Surely the Crown should be prepared to do the same as it does with a freehold tenure and allow to the lessee the increase in the value of the asset. This would rectify the present position where a freehold tenure has its value fixed at time of purchase, whereas the leasehold tenure is revalued after every 33 years—a position it is difficult to justify.

Giving the tenant the right to the increase in value would fit in with the Crown's policy on Pastoral Leases. In these the rent is based on the stock-carrying capacity when the Pastoral Lease was first issued. This sets the basic unimproved carrying capacity of the run for all time. Any increases in carrying capacity over this are said to be due to the lessee’s efforts and are credited to him.

WHO MAKES INCREASED PRODUCTION POSSIBLE?

Increases in productive capacity of land are due to three main factors—investment of money, managerial skill and the advances in technical knowledge. Obviously, the first two are usually due to farmers' efforts and it must be remembered that agricultural research and extension are supplied by the Crown primarily for the national benefit and not purely for the benefit of farmers.

There is no doubt that there is tremendous scope for increased production in the South Island tussock country and this must be taken advantage of in the future. It will take the form of intensive farming of lower and easier country and, in
"There is tremendous scope for increased production in the South Island tussock country."

(Photograph: L. W. McCaskill)

our present state of knowledge, easing of grazing pressures on higher and more critical country.

FREEHOLDING HAS ITS DISADVANTAGES

Because of this intensive work on selected areas within a run there will, under present conditions, be a demand for freeholding by lessees purely for self-protection. If these demands are granted there could be some highly undesirable effects. First, there would be the locking up of large sums of money which would be much better spent on development work. Second, it could lead to a rash of freehold areas scattered through the back country, taking in the best land and leaving second-class land still leasehold. At best this would make land administration difficult and could lead, over a period of time, to some very bad subdivisions. We have had enough of these in the past but if the advantages of freeholding are not matched by better leasehold tenure a lessee is going to think long and hard before he intensively develops a large area of Crown land.
Because of the layout and climate of most of our back country runs, together with the worsening cost-price squeeze, it is essential that these runs remain relatively large units in order to finance development and remain economically viable.

THOUGHT AND ACTION NEEDED

If we are to go forward in the future we must have some clear thinking on these problems and some equally clear and definite action, realising that:

(a) There is a large potential for increased production in South Island tussock country.

(b) If this is to be taken advantage of, leasehold tenure has a vital part to play.

(c) There may have to be a separation in the terms of industrial and farming leaseholds.

(d) A completely new method of rent assessment will have to be found which will give lessees some encouragement to make major investments in their leases.

BOOK REVIEW

GENERAL SURVEY OF THE SOILS OF SOUTH ISLAND, NEW ZEALAND


As is stated on the title page of the bulletin, this is a reconnaissance by the staffs of the Soil Bureau, Department of Scientific and Industrial Research; Farm Advisory Division, Department of Agriculture; and the N.Z. Forest Service. The publication of this reconnaissance is an event with immense importance to the understanding and management of the land resources of the South Island. It is true that provisional maps and legends have been available to a limited number of organisations for almost ten years, and that final printed maps have also been available for a few years, but it is only with the publication of the complete bulletin that a full appreciation of the soil pattern and its relationship to land use and development may be gained.
The text of 404 pages includes a general description of the area by J. D. Raeside, a description of the soils compiled by E. J. B. Cutler, an account of soil chemistry by R. B. Miller, and detailed tables of soil analyses by the Soil Analysis Section under L. C. Blackmore. In the extended legend which is compiled principally by E. J. B. Cutler and C. G. Vucetich of the Soil Bureau, E. J. Stonyer, Department of Agriculture, and H. V. Hinds, N.Z. Forest Service, the soils are described by name, parent material, native vegetation, topography, rainfall, profile, nutrient status, present uses, carrying capacity, potential uses, responses to pasture topdressing and liability to soil erosion.

The late Dr J. K. Dixon, in writing the introduction, stressed the general picture given by the survey, due to the scale of mapping at four miles to one inch. He said, “the survey does, however, show the distribution and extent of the main kinds of soils and will be particularly valuable to those who are interested in the broader aspects of soils and land-use planning”. Also that, “it is hoped that the survey will be used by administrators of land as well as field officers and research workers, and for land-use planning generally”.

It could be added that detailed soil maps of hill and mountain country are rarely available and, in my opinion, many landholders on such country should be able to obtain much assistance in the appreciation of their country, its responses to their management practices, and its relationship to other country in the South Island through study of this bulletin.

G. A. Dunbar.

HISTORY OF MOLESWORTH

Mr L. W. McCaskill, former Director of the Institute, has written a book entitled “Molesworth”, which will be published by A. H. & A. W. Reed. It is expected to be on sale in October.

