

ADVANCES IN GRAZING ALFALFA

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Introduction

Many farmers are reluctant to develop a new enterprise based on the grazing of alfalfa if they have had no experience with grazing of this species. Their first negative reaction is usually based on their fear of legume bloat. Often their second reaction is that grazing will destroy the alfalfa stand in short order. Another response is that grazing is a wasteful and inefficient use of a valuable resource generating less income than conventional uses, such as hay and silage. Another reaction is based on the fear Alfalfa grazing, according to other sceptics, also requires lots of capital for fencing and water services, needs much more labor, demands complex managerial skills and the assumption of more risk. Still others believe that alfalfa does not provide a balanced diet for grazing livestock.

In this paper I will discuss these points of concern about the grazing of alfalfa: whether they are real (and if they are the available options to avoid or minimize them) or imaginary. I will also discuss new technology and research activities that affect the grazing of alfalfa.

Legume bloat

Bloat is a potential problem when grazing alfalfa. When current recommendations for grazing management of alfalfa are followed and when situations associated with outbreaks of bloat are recognized, there is a low probability of a serious outbreak of legume bloat. It is prudent for novices of alfalfa grazing to become familiar with conditions that predispose cattle to bloat and take appropriate action when those conditions arise. Surface active agents, such as poloxalene and laureth 26, may be needed when conditions associated with bloat are imminent. Monensin (but not lasalocid) and mineral supplements may have positive benefits to cattle grazing alfalfa and may have the added benefit of reducing the incidence and or severity of bloat. It is also prudent to plan in advance for an outbreak of bloat by keeping poloxalene or laureth 26 on hand for direct oral treatment of bloat-stricken cattle.

Herbage legumes that lead to bloat have thin-walled cells that rupture easily, flooding the reticulo-rumen with the soluble proteins that form stable foam. Less digestible and slowly digested herbage (grasses, for example) usually are less likely to cause bloat. Consequently, alfalfa-grass mixtures are less likely to cause bloat than pure alfalfa stands.

Canadian researchers are attempting to transfer genes from non-bloating legumes to alfalfa. Tannins present in legumes, such as birdsfoot trefoil and crown vetch, may prevent the formation of stable foam in the reticulo-rumen that causes bloat and they may also have the added advantage of increasing the amount of by-pass protein (the protein that passes through the reticulo-rumen and is digested and absorbed in the hindgut). Incorporating the genes responsible for tannin synthesis into alfalfa may benefit grazing of alfalfa more than alfalfa grown for hay and silage. Don't expect to find seed of bloat-free varieties at the local co-op for a year or two.

Bloat susceptibility of cattle is quite highly inherited. Cow-calf operators, who plan to graze alfalfa for several years should consider culling chronic bloaters. It is not surprising, given the causes of bloat, that many chronic bloaters are high producers in dairy herds.

Grazing varieties

Grazing types of alfalfa have been under development for over 80 years. Rhizoma, Glutinosa, CanCreep, Spredor II, Victoria, Travois and Roamer were varieties developed on the theory that rhizomes and creeping roots transferred in genes from the hardy *Medicago falcata* types should favor persistence under grazing management. Grazing tolerance of alfalfa has also been related to deep and broad crowns, subsurface, prolific, extended and non-synchronous budding, high carbohydrate levels in the crown, and disease and pest resistance. Varieties developed under these premises did not perform according to theory in grazing practice. Increased root mass and longer dormancy of these varieties, for example, tended to lower harvestable yields and make stands more susceptible to grass and weed competition.

Alfagraze, a new variety selected for persistence under continuous grazing in Georgia, holds much promise for the South. This variety was also derived from hardier, dormant types of alfalfa. It is claimed that its persistence under continuous grazing is due partly to its ability to produce new crown shoots with minimum depletion of crown carbohydrate reserves and partly to early release of crown shoots from apical dominance so that new crown shoots co-exist with older and taller stems. These physiological features may allow plants to sustain continuous grazing better than conventional varieties and lessen rates of stand depletion. Alfagraze was selected under a specific management program. The alfalfa was not grazed in early spring and the first crop was harvested for hay. The alfalfa was then grazed continuously for 18 weeks. In Georgia, this means that the alfalfa was harvested for hay in late April. (This probably allowed the restoration of the populations of crown bud initials). The regrowth was then grazed continuously by beef stockers through May, June, July and August. In fall the alfalfa was managed to restore root carbohydrate reserves for winter and spring, just as we recommend in Kentucky. It would be wise for Kentucky farmers, who are interested in grazing Alfagraze, to follow a management scheme that allows for restorative growth phases in spring and fall.

Continuous grazing at high stocking rates destroys most alfalfa stands within one year. If Alfagraze persists under continuous grazing, it is truly a remarkable breakthrough that will revolutionize alfalfa grazing. It will be five or more years of grazing before we will have an indication whether this new variety persists longer in Kentucky than other varieties under conventional grazing management.

Alfalfa stand maintenance under grazing

Most Kentucky alfalfa stands deteriorate three to four years after establishment. Soil tests have revealed that Kentucky farmers do a good job of liming, fertilizing and seeding new stands. After two or three seasons, however, many growers cut back or quit applying the fertilizer needed to maintain adequate soil fertility for productivity and longevity. About the same time they also quit weed control practices, usually because of cost, but sometimes because of difficulties in getting the appropriate herbicide on in time. Weed ingression further exacerbates stand deterioration.

Alfalfa normally has high concentrations of potassium and low levels of sodium that may result in sodium deficiency in grazing livestock. Continued high levels of potassium fertilization may further upset potassium/sodium imbalance in cattle. For reasons that are not known at this time, this mineral imbalance makes cattle more susceptible to bloat. To counter this problem, cattle grazing alfalfa should have access to salt-based mineral supplements (say with monensin). The bloat problem should diminish as alfalfa stands age and deteriorate because of ingression of weed grasses and because of declining potassium content of the alfalfa herbage as a result of declining soil fertility.

