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Pasture Renovation in the Maritime Provinces

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Revision

HIGHLIGHTS

- Good pasture provides the most economical feed for livestock, while neglected pasture feeds fewer animals and is used up early in the summer.
- A run-down pasture can be improved effectively by using a planned renovation program.
- The renovation method to be used depends on the condition of the pasture, the feed requirement, and the cost in relation to the expected returns.
- A good method that needs a minimum of labor and results in high pasture yields for several years consists of broadcasting fertilizer, lime, manure, and seed on the surface of the old sod.
- In experiments at Nappan the renovated pasture produced at least twice as much forage as the original pasture, and the crop contained more legumes and fewer weeds. The improvement lasted more than three years.
- Renovation without plowing was effective and permitted continuous use of the pasture.
- After renovation, careful management of the pasture is needed for maximum improvement.
- Controlled grazing should be practiced on newly renovated pastures.

PASTURE RENOVATION IN THE MARITIME PROVINCES

F.W. Calder and F.S. Warren¹
Experimental Farm, Nappan, Nova Scotia

The climate of the Maritime Provinces is well suited to growing several productive grasses and legumes. Summer temperatures are moderate and there is usually enough rain throughout the year for good growth.

In other ways as well, the farming area is adaptable to the production of forage crops. While the soil often is more acid than is favorable for most legumes, it is usually deep and fertile enough to permit the production of large crops of hay and pasture. Where acidity has been corrected by the use of lime, and sufficient fertilizer and manure have been incorporated into the soil, high yields of hay and pasture can be obtained.

Much of the pasture area is unimproved land not included in a regular rotation. As long as such areas provide some feed the possibility of improvement is often overlooked. Yet renovation of a poorly producing pasture will usually result in very worthwhile returns from a comparatively small investment.

POSSIBILITIES OF PASTURE RENOVATION

What Pasture Renovation Means

Pasture renovation is any method of rapidly improving pasture without growing an intervening crop. It has been used successfully in the British Isles for many years. Experience shows that a cheap renovation program can increase pasture production two to five times over that of the original sward. Increased production begins in the same year the program is begun. Therefore, increased pasturage can often be provided more economically by the renovation of existing holdings than by renting or buying additional pasture land.

Many pastures in the Maritime Provinces carry only a thin unproductive sod made up of the poorer kinds of grasses with many weeds and often encroaching brushes and shrubs (Figure 1). These pastures respond quickly to renovation using lime, fertilizer, manure, and seed.

Recent experiments at the Experimental Farm at Nappan show that pasture forage composed of the more productive species in a properly managed pasture can produce higher yields throughout the season than native or unimproved forage species.

Digestibility of forage (Figure 2) can be held at a high level throughout the season when the proper species are grown with enough plant nutrients

¹Present address: Research Station, Ottawa, Ontario.



Figure 1. This kind of pasture land could readily be renovated.