Working from diaries, letters, official records, published works and interviews, Mr McCaskill has compiled a detailed account of the history of the Molesworth, Tarndale, Rainbow and St Helen’s stations. Although factual, it is nevertheless a human story for much is told in the words of owners, musterers, managers and supervisors who lived the history.

The book will be valuable as a story of the problems of pastoral farming in a region as colourful as any in the high country.
Lucerne has been accepted by most farmers as one of our best plants for hay stands, especially in areas where the annual rainfall is less than 30 inches.

In the drier areas of the South Island, such as Central Otago, lucerne is also slowly gaining acceptance as a valuable plant for grazing as well as for hay. Research work and farmer experience have shown quite clearly in recent years the role.
Lucerne can play in developing these low rainfall areas—areas which 10 years ago were regarded as almost completely unproductive.

Nowhere is lucerne more important than in Central Otago, where low rainfall, hard winters and high summer temperatures put a severe limitation on the development of much of the rolling and terrace lowland country.

Today we are seeing a transformation over large areas of this drier country, a change due to rabbit control, fencing and the sowing of lucerne for grazing. Many dryland areas with an annual rainfall of less than 16 inches developed with lucerne are now carrying 1 1/2 sheep to the acre, where formerly you were lucky to carry one sheep to 10 acres.

Under higher rainfall conditions this carrying capacity can be increased considerably. Work at Ashley Dene is giving a lead to this with their seven sheep to the acre on rotational grazing of lucerne. We now have enough experience to establish guidelines for dryland development through lucerne, guidelines which can be used profitably in low rainfall areas throughout the South Island.

DEVELOPMENT GUIDELINES

Fencing and Stock-Water

—**Provide sufficient subdivision** to allow good grazing management. As a guide, the block size should allow mob stocking with at least 20 to 30 sheep to the acre.

—**Stock water is vital** and you should plan your subdivision to provide sufficient stock water.

—**Low-cost fencing has a definite place.** Electric fencing should always be considered, especially if you can connect to a mains supply.

—Where rabbits are still a problem, **rabbit-proof fencing may be necessary.**

Establishment

—**Establishment is the most critical stage** in the life of the lucerne plant.

—**Sod-seeding can be a useful low-cost method of improvement** on certain soil types particularly where there is little plant competition.

—**More certain results will be obtained by sowing after a light cultivation** or following a forage crop such as turnips.
Where establishment is through normal cultivation, good seedbed consolidation is essential to conserve moisture.

Seed should be drilled direct into the ground.

Soil moisture is critical in the first two weeks—always sow into a moist seedbed.

Sowing can be made from September through to March—always wait for adequate soil moisture, however, to ensure a quick strike.

Aerial oversowing of lucerne in late autumn is giving good results at Tara Hills and could be worthwhile on much of our steeper dryland country. Further trials are studying this.

**Seed Mixtures**

- Where sod seeding—4 lbs to 6 lbs of lucerne to the acre.
- Drilling rates—8 lbs to 12 lbs to the acre.
- There seems to be little advantage in sowing cocksfoot too, but where sown in a mixture, 1-2 lbs is sufficient.
Lucerne Successfully Established by Sod Seeding at Ophir in a 15-inch rainfall.

(Photo: C. R. Plummer)

— **Use good quality seed.** Use lucerne seed with a high initial germination. 70 per cent is suggested as a minimum initial germination from trials in the Mackenzie Country.

— More trial work in this same area suggests that on lower fertility soils **soaking the seed in skim milk before sowing** will give better establishment.

**Inoculation**

— **Good seed inoculation is vital** and poor inoculation accounts for most of the lucerne failures in Central Otago.

— **Heavy rates of inoculation give a better nodulation;** double inoculation should always be used on difficult soils.

— **Inoculate your own seed** and sow within 24 hours.

— Recent trial work has shown the importance of **molybdenum** in lucerne establishment through improved nodulation.

— **Sow with reverted molybdic super** or lime/super mix to avoid inoculation injury.
—Keep freshly inoculated seed in a cool place out of direct sunlight.
—Lime-pelleted seed may have a place on acid soils or for overdrilling.

Weed Control
—Aim to start with a weed-free seedbed where cultivating.
—Good grazing management is the cheapest method of weed control.
—Graze hard in the winter months and rotationally graze with large mobs in the growing season.
—Barley grass is one of the main problems of dryland stands.
—When winter feeding on your lucerne stands, feed out only clean hay.
—Atrazine/Dalapon mixtures look promising for barley grass control—apply in mid-winter.
—Where weeds are a problem from a spring sowing, a quick and careful grazing by mob- stocking of the young stand will aid establishment and suppress weed competition.

