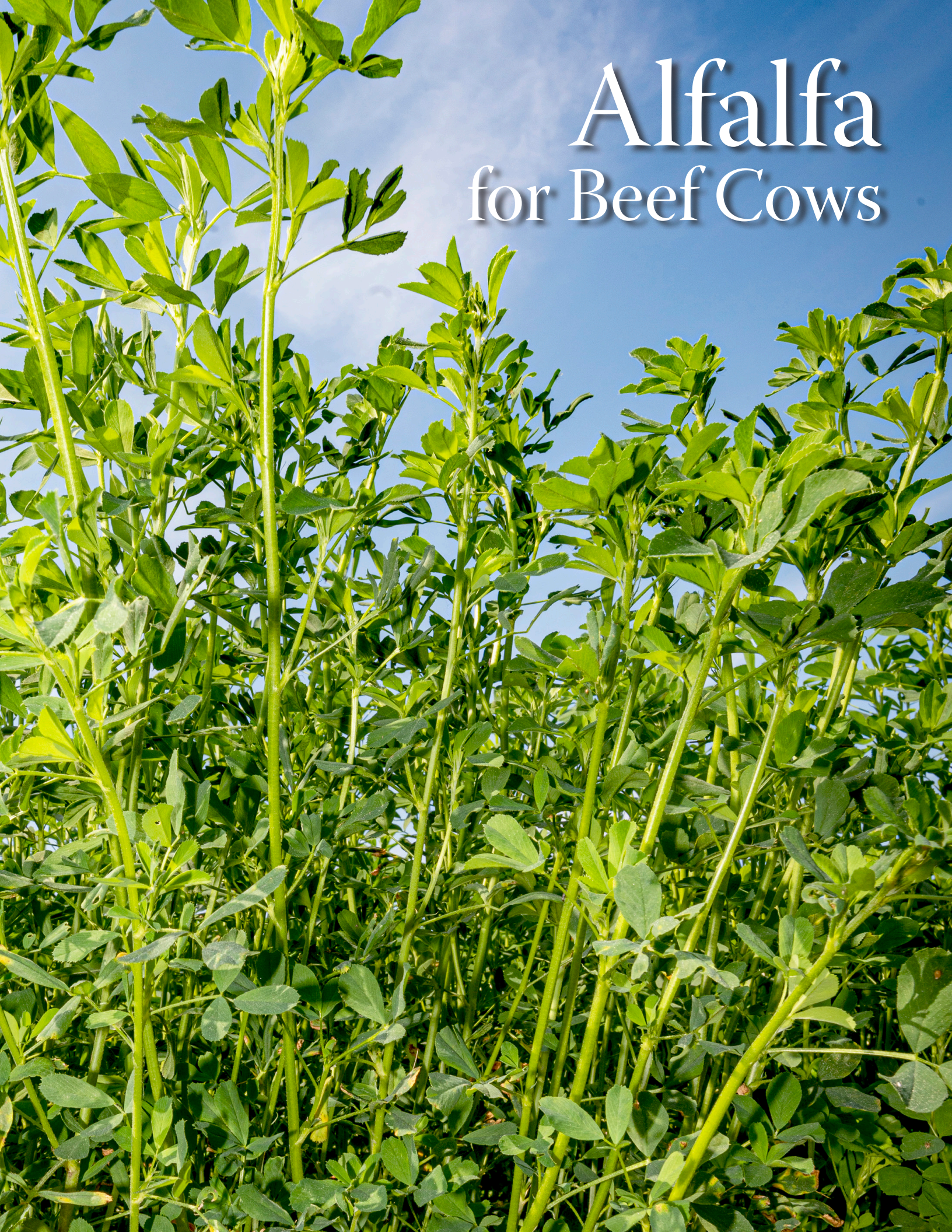

Alfalfa
for Beef Cows

Alfalfa for Beef Cows

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Alfalfa is recognized as a productive and highly nutritional forage for ruminants. It has been a staple of dairy rations for decades, notably as a forage derived supplemental protein source. The productivity of alfalfa can vary, but yields of 3-6 tons of dry matter per acre or more make it an attractive crop for ruminants requiring higher protein diets. Beef cattle managers have been less inclined to grow alfalfa, despite its high productivity and nutritional value. However, increasing market volatility for grain and coproduct feedstuffs provides an opportunity for greater use of alfalfa in beef cattle diets.

Alfalfa is the highest quality, highest yielding forage legume and has long been a staple in the diets of ruminants.

A healthy crown and root from a six-year old stand of alfalfa grown in a well-drained deep soil.

Why Consider Alfalfa for Beef Cattle?

Alfalfa can play a role in beef cattle operations as a supplemental feed or a main component of the animals' basal diet. Managers must address the specific soil and fertility requirements of alfalfa for maximum productivity and profitable returns. Many beef cattle operations have limited acreage that will support alfalfa production. However, for operations with tillable acres and soils conducive to growing alfalfa, the crop can be a reliable, high-quality forage. Alfalfa requires soils that are well drained and with lower clay content to prevent root rot and heaving. Deep soils, free of rock layers and fragipans, allow alfalfa to send a taproot down several feet to reach soil nutrients and moisture. This deep taproot allows alfalfa to be productive during periods of limited precipitation while other shallow-rooted forages are less productive or dormant. Soil pH for optimum alfalfa growth should be 6.5 to 7, and sufficient phosphorus and potassium should be available in the soil to ensure stand establishment and longevity. Each ton of harvested alfalfa can remove approximately 10-12 pounds of P_2O_5 and 50-55 pounds of K_2O. Replenishing nutrients removed is essential for alfalfa stand survival.

