



FLUID FACTS

NFSA AGRONOMIC NEWSLETTER

MANAGING FORAGE FOR HIGH YIELDS AND PROFITS

Now is a good time to evaluate fertility programs for forage crops. Many crops can be considered forage (plants that provide roughage for livestock), including legumes and both cool and warm season grasses. In some instances grass-legume mixtures are used for pasture and hay.

The first flush of growth following dormancy can be a good indication of overall annual production potential when temperature and moisture conditions are favorable. Vigorous, lush growth usually indicates that plants had an adequate supply of nutrients going into dormancy. Slow growth, thin stands and poor color often indicate nutrient deficiencies that need management attention.

HIGH NUTRIENT REMOVAL

Careful fertility management is essential to produce high-yield, high quality forage for livestock feed. Because nearly the entire plant is harvested, most forage crops have a heavy requirement for nutrients and nutrient removal is high compared to crops harvested for grain.

The approximate nutrient removal of corn harvested for grain and by one ton of dry hay (DM) from three major forage varieties is compared below:

TABLE 1

CROP	Nutrient Removal					
	N	P ₂ O ₅	K ₂ O	Mg	Ca	S
	lbs./acre					
CORN - 1 TON OF GRAIN DM (41.3 BUSHELS)	41	14	10	2.5	0.8	2.3
ALFALFA	60	14	50	5	28	5
BROMEGRASS	40	12	44	4	8.5	3.4
BERMUDA GRASS	50	12	40	4.5	7.5	6

With yield potentials above eight tons per acre for alfalfa, four tons for brome grass and 12 tons for Bermuda grass, nutrient requirements quickly reach levels that make fertilization necessary.

In some instances, researchers have found that the nutrient requirement for optimum yield and quality response exceeds

the requirement for yield alone. University of Arkansas researchers say that 25 pounds of N can produce one ton of poor-quality Bermuda grass hay-equivalent forage while 100 pounds of N may be needed for a ton of high-quality forage containing as much as 25 percent crude protein.

Although N gets most of the attention in a fertilizer program for forage grasses, it is risky to develop any nutrient program without benefit of soil analysis.

As shown in Table 1, forage crops have a substantial Ca and Mg requirement relative to grain crops. Although many forage crops are well adapted to acid soils, it is important to maintain sufficient Ca and Mg levels. This can be done by liming acid soils with calcitic (Ca) or dolomitic (Ca and Mg) limestones, through gypsum applications (Ca) or by applying potassium magnesium sulfate (K and Mg) fertilizer. Proper levels of all essential plant nutrients are necessary for profitable forage production.

REVERSE PRODUCTION DECLINES

Beef producers in northeast Kansas observed that production was declining on established brome grass pasture sites where P fertilizer was not being applied. A research study conducted by Kansas State University (KSU) determined that P was limiting response to N fertilizer applications.

On a soil with pH of 6.1 (available P of 7 and exchangeable K of 500* pounds per acre), the two-year yield average for the unfertilized forage was 1,062 lbs./acre. A P treatment of 60 lbs. P₂O₅/acre produced an additional 181 lbs./acre of forage. N applied at the rate of 90 lbs./acre as ammonium nitrate produced 1,281 lbs./acre of forage over the check plot. When both N and P were applied at 90 and 60 lbs./acre, respectively, yield increased by 3,508 lbs./acre of forage over the unfertilized plot.

TABLE 2

N LBS./ACRE	P ₂ O ₅ LBS./ACRE	COST OF N & P FERTILIZER* \$/ACRE	YIELD LBS. DM/ACRE	RELATIVE FERTILIZER COST \$/TON DM
0	0	0	1062	—
0	60	15.00	1243	24.14
90	0	22.50	2343	19.21
90	60	37.50	4570	16.41

* N and P₂O₅ cost of \$0.25/lb.



By investing in a balanced fertility program costing \$38 per acre, increased brome grass yields could produce an additional return to growers as much as \$114 per acre (based on hay valued at \$65 per ton.)

In Louisiana, coastal Bermuda grass hay yield had declined to an estimated 60 percent of yield potential after 11 years of hay cropping. Researchers applied 400 lbs./acre of K_2O annually in split applications for five years. Average forage yield increased from 6,733 lbs./acre to 15,700 lbs./acre and forage digestibility increased by an average of 1.7 percent.

Researchers at Kansas State University have obtained small but consistent forage yield increases with sulfur (S) fertilization of brome grass. In 1990, Dr. Dan Sweeney, project leader for a Fluid Fertilizer Foundation supported project, reported a yield response to 15 lbs./acre of S on fescue, but yield was reduced when the S rate was increased to 30 lbs./acre.

Ammonium thiosulfate (ATS) resulted in approximately 10 percent higher forage yield of fescue than ammonium sulfate. Placement also was a factor in this study with yield affected in order: knife > dribble > broadcast.

In another study, KSU evaluated UAN management techniques on brome grass. Yields were excellent in 1990. The dribble band treatment with ATS applied at 120 lbs./acre N produced the highest yield at 9,390 lbs./acre of forage. This was in comparison to only 2,630 lbs./acre of forage from the unfertilized check treatment. A statistical analysis of the data showed that dribble application produced significantly more forage with higher protein than the surface-broadcast method of application.

P-K PRIORITIES

Because alfalfa is a legume, N drops down in fertilizer program priority and gives way to P and K. Iowa State University suggests that it may be necessary to apply 100 lbs. P_2O_5 and 400 lbs. K_2O per acre annually to produce eight-ton yields of alfalfa. The recommendation for timing is one-half after the first cutting and one-half after the third cutting.

The University of Arkansas fertilizer timing recommendation for Bermuda grass includes:

- Apply P and part of the K at first green up.
- For high to very high yields apply 80-100 lbs./acre K_2O with N every other hay harvest or graze off.
- Apply N at the rate of 40-50 lbs./acre with P-K at green up followed by 60-70 lbs./acre after each hay harvest or every 4-6 weeks of grazing for medium to high production.

For cool season grasses such as brome grass and fescue there are several options for fertilizer timing, depending on soils and production goals. Most agronomists recommend that all P and K be applied with some N in the fall. If late fall-early winter grazing is a goal, late summer-early fall fertilization will be important on low fertility soils. When fall production of forage has been high it often will be necessary to topdress N before spring green up to replace the fall removal and ensure abundant spring production.

Many factors must be considered when managing forage crops for high yields and profitability. Attention to details such as fertility management, harvest timing and proper curing before baling affect quality and yield. Also, soil and tissue testing should be considered to monitor crop nutrient needs as you strive to produce optimum yields within acceptable economic and environmental objectives.