Under cattle grazing most of the plant nutrients ingested by cattle are recycled back to the soil in dung and urine where they are immediately available to support alfalfa growth. Presumably, grazed alfalfa requires less phosphate and potassium fertilization than alfalfa harvested for hay and or silage. No one has addressed this aspect of alfalfa stand maintenance under grazing but it is obvious that routine soil testing may help reduce costs of fertilization. Much of the alfalfa nitrogen is also returned to the soil. This usually leads to higher soil fertility and higher yields but it may also increase weed and grass competition.

Longevity of alfalfa stands under grazing

We have no reason to expect that the productive life of alfalfa stands under appropriate grazing management would differ from that of alfalfa managed for hay and silage. Longevity of alfalfa stands is difficult to define and to measure but we know that if we can amortize the quite expensive costs of establishment over just one or two more years of production then the economics are much more favorable. As a perennial, alfalfa may persist for many years and stands over 20 years old are not uncommon under rotational grazing with sheep in dry areas of New Zealand. It is difficult to define appropriate and inappropriate grazing management during and after

a catastrophic event. In some instances grazing extends stand productivity by reducing grass competition, conversely, abusive grazing practices may promptly annihilate alfalfa stands. It appears that farmers are likely to keep poor alfalfa stands longer for grazing than for hay and silage for the decline in profitability as stands deteriorate is likely to be less.

Dietary quality

Alfalfa, if well made and properly stored as hay and silage, is our best forage in terms of feeding quality. When grazed the ingested forage may be even better than harvested hay or silage if operators do not insist livestock consume the woody lower portions of the stems. If limited to grazing the upper 75% of the crop, cattle graze quickly and with little effort. The herbage that they eat may contain up to 40% protein (if grazed at the late bud stage or earlier) and metabolizable energy content may approach that of corn grain. At this stage the herbage of the grazed horizon is composed primarily of leaf and quite digestible young stems, and the ingested herbage has small. This alfalfa herbage is easily masticated into small particles. Very little rumination is needed, if any, to further reduce particle size. Grazed alfalfa, therefore, is digested very quickly and moves rapidly through the tract. Cattle, as a consequence, graze quickly during several short meals each day. Their energy requirement may be met by as little as 5 or 6 hours grazing each day. Minimal effort is expended in grazing energy is available for production. Daily gains of stockers may average over 3 lbs with higher rates possible over shorter periods.

Most (90-95%) of the alfalfa herbage protein is degraded in reticulo-rumen to ammonia, which is either converted into microbial protein or excreted as urea in the urine. Carbon skeletons of the amino acids are metabolized as an energy source. Common sense tells us that energy supplements may be profitably used to take advantage of the surplus protein, however, it is probable that grazing livestock will merely substitute grain for alfalfa herbage.

Stubble management

Forcing stockers to clean up alfalfa stands at the end of a grazing cycle drastically reduces herbage intake and digestibility because the residual stems bases are high in lignin and are not very digestible. Rate of live weight gain declines linearly as one attempts to increase herbage utilization. It does not usually pay to clean up grazed stands with stockers nor is it worthwhile to mow off alfalfa residues. Livestock with lower nutritional needs, such as dry or barren cows, mature bulls (after the breeding season), or ewes may be used to clean up after top-grazed alfalfa stands. It is not critical to remove the stems down to mower height and they can left to rot down, however, at the end of the season stem residues should be removed as they may harbor adults alfalfa weevils and their eggs.

Management systems

Rotation grazing systems based on grazing for less than 12 days followed by a recovery period of 28 to 35 days are proven practices for alfalfa grazing. Alfalfa stands managed for hay and silage may be abused to a limited extent provided they are allowed to recover. The same goes for grazing. Two alfalfa grazing systems developed in Virginia are based on the ability of alfalfa to recover from stress, if given the opportunity to recover. One system uses continuous grazing in early spring at low stocking rates followed by normal haying management when weather is better for hay curing. Another Virginian system involves continuous grazing for longer periods during the season if the stands are allowed to recover and if the fall management follows normal recommendations that allows plants to prepare for winter. These grazing systems are not really new but merely variants of grazing systems that are based on ability of alfalfa to recover from a little abuse. They appear to be a little complicated for farmers starting out in grazing alfalfa. To paraphrase Abe Lincoln "*you can abuse some of the alfalfa some of the time but not all of the alfalfa all of the time*".

Profitability

High prices for cattle and relatively stable prices for hay continue to favor alfalfa grazing systems for stocker cattle. Per acre live weight production of alfalfa may easily exceed 1000 lbs per year. Assume that we can produce 10,000 lb of dry matter per acre per year. Kentucky research indicates that we can get 75% of the standing crop of alfalfa into stockers and still get over 2 lb ADG. Based on John John's research in Owen County we can assume that it takes 7.5 lb alfalfa to make 1 lb of gain then 1000 lb of gain is possible (7500/7.5). With stockers at \$80/100 lb and allowing 50% for costs of feed then the alfalfa in a stocker grazing enterprise is worth about \$400 per acre. After allowing 20% harvest and storage losses, the same alfalfa crop would yield 4.4 tons of alfalfa hay (at 10% moisture), which is worth about \$333 at an average price of \$75 per ton. Haying incurs mowing, tedding, raking, baling, storage, transport and commission charges that likely reduce net income and traffic may damage the stand as well.

Conclusion

Stocker systems based on alfalfa or alfalfa/grass pastures, and cow-calf systems and combined cow-calf-stocker systems based on alfalfa and endophyte-free tall fescue are the best grassland management systems available to Kentucky beef producers at the present.