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The Institute does not necessarily agree with the views expressed in contributed papers published in the "Review."

Cover drawing by J. Morgan.
How Old Is Your Sweet Brier?

By B. P. J. Molloy, Field Research Officer, Department of Agriculture, Christchurch.

Present infestations of sweet brier are dominated by large veteran plants and by somewhat younger ones usually more than two feet high. There are relatively few plants less than two feet high, and vigorous seedlings are becoming hard to find. Each year a fresh crop of seedlings appears, but most fail to persist, except on young or eroding soils.

The main reason for the scarcity of young sweet brier is increasing competition from other species. Grazing of these improving areas by sheep has also prevented seedling establishment. As a result, the number of plants is rapidly becoming static. Moreover, sweet brier is unable to spread into surrounding grasslands.

Many people consider that all small sweet brier plants are young. This is not so; many small plants can be quite old. Confusion on this score has often led to confusion on whether sweet brier is spreading or not. To tell the age of sweet brier we should know something of its life history, and of the methods used in ageing woody plants.

Life History

Sweet brier flowers once a year, usually in November or December. Flowers in February or March rarely set seed. The seeds develop in the fleshy hip and are mature and viable when the hip turns orange but is still quite firm. As a rule hips are shed naturally or cropped by birds and animals within twelve months of formation. However, it is not uncommon to find two, three, and even four-year-old hips still attached to plants.

Some seed will germinate in the first spring following its production provided it is buried for several months beforehand. Most germinate in the second spring, but some do not germinate until the third or fourth spring following production. Unlike gorse seed, the seed of sweet brier lives no more than 6 or 8 years once it is shed.
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BAA'lCI
SUC!
MATURE
RHIZOME
LATERAL
BRANCH
REPLACEMENT
SHOOT
CROWN
Seedlings appear during a limited period in spring, beginning in August. They are most abundant around the base of mature plants and are easily recognised. There are no other seedlings quite like them in the tussock grasslands. When newly-germinated seedlings are grown in a greenhouse, they develop several branched and leafy stems and a robust root system by the end of their first summer (figure 1). In the following winter they become dormant and drop their leaves. During the next summer they develop vigorous stems and rhizomes from the base or crown. Thus, by the end of their second summer, greenhouse plants possess several upright stems, a weaker, straggling, juvenile shoot system (the first year’s growth), and one or more rhizomes. These plants will flower in their third year following germination, thus completing the life cycle. Forced plants will flower in their second year (figure 2).

In nature, even under favourable growing conditions, plants will remain in a juvenile state for several years. Under poor conditions they retain a single-stemmed habit for even longer periods. **For example, one plant about 5 inches long proved to be 14 years old.**

A mature plant of sweet brier consists of a long-lived crown which supports a colony of perennial stems or canes. Stems arise in three different ways (figure 3):

1. As replacement shoots from crown buds (known to rose growers as water sprouts, basal shoots, or bottom breaks).
2. As lateral branches from buds above the crown.
3. As suckers from buds on the rhizomes.

Suckers may also develop from buds which arise on roots, but only when the roots are injured, exposed, or cut. In their first year all new stems are leafy and usually unbranched. Repeated flowering in later years gives rise to the familiar mature cane with its mass of small branches.

Once it is firmly established, sweet brier can survive indefinitely by producing replacement shoots and lateral branches. Further, it can form fresh colonies around suckers derived from

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**FIG. 1**—(top left): First year seedling raised in greenhouse (scale in feet and inches).
**FIG. 2**—(bottom): Forced plant (right) compared with one raised outside. Both 12 months old.
**FIG. 3**—(top right): Diagram of sweet brier plant.
its rhizomes. This happens more often on stony soils and when plants are disturbed by cutting, burning, pulling and grubbing.

**HOW TO AGE SWEET BRIER**

Seedlings of perennial woody plants can be aged by two methods:

1. Counting the clusters of bud-scale scars on the main stem.
2. Counting the growth rings in the stem or root.

After germinating in the field, a sweet brier seedling develops a short leafy stem. With the onset of winter, growth slows down, a terminal winter bud is formed and the leaves are shed, leaving small scars known as "leaf scars" spaced regularly along the stem. The winter bud consists of several bud scales enclosing partly-developed leaves and the minute growing point. When this bud opens in the following spring, new leaves unfold, another section of stem elongates and the bud scales are shed, leaving a cluster of closely-spaced scars known as "bud-scale scars". This pattern may be repeated in subsequent years resulting in a stem with numerous leaf scars and clusters of bud-scale scars (figure 4). Thus, a seedling with no bud-scale scars is one year old, a seedling with one cluster is two years old, and so on.

Besides growing taller, the stems of perennial woody plants also grow thicker. The stem of sweet brier consists of a soft

![Diagram of Sweet Brier Seedling](image)

**FIG. 4**

**DIAGRAM OF SWEET BRIER SEEDLING**
centre or pith, concentric layers of hard wood, and a thin outer layer of soft bark. The layers of wood appear as rings, hence the terms "growth rings" and "annual rings". In sweet brier each ring represents the growth of one year and is a true annual ring. Unfortunately, the annual rings of sweet brier seedlings are not visible to the naked eye. They are very close together and can only be counted by cutting a thin section off the stem and looking at it through a microscope.

Both methods outlined can only be applied accurately to undamaged, single-stemmed seedlings (figure 5). Once a plant develops several stems from the crown, its true age is best obtained by cutting a thin section off the oldest root near its base, and counting the annual rings with the help of a microscope. Runholders should find the bud-scale method useful for determining the age of most seedlings found in nature.

Ageing retarded or mature plants is not easy. The most one can do in the field is to determine the age of the oldest cane in a colony. This can be done quite easily by cutting on a slight angle through the base of the cane. If the cut is clean the annual rings can be counted either with the naked eye or with the help of a pocket magnifying glass.

Since the oldest cane may be many years younger than the plant, the true age can only be measured by excavating the plant and cutting thick sections off several roots. These have to be dried, polished, and examined with a microscope. Even then we can only obtain a minimum age for the plant. There may be several years to add on because of the difficulty of obtaining satisfactory sections through the base of the first major root.

**FIELD DEMONSTRATION**

Figures 5-10 give a rough guide to the age of sweet brier plants of various sizes. But it is well to remember that size alone is not absolutely reliable. Small plants growing on poor sites can be just as old, if not older, than robust plants growing on favourable sites. The material shown is a cross section of plants collected in February from Ben Ohau station in the Mackenzie basin. The infestation occurs on the steep face of Mt. Ostler. The rolling tops of Mt. Ostler and the flat terrace below are well grassed and devoid of sweet brier. Previously, rabbits abounded. In recent years the block has been oversown and topdressed, beginning in 1957. At the same time, sweet brier increased visibly in density. At first glance this would
seem to be due to a recent increase in plant numbers. However, when we examine the age of representative plants, an interesting story emerges.

The largest plants on the site are at least 40 years old. Plants over two feet high (and some smaller than this) are at least 15 years old. Obviously these plants were established before the introduction of the rabbit killer policy in the early 1950's. The majority of smaller plants down to those about 3 or 4 inches high are about 10 or 12 years old. These plants probably represent seedlings which became established after the rabbit was destroyed and a temporary plant vacuum existed. Their present rate of growth suggests that conditions in recent years have gradually worsened for them. Between this age group and the young seedlings there is a distinct gap. The young seedlings themselves lack vigour and die out. The majority are clustered around the base of the parent plants and take little or no part in the dispersal of the species.

