



Improving Pastures by Renovation

Ed Ballard
Extension Specialist
Animal Systems/Retired

In Illinois, pastures are generally relegated to land that is too steep and rocky for row crops. The soils tend to be shallow, low in fertility, droughty and under managed. The dominant plant species are often Kentucky bluegrass, tall fescue, white clover, and weeds. The result of this combination of conditions is usually low yields of low quality forage.

One of the best ways to improve both forage yields and animal performance on these low-producing grass pastures is to periodically renovate them. Pasture renovation means "renewing" a pasture by the introduction of desired forage species into present plant stands. It usually involves partially destroying the sod, liming and fertilizing according to soil test, seeding a legume or legume-grass mixture, and controlling weeds.

Benefits Of Legume-Renovated Pasture

Research and farmer experience show that legumes into Kentucky bluegrass or tall fescue sods produce the following benefits:

- Elimination of the need for nitrogen fertilization.
- Better seasonal distribution of forage. (Legumes are more productive in mid-summer than cool season grasses.)
- Increased forage protein content and quality.
- Improved forage digestibility and palatability.
- Higher mineral concentrations (especially calcium and magnesium), that help prevent health problems.
- Improved livestock performance, such as daily gain, milk, and wool production.
- Improved beef breeding performance. (Legumes have been shown to reduce sheep breeding performance because of estrogenic compounds. So keep legumes less than 30 percent of mixture for sheep)

Pasture renovation experiments in Ohio and Illinois illustrate the degree of improvement from the introduction of legumes into low producing grass sods. An Ohio State University study (Table 1) revealed significant increases in cow-calf carrying capacity by renovating a permanent bluegrass pastures. Some improvement was made simply by adding a better forage grass. Further improvement was achieved by increasing soil fertility. However, the greatest improvement resulted from growing either a mixture of alfalfa or orchardgrass or a well-fertilized orchardgrass, both of which tripled animal carrying capacity as compared to the unfertilized bluegrass pasture.

A recent Purdue University experiment (Table 2) further supports two of the Ohio State findings, suggesting they be carefully considered when making pasture renovation decisions. One is that some grass species are better than others as pasture for cow-calf herds. (Compare the daily gains and conception rates for herds on orchardgrass vs. tall fescue receiving the same amount of nitrogen.) The second finding is that seeding a legume into a tall fescue pasture gives better cow-calf production results than merely fertilizing the tall fescue pasture with nitrogen and gives similar results to N-fertilized orchardgrass. (Again in Table 2, compare animal performance on the tall fescue-clover mixture vs. tall fescue alone receiving N fertilizer.

Major Problems In Pasture Renovation

Pasture renovation needs to be done on a regular basis. The reason is that legumes, as compared to grasses, tend to be short-lived in a pasture. In fact, they will disappear rather quickly in the face of such "adversities" as lime, phosphorus and potassium deficiency, disease and insect damage, overgrazing, drought, or grass and weed completion.

TABLE 1. Effect of Forage Species and Fertility Levels on Pasture Grazing Days and Carrying Capacity, Ohio State University.

Forage Species	Soil Fertility	Available Grazing Days	Acres Per Cow/Calf
Bluegrass	Low	59	3.13
Bluegrass Orchardgrass	Low	89	2.08
Bluegrass Orchardgrass	Moderate	106	1.74
Bluegrass Orchardgrass	Good + 130 lb N	104	1.00

Orchardgrass Alfalfa	Moderate	189	0.97
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TABLE 2. Effect of Forage Species and Nitrogen Fertilization on Conception Rate and Daily Gain of Cows and Calves on Pasture, Purdue University.

Forage Species	N Fertilizer Treatment	LB Daily Gain		
		Calves	Cows	Conception Rate
Orchardgrass	100 lb	1.8	0.8	90%
Tall Fescue	100 lb	1.2	0.02	71%
Tall Fescue Red Clover	none	1.8	0.6	92%

Two problems associated with introducing a legume into pasture are the possibility of bloat and the difficulty in getting the legume established. Potential bloat problems can be minimized by seeding non-bloat species (birdsfoot trefoil or lespedeza), by introducing the animals slowly to legume-containing pasture, by feeding hay before turning animals into legume-containing pasture, or by supplement-feeding poloxalene (the active ingredient in "Bloat Guard").

The chances of getting a seeded legume successfully established in an existing sod depends on the farmer ability to meet the two requirements:

- The existing vegetation must be sufficiently suppressed to permit the legume seed to germinate and emerge. This is accomplished either by tillage or by application of a "knockdown" herbicide in combination with overgrazing prior to seeding. If tillage or herbicide application cannot be made, the sod still should be overgrazed.
- Management after emergence of the legume must favor the legume if a mixture is to be maintained. This means grazing down the early flush of spring grass growth and then removing the animals to give the legume an opportunity to get established.

