Pasture Renovation - When Changes Are Needed

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Pasture improvement is often considered to include liming, fertilization, weed control and seeding as required to establish desirable forage plants. The degree of suppression or sod destruction and seeding depends upon whether the objective of the improvement is to: a) "repair", b) add to or c) replace the existing vegetation. The latter two of these strategies are often referred to as pasture renovation.

HAVE A PLAN AND RENOVATE FOR THE RIGHT REASONS

several good reasons for renovating a pasture include: a) to achieve higher yields of forage and animal product per acre; b) to improve the nutritive quality of the forage being produced; c) to take advantage of the capability of legumes to provide some of the nitrogen for pasture production; and d) to improve the distribution of the pastures growth, particularly during the summer months. In many cases several of these benefits can be obtained simultaneously.

Far too frequently, renovation is chosen as a way to salvage a rapidly declining pasture condition, characterized by poor fertility, overgrazing, an increasing weed and brush population and erosion. These efforts are often futile or their benefits are short lived because the basic cause of the pasture decline, poor pasture management, continues to be practiced.

Significant thought and planning should precede a renovation program. Renovation efforts can, depending upon how drastic the approach, amount to a large investment of time and expense. In many forage/livestock enterprises a gradual, sequential renovation program should be considered, both from a cash flow standpoint, and to allow the manager to integrate renovation improvements with other pasture management efforts. Several University and USDA economic models point out clearly what producers have experienced, that cash flow requirements for large renovation efforts not only include the actual costs for the practices but the producer must also be prepared to obtain additional livestock, if necessary, to utilize the additional forage produced.
COMPLETE RENOVATION - TOTAL DESTRUCTION OF EXISTING SOD & RESEEDING

Advantages
- major changes in species can be achieved
- large fertility corrections can be made
- most equipment needed is already available

Disadvantages
- greater cost
- greater potential for soil erosion
- a seeding failure may be most damaging

This type of renovation is the most drastic and expensive. It is usually considered when a complete change in forage species or variety is desired.

The best opportunity for needed pH and fertility corrections exist when a tillage operation is associated with this renovation method. Seeding are not often completed in early spring, but, if conditions permit, successful pasture stands can also be achieved from late summer seedings.

Historically, the destruction of the old sod was accomplished by moldboard plowing; or, a sequence of shallow diskings (sometimes 10 to 15) were necessary to completely subdue the old sod. The development of non-selective herbicides has provided an alternative method for the permanent elimination of the existing sod competition without a corresponding increase in the erosion potential. Research and experience has shown that 'burn-down' herbicides applied in mid-Autumn are more effective in killing sod than are spring applications. The most appropriate use of the term no-till renovation probably applies to this herbicide-assisted, complete renovation approach.

Other management steps associated with the complete renovation method include:

- selecting of species and varieties appropriate for the site and future use of the forage
- corrective liming and fertility where needed
- buying high quality seed, inoculate legumes, use enough seed
- using good seeding technique, not too deep (1/4" to 3/4"), provide seed coverage, provide good seed-to-soil contact
- providing early erosion protection through the use of a cereal grain 'companion' or 'cover' crop, (the killed sod in the case of herbicide-assisted, no-till renovation);
- careful management of vegetative competition from the 'companion' crop and weeds during the seeding year;
- use good grazing management in seeding year and later years to maintain the vigor and persistence of the improved species.

RENOVATION WITH SUPPRESSION OR PARTIAL DESTRUCTION OF EXISTING SOD

This pasture renovation approach called interseeding, sod seeding, and over seeding is most appropriate where the existing pasture vegetation has some desirable traits and the intent is to add plants of another species (or the same species) to in some way improve the productivity, growth pattern,
seedlings. From a research/recommendation standpoint about the only minor differences between surface seeding and interseeding is in the method/location of seed placement, the time of seeding and, in practice, how the competing vegetation is suppressed.

**Advantages**
- least cost and rapid
- least machinery used
- best suited for steeply sloping sites

**Disadvantages**
- more seed necessary than interseeding for same results
- less successful where good grass sod already exists.

A suitable site should include: a correct soil fertility and pH for the forage being sown; control gained over persistent weeds; and grass grazed closely the previous autumn to suppress spring regrowth vigor and to minimize the amount of surface cover. Iowa experience has shown the most success with frost seedings where the grass sod is the least dense and least vigorous.