To summarise, the apparent spread of sweet brier on this site in recent years is really an increase in the growth of plants which were established before or immediately after the reduction in rabbits. Conditions in the last 5 or 10 years have become detrimental to both seedling establishment and the growth of older plants; a trend which seems to be wide-spread throughout the tussock grasslands.

FIG. 5—(top left): Wild seedlings. Age from top to bottom—1, 2, 3 years. Large plant on right 4 years old.
FIG. 6—(top right): Height 6ins.—(left) age 12 years. (right) age 9 years.
FIG. 7—(middle left): Height 1ft.—(left) age 18 years. (right) age 12 years.
FIG. 8—(middle right): Height 2ft. Age 18 years.
FIG. 9—(bottom left): Height 5ft. Age 30 years.
FIG. 10—(middle right): Height 6ft. Age 45 years.

N.B.—Plants over 1ft. high have been trimmed for these photographs. Scale in feet and inches.
BIOLOGICAL CONTROL OF SWEET BRIER

The situation in February, 1967

By B. B. Given, Entomology Division, D.S.I.R., Nelson.

When sweet brier became a problem after rabbit control, Entomology Division, D.S.I.R., gave high priority to biological control investigations. The European Station, Commonwealth Institute of Biological Control was asked in 1962 to undertake this study and since then this work has superceded all other weed control work.

Biological control of sweet brier, however, is no easy task. Brier is a member of the family Rosaceae and an insect which attacks brier may attack other plants of the same family. These include apples, plums, apricots and raspberries. Clearly, before an insect which attacks brier can be released, we must be absolutely sure that it will not damage these economically important plants.

Since 1962, the Commonwealth Institute of Biological Control has investigated over 400 insects attacking brier and its relatives in Europe and one of these, the gall wasp Rhodites rosae has been selected for trial. Most of the major insect groups have been studied over a wide area in Europe. Present studies are concentrating on sawflies (Tenthredinidae), some 30 species of which attack Rosaceae in Europe.

Some quarantine facilities should be available in Nelson this year and a pilot consignment of Rhodites will be obtained to learn how to handle the insect when the need for extensive testing arises. Even if this gall wasp proves safe to release, it will attack only the hips and will not destroy whole bushes.

Thus biological control may ultimately help chemical and cultural methods of overcoming brier. But there is no prospect of biological control providing a quick and easy solution to the problem.

CORRECTION

Readers may have noticed a misprint in the article on silage in our last (No. 11) Review. On page 16, the last line in the paragraph headed Silage and Sheep should read: “Two hundred tons feed about 1000 ewes for two months”.

8
WHAT IS EFFICIENT RABBIT DESTRUCTION?

by J. A. Gibb*

(Animal Ecology Division, D.S.I.R., Lower Hutt.)

So long as rabbits plagued the land the sole and rightful aim of rabbit destruction was to destroy rabbits; and so long as they were being reduced, visibly, from year to year the battle was being won. The battle cry “To the last rabbit!” was inspiring, but irrelevant because there were so many left to kill.

By about 1960 the rabbit had been well and truly defeated, and all praise is due to those many dogged persons who engineered the victory against such seemingly impossible odds. Their achievement is the envy of many countries, especially Australia.

* I thank my colleagues Mrs C. P. Ward and Dr. J. E. C. Flux, for commenting on an earlier draft of this article; and for discussion, many good friends in the rabbit destruction movement who may prefer to remain anonymous. The views expressed here are mine, not theirs, nor necessarily those of my Department.
and Britain, where rabbits continue to nibble away at farm production despite the massacre by myxomatosis. But the cry "To the last rabbit!" persists, and begins to rattle in the ears of those who can see rabbits living on, unobtrusively, in small groups throughout the country. Almost wherever one goes, a few rabbits can be found not far away: from Petone foreshore to above the bush-line on Mt. Egmont, and from Gabriel’s Gully across the revitalised tussock grasslands of Central, over to remote West Coast beaches from Haast to Hokitika. Doubtless there are large blocks of land (other than bush) free of rabbits, but the real job of getting the last one has hardly begun. It may seem ungracious to criticise when so much has been won, but it is high time to admit that there is not the remotest chance of getting the last rabbit in the foreseeable future; and this matters because it affects policy.

Rabbit destruction is at a crossroads: either it clings to the aim of getting the last rabbit, or it admits this cannot be done in the present state of knowledge. If the policy is to get the last rabbit then we must not allow the present effort to slacken at any cost — in fact the effort and cost (already about £1.5 million a year) will have to be increased very greatly. Such a policy is justified only if there is a reasonable prospect of getting the last rabbit in the foreseeable future, so that eventually there will be no need for any rabbit control at all. Until then cost will be of little importance, and the only valid measure of success will be the annual reduction in the number of rabbits left.

Alternatively, if we drop the “last rabbit” we can get down to formulating a realistic policy of economic control, in which the continuing cost of control is related to the value of production saved. Truly the slogan “To the last rabbit!” is straightforward, whereas the concept of economic control is a little more subtle; but if we retain the out-moded ideal knowing it cannot be achieved, we make it impossible to define efficient rabbit destruction because we do not know where we are supposed to be heading. This is the present dilemma, and a change must be made because the last ditch stand of the “last rabbiters” is blocking efficiency. I will give one example.

In an enlightened (some might say “unguarded”) moment, a North Island rabbit board undertook to withhold all rabbit control from a 3000-acre block of east coast hill country for three years, to allow Animal Ecology Division, D.S.I.R., to measure the changes in rabbit numbers that would follow. Most of this country had never been very heavily infested with rabbits, but it was still peppered with small pockets of them round
scrub margins and gullies. It had come only recently to be regarded as problem country for rabbits because it was difficult to make much impression on the few rabbits left, not because there were so many of them.

After three years without control on the research block the rabbits there had neither increased nor decreased.

Detailed 6-monthly checks by Animal Ecology Division showed that some small pockets of rabbits had increased slightly, whilst others had dwindled away; but the over-all picture was unchanged.

By no stretch of the imagination are these few rabbits causing detectable production losses. If the policy is to get the last rabbit then the rabbit board is morally bound to hammer at them relentlessly year after year. Under a policy of economic control, however, we should be at least free to decide whether it is more economical to take active control measures every year, or to reserve control for when it is really necessary to safeguard agricultural production.

There are many parts of New Zealand where sustained rabbit control is necessary; but equally there are others where it is not. We must have a policy for rabbit destruction that recognises this plain fact.

For many years in New Zealand, animal ecologists have been labelled defeatist because they have consistently warned that it would prove impossible to get the last rabbit. This prediction springs from familiarity with a wide range of fundamental research into the things that affect animal numbers, and of the way they act. For instance, much research into the way that natural predators affect the numbers of their prey applies directly to our own efforts to reduce the numbers of rabbits.

One important conclusion from this research is that natural predators seldom or never exterminate their prey. The predators are not restrained by any farsighted conservation of their food stocks, but simply die of starvation, or fail to reproduce long before the prey is gone. We do not expect to starve (or fail to reproduce) before exterminating rabbits, because we shall certainly run out of cash first; but our actions are just as effectively restricted.