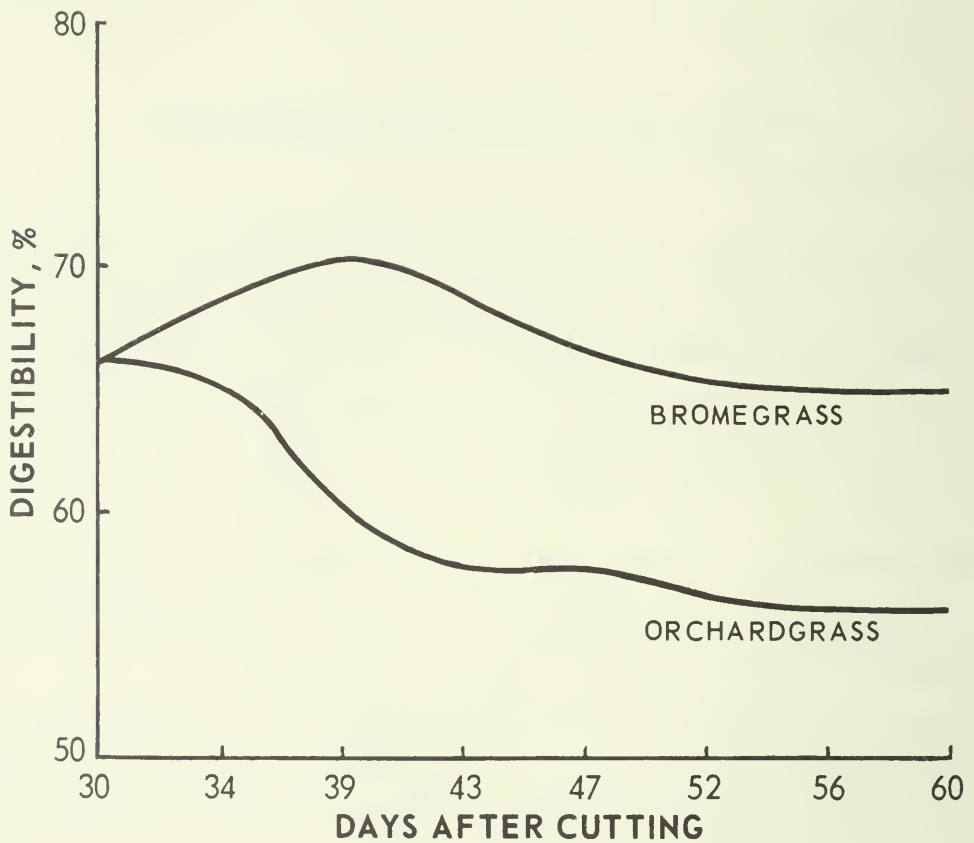


Figure 2. Percentage of relative digestibility of two grass species showing the differences which develop between them as time after cutting increases.

available, and when good grazing management is practiced. Early maturing species produce forage of much lower digestibility if it is not grazed too closely to bring on regrowth.

Benefits Expected From Renovation

Experiments show that important improvements may be expected from a renovation program.

All renovation methods tested showed a greatly increased yield of forage (Table 1). The pasture having the smallest increase after treatment gave more than twice the yield of the original pasture. The value of renovation cannot be measured only by the increased yields obtained in the year of treatment, but also must include the increases to be expected annually for several years.

Table 1. Pasture production after various renovation treatments at three locations in eastern Nova Scotia

Treatment	Tons of green forage produced per acre	
	Third crop year	Annually for three-year period
Plowed, fertilizer and lime applied, reseeded	6.26	6.17
Harrowed, fertilizer and lime applied reseeded	7.04	6.67
Fertilizer and lime applied, reseeded on surface of sod	6.76	6.62
Fertilizer applied (no lime), reseeded on surface of sod	6.35	4.95
Control (no treatment)	1.70	2.46

NOTE: If fertilizer was used in the treatments the rate was 800 pounds per acre of 3-15-6, and if lime was applied the rate was 2 tons per acre.

While disking and plowing gave high yields, almost equally good results were obtained when fertilizer, lime, and seed were applied to the surface without working the land. Substantial improvement can be expected from renovation of pastures where working the land is not practical.

All improved pastures were more uniform in production throughout the season than the unimproved pastures. After the first year the improved pastures could be grazed early in the spring, stocked more heavily through the summer, and used to provide good pasture until late in the fall.

The improved pastures had a much higher proportion of clovers than the original pasture. Clovers are higher in protein than grasses, therefore

the improved pasture supplied more of this important nutrient than the original pasture.

Many weeds were present in the original pasture, but after renovation weeds made up only a small proportion of the growth and nearly all the land was producing good pasture.

RENOVATION METHODS

Seeding in a Prepared Seedbed

Where existing vegetation is useless and should be destroyed, seeding in a prepared seedbed is probably the most common and best method of renovation. Other methods must be used where stones or the steepness of the slope prevent proper cultivation. Enough lime and fertilizer should be applied to ensure satisfactory germination and growth of the new seeding.

It is not necessary to use a nurse crop and if seeding is finished by the end of May grazing can usually be started by the first of August. Generally, the weed problem is not serious, as the stock will eat many weeds at this stage. Animals must not be allowed to damage the young tender plants by tramping or too close grazing and it is wise to remove them when 3 or 4 inches of herbage is left. Seeding in a prepared seedbed will produce more herbage the first year, but it needs more labor and care and may provide less growth than other methods in following years.