Steps To Successful Pasture Renovation

To fulfill the above requirements for establishing and maintaining a good legume stand, the following steps are suggested:

1. Overgrazing. Livestock should be allowed to overgraze the pasture in the fall so that tillage or herbicide is more effective at tearing or reducing the sod. Even if tillage is not

clone, the grass should be overgrazed so the mulch will not interfere with legume establishment.

2. Soil Testing. The soil should be tested and limed and fertilized, using soil test as a guide. Soil pH should be between 6.5 and 7.0. Desirable test levels of phosphorus and potassium vary with soil type; phosphorus should be in the range of 40 to 50 pounds per acre, and potassium in the range of 260 to 300 pounds per acre.
3. Disturbing or suppressing the sod. If erosion is not a hazard, disk or field-cultivate to disturb the grass sod. (Renovation is more successful if tillage can be done in the fall.) To minimize soil loss, do not overwork the seedbed. The sod should be disturbed 50-70 percent if seeding clovers and 80-90 percent if seeding alfalfa and birdsfoot trefoil. It is not necessary to reseed the grass, since the undisturbed tillers will begin to grow the following spring.

On sloping land with highly erosive soils where tillage is not practical, the grass stand can be "knocked back" with Gramoxone Super (paraquat) or Roundup, which are approved for this purpose. However, the grass must be actively growing for Paraquat to be effective. Therefore, wait until the grass has "greened up" to apply it.

4. Seeding the legume. Frost-seeding inoculated legumes in the late winter has provided good results in tillage-disturbed and undisturbed sod.

On Paraquat-treated sod, legumes can be seeded immediately after application. Seeding is best accomplished after Paraquat treatment with a no-till drill, because it places the seed in direct contact with the soil at the proper seeding depth (1/4 -3/8-inch). Overseeding Paraquat-treated sod is not effective because there is no frost action to provide seed-soil contact that late in the season.

Table 3 lists the legume species, alone or in mixture, considered best for renovation and their proper seeding rates. Alfalfa should not be used on soils that heave severely. Birdsfoot trefoil complements bluegrass pastures very well. Always select "improved" varieties.

5. Grazing newly legume-seeded pasture. In the spring once the grass is growing and the ground has dried out enough to support livestock, graze the pasture until the animals start to defoliate the legume seedlings. Then remove the livestock and rest the pasture for 24 to 30 days to allow the legume to get established. Use rotational or management intensive grazing. Rotational grazing requires a maximum of 5 to 7 grazing days, 28 to 32 resting days, and 5 to 6 pastures. For higher quality feed, higher yields and greater animal production, and increased persistence of interseeded legumes use management intensive grazing.
6. Grazing established grass-legume pastures. Rotationally graze from spring to fall this favors the legumes. To rotate, use several fields or divide into paddocks with an electric fence. Adjust stocking rate per field or paddock to defoliate grass-legumes within a 7 to 10-day period. Do not overgraze, and plan on providing plenty of recovery time usually from 24 to 32 days, depending on time of season and rate of regrowth.

One suggested grazing system is to: (a) harvest one or two hay crops in the spring and summer, (b) allow 30 -32 days for recovery, (c) graze off in 7 days, (d) repeat the Resting-grazing cycle, and (e) allow 4 to 6 weeks of plant recovery before the first Killing frost.

- Fertilizing. Fertilize the pastures annually on the basis of estimated crop removal. Each ton of dry matter from a pasture contains about 12 pounds of phosphate (P₂O₅) and 50 to 60 pounds of potash (K₂O). Do not use nitrogen on established pastures where the sward is at least 30 percent alfalfa, or red clover, or both. Because 20 to 80 percent of the nutrients grazed may be returned to the pasture in the form of urine and manure fertilization rates for pastures will be less than for hay production.

TABLE 3. Suggested Legumes and Seeding Rates for Renovation Grass Pastures.

Seed Mixture	Species	LB. Per Acre Seeding Rate
1	Red Clover	8 - 10
	Ladino Clover	0.5 - 1
2	Alfalfa	10 - 12
	Red Clover	2 - 4
3	Annual lespedeza	20 - 25
4	Red Clover	0 - 7
	Ladino Clover	0 - .5 - 1
	Annual lespedeza	8 - 1
5	Birdsfoot trefoil	5

- Assumes high quality seed (90+ germination and 99+ % pure)

Ed Ballard, 217-774-4267, edward@consolidated .net
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