Other research by Animal Ecology Division has shown very clearly that rabbits are better equipped to resist or recuperate from control or natural mortality when they are at low rather than high densities. Appreciation of this helps to remove some of the frustrations commonly met in rabbit destruction at today's prevailing low densities.
When held at low density by our control, rabbits are usually well fed and in specially good condition. They are large and muscular, and have few internal parasites. Few die from causes other than control because, at low density, they are not disposed to disease and it does not pay their natural predators (cats, ferrets, stoats) to seek them. They need to spend very little time away from the safety of cover and can rest for most of the day and night. At low density, too, rabbits have a long and intense breeding season each year. Because the females are in good condition they start breeding early in the season; there is little pre-natal mortality of the embryos and the litters are large. Moreover, litters follow each other in quick succession (usually the female mates literally within minutes of giving birth), so that at low density one female can raise several litters instead of only one or two a year. Young born under these favourable conditions grow fast, whereas the growth of those born at high densities is retarded. Young born early in the season may themselves produce young later the same season if they have grown fast, but not otherwise.

Finally, we must realise that we keep the rabbits permanently under these in-a-sense “favourable” conditions by stringently culling them so that their numbers are permanently well below the carrying capacity of the land. This is usually unavoidable, but it does explain why we find it progressively harder to reduce the numbers of rabbits the lower we get them.

There are of course many other familiar problems peculiar to rabbit destruction at low densities, not the least of which is the difficulty of maintaining enthusiasm at all levels once rabbits have been made inconspicuous.

No urge to kill is so strong as that impelled by hunger. The island of Malta, about 20 miles long by 5 miles wide, was inhabited during the 1939-45 war by more than 250,000 Maltese and around 50,000 troops. For a long period it was more or less cut off from its outside food supplies and stocks were almost exhausted, so everyone was on the brink of starvation. Most people were armed or operated traps to augment their rations by fair means or foul. There were a very, very few wild rabbits, regarded as “big game” compared to migratory birds, and in four years spent patrolling the island for one purpose or another, I saw only two — though there was very little cover for them. Yet these few rabbits survived the terrific hunting pressure exerted by an average 3000 hungry, crafty and mostly well armed persons to the square mile! Perhaps we may be excused
for failing to exterminate them here, with our much weaker incentive.

From time to time we in Animal Ecology Division have advocated a limited extermination trial of rabbits in New Zealand to test its feasibility over a large area, but without committing the whole country. Such a trial would have to be carefully costed as it ran, but money no object in the running of it. The results would be valuable in planning for the future, no matter what the outcome; but a national policy of extermination cannot be justified until it is shown to be feasible on a smaller scale.

As an animal ecologist I am often asked how to exterminate rabbits, and sometimes told to go and find out — by some magic formula. Others (who should know better) complain that science has played no part in rabbit destruction in New Zealand. Our effort has been necessarily restricted, but I have to point out that there has never been a scientist on the Rabbit Destruction Council, nor so far as I am aware on any Rabbit Board. The greatest contribution that a scientist could make would be to help formulate a proper policy in the light of existing scientific knowledge. If the scientist is not in sympathy with the accepted policy, or if efficiency cannot be properly defined, then the scientist is unlikely to prove very helpful in rabbit destruction or in any other field.

In the meantime it is my personal opinion that the present policy of outright extermination must be changed to one of economic control. This could spell the beginning of an exciting new era for rabbit destruction; one of control, experiment and research marching together to improve efficiency. It would demand new skills and responsibilities, re-organisation and initiative; and the same devotion that has characterised the rabbit destruction movement in New Zealand in the past.

Every rabbit board would have to map the distribution and density of rabbits in its district, and grade them according to their supposed danger of resurgence based on previous experience. There is no one or exactly definable level of infestation that can be regarded as "safe" (though a knowledge of the age structure of a population can provide a good clue); nor is it possible to say just what is the most economic level at which rabbits should be controlled. These matters have yet to be determined, but are being studied now by Animal Ecology Division jointly with the Wairarapa Rabbit Board. The second stage (policy permitting) will be to relax control gradually and cautiously in the supposedly safest areas, remaining poised to step
in and kill if necessary. The object of this exercise will be to see how little control is necessary to keep rabbits at, say, their present densities; and then later to experiment to find out what is the most economic level at which to hold them — and this may be above or below existing levels.

At first there will be no great saving of costs because the progress of the experiment must be watched closely; and the experiment itself limited to only one or two rabbit districts. But with growing experience and confidence, and wider acceptance, if the experiment is successful, the saving should be great. In matters of staffing, the emphasis eventually should be on reducing numbers but improving quality. With the sound objective of improving efficiency on scientific lines, the rabbiter's job should offer an attractive career to an intelligent man prepared to use his eyes, his judgement and his initiative.

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SOME OBSERVATIONS ON KEAS

By J. C. Aspinall, Mt. Aspiring Station, Wanaka.

The kea is one of the most colourful, interesting and amusing birds in the country and its habit of attacking sheep is a tragedy both for the sheep and the kea. This destructive habit is mainly caused by hunger, though keas which have become accustomed to attacking sheep may do so at any time of the year. The worst attacks on sheep occur from July to October. During this period, many native birds lose condition because they suffer from a shortage of alpine berries such as gaultheria and coprosmas. Deer may contribute towards this food shortage by eating out berry-producing shrubs.

I have examined the crop contents of many keas shot on sheep country. During April and May, the birds were full of native berries and their bodies well covered in fat. In June and July, the crops were often empty, apart from perhaps a few berries or grubs, and the bodies losing condition. For the next few months the bodies have had little or no fat on them, the flesh has been lean and dark and the crops have been either empty or full of wool and meat or the odorous remains of old sheep, deer or cattle carcasses.

I think the old story of keas preferring kidney fat is just a fallacy, because I have often fed them fatty meat and they certainly-prefer the meat. The back of a sheep is the obvious
place to land on and, like many other carnivorous animals and birds, they eat their way into the stomach of their victim.

Keas usually attack sheep at night or after a heavy fall of snow so it is most difficult to observe them attacking live sheep, let alone to photograph them. The photograph shows a sheep with the characteristic kea wound on its back. It is only one of hundreds of kea wounds, many smaller but sufficient to cause fatal blood poisoning, that I have seen. This particular type of wound is found on sheep only in areas known to be visited by keas. It has only occurred with the arrival of the birds after months of contentment and no sign of trouble amongst the sheep.

Sheep can become snowed in and, apart from avalanche dangers, survive for several weeks in deep snow. But there is nothing they can do if the keas find them. Often all I would see when the snow thawed would be the bones and a 10-20 yard circle of wool.

For the past 25 years I have had to carry out a vigorous campaign against keas on my run country. In the winter of 1942, with up to 15 inches of snow on the flats, 70 sheep were killed by keas on one face alone. Two hundred and fifty keas were shot off these carcasses. In the same area a few years later,
there was no trouble until late July. Then 72 keas were shot off ten dead sheep between 7 and 11 p.m. one night.

Our control work has been assisted by careful observation of keas, hawks and seagulls during early morning and evening through powerful binoculars. Seagulls often indicate kea kills by congregating round them. Keas can also be seen or heard going into sheep country at night and leaving in the early morning. One winter, for example, I went to town for a fortnight. On my return, I noticed keas flying out of a certain tussock basin at 9 a.m. in the morning. Investigation revealed 10 to 12 sheep eaten to the bones. There was one half-eaten sheep off which I shot 31 keas between 7 and 9 p.m.

I have poisoned keas by using strychnine on carcasses, but it is often difficult to find the one they are feeding on and too many poisoned carcasses are a menace to musterers' dogs. I prefer shooting. My favourite weapon is the .22 with the quietest ammunition that can be bought. The .22 is good for long shots and it is effective at night, with the aid of a torch, if the hunter is patient and plays on the birds' natural curiosity. Shotguns, kea guns and pistols are too noisy. They tend to
frighten and also to wound birds which then become wary and hard to stalk.