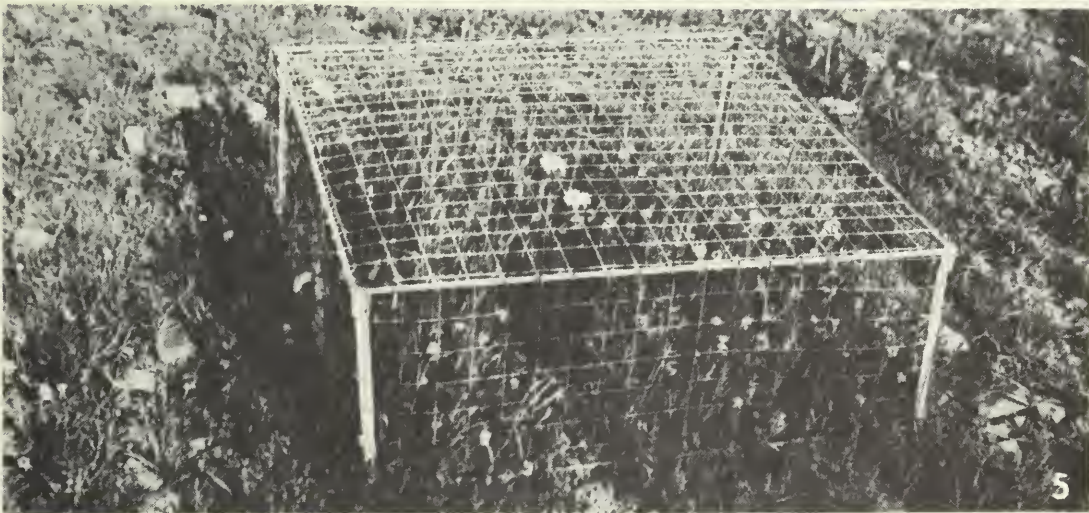
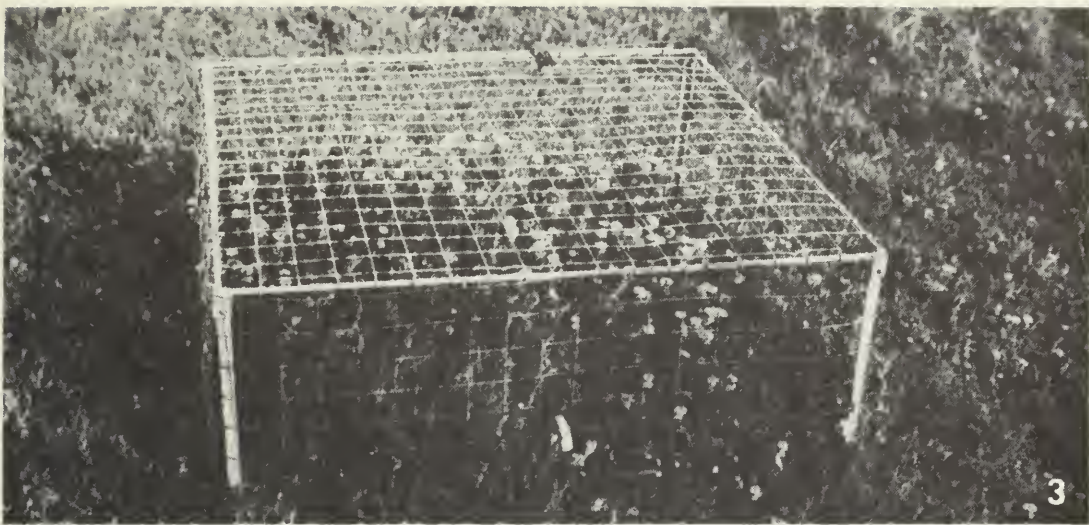
Seeding in Surface-worked Sod

To seed in surface-worked sod, the sod is worked with a spring tooth, spike tooth, or disk harrow; best results will be obtained if the machine used is set for shallow cultivation. Two to four trips over the land will tear up the sod and give a suitable though rough-looking seedbed. Fertilizer and lime should be applied before harrowing, and then seed applied broadcast or with a seed drill. Rolling after seeding may help establish the seeds in loose soil. The newly seeded pasture should be protected from cattle for 6 to 8 weeks, when a good sod should be established.

Seeding in Sod Without Cultivation

Seeding in sod without cultivation is a labor-saving method of renovation. Fertilizer, lime, and seed are spread directly on the surface of the sod in the spring. For best results cattle should be kept off this pasture until the new seedlings are well established. However, the existing sod will provide some protection for the new plants from excessive damage by grazing livestock. The poorer and more open the sod, the more improvement may be expected from renovation in this way (Figures 6 and 7).