Fertilisers
—Always check your soil fertility and pH with a soil test before establishing lucerne.
—A soil test must not be too acid. The pH should be above 6.0 for good lucerne establishment.
—Lime will be needed for low pH soils. Broadcast lime at least six months before sowing to allow time for it to work into the soil.
—Lucerne initially responds to sulphur and, generally, phosphate on all Central Otago soils.
—In certain areas, responses are also obtained from: Potash and Boron.
—1-1½ cwt Sulphur Super 400 every two to three years is generally required, depending on rainfall and production. Under irrigation, higher rates of top-dressing are required.
—Where the annual rainfall is less than 16 inches there does not appear to be any need to top-dress lucerne in Central Otago.

Management
—Good grazing management is the KEY to dryland farming.
1. Month-old seedlings well nodulated.
2. Month-old seedlings without nodulation.
3. Three-month-old seedlings well nodulated. (Photo: C. R. Plummer)

—DO NOT graze a stand until well established even if this is over 12 months, especially with sod-seeding.

—DO NOT set-stock in the growing season. This is the quickest way to get a run-out stand.

—DO NOT graze in the early spring. If possible let your stands get to early flowering before grazing.

—DO rotationally graze in the growing season by mob stocking. You can double your production by rotationally grazing at early flowering or when growth has stopped.

—DO graze hard over a short period with large mobs then spell for several weeks to let growth come away again.

—DO spell your block in the late autumn, let the stand go into the winter with some growth.

—DO use your stand after the first frosts for feeding off in the winter. Dormant lucerne can stand heavy stocking in the winter, and you will get good weed control and a better stand.

There is no set method of establishing lucerne and local farmer experience and the recommendations of your local farm advisory officer should be sought for your own soil types.
A CITY'S WATER SUPPLY – TODAY AND TOMORROW

Martin Lush
Water Staff Engineer, Dunedin City Council.

Of all the scientific achievements which contribute to the comforts of our modern way of life, an adequate and safe water supply is probably one which most urban dwellers commonly take for granted. “Because it is there” was Mallory’s reason for climbing a mountain. The same phrase is probably the reason why water from a tap receives such scant thought from the average consumer who assumes all too often that this life blood is free to use and misuse at all times in unlimited quantities as he pleases.

But is it? Let us have a look at the water supply of one New Zealand city and consider the problems involved in ensuring that sufficient water of good quality is always available for domestic and industrial use.

DUNEDIN’S WATER SUPPLY

Dunedin’s first supplies were drawn from stream intakes in the nearby Leith and Silverstream valleys and apart from minor improvements and additions, these sufficed until the 1930s, by which time repeated shortages in dry periods emphasised the urgency for additional water. In 1936 a gravity supply was commissioned which delivered 2.5 million gallons per day (m.g.d.) from Deep Creek through a 15-inch diameter pipeline 37 miles long.

The impetus given to industry by the war, coupled with rising standards of living and the population growth, affected water supply in the same way that other services were affected. The familiar signs of a deficiency in the system in the form of more water shortages again showed itself in the 1946-48 period.

By this time all the supplies closest to the city that were capable of economic development had been utilised. An appraisal of those further afield soon showed that the choice lay between another long pipeline bringing water by gravity from the Lammermoor Range, and a pumped supply from wells beside the Taieri River near Outram. The first had a very high initial capital cost with low annual running costs and would require a considerable time to complete. On the other hand, the pumped scheme was much lower in capital cost and quicker to construct but would have high running costs as the quantity of water and the cost of power increased.
Ross Creek Reservoir: Part of the City's Low Levels System, it can also be used for augmenting the High Levels by pumping. It was constructed in 1864 and holds 50 million gallons.

(Phntn: R. A. Boxman)

The decision was made to proceed with the pumped scheme. Since commissioning in 1956, it has proved extremely successful and has subsequently been enlarged still further by re-machining with larger pumping units.

The reliability and quality of the Taieri River bores has been such that after an exhaustive analysis of the water requirements of the city and adjoining boroughs, a further augmentation from the same source has been approved by the City Council. It is at present being planned for completion in 1972 at a cost of nearly $1.75 million for the supply and treatment of an additional 9.1 m.g.d.

Naturally an immense amount of team work is involved in assessing and designing such an important scheme, the life and use of which will extend well into the next century. In a short article like this it is not possible to list all the design factors but the following are some of the more important:
WATER QUANTITY

An analysis based on projected population growth and increased per capita demands was carried out to determine the quantity of additional water needed for adequate supplies up to 1988. By that time it is estimated that the average per capita demand will be 150 gallons per day.

Water drawn from river and stream intakes is normally passed into storage reservoirs before being delivered to the consumer and such a system has many advantages. A steady draw-off can be maintained from the reservoir while the intake is low, and the storage can be replenished following times of higher river flow after higher rainfall. However, Dunedin's storage reservoirs are not, in effect, much larger than service reservoirs to even out short-term fluctuations in demand and form an emergency reserve. Consequently the quantity of water provided has to be large enough to meet the much higher demands which occur over shorter periods.