In May 1960, I inoculated all my sheep against blood poisoning (blackleg, malignant oedema) and, judging by the following shearing tallies, this could prevent many kea losses. Although I have seen inoculated hoggets dead from blood poisoning caused by kea wounds, the shorn sheep in the photograph certainly benefitted. The worst part of the wound was over an inch deep down to the backbone and it was alive with maggots. This sheep recovered after treatment.

From 1942 to 1958, I paid bounties on at least 1,500 kea beaks and this has certainly helped to reduce winter losses among my sheep. Several hundred keas were destroyed between 1942 and 1946 and our winter sheep losses dropped from 35-40 per cent to 14 per cent. Since 1942, helped by the removal of rabbits and top dressing, carrying capacity has doubled and sheep losses are now only 8 or 9 per cent.

In the last few years our losses from keas have certainly diminished and for two years I have not seen a sheep I can claim to have been molested by keas. This pleasing state of affairs won’t last without regular and thorough vigilance. I certainly hope that it lasts as long as possible. Now I am getting older, I do not look forward to spending evenings on the hills struggling through snow looking for keas, especially when trousers get wet and the lower legs freeze like stovepipes.

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**NOXIOUS ANIMALS: THE FOREST SERVICE POLICY**

Many people are not clear what is the Forest Service policy towards noxious animals. It is often held that their policy is total extermination. This is not so. In the 1965 report of the noxious animals committee, the Forest Service has defined its policy as being:

“to control noxious animals generally, to the level dictated by correct land use, and to eradicate noxious animals locally where necessary and practicable (such as in some new exotic forests and the new herd in Northland) following an order of priority dictated by the values at stake and at a rate governed by available finance”.

17
MATAGOURI
(Discaria Tournatou)
By G. T. Daly*
Plant Science Dept., Lincoln College.

Matagouri on a moist, mature fan in inland Canterbury.

Matagouri seems ever-present in eastern hill country and fescue tussock grasslands of the South Island. Despite the early interest of Dr. L. Cockayne, this spiny plant has only recently received much attention. Is it, for instance, relatively unimportant or is it a potentially important shrub weed hampering pasture improvement?

In the first Tussock Grasslands and Mountain Lands Institute Review, Mr L. W. McCaskill gave a pleasant and informative introduction to matagouri. He invited information from run-holders and several interesting replies were summarised in the second “Review”. Those comments have influenced a study of matagouri which I began last year.

The aim is to provide information under three headings.

1. The life history of matagouri from seed germination to old age.

*Miss E. L. Hellaby Indigenous Grasslands Research Fellow
2. The conditions which affect establishment and growth of the plant.
3. Its reaction to management practices such as burning, aerial topdressing, oversowing and grazing.

**LIFE HISTORY**

This tough, small-leaved shrub begins as an egg-shaped black seed about the size of a turnip seed. These seeds form in three- or four-compartmented capsules which are abundant on all plants more than five years old. In late summer the dry capsules shatter explosively and seeds are scattered all round the parent plants. Seeds which fall in favourable sites germinate to form fragile seedlings. In October and November it is common to see hundreds of seedlings on the lee of mature shrubs where there is shelter from drying winds.

The moist, cold conditions of winter encourage germination. In a laboratory test, moist seed held in a refrigerator for 16 weeks had a subsequent germination count of 80 per cent. The figure for seed kept at room temperature was 5 per cent.

Though seedlings are plentiful in the spring wherever mature plants occur, few survive the first summer. They appear unable to withstand dry conditions, particularly when weakened by shade from established vegetation. However, in open grassland, eroding, rubbly slopes or gravel, where germination may be low, some seedlings do survive. Eventually, dense thickets of mature plants can develop.

Few seedlings survive where the resident vegetation is dense. Up to 120 seedlings may be found per square yard in such sites, but no young plants of 1 to 15 years of age. On the other hand, such young plants are found in open grassland with 10-30 per cent of bare ground. In grassland with scattered matagouri and 27 per cent bare ground near Gorge Creek, Central Otago, for example, twenty matagouri plants between 1 and 15 years old were found per square yard.

Plants which survive the first two years persist even when grazed. Periodic grazing and burning causes the continual production of basal shoots. Matagouri plants so treated gradually form thick basal crowns and taproots reaching down ten feet or more into subsoil or rock crevices.

Mature matagouri eventually resists grazing pressure when spined shoots are not eaten in the year of formation. These branches continue to grow in several directions and in a few years form the typically thicketed growth habit. Some runholders refer to this as "creeping matagouri". The thicketed
plant usually has one or several branches which grow faster than the others and, in 20 to 30 years the upright tree habit is achieved. These “old man” matagouri plants are the normal mature shape and many are over one hundred years of age. However, they appear to become senile and die before reaching two hundred years. The thicketed plant may be considered as a juvenile form. Healthy matagouri, despite the official description, appears always to bear leaves during the growing season. These small leaves are, however, lost every autumn. Thus matagouri is one of the few truly deciduous New Zealand plants.

**CONDITIONS AFFECTING ESTABLISHMENT AND GROWTH**

The range of matagouri in the South Island is being surveyed. Stands of grassland containing the shrub are recorded to help pin-point the conditions in which it thrives. From stem-ring counts the growth rate can be shown to vary considerably with season and habitat.

Growth is most vigorous on moist, well drained river terraces and shingle fans. Matagouri may succeed on these sites because they are relatively rich in available phosphate. Matagouri is an unusual shrub because it bears root nodules which can fix nitrogen in much the same way as do those of legumes. As is well-known, a legume such as clover can flourish if given enough phosphate and sulphur; it has no need of soil nitrogen. In the same way, the nitrogen-fixing matagouri may succeed on very young soils which, although nitrogen-deficient for grasses and herbs, are fairly well supplied with phosphate.

Absence of matagouri on mature soils carrying closed vegetation can, however, be due to many factors. The most likely appear to be low available phosphate, insufficient aeration for its roots and, of course, competition for light and moisture by other vegetation.

Throughout run country below 3000 ft. matagouri has occasionally been able to establish in depleted grassland on mature soils. These soils are usually yellow-grey earths and are always well-drained with a supply of ground water. A number of runholders find that it responds rapidly to superphosphate in these areas. In some cases matagouri is reported to have increased in density and size to dominate previously clear grassland. I think that almost all the apparent increase would be in size of plants well-established at the time of topdressing. A fair number of plants could have been present beforehand but not noticed because they were kept small by animal browsing and poor nutrition.
Because it can fix nitrogen like clovers, matagouri would be expected to respond to superphosphate on phosphate and sulphur deficient soils. Strong competition from clovers and grasses could suppress seedling matagouri but not ungrazed thicket-forming plants. Pot trial and field plot work is being used to test this. Measurements will also be made of fertilizer effects on matagouri seedlings and mature plants growing in several tussock grassland soils.

**CONTROL OF MATURE PLANTS**

An extremely hot fire in matagouri-infested grassland kills or damages thicketed plants but some taller individuals survive and are a continuing seed source. After most fires, however, matagouri shrubs respout from the stem base. Burning alone thus gives only temporary control. Is heavy mob stocking afterward either practicable or effective in getting rid of surviving shrubs?

Burning, where used, is most usefully followed by top-dressing and oversowing. Where control of matagouri is desired, block-size would need to be of the order of 100-200 acres to enable control over grazing in subsequent years. A Central Otago runholder has commented that matagouri is no problem because he “bares every block once a year”. Heavy grazing of productive grass-clover mixtures on small blocks has been suggested to control sweet brier. Matagouri may be best controlled in the same way for the similarity in the ecology of these two shrubs is quite striking.

