



Renovating Hay and Pasture Fields

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Renovate means to renew and improve. This publication discusses managing a pasture or hay field that has become less productive and "renewing" it so that it will become more productive. In Kentucky, this usually means adding lime and fertilizer, controlling weeds and insects, and planting a legume such as red clover. The primary benefits come as a result of getting legumes established in grass-dominated fields.

Benefits of Legumes

Adding legumes to hay and pasture fields brings at least four benefits:

(1) Higher yields

The total yield of forage per acre is increased. For example, a study conducted at Lexington compared renovating a fescue pasture using red clover to fertilizing the grass with nitrogen (Table 1). In this study, red clover growing with fescue produced higher yields than fescue fertilized with up to 180 lb N/ac.

(2) Improved quality

Adding legumes to grass fields improves forage quality over grass alone. This added quality includes increases in palatability, intake, digestibility, and nutrient content. The result is improved animal performance. Research has shown that legumes improve animal growth rates, reproductive efficiency, and milk production. The three studies summarized in Table 2 show improved growth rates of beef cows, calves, and steers when legumes are used. The study reported in Table 3 shows increased growth rates of beef steers grazing a fescue-ladino clover pasture. It also shows higher gains per acre as a result of improved forage quality and higher yields.

High quality feed is important in getting beef cows rebred after calving. Research conducted in Illinois and Indiana (Table 4) compared conception rates of cows grazing tall fescue pastures with and without legumes. In both tests, the cows grazing legume-grass pastures had much higher conception rates.

(3) Nitrogen fixation

Legumes get their nitrogen needs from symbiotic bacteria that live in "knots" (nodules) on their roots. These bacteria are added when legume seed is inoculated. This "fixed" nitrogen provides the nitrogen needed by the legumes and also by grasses growing with them. Different legumes are able to "fix" different amounts of nitrogen (Table 5). Alfalfa

Table 1. Dry Matter Yields of Fescue-Clover vs. Fescue-Nitrogen—Lexington, 1978, 2 Yr. Average

Treatments	Yields, lb/ac
Fescue-Red Clover 6 lb Seed/ac	11,100
Fescue + Nitrogen	
0 lb/ac	3,900
90 lb/ac	6,700
180 lb/ac	9,900

Taylor, T.H., et al. University of Kentucky

Table 2. Animal Performance on Grass vs. Legume-Grass Mixtures

Species	Length of Trials (Yrs)	Gain/Head (lb/day)	Animal Class	State
Tall Fescue	3	0.12	Cows	IN
Tall Fescue + Red & Ladino Clover		0.74		
Tall Fescue	3	1.30	Calves	IN
Tall Fescue + Red & Ladino Clover		1.80		
Orchard-grass	10	1.07	Steers	VA
Orchard-grass + Ladino Clover		1.28		

Table 3. Av. Daily Gain and Gains/Acre of Steers Grazing Tall Fescue & Tall Fescue-Clover Pastures

Pastures	Daily Gain (lb/steer)	Total Gains	
		lb/steer	lb/ac
Fescue + Ladino Clover	1.53	307	582
Fescue + 150 lb N/ac	1.06	203	374

Hoveland, C.S., et al. 1981. Bulletin 530. Auburn, AL

usually fixes the most, while annual lespedeza is on the low side with about 75 pounds.

The value of the nitrogen fixed by legumes depends on the cost of nitrogen fertilizer. The values in the right column of Table 5 are based on nitrogen priced at 25 cents/lb or ammonium nitrate fertilizer at \$170/ton.

(4) More summer growth

Most of the growth of cool-season grasses occurs during the spring and fall. Legumes make more growth during the summer months than cool-season grasses. Growing grasses and legumes together improves the seasonal distribution of forages and provides more growth during summer.

How to Renovate

Follow these six important steps when renovating grass fields with legumes:

Step 1. Have the soil tested and apply the needed lime and fertilizer. Legumes need a higher soil pH and fertility level than grasses. However, DO NOT use nitrogen. Added nitrogen stimulates grasses, which increase competition with the legumes.

Step 2. Reduce the vegetative cover on the soil. This is best done by heavy grazing in late fall and early winter. Removing the excess grass cover will make it easier to get the legume seed in contact with the soil.

Step 3. Select the legumes to be used. This will depend on the soil and the planned use of the forage. For hay, alfalfa or red clover is usually best. For both hay and grazing, a combination of red clover and ladino clover works well. Ladino, red clover, and/or annual lespedeza work well in pastures.

Step 4. Use the right kind and amount of seed. Select varieties that perform well in your area. The only way to be sure of what you're planting is to use certified seed. Table 6 provides some seeding rate guidelines. Also be sure to use the right kind of high quality inoculant mixed with the seed just before planting. Use a sticking agent to be sure that the inoculant sticks to the seed.