This leads me to the second point—it is most costly to waste water, either deliberately or accidentally. Even water that is eventually wasted has to enter the reticulation system, and results in a needless increase in the diameter of the mains. Not only the consumer wastes water; undetected leaks in the mains themselves can also add substantially to the amount lost.

Universal metering is undoubtedly the most satisfactory means of accounting for all the water used and is widely accepted in many parts of the world. The user pays only for the water he uses and the supply authority can account for all the water delivered, and knows how much is lost from the reticulation system. The information gained is invaluable in designing improvements in the system and the capital outlay of metering can be recovered quickly in the value of the water saved.

Unfortunately there is still widespread distrust of metering for domestic supplies, mostly on the grounds that people on lower incomes and those with large families would be penalised in the use of an essential commodity. As an alternative to metering domestic consumers in Dunedin, special staff are engaged in leak detection during night hours when the draw-off should be at a minimum. A house-to-house system of inspection to locate and remedy water leaks is being started.

WATER QUALITY

The necessity for ensuring that a public water supply is pure and potable has been appreciated for a very long time. However, as the number of people supplied from public schemes
 Booth Road Treatment Station: View showing four micro-strainers which filter up to six million gallons per day. The wash-water nozzles can be seen at the top of the nearest micro-strainer.

(Phot: R. A. Boxon)

has risen, so has the tendency to draw waters which have already been used and contaminated by some other town or industry. This has happened particularly in the highly industrialised and populated parts of Europe, Asia and America although less at present in New Zealand, which is still a developing country.

Mineral contamination arising from dissolved salts and suspended solids can be both expensive and difficult to reduce to acceptable levels. Fortunately, complicated treatment processes are not necessary for water drawn from streams or underground sources near Dunedin so far. Bacterial contamination, however, is an ever present danger which can occur in any supply except perhaps a true artesian supply. Its importance cannot be over emphasised. Supplies which have been perfectly satisfactory in the past can become contaminated with disastrous rapidity and results.

The World Health Organisation has established Interna-
Booth Road Treatment Station: Water treatment plant from left are the chlorinator, chlorine residual recorder, chlorine residual recorder controller and fluoridator.

(Photo: R. A. Bowman)

itional Standards for drinking water and the new supply has to be capable of meeting these standards after treatment. By drawing water from boreholes beside the Taieri River, an extremely pure, soft water filtered by long passage through underground gravels is obtained. Although no sample has yet yielded a positive bacterial count, the water is nevertheless sterilised by chlorination after leaving the Southern Reservoir to which it is delivered by pumping. This well-proven process is more economical than sterilisation using ozone which requires cheap electric power.

Liquid chlorine is imported from Australia in steel cylinders of 2,000 lbs capacity each. Sterilisation is done by injecting a solution of chlorine gas dissolved in water into the outlet mains from the treatment stations. The quantity of chlorine required for sterilisation varies with both the flow and the water
quality. Before being delivered to the first consumer, the water has to be held for one hour in order to kill any bacteria present.

Dunedin waters, being drawn from high moorland catchments, are fairly highly coloured and contain a quantity of organic material which, while a nuisance to consumers, would also require large quantities of chlorine to oxidise if it were not first removed by some form of filtration.

The filtration method uses microstrainers. These are essentially large cylindrical self-cleansing rotating strainers fitted with an extremely fine stainless-steel wire mesh. The strainers are 7 ft 6 in. in diameter. The raw water enters the inside of a strainer at atmospheric pressure and is filtered as it passes outwards through the mesh which has 166,000 openings to the square inch. Solids down to 5 microns in size (1 micron = 1/1000 millimetre) are removed when they are washed off the mesh by high pressure jets of clean water pumped from the downstream side of the strainer. The solids drop into a hopper whose top extends above the water level and are carried away to waste through the hollow axle.

The standard of filtration is equal to that of most other types of filter but any bacteria and colour removal is incidental. Bacteria are killed by the subsequent chlorination which also tends to reduce slightly discolouration arising from the organic acids in the water.

Once having sterilised the water it is most important to retain it in this condition, so all service reservoirs downstream of the treatment stations have been roofed to prevent subsequent contamination and also to prevent sunlight which would nullify the effect of chlorine.

For the last two years Dunedin water supplies have been fluoridated to reduce dental caries and this process, using dry feeders for sodium silico-fluoride, is also done at the treatment stations. The natural level of fluoride in the water is approximately 0.08-0.14 ppm and sufficient fluoride is added to bring the concentration up to 1 ppm.

Regular checks are taken, both of fluoride concentration and free residual chlorine, by sampling water at different places in the reticulation system.

It will be seen that every effort is made to provide a sterile potable water but any water treatment processes must always be regarded only as a second line of defence. It is of prime importance always to collect, in the first instance, water as clean and safe as possible. For this reason public access to the water
reserves for recreation purposes has to be completely prohibited near streams and intakes. Limited access to the outskirts of the catchment areas is permitted for tramping, but active development of these parts is not allowed or encouraged. It has been found by experience that road construction results in increased turbidity at times of heavy rainfall. Public access increases the risk of contamination of the water and also the danger of fire—which destroys the plant cover so essential to regulating the run off from the catchment and preventing erosion.