Though herbicides such as “Tordon” do kill matagouri, spraying large blocks of run country would clearly be uneconomic. However, if thickets of the shrub are reducing the amount of grazing on improved country, their removal is certainly worth some attention. I intend to measure the effectiveness of a combination of burning, topdressing and oversowing and subsequent heavy grazing as a means of clearing matagouri.

At present the questions are many but the answers are few. **The advice and comment of runholders would be most welcome.**

**ACKNOWLEDGEMENTS**

This study is being financed largely by the Miss E. L. Hellaby Indigenous Grasslands Research Trust; I thank the Board of Governors and Trustees. The Plant Science Dept. is very appreciative of a grant from the Tussock Grasslands and Mountain Lands Institute. The interest and advice of Dr. B. P. J. Molloy, Professor T. M. Morrison and Professor T. W. Walker is acknowledged.
OVERDRILLED CEREALS FOR WINTER-GROWN GREENFEED

By P. T. P. Clifford and E. W. Vartha, Grasslands Division, D.S.I.R., Lincoln.

The late winter-early spring period before growth “moves” on tussock blocks is a critical time for the thrift of breeding stock, in particular young stock. In the March 1966 “Review”, we indicated that the practice of overdrilling ryecorn into improved tussock grassland might be used to produce winter-grown greenfeed. This article discusses results from an overdrilling trial at Simons Hill Station in the Mackenzie Country.

The trial is on well-drained winter country of north-west aspect, at the foot of Simons Hill. There, fescue-tussock grassland had been oversown with clovers and cocksfoot thirteen years previously. In February 1966, C.R.D. ryecorn, a Mackenzie Country selection from C.R.D. ryecorn, and Montanum winter ryecorn were overdrilled with a disc-seeder at three bushels per acre with 2½ cwt. of a 50:50 mixture of nitrolime and 400-S superphosphate.

A satisfactory “strike” of ryecorn was obtained. Extremely dry conditions persisted for three weeks after emergence. Ryecorn survived well and was first grazed in April.

Typical country used for overdrilling trials. D.S.I.R. Photo.
The regrowth was disappointing except in strips where the drill had overlapped on the boundary between plots. Before the second grazing in May, yields of ryecorn in these overlaps (1000 lb. dry matter per acre) were double the yields from the drill rows. This difference may be due to the additional fertilizer, although the effect of additional seed drilled cannot be discounted.

In May we applied an extra 3 cwt. per acre of nitrolime to half the drills. The effect of the extra nitrogen was obvious by early September. The following table shows production to that date from the second grazing in May.

<table>
<thead>
<tr>
<th>Ryecorn Yield (lb D.M./acre)</th>
<th>Spelled 25th May to 8th September.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Nitrogen</td>
<td>Montanum Winter ‘Mackenzie’</td>
</tr>
<tr>
<td>Nil</td>
<td>C.R.D.</td>
</tr>
<tr>
<td>3 cwt/acre</td>
<td>820</td>
</tr>
<tr>
<td></td>
<td>370</td>
</tr>
<tr>
<td></td>
<td>360</td>
</tr>
<tr>
<td></td>
<td>1030</td>
</tr>
<tr>
<td></td>
<td>1730</td>
</tr>
<tr>
<td></td>
<td>1630</td>
</tr>
</tbody>
</table>

If the greenfeed grown up to 8th September were all used in September, maximum stocking rates (100 lb ewe equivalent) on the highest yielding varieties without and with additional nitrogen could be 5.5 and 11 ewe equivalents per acre respectively.

Results from a further harvest on 29th September indicated that the average daily rate of regrowth of grazed ryecorn was sufficient to carry an additional 2.5 ewe equivalents per acre for the 21 day period.

Work in 1967 will investigate the response of a wider range of ryecorn varieties to rates of nitrogen application. The variety Rheidol S239 recently released by the Welsh Plant Breeding Station and which will be tested in the Mackenzie Country should be of particular interest. In Wales, this variety shows very early spring growth, responds to nitrogen application under low temperatures and possesses a high degree of winter hardiness.

The runholder, Mr R. Hosken, suggested that overdrilling grasses with the ryecorn into clover-oversown grassland could be a more attractive proposition economically than simply overdrilling ryecorn alone for greenfeed. Therefore, we overdrilled C.R.D. ryecorn at either 1½ or 2 bushels per acre with mixtures of Ariki and perennial (Ruanui) ryegrasses, or Welsh S170 fescue and cock'sfoot, the total seeding rate of the grass mixtures being 25lb per acre. In September, ryecorn yields from these
combined drills to which additional nitrogen had been applied were:—

1½ bushels ryecorn—1000 lb dry matter per acre.
2 bushels ryecorn—1200 lb dry matter per acre.

Establishment of the grasses was excellent.

CONCLUSION:

In common with greenfeed overdrilling practice in Canterbury results in the tussock grasslands will be disappointing unless adequate fertilizer nitrogen is applied. The economics of the use of this fertilizer depends on the value to the runholder of the **high quality** greenfeed produced and cannot be decided entirely on the basis of yield of dry matter per acre.

The ability of ryecorn to survive under extremely dry conditions is an important quality enabling this cereal to be overdrilled early in autumn.

Drilling of ryecorn with grasses appears to be a practical method of both growing winter greenfeed and improving clover-oversown tussock grassland with bred grasses.

ACKNOWLEDGEMENTS:

We acknowledge in particular the cooperation of Mr R. Hosken of Simons Hill Station; also Messrs T. Murray of Maryburn Station, J. Cameron of Ben Ohau Station and F. Henderson of Lumsden, Southland, for supplying materials to carry out this trial.
A FARM DEVELOPMENT PLAN
REVIEWED

By G. A. G. Frengley, Lecturer in Farm Management,
Lincoln College.

In July 1964, the Cheviot Farm Improvement Club held a
Field Day in the Leamington Valley. Before the meeting, the
Lincoln College Farm Management Department had drawn up
detailed development plans for two local hill country farms.
These plans took into account both the technical possibilities of
development and also the rate at which the farmers could rea-
onably afford to develop.

Both farmers adopted these development plans. This
article reviews the effect of seasonal and price variation and
changes in the owner’s personal objectives on one of the original
plans.

THE PROPERTY BEFORE THE DEVELOPMENT PLAN

The property, of 952 acres, is 9 miles west of Cheviot, and
between 600 and 1,350 feet above sea level. Rainfall averages
35-40in. per year evenly spread, but “norwesters” from Novem-
ber to March often cause severe summer droughts. The natural
cover was largely silver tussock with scattered matagouri, tutu
and bracken fern.

About 100 acres are ploughable, a further 250 acres are
discable and the rest is moderately steep to steep hill-country.
Apart from 80 acres of limestone soils, the soils are Gower Hill
series, which are subject to erosion if not reasonably covered.
Both soil types are deficient in sulphur and phosphate and have
a pH of 5.5 to 5.8 which is satisfactory for grassland farming.

The owner was 44 years old, married, with five children.
He took over the farm in 1952 with an ex-serviceman’s loan
and had been developing it steadily out of income as the seasons
allowed.

In 1964, the property wintered 2.1 ewe equivalents per acre,
consisting of 1,200 Corriedale ewes plus replacements and 87
Aberdeen Angus cows. Stock performance, wool weight and
quality were above average for the district. Stock were largely
wintered on saved blocks of grass, and summer feed shortages
were overcome by selling lambs early.