This method is particularly desirable when a thin, poor sod exists on sloping or stony land. When stony land is plowed most of the grazing area is left covered by loose stones. Less loss of area from stones occurs when surface seeding is used.



Figures 3-5. Renovation of pastures: 3, surface application of fertilizer and seed increased the pasture yield; 4, surface application of fertilizer, lime, and seed resulted in more and better pasture; 5, plowing followed by fertilizing, liming, and seeding.



Figure 6. Unproductive sod.

Figure 7. Same area one year later, after seed, lime, and fertilizer was applied.

ESSENTIAL FEATURES OF RENOVATION

While cultivation is not essential, the importance of good fertility and suitable seed mixtures cannot be overemphasized. The application of fertilizer or manure and lime promotes good seed germination, aids in the establishment of the young seedling plants, helps these plants to overcome weed competition, and results in improved yields. Sowing a good seed mixture makes possible the replacing of weeds and pasture plants of low productivity with plants capable of giving large yields of highly nutritious feed.

Lime and Fertilizer are Necessary for Forage Production

Pasture renovation without the application of fertilizer cannot give satisfactory returns and throughout the Atlantic Provinces soils are usually too acid for best results from fertilizer. Satisfactory production can be obtained only when the acid condition has been corrected by the use of lime. While common pasture grasses grow quite well over a wide range of conditions, they make their best growth where the soil is slightly acid. However, most of the clovers and other legumes need a more nearly neutral reaction of the soil. Alfalfa, for example, cannot be grown successfully where the soil is strongly acid.

Legumes have qualities that make soil adjustments worth while to ensure their best growth. They are generally higher in protein than the grasses so that pasture with an abundance of clover produces a more nutritious feed than a pasture consisting largely of grasses. Higher total yields can be obtained from legume-grass mixtures than from grasses alone. Legumes also promote good physical structure or tilth of the soil and they use up substantial amounts of nitrogen in the air.

Lime can be spread directly on sod, but the results will depend largely on the nature of the soil and the type of vegetative growth. If the sod is not heavy and the soil is of an open texture, an important increase in pasture yield will result from surface application of lime (Table 2). On heavier sods, surface application of lime may not be so successful and it is not recommended.

The amount of lime and fertilizer to apply can be determined by a soil analysis. Details on how to take soil samples and where to send them may be obtained from your nearest agricultural officer. The fertilizer recommendations published yearly by each provincial Department of Agriculture should be followed closely for best results.

Table 2. Yield of forage in tons of green weight per acre as affected by various rates of limestone applied to the surface of a thin unproductive sod

Limestone, tons per acre	Tons of green weight forage
0	3.04
0.5	4.36
1.0	5.04
2.0	5.40
4.0	5.44
6.0	6.00

In the experiment 2 tons of lime at \$2.00 per ton gave a return of 2.36 tons of green forage per acre. At a value of \$5.00 per ton for green forage, the return for each dollar spent on lime is \$2.95. Farmers in the Atlantic Provinces can expect this return on their money.

Manure Boosts Yields

Manure produces large increases in yields of pastures in a renovation program. Used with broadcast applications of fertilizer, lime, and seed, applications of manure will increase average yields by more than a ton of green feed per acre. Wherever possible, manure should be used in any pasture renovation, even if only a small amount can be applied.

Importance of Good Seed

Seed mixtures recommended for renovating old pastures range from complex assortments of 10 or more kinds of seeds to the simplest combination of only two or three species. Experiments show that complex mixtures do not produce higher yields than the best simple mixtures. Average yearly production at three different locations for three years was only 0.28 tons of green weight more for the complex mixture of 11 kinds than for a simple one of five species. The slight increase in yield would not justify the extra expense of a complex seed mixture.

It is important to use the varieties of forage species recommended by the provincial Departments of Agriculture, as they are the most productive and winter-hardy for local conditions.

Recommended Seed Mixtures

Two basic seed mixtures are recommended for pasture renovation. These are:

<i>With alfalfa</i>		<i>Without alfalfa, short-term mixture (1 to 3 years)</i>	
Timothy	6 pounds per acre	Timothy	3 pounds per acre
Ladino clover	2 pounds per acre	Red clover	7 pounds per acre
Alfalfa	8 pounds per acre	Alsike	4 pounds per acre

If the soil is poorly drained or low in fertility, 2 pounds per acre of redtop should be added to the above mixtures. Replace part of the timothy seed in either mixture with brome, at 10 pounds per acre, where the fertility and pH are high, and with orchardgrass at 4 pounds per acre, where winters are mild. The resulting yields will be somewhat higher. Brome has a large, chaffy seed and cannot be seeded in mixtures with other pasture seeds. It can be seeded with a Cyclone seeder, a roller-packer type seeder, broadcast by hand, or through the grain box of a drill set to seed not more than half an inch deep.