Forestry operations are likewise unacceptable anywhere except on the fringes of very large catchment areas because of the increased turbidity due to roading and contamination. Apart from this, trees of the Pinus family absorb up to 10 inches of rain per annum and this is far more than the loss from plant cover of the native bush type.

These restrictions on the use of water-gathering grounds are not unique to Dunedin. They are common the world over to water supply authorities who are under constant pressure to open up the water catchments and reservoirs to the public. When dealing with the supply of water for human consumption, public health considerations must always prevail.

THE FUTURE

What of the future? Water so freely and easily available in the past may yet be in short supply in some areas in the not too distant future. The situation has already been reached where the only economic municipal water supply schemes are relatively large and costly to construct. An awareness by the public of the importance of using water economically and avoiding waste will go far towards conserving the existing supplies and save immense sums of money. Water supply authorities will have to promote this attitude of mind in their consumers by education. At the same time they will have to endeavour to raise the status of the industry by employing sufficient numbers of trained personnel to ensure that people in both town and country receive adequate quantities of the safe, potable water that is their right.
A SURVEY OF THE INCIDENCE OF LYMPHO IN THE HIGH COUNTRY

By J. G. Hughes and J. Barton
Tussock Grasslands and Mountain Lands Institute.

INTRODUCTION

In June 1968 the Annual Conference of the High-Country Committee of Federated Farmers requested the Institute to find out how many carcasses from high-country runs were rejected for export due to infection with the disease Caseous Lymphadenitis or "lympho".

THE SURVEY

We sent a list of high-country runholders to each of the nine freezing companies in the South Island and to 18 exporters. All the companies and 12 of the exporters agreed to search their records for the names of suppliers during the last two years. Later we found that the remaining six exporters were making few purchases from the high-country region anyway.

When the companies returned the lists marked with the names of 250 stations from which they had received stock, we sent letters to their owners asking for permission to recover killing figures. A gratifying 82 per cent or 205 runholders gave us the right to do so. Several others later told us that they had not replied because, in spite of the freezing companies listing them as suppliers, they had not in fact recently sold sheep to the works. Some of this confusion came about when one company included in their list (as we later discovered) possible as well as actual suppliers.

We then returned the lists of approving runholders to the companies for them to compile lympho totals off killing sheets. This they did with varying success.

SURVEY PROBLEMS

We ran into some difficulties:

In some cases several suppliers and their figures had been left off a company's list.

Some companies found that, in the end, they could not spare staff for the search so we checked 67,000 killing sheets to fill these gaps.

Although lamb killing sheets were usually kept separate,
several works "boxed" together lines of adult sheep bought "on the hoof" from different owners and had no way of identifying them later.

One company had stored their sheets loose in sacks.

Others did not record the lympho in stock killed outside the export season for local use. This meant there were no records for several lines of fat wethers.

As a result of these errors and omissions the survey is not as complete as we would have liked. However, we have gathered sufficient data to give us a reasonable picture of the distribution of the disease and its cost to runholders. We know that the disease is not restricted to high-country flocks. Many hill-country flocks are also severely infected. Unfortunately, the survey could not be extended to this region.

THE RESULTS

After the Institute's 1965-67 high-country production survey, we grouped the 300 runs into districts so that several properties with roughly similar climates and locations could have their production compared with other groups. We used this same classification to compare the incidence of lympho between districts in this survey.

While the land-form classification was roughly provincial, the climatic zones were based on average annual rainfall and were: "dry"—15-25 in., "moist"—26-45 in., and "wet"—more than 45 in. We realise that the rainfall on some properties varies from one part to another and made allowances for this.

We also grouped properties according to their main sheep breed and whether they sheared with blades or machines. The results we found are shown in table 1.

You must remember that these figures are averages of the results from many properties, often with widely different levels of rejection—particularly in the moist and wet climatic ranges.

If the amount of lympho in a flock does to some extent depend on shed and yard hygiene, then the figures represent all levels of care to control the disease. It was not uncommon to find individual flocks in wet and moist climates with almost no lympho at all. We could find no obvious reason for this other than a history of reasonable hygiene being practised on the property. On the other hand, flocks similar in breed, shearing method and type of country could have high levels of rejection.
TABLE 1
Percentage of Rejections for Lympho from Adult Sheep Killed at South Island Freezing Works

<table>
<thead>
<tr>
<th>Breed</th>
<th>Shorn</th>
<th>Dry</th>
<th>Moist</th>
<th>Wet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mrthb</td>
<td>Otago</td>
<td>Mrthb</td>
</tr>
<tr>
<td>Merino</td>
<td>Machines</td>
<td>30-40%</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Blades</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halfbred</td>
<td>Machines</td>
<td>12</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Blades</td>
<td></td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Corriedale</td>
<td>Machines</td>
<td>11</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Blades</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romney and Similar</td>
<td>Machines</td>
<td>2</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Blades</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the above table a blank space means we did not recover any lympho figures for the category.