Budget calculations showed that an annual cash surplus of
£1,160 (over and above personal drawings) was available for
development. The gross income was £7,275, made up of wool 48 per cent, sheep sales 35 per cent and cattle sales 13 per cent.

THE DEVELOPMENT PROGRAMME

The planning involved the preparation of a before-development budget. A set of development budgets was then prepared relating the annual costs to the programme. An after-development budget was also drawn up to estimate the farmer's financial position at the end. Personal income before tax was estimated to rise from £2,425 before development to nearly £5,000 afterwards.

The physical development

The plan aimed to increase stock wintered from 2.2 to 3.5 ewe equivalents per acre. At the field day, many farmers doubted if this could be done.

The development methods were as usual — subdivision, oversowing and topdressing paralleled by more stock. Feed reserves were to be built up 50 per cent faster than the increase in stock numbers. A winter forage crop of 25 to 30 acres was to have been grown each year and sown down in lucerne in the first two years and in pasture subsequently. A hay reserve of 2,000 bales was planned for each winter after the first year. To allow stock numbers to be reduced in bad seasons by selling sheep, and to save labour, all sheep increases were to be in dry sheep—hoggets and wethers. The progeny of the ewe flock were to be retained as feed supplies increased. Subsequently, surplus 2-tooth ewes and 6-tooth wethers were to be sold. Wool output was to rise from 17,000 lb. to 36,000 lb. and the wool cheque was to form two-thirds of the total income after development. Cow numbers were to increase from 87 to 125.

The following was the planned investment in plant and buildings:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>Haybarn</td>
</tr>
<tr>
<td>3</td>
<td>Tractor</td>
</tr>
<tr>
<td>3-5</td>
<td>Haymaking equipment</td>
</tr>
<tr>
<td></td>
<td>Major alterations and repair to woolshed</td>
</tr>
<tr>
<td>6</td>
<td>Cattle yards</td>
</tr>
<tr>
<td>7</td>
<td>Married man’s house</td>
</tr>
<tr>
<td></td>
<td>26</td>
</tr>
</tbody>
</table>
FIG. 1.

ESTIMATES FROM THE ORIGINAL PLAN

STOCK SALES
(Numbers)

Mature Sheep

Weaners

Lambs

WOOL SALES
(1000 lb)

FINANCE
(£1000)

Gross Revenue (cash)

Gross Expenditure (cash)

Overdraft

Taxable Income

Tax

YEARS

1 2 3 4 5 6 7 8
In brief, the aim was to increase stock numbers and production rapidly in the first three years and to postpone building investment until the second half of the period. Fig. 1 shows both the physical and financial details of the plan.

The farmer considered the plan to be quite feasible and he intended to follow it as closely as possible.

**COMPARISON OF THE ACTUAL AND PROPOSED DEVELOPMENT PROGRAMME**

The plan did not aim to re-pay the existing overdraft until the 6th year. However, credit restrictions in late 1964 meant that the overdraft had to be reduced in 1965. Also, ill-health in the family compelled the farmer to increase his personal expenditure. These two factors meant that there would have been no surplus for development. For this reason, the property has been refinanced through a State Advances Corporation development loan. Initially, £5,000 was borrowed on table mortgage and the loan was increased to £6,800 at the end of 1965. This influx of funds made it possible to speed development considerably. The area subdivided, topdressed and over-sown in the initial two years was increased to the planned fourth year level. Investment in the tractor and some buildings was also advanced to keep the whole development in balance.

These changes proved to be advantageous. The owner had a higher standard of living than planned, the overdraft was reduced and the rate of development was increased. The only disadvantage was the cost of servicing the loan, but this was more than offset by the return from the extra investment.

**UNCERTAINTY**

Uncertainty affected the original plan in several ways.

Firstly, the estimated prices used were based only on an informed guess. Obviously, the longer the plan the more inaccurate these estimates are likely to be.

Secondly, the expected increases in pasture and hay production and in stock performance were also only informed guesses. Hence slightly conservative animal production figures were adopted.

Thirdly, seasonal variations cause uncertainty. To allow for this, stock numbers were allowed to rise to only 50
per cent of the numbers which theoretically could be carried. Nevertheless, in one particular season this safety margin was inadequate.

Three events which could not be predicted were as follows:

1. The 1964/5 summer drought was the most severe recorded in the district for 70 years, but was followed fortunately by a mild winter.
2. The 1965/6 summer was an extremely good grass growing season.
3. In 1966/7, average national wool prices plunged.

The plan had to be changed to cope with these events. During the drought, stock numbers were fewer than planned. Cow numbers were reduced because water for cattle was short. On the other hand, sheep were increased slightly more than planned despite the lack of reserve feed. The plan to run dry sheep was adopted to allow sheep to be sold during droughts.

During 1966, sheep numbers were increased as far as possible without buying stock, by holding all lambs. Even so, only 2,000 out of the 5,500 bales of hay available were used in winter. It was also found that developed pastures produced much more than was expected. Some developed paddocks even carried more than 5½ ewe equivalents for the year.

Changes were made to offset the seasonal variation of grass production. More lucerne was grown and the hay reserve was increased to a minimum of 4,000 bales. An extra hay-barn was built. Oversowing and topdressing also helped to combat seasonal variations. The improved pastures grew on well in summer dry periods in shady country and almost continuously in winter on the sunny country. Winter dormancy was considerably reduced on other areas.

These factors, and the flexible stock policy, mean that the property is now much less vulnerable to bad seasons than it was before development.

Despite the drought, per head production (except calving per cent) has been higher than expected. The owner is a particularly good stockman and has been adept at using his natural feed reserve of roughage in the tussock, matagouri and rough gullies. More recently, the problem has been to use all the feed available with the stock on hand despite the need to provide adequate reserves for future bad seasons.
Comparison of Planned and Actual Results

(a) Stock Numbers

<table>
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<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ewes (Corriedales)</td>
<td>1,196</td>
<td>1,196</td>
<td>1,230</td>
<td>1,200</td>
<td>1,550</td>
</tr>
<tr>
<td>Rams &amp; wether hoggets</td>
<td>410</td>
<td>410</td>
<td>586</td>
<td>410</td>
<td>600</td>
</tr>
<tr>
<td>Wethers</td>
<td>—</td>
<td>—</td>
<td>94</td>
<td>330</td>
<td>300</td>
</tr>
<tr>
<td>Cows</td>
<td>87</td>
<td>98</td>
<td>71</td>
<td>113</td>
<td>120</td>
</tr>
<tr>
<td>Bulls</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Yearlings</td>
<td>—</td>
<td>—</td>
<td>22</td>
<td>36</td>
<td>30</td>
</tr>
<tr>
<td>Ewe Equivalents</td>
<td>2,034</td>
<td>2,209</td>
<td>2,165</td>
<td>2,504</td>
<td>3,145</td>
</tr>
<tr>
<td>Annual Increase</td>
<td>—</td>
<td>175</td>
<td>131</td>
<td>295</td>
<td>411</td>
</tr>
</tbody>
</table>

(b) Wool Production (lbs)

<table>
<thead>
<tr>
<th></th>
<th>1963/4</th>
<th>1964/5</th>
<th>1965/6</th>
<th>1966/7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned</td>
<td>19,480</td>
<td>19,500</td>
<td>23,700</td>
<td>30,150</td>
</tr>
<tr>
<td>Actual</td>
<td>17,000</td>
<td>17,636</td>
<td>23,700</td>
<td>30,150</td>
</tr>
<tr>
<td>Difference</td>
<td>—1,854</td>
<td>+4,200</td>
<td>+8,050</td>
<td></td>
</tr>
</tbody>
</table>

The experience from this development programme has also emphasized the importance of taking into account the increased stress to which the farmer and his family are subjected. This results not only from the greater physical work load but also from the increased worry resulting from borrowing funds and the increased complexity of management. Both these aspects had a strong influence on the course of the development programme on this property.