Seeding rates for a frost seeding should be about the same as or slightly higher than those used for an interseeding -- about half that for a complete new seeding renovation. Forage researchers in Iowa found that frost seeding at twice the normal frost seeding rate produced greater seedling numbers but only slight increases in forage production. In Iowa, red clover and birdsfoot trefoil are the easiest to establish by frost seeding. We have had mixed success when frost seeding alfalfa. Additional research is being conducted with various legumes frost seeded into established, managed warm-season grasses.

Careful grazing management of the pasture following frost seeding is important for maximum initial suppression of sod competition and then for continued management which benefits the rapid establishment and persistence of the seeding.

**SOME OBSERVED PRODUCER PROBLEMS**

As with many production managements, the local producer must ultimately implement or adapt recommendations to the farm site situation. Sometimes this implementation is very exact; sometimes, however, the producer decides to skip a few steps for practical or economic reasons. This author has observed that often the short-cuts taken significantly reduce the success of the practice.

Skipping some preparation steps is consistent with the "let's renovate today" approach. Such lack of forethought usually means that the producer: doesn't soil test; doesn't apply needed lime early enough ahead of seeding for it to effectively correct pH; and doesn't apply needed corrective fertilizer before tillage or before interseeding. A last minute decision to interseed usually means that the producer likely hasn't gained control of pasture weed problems before introducing a legume into the site vegetation.

Seeding short-cuts such as buying what ever clover or pasture mix the seed store is selling today, not inoculating the legume seed, not using enough seed, and sloppy seeding technique are often associated with thin stands or
decent stands of inappropriate varieties or mixtures.

For interseedings and frostseedings, failure to adequately control vegetation competition often leads to less-than-desirable stands. Reduced herbicide rates, insufficient canopy height for contact herbicide efficacy, or not using any herbicides for grass suppression can all contribute to excessive sod competition for the emerging and establishing seedlings. Using grazing animals seems to be a money saving and practical approach to sod suppression, but even with careful grazing control, final stands of the interseeded species are often less dense than where an effective suppression herbicide was used.

In some environments, failure to control insects has been a primary reason for stand failures in interseedings and no-till, killed-sod renovations. Insect problems in sod-seeding situations have most frequently been found in the more humid parts of the U.S. (the southeast and eastern states) and has been effectively corrected with the use of soil-applied insecticides. The author is not aware of any soil-applied insecticide research done in Iowa, however grasshopper and armyworm populations can reach sufficiently high levels in the upper mid-west U.S. to cause damage to new pasture renovations.

'Hurry up' interseedings and frostseedings are often implemented before existing, troublesome weeds and brush are under control. Not only will these unwanted species compete for fertilizer nutrient, water and light, but once the interseeded or frostseeded legumes are established, the need for a broadcast herbicide a year or two later will often erase what gain had been made with the renovation effort.

Probably the most consistent mismanagement leading to short-lived gains from renovation is improper grazing management which degrades the improved pasture vegetation. Excessive stocking rates in continuous grazing contribute to selective grazing, decline in vigor and eventual loss of introduced legumes in many renovations.

Dollars and Sense of Pasture Renovation

When comparing renovation methods, each individual site and renovation approach must be evaluated on the basis of the actual costs which will be incurred. Table 1. lists an estimate of the costs of several major categories of costs associated with renovation by various methods. Producers generally argue over these estimates, citing that for their situation, one or another of these costs does not apply. Use those costs which you feel are appropriate. A more complete list of costs is contained in Iowa State University Extension Bulletin AG-96, Estimated Costs of Pasture and Hay Production.

In Table 1. the slight difference between the complete renovation to a grass-based pasture and that of a legume/grass-based pasture is for additional nitrogen for the grass seeding in the establishment year. Complete renovations also include a slightly higher fertilizer application to be incorporated during tillage. All renovation estimates include an application of 2 tons/A of ag-lime. Seeding rates influence the seed costs between the methods. Suppression herbicides substitute to some extent for tillage between the total renovation and interseeding.
nutritive quality or nitrogen supplying status of the pasture site. Interseedings can be done in spring or late summer when moisture conditions and temperatures are suitable.

**Advantages**
- less seed required
- generally less erosion risk
- seeding failure is less detrimental (some sod remains)
- sometime less costly

**Disadvantages**
- less desirable for major pH and fertility correction
- specialized seeding equipment availability

This approach to pasture renovation has been investigated and practiced for several decades. Over the years the greatest success has come where suppression of the existing sod is achieved. Suppression can be achieved either by partial tillage or through the use of herbicides which have been granted legal clearance for their use for this purpose.