However, within their limitations, the figures do show some interesting trends:

1. **Merinos appear more susceptible to lympho than Halfbreds or Corriedales, and they more than Romneys.**
   We know of no reason for this other than that the wrinkled skin of the Merino is more prone to shearing cuts.

2. **Sheep shorn with machines appear to be more susceptible than those shorn with blades.**
   This is almost certainly due to blade shears being dropped into a disinfectant-containing water pot after each sheep while machine handpieces are not.

3. **Dry climates predispose to a higher incidence of the disease than moist climates and they to a higher incidence than wet.**
   This bears out the contention that dusty conditions, particularly near shearing sheds and yards, favour infection with lympho.

4. Although we were not able to take out satisfactory figures to compare the sexes, **lines of wethers almost always had a higher average incidence than lines of ewes from the same property.** This could be due to the greater age at which wethers are usually culled.
THE COST

Since the figures we recovered from the freezing works were incomplete, they could not be used directly to find the cost of rejection. Also many runholders, particularly in the drier districts, sell their old sheep, even if in forward store condition, in saleyards rather than to freezing works due to previous high levels of rejection. These sheep would often be bought by farmers on lower country, kept for a year or two, then sold to freezing works or butchers. The farmers would thus have to stand the cost of rejection. Therefore one could expect that a high rejection loss would make them less eager to buy from the same high-country supplier again. Consequently with less demand for his sheep, in time one would expect the price paid for them to fall.

To arrive at some idea of the cost we have totalled the stock sold both fat and store from all the runs located in the various climatic districts mentioned before, and further subdivided them by breed and shearing method. The percentage rejection found from the records which were available have been applied to all the sheep sold to the works from these districts.

Appendix I shows that in an average season (between 1965 and 1967) 67,500 adult sheep were sold fat for freezing from all the 300 high-country stations. Of these an estimated 9,400 were rejected for lympho (or 14 per cent).

The following extract is from a letter to the Institute from the Canterbury Frozen Meat Company Ltd. (17/9/68).

"... The reject allowance for the last season (1967/68) was No. 1, 0.8c. lb; No. 3, 0.4c. lb; condemned, nil; plus of course the skin value as for the whole line. The difference in value between the rejects and the export carcasses would depend upon how the export carcasses were graded (i.e. prime or seconds) and weight range. In general, wether lympho rejects would be worth 5½ to 6½ cents per lb or $2.50-$3.00 per carcass less than an export-quality wether. Ewes: 3½ to 4½ cents per lb or $1.50 to $2 less than an export-quality ewe."

If from this letter we take $2.20 as the average loss per head from mixed-sex adult sheep in 1967/68, then the annual direct loss of income to the high country from lympho rejections was 9,400 x $2.20 or about $20,700.
To take the estimation further, we could assume that the average number of store stock sold from these 300 stations in a season between 1954 and 1967 was sold to easier country. Over the next two seasons let us say 10 per cent of them died. If the remaining sheep were then sold to the works, and the district
and breed percentage rejections for lympho applied to them also, then another 40,000 would be rejected. The loss in value at $2.20 per head would be $88,000.

Thus, if the prices paid by farmers to runholders for their store stock make allowance for later lympho rejection, then to the high-country’s direct loss of $20,700 of income from the disease could be added the indirect loss of a further $88,000 in lower sale prices. The total loss to the high country due to lympho would then be $108,700 in a season (about an average of $362 per station). In fact, of course, unless a flock is known to be very bad with lympho we doubt whether the unseen presence would lower the ewe-fair selling price of its surplus sheep. The cash loss to the high country from lympho would therefore be a good deal less than the $108,700 we calculated. Speculation this may be, but whatever the exact figure the cost is still substantial.

AN EXAMPLE

Say a good property shearing 6,000 sheep is selling annually 550 cull ewes and 250 cull wethers to the freezing works—without lympho and with ewes at $2.50 and wethers at $4 the gross receipts would be $2375.

At 10 per cent rejection for lympho and assuming $1.75 per head loss on ewe carcasses and $2.75 per head loss on wether carcasses, the station would receive $165 less. But if the lympho rejection rate rose to 30 per cent then it would receive nearly $500 less.

Therefore, if shed and yard hygiene are the main ways to reduce lympho infection, from the above example expenditure on it can be expected to show a good rate of return.