Surprisingly, variation between seasons has affected the farm income less than variation in product prices. Development from income, as originally planned, was not possible. In at least one season of the three under review, there was no surplus for development. Development from income has one important limitation. Investment in subdivision, over-sowing and topdressing must be followed immediately by increased stock the next year if it is to pay. If prices are low, stock increases could be delayed for several years. This will sharply reduce the return from the investment.

When planning, future prices should be estimated at two levels. For example, wool prices of 48 pence (average net price) and 42 pence could have been assumed. In fact, average wool prices of 44 pence were obtained in 1965/66 and 52 pence in 1966/67. This much higher average price has happened in a season of falling national prices. Obviously there has been a significant rise in wool quality. Cattle prices have been higher...
than expected and, once there are permanent water supplies, cow numbers will be increased rapidly.

The future programme is now being reviewed. At all times, the approach must be flexible.

LESSONS FROM THE PROGRAMME

1. A short term plan of 3 to 4 years is much more use than a longer planning period.

2. Try to make the plan completely terminable at certain stages. You must be able to consolidate at any stage if circumstances alter.

3. Never overlook that a rapid development programme may make more work for your wife and family as well as for yourself.

4. Minimize uncertainty as much as possible.
   (a) Financial. Re-finance with a long-term loan if possible.
   (b) Personal. Increase if possible the money you take out of the property to compensate your family for the extra work.
   (c) Prices. Incorporate high and low prices in any budget to guide the rate of development under different price levels.
   (d) Offset seasonal variability by a flexible stock policy, providing ample feed reserves and adopting conservative production estimates.

5. Where response to topdressing and oversowing are unknown, seek advice from experienced professional men. Untrained men, even with long experience of local conditions, can make estimates which may be very wide of the mark. In this example, few local farmers thought that $3\frac{1}{2}$ ewe equivalents could be carried after seven years. Yet the property now winters $3\frac{1}{4}$ ewe equivalents after only three years, and the potential is clearly well over 5 ewe equivalents.

6. Do not hesitate to change the plan as circumstances alter.

7. In conclusion, be prepared to plan. Any plan will help to coordinate the timing of specific operations. Unplanned development may result in a complete waste of money.

Footnote — The original programmes and their economic evaluation are shown in detail in Programming Farm Development, G. A. G. Frengley, R. H. B. Tonkin, R. W. M. Johnson, Publication No. 35 of the Agricultural Economics Research Unit, Lincoln College.
FACTORS TO CONSIDER WHEN BUYING A LEASEHOLD PROPERTY

By J. H. Ford, Pastoral Officer, Head Office, National Mortgage & Agency Co. of N.Z. Ltd., Dunedin.

During my twenty-two years' association with the farming community, in particular Crown Land tenants, I have made observations and come to certain conclusions which I feel could be of interest to many farmers — particularly those who have sons with plans for buying a property. The importance of buying the right place at the right price is second only to choosing the right partner in marriage. The principles are the same — acquire in haste and repent at leisure.

THE PROPERTY

When, for example, weighing up what a run is worth, think about the three A's — aspect, altitude and access. Many properties with fairly high country, poor aspect and difficult access can be farmed successfully but the key factor when buying such a property is to recognise its shortcomings and to make due allowance when deciding a price.

LEASEHOLD

It is surprising how many people buy a Crown leasehold property without finding out the rent, term of the lease, the restrictions included in the lease and, most important, the vendor's (or seller's) interest in the property as determined by the latest government valuation. I can even recall a purchaser who closed a deal without realising that the land was leasehold; another purchaser who did not appreciate that the lease had no right of renewal; one who did not know that the lease had a stock restriction; and still another who paid 50 per cent above the Government Capital Valuation without realising that since the lease had only four years to run he had virtually no equity or financial interest in the land.

LESEEE'S INTEREST

The Government Capital Valuation of a property is made up of the Value of Improvements (buildings, fences, sown pastures) and the Unimproved Value, which is the current state or condition of the land without the benefit of improvements.

Although the Crown owns the land, this is not to say that the vendor or seller of a Crown property is entitled only to the
value of the improvements. The Land Settlement Board has, of
course, to approve the transfer of all Crown leases. But, provided
the financial arrangements of the incoming tenant are satis-
factory, there are no restrictions on the price paid. However, a
prudent and informed purchaser should realise that a property
where the lease has only five years to go before it expires is not
worth nearly as much as one which has twenty-five years to go.
Why is this? And what is this Lessee’s or Vendor’s Interest
which valuers, bankers and stock firm managers talk about?

Let us go back fifteen years. The lease of a property
expired and was duly renewed. If it was a “farm land” lease it
would normally carry a right to freehold while the new rental
would be based on the market value of the land in its unimproved
state. If it was a renewal of pastoral country, the lease would
be renewed as a Pastoral Lease which carried no right to free-
hold and the rental would be based on the estimated carrying
capacity of the property in its native state. But let us say it
was a farm land lease. At the time of renewal the Crown
tenant had no equity or financial interest in the value of the
unimproved land because his new rent had been assessed on its
current value. He was paying full rent or interest to the Crown
for the value of their land he was using.

However, over the past fifteen years, the value of this
unimproved land (quite apart from the improvements on it)
has increased year by year. At the time of renewal the unim-
proved value was worth £5,000, 5½ per cent of which produced
a rental of £275. Fifteen years later the Government Valuation
of the unimproved has risen to £15,000, 5½ per cent of which
would (if being renewed today) be £825. This therefore simply
means that the occupier of this particular Crown lease is enjoying
the benefit of a very low rent in relation to the present day value
of the unimproved and what he would have to pay if the rent
was reassessed now. This is what a potential buyer should be
able to recognise and which his advisers or agents will be able to
arrange to have assessed for him. A set of tables known as
“Inwards Tables” is used by valuers to determine what the
lessee’s interest is. These Tables are for depreciating a wasting
asset such as the right to lease this land at the rental charged at
the start of the new lease. It is a mathematical calculation
based on the present rent, the present market value of the unim-
proved, and the number of years the lease still has to run before
expiry. Giving an example would not be enlightening, but the
general principle can be demonstrated as follows.
Three farmers buy properties, all of which are identical and which have the same value for the improvements and for the basic unimproved land itself. The purchase price paid is the same, namely, 10 per cent above the government valuation which is

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Improvements</td>
<td>18,000</td>
<td></td>
</tr>
<tr>
<td>Unimproved</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td><strong>Therefore Capital Value</strong></td>
<td><strong>30,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

There is, however, a difference in these three properties in that

(a) is freehold;
(b) is leasehold, the rent being £200, and the lease has 25 years to run;
(c) is leasehold, the rent is £200, and the lease has 5 years to run.