The research and demonstration programs from many states in the U.S. and in foreign countries have generally concluded that for greatest chance of success from interseeding (sod seeding) renovation, a series of important steps must be followed. These steps or conditions include:

- **Selection of species** appropriate for the site and future use of the forage
- **Corrective liming and fertility** where needed
- **Control persistent weed populations**
- **Suppress existing vegetation before seeding**
- **Use high quality seed, Inoculate legumes, Use enough seed**
- **Use good seeding technique**, not too deep (1/4" to 3/4"), provide seed coverage, provide good seed-to-soil contact
- **Control competition during establishment** from associated sod and weeds (including careful grazing and/or clipping)
- **Control pests** (in some environments insect pests, and seeding diseases can be devastating)
- **use good grazing management** in seeding year and later years to maintain the vigor and persistence of the improved species.

**NO-TILL, NO-DRILL, NO-FRILLS APPROACH -- FROST SEEDING**

The lowest cost, low technology approach to pasture improvement is called frost seeding, surface seeding or oversowing. Based on the original definition, sowing seed on the surface of an undisturbed, living sod is not technically renovation. But, it falls at the other end of the pasture reseeding/renovation spectrum from the complete tillage renovation method.

Frost seeding is: the surface placement of forage seed, grasses or legumes, on a suitable site in late winter; allowing freeze/thaw cycles, early spring rains and grazing animals to provide seed-to-soil contact; and, the management of sod regrowth to benefit the emergence and development of the
Table 1. Summary of Pasture Renovation Costs

<table>
<thead>
<tr>
<th></th>
<th>Complete Renovation</th>
<th>Complete Renovation</th>
<th>Interseed</th>
<th>Frost Seed</th>
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<tbody>
<tr>
<td></td>
<td>(Grass)</td>
<td>(Leg/Grass)</td>
<td>(Legume)</td>
<td>(Legume)</td>
</tr>
<tr>
<td>Machinery</td>
<td>$30.88</td>
<td>$30.88</td>
<td>$21.99</td>
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<tr>
<td>Lime &amp; Fertilizer</td>
<td>68.00</td>
<td>62.00</td>
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<tr>
<td>Herbicide</td>
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<td>0.00</td>
<td>11.00</td>
<td>3.50</td>
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<td>Seed</td>
<td>25.63</td>
<td>25.63</td>
<td>16.60</td>
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<tr>
<td>Labor</td>
<td>12.95</td>
<td>12.95</td>
<td>4.90</td>
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<tr>
<td>Total Cost/A</td>
<td>$137.45</td>
<td>$136.05</td>
<td>$107.39</td>
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<tr>
<td>Total Cash Cost/A</td>
<td>$105.72</td>
<td>$104.32</td>
<td>$94.73</td>
<td>$82.09</td>
</tr>
</tbody>
</table>

1/ Includes 2T/A lime, 30-50-100/A fertilizer, 1 ½ Bu/A oats, 10 lb/A bromegrass + 3 lb/A orchardgrass

2/ Includes 2T/A lime, 0-50-100/A fertilizer, 1 ½ Bu/A oats, 6 lb/A birdsfoot trefoil + 3 lb/A orchardgrass

3/ Includes 2 T/A lime, 0-50-30/A fertilizer, 2,4-D+paraquat, 4 lb/A Birdsfoot trefoil + 3 lb/A red clover

4/ Includes 2 T/A lime, 0-50-30/A fertilizer, 2,4-D, 5 lb/A birdsfoot trefoil + 3 lb/A red clover

One of the reasons given for renovation is to include a legume to substitute for some of the fertility requirements in later years. Estimates of cash costs necessary for pasture maintenance in later years shows that maintaining productivity of a grass-based pasture with modest annual nitrogen applications is 2X that of maintaining a legume/grass pasture, $35 vs. $18/A. The "cost to the environment" from fertilizers, pesticides and fossil fuels will undoubtedly influence the economic feasibility of these renovation alternatives in the future.

IN CONCLUSION

There are several workable alternatives available to producers for making changes in the productive potential of their pasture. Some are more drastic and involve a large commitment of time and resources; others can be accomplished at relatively low cost and with a low level of technology. All approaches can be economically rewarding if conducted properly and with a little help from the weather. Similarly, all can be miserable failures if critically important steps are not included. Lastly, the benefits from renovation should be lasting (5 to 10 years), provided good fertility and grazing management are continued as part of the overall management of the improved pasture.
Specific publications referred are listed at the end of this paper. There are many other excellent general references for forage production and management available. Contact the Extension Service in your state for additional, specific publications related to forage species/variety selection and, state-specific pasture fertilization, pest control and renovation recommendations.

**Additional ISU Extension References On These Topics**