THE RUNHOLDERS’ ATTITUDE TO LYMPHO

Our survey showed that in the season 1966/67, the 300 high-country runs sold each season an average of 67,500 sheep to butchers or freezing works and 272,800 sheep in the store pens to other farmers. Obviously owners who have lost money from high rejection rates in the past are not likely to risk the same again by sending sheep to the works if they can avoid it. At present they have a choice. Store sheep prices for both ewes and wethers are high and often quite competitive with works prices. Therefore there is little incentive to clean up the disease. Most runholders selling “store” were unaware of how much lympho there was in their flocks. Even a few selling “on schedule” clearly had not looked at their killing sheets. Most
runholders selling to freezing works did so “on the hoof” at a negotiated price and received no advice of killing weights or disease, nor was it usually possible for them to find out. This is unfortunate.

At times the buyer said the sheep had a high rejection rate in the past and offered a lower price because of it. This may or may not have been true. One runholder tested and found it wrong. Most found it all too well-proven. But the opportunity to sell sheep in the station yard for cash is tempting. Unfortunately, like selling at ewe fairs, it can make the disease seem unimportant.

Luckily, not all runholders ignore the disease. Most make some effort to control it—a very few take every reasonable precaution. Surprisingly, in view of the many sources of infection, these men are mostly successful in reducing the disease
to less than 5 per cent of killings. It may take up to six or seven years but apparently it can be done.

THE DISEASE

M. C. Armstrong described the cause and effects of the disease in the March 1968 Review and gave ways to control it. He pointed out that it is caused by an organism, Corynebacterium ovis and it is usually recognised by enlarged abscessed lymph glands in infected sheep.

There are two principle sources of infection of young sheep—dung and the ruptured abscesses of older sheep. Lymph gland abscesses large enough to burst are not often seen.

The next few paragraphs summarise practical features of the disease and runholders’ methods of combating it. No man has found it possible or worthwhile to carry out every precaution but each practice must help with disease control even if only in a minor way.

LAMBS

Killing records showed that the amount of lympho in lambs was small. Most showed only an occasional reject. A 1 per cent incidence was high and rare.

If infection comes mainly through wounds, then since lambs for killing are not shorn, the most likely time for the disease organism to enter the lamb is at marking. This is especially so when marking is done in the station yards. Lambs can also get the disease at birth by infection of the umbilical cord. However, the risk of this is low where ewes are lambed on hill blocks.

One runholder selling most of his lambs on schedule had reduced the export rejection for lympho in them by using rubber rings instead of the knife. However, others said they had stopped using rings because of fly strike or tetanus losses.

Two runholders squirted antiseptic from an oilcan onto the tail and purse wounds at marking time.

THE YARDS

Since dust and contaminated soil seem to be prime carriers of the organism, any way to reduce them near the shearing shed must be good practice.

Various owners commented on the importance of saving paddocks near the shed before shearing to get a good sward. One or two flood irrigated them where they had water—others sprinkled the yards daily or more often to reduce dust.
Counting-out pens can be an important source of infection.

(Photo: B. M. Tinnock)

start controlling lympho it seems that a good supply of water at the woolshed is essential.

THE CATCHING PENS

Hardboard lining of pens may cut down dirt and dust and make it easier to clean them regularly, preferably daily. Some men also sprayed the pen floors daily.

THE SHEARING BOARD

Mr John Scott of Godley Peaks Station described in the March 1968 Review how he resurfaced his old wooden shearing board with an emulsified bitumen-sand-cement mixture then covered it with painted hardboard to cut down the number of infection-harbouning cracks and crevices. Hardboard lining of walls around the board also helps to reduce dust. Frequent, even daily washing, broom scrubbing and disinfecting of the board is desirable, although this can cause freezing up if done too often at early pre-lamb shearing in cold regions.
Get sheep away from the shed quickly.

(Photograph by B. M. Tinock)

One writer recommends moveable floor stands or sheets of fibre (hardboard) for the shearer to work on. When a cut or discharging abscess fouls the stand the sheet of board can be quickly replaced by a clean spare one. He also recommends having spare sterilised handpieces available to replace any which become soiled.

The owner is well advised to change the water in the shear pots and recharge it with antiseptic at least daily, to provide disinfected water for washing handpieces, and disinfected oil for oiling them or blade-sharpening stones. There should be some handy place for the shearer to boil his combs and cutters.

THE ORDER OF SHEARING

An early Australian survey of a large number of sheep showed how the incidence of the disease increased with age. Lambs had none, one-year-old ewes 5.8% and five-year-old ewes 30.5%. Two-year-old wethers had 27% and three-year-olds 39%. This seemed to show that shear cuts were the most common avenues of infection and that the more often the sheep had been shorn, the higher the incidence of the disease.
Most runholders believe this too. One, aware of the risk of cross infection from old to young sheep, arranged his shearing so that hoggets were shorn first, two-tooths next and adult sheep last. In this way he cut down the risk of hoggets picking up infection from newly-contaminated rails and yards.