Now,

(a) pays £33,000

(b) pays £33,000 but also has to pay a rental of £200 which is the equivalent of 5 per cent interest on £4,000, so that in actual fact he has paid the equivalent of £37,000, when in fact the calculated lessee’s or seller’s interest on the basis of Inwards Tables was only £23,600

(c) The commitment here is the same as (b). He has paid the equivalent of £37,000, but as the lease has only 5 years to go the vendor’s interest on the basis of Inwards Tables is only £19,700

I do not suggest that a buyer should offer the seller only the lessee’s interest based on an up-to-date government valuation. If he did he would probably never buy a property. But this is information which every purchaser should know and make use of when weighing up the pros and cons of what he should finally offer for the property.
The important thing to remember is that the less time a lease has to run, the less is the value of the right to use it to the occupier and hence to the potential buyer.

A prospective buyer should never commit himself until he has sighted a lease which gives all the essential information. Furthermore, it costs him or his agent nothing to go to the Valuation Department to get the latest Government Valuation and an up-to-date assessment of the Lessee's or Occupier's Interest.

BORROWING

The basic policy of lending agencies is the same — each case is treated on its merits. The limits may vary according to the economic climate and the general availability of money, but the principal questions are how much capital a man has to start with and whether he and the property are good enough to service the total proposed debt.

What is the personal factor? The applicant's age, size of family. Has he boarding school fees to pay? His farming ability and financial sense — Is he thrifty? And the place— what price is being asked, how will it be financed, what is the location, size, productivity and potential of the property? These factors determine how much is loaned. If they are not properly weighed the result can be trouble for the lender and the client.

When looking for money, whether from a bank, stock firm or insurance company, don't ask "How much will you lend me?" or "I want so much money" but instead "How much am I wise to borrow if I buy this property?" "Can the place pay the interest and principal on the size of loan I need?" This after all is the real test. Even if the prospective buyer has half the total cost, the proposition is not necessarily a sound one. I know of many such cases today where farmers are struggling to meet their interest bill, let alone their payments of principal. Some have had to cease development and some have had to arrange for payment of these commitments to be postponed.

Past accounts for a property are usually available to the genuine enquirer. He must work out from these if the place will pay the interest bill he proposes and still pay all normal working expenses plus a reasonable living for himself. Any farmer who has borrowed heavily should periodically compare the interest bill he is paying with the stock carried.

Example — for a £45,000 place (stock and plant £10,000, land £35,000) carrying 1,500 ewe equivalents. This
net price of £23 per E.E. for the land has been fairly common, particularly for well farmed, high producing fat lamb units in desirable localities.

Liabilities, say:

1st mortgage  £13,000 @ 6½% = £845
2nd mortgage  £5,000 @ 7% = £350
Stock account, say average £4,000 @ 6½% = £260

Total interest bill = £1,455

£1,455 for 1,500 ewe equivalents is approximately £1 per head — a very high figure and just about the maximum possible on a good well-farmed fat lamb unit. Many fat lamb farms flounder at even 15/- a head, and many more farms and runs, depending on the class of sheep and type of unit, are fully extended interest-wise at 10/- per head. Obviously everything hinges on the profitability of the unit as to whether or not a farmer can meet his interest commitments.

THE MORTGAGE

If a property is a marginal unit because of low stock numbers carried, beware of the table mortgage. No such place, if it has a good potential, should be burdened with the regular repayments of a table mortgage until it becomes strong in carrying capacity and profits. Only a flat mortgage repayable in full at some future date would leave the maximum funds available each year for development to increase the carrying capacity.

High vendor mortgages (money left in by the seller) on properties which are not attractive or productive should be avoided because usually they are difficult if not impossible to service. Vendor mortgages are usually for only five years, and a farmer could find himself in an unenviable position at the end of this period when he had to find an alternative lender.

When arranging finance you should always try to borrow the maximum on your fixed assets (on your land) and the minimum on your floating assets (a low stock debt). This is particularly pertinent at the present period of high land prices and tightening credit. In any business it is always advisable to retain some element of liquidity, or otherwise in times such as we have at present when there is a general shortage of money a farmer or businessman can find himself severely restricted in his general programming. In particular it could totally restrict
him in any development project or even deny him the opportunity to buy stock for the purpose of increasing his carrying capacity.

SEASONAL AND DEVELOPMENT FINANCE

The place of the stock firm is to provide seasonal expenses for the running of a property. Until recently the main burden for finding development moneys has fallen on the Stock and Station Industry. However, the new policy of the State Advances Corporation in providing loan moneys for development should do much towards eliminating the previous unavoidable hot and cold supply of money for this purpose. Any farmer, whether interested in long or short term development, can now plan with confidence. Depending on the proposition, the State Advances will now provide mortgage money on second or subsequent mortgage.

The term of these development loans is dependent upon the ability of the farmer to meet his commitments. In other words, a low-revenue-producing unit would necessarily require a longer period to repay than the case of a strong high-revenue producing property.

A requirement of the State Advances Corporation when considering loan applications is to establish what arrangements the farmer has for renewing or refinancing his first mortgage, assuming it is for say a five year term with no right of renewal.

BUDGETS

I would like to refer to annual budgeting. Many farmers will not be bothered with this form of cost control. But I suggest that any farmer, regardless of his financial position, who fails to make some sort of assessment of his financial progress or lack of it during the course of each farming year is not efficient.

The farmers' big enemies today are rising costs and land speculators. The Meat and Wool Boards' Economic Service found that production costs rose 3 per cent in 1965 — the highest increase for many years.

To those who do not work to budgets, I suggest you ask your accountant to make out a three-month schedule of expenses, with last year's figures alongside for comparison. This is not a big job — he should willingly do it for a small extra charge. With this system you can watch your expenditure
closely. At the end of nine months you can see, from a profit or tax-saving angle, whether you can afford to spend more on development or maintenance before the end of the year.

TEAMWORK

I would offer a little advice. The prudent and informed buyer who has good advisers is more than half-way towards being a successful farmer.

If you are not familiar with the district into which you propose to buy, you should never hesitate to consider such people as Department of Agriculture Farm Advisory Officers, Lands Department officers, and, if a Catchment Board operates in your district, the Soil Conservator. These three agencies can give you very valuable information, and what is more, it is, or should be, impartial. There is sometimes adverse criticism of Government Departments and Catchment Boards, but my experience has been that they are the most helpful agents a prospective farmer can consult.

Indeed, every farmer and potential farmer to be successful should, and in fact must, work in close contact with his advisers — in particular his financial advisers. The New Zealand run-holder has during the past decade become the proprietor of a valuable estate. Quite understandably, few are equipped with the modern knowledge to guide the destiny of their now substantial business enterprises alone. If I were to go farming the panel I would gather around me to help in the handling of my affairs would be — the branch manager of my stock firm or bank, my accountant, my solicitor, the Farm Advisory Officer for the district, and the local Soil Conservator. In addition, if buying or occupying a leasehold run, I would establish a close liaison with the Lands and Survey Department.

The New Zealand farmer is renowned for his independence and initiative and many still prefer to “go it alone”. But whether he likes it or not, successful farming today has become a team effort. Some critics say the farmer has lost his initiative and relies too much on outside advice, but modern farm management and financing problems need the help of skilled technical and professional people to solve them. You must, however, ensure that the advisers you select to help you are capable and up-to-date.
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### TUSSOCK GRASSLANDS AND MOUNTAIN LANDS INSTITUTE

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L. P. Chapman (Deputy Chairman), New Zealand Wool Board.

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Dr. M. M. Burns, Lincoln College.

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J. Fitzharris, Department of Lands and Survey.

W. V. Hadfield, Department of Agriculture.

J. T. Holloway, New Zealand Forest Service.


C. J. Speight, New Zealand Meat Producers’ Board.

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(Tel. 168M Lincoln)

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#### Planning Officer:  
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