Alfalfa Increases Yields

The highest yielding pasture and hay mixtures in this area contain alfalfa. Alfalfa requires a fertile well-drained soil only slightly acid in reaction. Throughout the Maritime Provinces lime must be added to the soil before alfalfa can be grown successfully. However, some of the newer varieties will grow vigorously where older varieties would not do well. All alfalfa seed should be inoculated and this is especially important when this crop is to be grown on a field for the first time. Very close grazing is harmful to alfalfa, particularly in early September, and should be avoided. A pasture made up mostly of alfalfa should not be closely grazed because it may cause bloat.

Special Seed Mixtures

Low-lying, poorly drained parts of a farm can be made into productive pasture areas by using a special seed mixture. Reed canarygrass should be the main item in such a mixture. It thrives under moist conditions and produces large yields of forage. A suitable long-term pasture mixture for wet areas is:

Timothy	6 pounds per acre
Reed canarygrass	6 pounds per acre
Alsike	4 pounds per acre

This seed mixture is also useful for reseeding areas of a new pasture that have been killed out by excessive moisture.

Reed canarygrass is a vigorous grower and may be difficult to control in short rotations. It may also prevent proper drainage by blocking ditches and natural water courses.

Birdsfoot trefoil is a legume likely to yield good results for pasture, particularly when grown without competition, and it should be used where it is suitable.

Special seed mixtures can be prepared for many other soil conditions or for particular purposes or classes of livestock. Advice on special mixtures can be obtained from agricultural representatives and experimental farms.

MANAGEMENT AFTER RENOVATION

Careful management of the newly renovated pasture for the first year may make the difference between a successful renovation and one that shows little improvement. Pasture is a long-term investment and the benefits of extra care may extend over many years.

Controlled Grazing

The main advantage of pasture renovation is that grazing is provided soon after seeding. The actual time lapse depends on the growth of the young plants and on the soil conditions. Moderate grazing is desirable as soon as the new growth is 10 to 12 inches high. Grazing should be controlled to leave at least 4 or 5 inches of ground cover. Where only part of a pasture has been renovated, the improved area should be fenced off for better control. If this is not done, the improved section will be overgrazed while good feed will be wasted on the unimproved pasture. Grazing when the ground is wet and soft may cause extensive damage to the sod. Newly renovated pastures should not be grazed late in the fall.

Mowing

Mowing the new pasture may be needed to control weed growth. Always cut weeds before the seeds mature. Where grazing does not prevent the

taller grasses from smothering the clovers, mowing will allow the lower growing grasses and clover to make better growth. The mower should be set to leave about 6 inches of stubble.

Top Dressing

Fertilizing a good pasture sward will result in increased yield. Nitrate of ammonia applied in early summer will increase production in midsummer. An application of 150 pounds of nitrate of ammonia per acre is usually sufficient.

Manure may also be used to bolster yields at any time, but cattle will not thoroughly graze freshly manured pasture and it is unwise to apply manure when full use of all available pasture herbage is needed. Close attention to individual conditions will signify when to apply the manure.

Harrowing

Harrowing a pasture spreads the droppings and works them into the soil more uniformly. Much of a pasture may be wasted if droppings are not spread, since animals will not eat the herbage around droppings for an entire season.

Where a suitable harrow is not available, a simple drag of brush or old tires tied together will spread droppings satisfactorily. Early spring is the usual time for harrowing though it may be effective at other times as droppings accumulate.

SPECIAL CONDITIONS

Where to Renovate

Any pasture land having a thin, open, nonproductive sod will produce good returns after renovation. Some of these areas need only a minimum of attention to show marked improvement. Other areas are so rough, stony, or overgrown with shrubs and bushes that renovation may be uneconomical. However, good pasture on the farm is valuable and the possibility of improving any pasture area is worth considering. For some pastures stone or brush removal is needed before fertilizer and seed can be of any use.