Step 5. Plant the seed so that it makes good contact with the soil. There are several ways to do this. One of the best ways for most farmers is to use a disk, field cultivator, or field tiller. Disturb 40 to 60 percent of the sod for planting clovers. For alfalfa seeding, almost all of the sod should be torn up (loosened from the soil). Tillage helps control the grass growth and exposes the soil so the legumes have a better chance to germinate and grow. Broadcast the seed and pack the soil with a corrugated roller.

Another method is to use a no-till renovation seeder. These do a good job of placing the seed in the soil, but they don't reduce the competition from the grass.

A simple, but effective method is to broadcast the legume seed on the soil surface in late winter (Feb. 15 to March 15). As the soil freezes and thaws, the seeds become covered. This method does not work well with alfalfa.

Table 4. Conception Rates on Grass vs. Grass-Legume Pastures

Species	Conception Rate %	State
Tall Fescue	75	IL
Tall Fescue + Legume	89	
Tall Fescue	72	IN
Tall Fescue + Clover	92	

Table 5. Value and Amount of Nitrogen Fixed by Different Legumes

Crop	Lb/ac/Yr	Value of Nitrogen ¹
Alfalfa	200 - 300	\$ 50 - 75
Red Clover	100 - 200	25 - 50
Ladino Clover	100 - 150	25 - 37.50
Vetch, Lespedeza and Other Annual Forage Legumes	75 - 150	18.75 - 37.50

¹Fertilizer nitrogen valued at \$0.25/lb

Table 6. Legume Seeding Rates for Renovating Grass Fields

Mixture Number	Legume(s)	Seeding Rates* lb/ac
1	White Clover	1 - 3
2	Red Clover	6 - 12
3	Annual Lespedeza	15 - 25
4	Alfalfa	12 - 20
5	White Clover and Red Clover	1 - 2 4 - 6
6	Alfalfa and Ladino Clover	8 - 10 ½ - 1
7	Birdsfoot Trefoil	6 - 8

*If seeding is done at the proper time and under good conditions, the lower rates can be used. The higher rates may be needed for broadcast seedings or when conditions are not the best.

Herbicides can be used to kill or suppress some of the grass and help control competition. Follow the label directions for rates and grazing restrictions when herbicides are used.

Step 6. Control grass and weed competition. This step is one of the most critical ones. Many attempts at renovation have failed simply because the grass was allowed to grow and reduce the light, nutrients, and water available to the young legume plants. The grass must be kept short by grazing or mowing until the new legume plants are 3 to 4 inches tall. Stop grazing if the animals begin biting off the young legume leaves. Grazing and mowing should be stopped for several weeks to allow the legumes to become well established. After this, the field should be mowed or grazed on a schedule that will help keep the particular legumes used in good condition. A rotational grazing system helps keep legumes in the stand longer.

Managing Renovated Fields

Once legumes have been established in grass fields, maintaining them is important. To do so, the following management factors need to be taken care of:

- Follow an annual fertility program based on soil test recommendations to be sure phosphorus and potassium are available. Take a soil sample at least every third year to be sure enough fertilizer is being used and to see if more lime is needed. Again, to avoid too much competition from the grass, DO NOT use any nitrogen as long as you want to keep legumes in the field.
- Mow pastures as needed to remove grass seed heads and control weeds and woody vegetation.
- Harvest hay or manage grazing to favor the legume being used. Grass-clover pastures may be grazed all sea-

son, but take care to avoid overgrazing. Leave 2 or 3 inches of top growth at all times. A good rotation plan helps (see Cooperative Extension publication AGR-85). When annual lespedeza is used, pastures should be grazed heavily in April and May to control the grass and give the lespedeza a chance to get started. It should be given a rest then, until the lespedeza is 5 to 8 inches tall before grazing again. Alfalfa-grass fields can be grazed successfully, but a good rotation system must be used. A good plan is to use enough livestock to graze it down in 7 to 10 days. Then give it 4 or 5 weeks to re-grow before repeating the cycle.

- Observe renovated fields often to be sure insect problems are found early. If problems are discovered, consult with the agricultural Extension agent for recommendations on how to handle them.

Other Information

More detailed information on many of the recommendations discussed in this publication are available from the University of Kentucky College of Agriculture Cooperative Extension Service. The following list may be helpful:

- AGR-16 Taking Soil Test Samples
- AGR-19 Liming Acid Soils
- AGR-33 Growing Red Clover in Kentucky
- AGR-62 Quality Hay Production
- AGR-85 Efficient Pasture Systems
- AGR-86 Growing Lespedeza in Kentucky
- AGR-90 Inoculation of Forage Legumes
- AGR-104 'Fergus' Birdsfoot Trefoil
- AGR-116 Fertilizing Forage Legumes

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