As Paul Daigle suggested in his recent article on pasture improvement and renovation (Agri-View, January 20, 2000), pasture renovation should begin with knowing where we are, having a vision of where we want to be, then choosing an approach that fits our budgets and expectations. There are three approaches we can take to changing the composition of a pasture: frost seeding, interseeding, and complete replacement.

Following up on Paul’s comments, I’ll review research and observations that can help us make some choices. The key to successfully introducing new species into a pasture sward is minimizing competition from established plants through removal of as much existing live vegetation and thatch as possible and maximizing seed to soil contact. We are almost always more successful introducing legumes into an existing sod than we are grasses. In the grass dominated plant community of most pastures, legume seedlings have the advantage of filling an open niche, while grass seedlings are competing directly with established grass plants for nutrients, water, and space.

Frost seeding is the easiest and cheapest approach. It works by allowing the freeze-thaw action of the ground to work the seed into the soil. Timing is critical. In most years, February or early March is the best time. Although most people use red clover for frost seeding, you may wish to consider some of the other legume species or perhaps a mixture of legumes (Table 1).

Many graziers also frost seed annual ryegrass into existing pastures. A few years ago, I worked with Dan Undersander and Carl Fredericks on a trial involving frost seeding 5 ryegrass varieties at 20 lb/A with and without nitrogen fertilizer. We can draw several conclusions from the study.

1. Averaged across all varieties and nitrogen treatments, yield was not increased over unseeded check plots, but quality was. This result suggests that when we frost seed annual ryegrass, we’re simply displacing existing grasses with more digestible ryegrass, rather than adding to the total biomass of the pasture.
2. Nitrogen fertilization early in the season was counterproductive. Ryegrass established poorly in fertilized plots, probably because of intensified early season competition from existing grasses.
3. Unfertilized ryegrass plots did have greater yields than unfertilized, unseeded plots and these differences increased as the season progressed, with September yields of some varieties nearly twice that of the unseeded check plots (Figure 1).
4. Sikem, a common annual variety and Aubisque, a perennial, actually had lower yields than the unseeded check plots, again suggesting that the ryegrass is displacing other grasses, in this case more productive ones.

Frost seeding other grass species is more problematic. In a two year study at UW-Madison, Dave West, Dan Undersander, and Michael Casler frost seeded 5 grass species into hay fields. In the second year after frost seeding smooth bromegrass, orchardgrass, perennial ryegrass, reed canarygrass, and timothy, the seeded grasses averaged 25.9% of the stands. However, results varied greatly among species and sites, with big differences between years. Average establishment rates were 40.8% in 1995 and only 15.3% in 1996, probably due to weather conditions. Plots that were mowed rather than grazed following establishment appeared to establish better, with mowed plots averaging 20.2% introduced grasses and grazed plots averaging 10.4%. The most effective establishment occurred with the mowed orchardgrass plots (34.8% establishment); the least effective was grazed reed canarygrass (2.3%).
In another UW study, Sean Weber-Small, Dan Undersander, and Michael Casler evaluated early growing season interseeding of 6 grasses using tillage and no-till methods. Species included smooth brome, reed canarygrass, timothy, orchardgrass, perennial ryegrass, and creeping foxtail. Three locations, Arlington, Lancaster, and East Troy, each had three sets of plots. Here again, results were highly variable. Among the 9 sites, 7 had higher yields in seeded plots versus unseeded check plots, but for most, these differences amounted to only 150-300 pounds dry matter per harvest. Only 2 had significantly greater yield improvements of 400 and 700 pounds per harvest in seeded plots versus unseeded check plots.

Averaging over both these studies, which introduced grasses established best and contributed the most to subsequent yields? Smooth bromegrass gave the best results, with an average yield of 1813 lb dry matter/acre/harvest, compared to 1526 lb for unimproved pastures. The other species improved yield as well, with orchardgrass at 1799, reed canarygrass at 1763, timothy at 1761, and perennial ryegrass at 1623 lb/acre/harvest. That’s an average improvement of 226 lb/acre/harvest and if we assume six grazing cycles per season, that comes to 1357 lb/season/acre. It might be worth it.

As you plan your renovation, keep in mind that the results from these studies were highly varied and the success of your efforts depends on a host of variables including the species and method chosen, weather conditions, soil type and fertility status, composition of the existing stand, what color shirt you were wearing that day, etc. Another limitation of both these studies was their duration (2 years). The most important variable in pasture renovation may be patience and across the state we may be getting better germination and survival of introduced grasses than the research suggests. My impression is that introduced grasses establish slowly over 3 to 5 years to take a position of relative prominence long after they are seeded. Many people, including the Central Wisconsin Graziers, who’ve invested in a no-till drill for interseeding, seem satisfied with the long-term results they’re getting.

Perhaps you want to make a major change in pasture composition and are not interested in waiting or you’ve tried these methods and just can’t come up with the right color shirt. You’ve got one more, pretty radical option. You can nuke the existing pasture with a broad spectrum herbicide and start over. That’s what Bob Breneman here in Columbia County is trying on one of his paddocks this year. He’s applied herbicide this past fall and will no-till drill the desired pasture mix into the dead sod in spring. Although I know of no study that’s evaluated this method, it should be highly effective. You’re creating a uniformly moist seed bed with excellent weed control. I’ve seen this done successfully in an effort to convert a cool season pasture to warm season grasses and if it works for the notoriously hard-to-establish prairie grasses, it should work with our more forgiving cool season pasture species.

This clearly would be the most expensive option for pasture renovation, and I would try other options first and certainly start with small areas (Bob is only doing one 9 acre paddock). However, if you are shooting for a particular mix of species or if you’re trying to establish slow growing species like reed canarygrass, this may be your best option. You need to be sure of what you’re doing though, because there’s no turning back.

Whatever approach you decide to take, remember that every pasture renovation should start with a few basic activities: 1. soil test and correct fertility, 2. control weeds, and 3. review management. Evaluating and improving our management should be an ongoing activity. These basics account for the biggest gains in pasture productivity--more than doubling yield, compared to set stocking (Figure 2). More often than not, the greatest improvements in pasture yield and quality are gained simply with good management and patience.

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