More Productive Areas

Occasionally the vegetation on a pasture consists of useful kinds of grass with some clover, and yet the pasture is not as productive as it should be. These pastures will respond well to applications of fertilizer as recommended by the provincial Departments of Agriculture. Even greater yield increases will result from using both manure and chemical fertilizer.

The better yields that result from improved fertility will last for many years. For best results fertilizer and manure should be added annually or at least every third year. This treatment not only improves the yield of a pasture, but also promotes the growth of better kinds of pasture plants, and

therefore improves the nutritive value of the feed produced.

Stony Areas

Stones are not a problem where pasture renovation consists of broadcasting fertilizer and seed without any tillage. Where it is possible, remove the larger stones and pick up many of the smaller ones so that the ground can be better used.

Rough Land Renovation – A Problem in Economics

Rough, hummocky, or stumpy land that produces mainly a mossy type of growth is often used for pasture but such areas produce little feed. It may not be economical to try to renovate land of this type and certainly seed and fertilizer would be wasted without a lot of preliminary work. Where circumstances warrant bringing rough land into productive pasture, heavy machinery may be used to advantage. Stumps can be removed by a bulldozer and the land turned with a breaker plow. After thorough cultivation, seed and fertilizer can be applied with more certain results.

Hilly Land

Good pasture can be supplied on steeply sloping areas under careful management. On hills or water courses where runoff and erosion may be severe it is particularly important not to plow or disturb the ground cover in any way. Most effective improvement can be made by applying fertilizer, manure, lime, and seed directly to the surface of the old sod. This should be done as soon as it is possible to drive over the fields in the spring.

Wet Land

Areas of wet land can often be improved very simply and they usually prove quite fertile. With a little attention to drainage the pasture value of this land will improve as more desirable plants move in.

Depending on the circumstances, different types of drainage ranging from tile drainage to an open furrow may be used. Blasting is an inexpensive and often satisfactory method of making a drain through wet areas. Once the drainage has been improved, reseeding with suitable pasture species may be done.

Weed Control

Weed growth should be reduced as much as possible before applying fertilizer and seed to the pasture. Mowing or grazing closely just before seeding will often control the weeds and permit establishment of the new seedlings.

Where weeds are particularly abundant, an effective herbicide should be used. In areas where ragwort is widespread, control is particularly important because, besides being very competitive, this weed is poisonous to cattle and horses when eaten either as pasture or hay. Ragwort and

many other weeds can be controlled with 2,4-D. High rates of herbicide will injure the clovers and should be avoided. In all cases the manufacturer's directions for the rate of application should be followed.

Once the desirable pasture plants have become established and extra fertility provided by fertilizer and manure, they will be able to compete successfully with the remaining weed growth and will eliminate many of the weeds. Some weeds such as the hawkweeds are more adaptable to acid soils. Liming, therefore, tends to make the soil less suitable for these plants and much more suitable for the seeded species. Unfortunately some weeds such as ragwort and thistles grow better on limed and fertilized pastures, so that cutting to prevent these plants from going to seed and the use of herbicides must be included in the management program. A properly renovated pasture will soon have a small proportion of weeds and little bare ground.

Brush Control

The problem presented by shrubs and trees growing in the pasture depends largely on the type of woody growth and the amount. Shrubs such as alder, wild roses, blackberry, hawthorne, and maple can be controlled in their early stages by mowing or cutting with a heavy brush knife. As the growth becomes larger the heavy trunks should be chopped down or pulled out with a tractor. The trees and shrubs mentioned, as well as many others, are susceptible to either 2,4-D or brush-killer mixtures of 2,4-D and 2,4,5-T and spraying with these chemicals hastens the renovation process. For further information on weed and brush control obtain a copy of Guide to Chemical Weed Control or a similar publication issued by your provincial Department of Agriculture. Always read and understand the label directions and cautions before using any pesticide.

Spruce and other conifers, which tend to encroach on fields that are not very fertile, can now be controlled by chemicals. However, these trees will not spread on lime-fertilized pastures that are well grazed. Be careful to leave the ground fairly level after removing the small trees. It may be necessary to smooth the area with a harrow before seed and fertilizer are applied.

ADDITIONAL INFORMATION

Further information about pasture renovation or other phases of pasture management can be obtained from provincial agricultural representatives, the Nova Scotia Agricultural College, or various experimental farms.

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