**SHEARERS AND SHEARING**

Machine shearing certainly predisposed to a much higher incidence of the disease than blade shearing. Several runholders thought that narrow gear or handpieces led to more cuts and thus more risk of infection. Others were sure that a rough gang of shearers who cut the sheep frequently had made the disease worse. The difficulty of disinfecting handpieces compared to blades must cause most of the difference, however.

Shearers varied greatly in their co-operation with owners in keeping down infection. The best washed their trousers each night (a washing machine and plenty of hot water makes it easier); boiled their gear daily or at least before starting in a shed to prevent spreading any infection from the last property; called out when infected glands were cut or an open discharging abscess seen; and allowed the owner to disinfect the stand before restarting with fresh combs and cutters.

One owner paid $1 a hundred extra for co-operation and said he got none. Another provided free beer at night and said it worked. Some gangs didn’t need bribes but did their best as a matter of course. Others were not interested.

If shearers can see that an owner is trying hard to keep down the disease, has good facilities for them, and takes pains not to upset their shearing unnecessarily, reasonable men are likely to help him.

Owners or their shedmen should be ready to clean down a stand if an abscess is cut and to pen the sheep away separate from the rest for killing or treatment. Even spraying disinfectant on a bad cut while the sheep is still on the board can prevent infection.

**COUNTING-OUT PENS**

The lympho organism may remain alive outside the animal body in surface soil or droppings under favourable conditions of shade, moisture or warmth for as long as two years\(^2\, 4\). In these conditions it can even multiply!

One authority\(^1\) says that since acid conditions restrict its growth in the soil, yards and pens should be treated with half a
ton of sulphur to the acre before rain every few years. This could, however, be a very expensive remedy.

The organism is also known to be passed out live in the dung of animals to contaminate the soil. Although sheep can probably be infected by eating contaminated pasture this is an uncommon source of infection\(^1,2\). They may also get the disease by inhaling dust containing the organism\(^2\). Obviously all these sources of infection mean that the shearing board is not the only place to take precautions.

Although covered counting-out pens protect sheep from storms, they can cause perpetually damp conditions under them which harbour the disease organisms. In the counting-out pens the newly shorn sheep is at its most susceptible to infection, particularly if it has to stand around for a whole shearing run. Some sheepmen believe open-topped pens favour the sterilising effect of sunlight. Concreting is a great help in reducing dust.

Better still are chutes with counting devices (out of reach of the shearsers’ brooms) so that shorn sheep can be put straight
out to grassed and sheltered paddocks. This seems to be most important—getting sheep away from the shed and yards quickly. In fact it could be the only reason why two adjoining owners of similar sheep, using the same shearsers in the same shed, should have widely varying levels of infection. The resident's sheep had a lot, the visitor's almost none.

Daily or more frequent disinfectant spraying of both the floors and rails of counting-out pens is best. One runholder in Otago sprayed them hourly.

OFF-SHEARS SPRAYING

Many runholders now spray their sheep off shears either with disinfectant alone (e.g. Syvel) or with disinfectant mixed with insecticide for lice and keds. Those spray-dipping off shears also usually dip again later in the season. Arsenic dipping is not enough to kill the lympho bacteria. Although the disinfectant spray is only now becoming popular, it is not a new practice. Even in 1933 it was being recommended that sheep should be sprayed with carbolic solution to disinfect shearing cuts. The modern followers of this old advice of off-shears spraying seem to be happy with the results provided it is done soon enough after shearing. It could be possible to fit an automatically-operated spray plant in a race leading from the shed to the paddock.

CONCLUSION

Variation and Cost

The figures we have given show that the incidence of lympho does vary with the breed of sheep, with the method of shearing and with the climatic district. It is also clear that some high-country flocks are badly infected and sell many diseased sheep each year. If they are sold store any price loss may be hidden. But if sold to freezing works, even as canners, the cost can be significant. It must rise, too, as improving properties sell more sheep.

The Freezing Companies' Part

We are convinced that freezing companies could do much to bring home the importance of this disease to their suppliers (and incidentally help their own buyers) by killing lines of adult sheep separately, recording the number rejected, and advising suppliers of this and the estimated cash loss compared to a clean line. The causes of other rejections, e.g. bruising, could also be emphasised. We are well aware of the big practical difficulties but think they would be worth overcoming.
Is Control Worthwhile?

The sources of infection on the station are many but the evidence is strong that the greatest risk is at shearing. Several runholders have found it worthwhile to strive for hygienic conditions in and around their shearing sheds. Where the measures have been the correct ones for the property and the programme has been going long enough, they have been successful.

The question is, how much is lympho costing you—even indirectly—and how keen are you to get rid of it?

REFERENCES


## APPENDIX


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Estimate.

| 67511 | 9398 | 272791 | 40006 |

| say, 67500 | say 9400 carcasses | say, 40000 carcasses |
| @ $2.20 p.h. less | @ $2.20 p.h. less |
|

*Estimate.

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