Operations may also choose to diversify their enterprise by selling high quality alfalfa hay to the horse or dairy industries. Alfalfa that is not marketable to horse operations or dairies can still be highly beneficial for beef cows. Feeding this forage to beef cattle provides a way to recoup some of the value of the alfalfa crop when harvesting at optimum harvest stages is not possible. As with other legumes, alfalfa can capture atmospheric nitrogen and incorporate this nitrogen into plant protein. With alfalfa pasture, this nitrogen can be recycled through grazing animals and excreted via urine and feces. Another way to recycle nitrogen, phosphorus and potassium in forage is to feed alfalfa hay on grass pastures. In this situation, alfalfa provides high quality feed for beef cattle and the mineral nutrients

Feeding alfalfa hay back onto low fertility land will recycle needed soil nutrients as well as adding organic matter.

in the hay are deposited back onto the pasture as manure and urine. When alfalfa fields are renovated to another crop, breakdown of alfalfa plant material can provide nitrogen for the next forage or crop, increasing productivity and lowering nitrogen fertility expenses.

Alfalfa as a Protein Source

Alfalfa is highly valued for its high crude protein concentration. During bud to early bloom stages, the crude protein concentration can be in the high teens to low 20's.

As alfalfa matures into the flowering stage, the crude protein content declines but will still be 16-18 percent. Like other legumes, alfalfa contains exceptionally high levels of rumen degradable protein, with more than 70% being available to the rumen microflora. The high degree of ruminally degradable protein in alfalfa provides a source of ammonia and short peptides needed by the rumen microbes. The microbes incorporate these short peptides and ammonia into microbial protein. Microbial protein contributes significantly to meeting the animal's amino acid needs for protein synthesis.

Beef cows and growing cattle have lower dietary protein needs than lactating dairy cows. When planted as a pure stand, harvested alfalfa can be offered as a protein supplement to other forages and feedstuffs offered to the beef herd. However, when fed to animals with low protein needs as the sole diet ingredient, the high protein level of alfalfa combined with the high rumen digestibility can reduce the protein utilization efficiency. Excess protein consumed is excreted and not retained by the animal. Interseeding alfalfa with grasses will decrease total protein intake and more closely align with beef cattle protein requirements, thus improving nitrogen efficiency.

Alfalfa is a superior forage for protein yield per acre. An acre of alfalfa yielding five tons of dry matter with 19 percent crude protein would produce 1,800 pounds of crude protein.

Alfalfa in the bloom stage.

Alfalfa in the pre-bud (L) and bloom stages. Harvesting alfalfa at the bud stage will result in higher leaf to stem ratios, and higher concentrations of crude protein and energy.

This protein yield is equivalent to that supplied by three tons of dried distillers grains and nearly two tons of soybean meal. Alfalfa can be a reliable source of home-grown protein for the beef herd.

Alfalfa as an Energy Source

Not only does alfalfa provide protein to ruminants, but alfalfa can also contribute significant dietary energy. When alfalfa is managed to maintain a high leaf to stem ratio, few forages surpass alfalfa's feeding value. The low level of fiber and lignin in the leaves allows them to be quickly digested in the rumen by the microbes.

Plant cells have a cell wall, predominately comprised of cellulose, hemi-cellulose and lignin. Lignin is found in the cell wall of plants providing a crosslinking of cells, increasing the plants' ability to grow upright and resist lodging. The role of lignin is often compared to that of rebar used in concrete to provide additional strength. Lignin is poorly digested by ruminants, therefore lowering the energy value. As plants mature, lignin concentrations increase, and forage digestibility decreases. As stated above, grazing or harvesting alfalfa at early stages of maturity will result in lower lignin concentrations and greater digestibility. Recent technological advances in breeding alfalfa varieties have led to low lignin varieties. As the name implies, these genetically modified

varieties have reduced levels of lignin, resulting in even greater energy yield from the increased digestibility.

Due to the highly digestible leaves and available protein, alfalfa has a high calculated Total Digestible Nutrient (TDN) value. Digestibility of the stem is lower than that of the leaves. Therefore, managers desiring the greatest digestibility and energy contribution from alfalfa should harvest or graze alfalfa at a bud stage, when the leaf to stem ratio is high. Additionally, when conserving alfalfa for stored feed, it is essential to minimize leaf shatter and loss during harvest to maximize feeding value. Conversely, when high energy is not required alfalfa can be harvested at flowering growth stages.

Alfalfa where more than 50% of stems are in bloom.

Alfalfa as a Source of Vitamins and Minerals

Alfalfa can provide vitamins and minerals in beef cattle diets. However, forage concentrations and availability of these nutrients can vary greatly and are influenced by factors such as stage of maturity, soil conditions, and geographical region. Thus, it is essential to also provide supplemental vitamins and minerals to complement the forage system.

Vitamins. Alfalfa can be a good source of fat-soluble vitamins, which are required nutrients for cattle. Alfalfa hay contains high concentrations of β-carotene, the precursor of vitamin-A. However, vitamin-A concentrations can vary greatly, likely due to differences in growth and harvest conditions. Furthermore, vitamin-A concentrations in alfalfa hay also decrease rapidly during storage. Vitamin-A supports vision and is also involved in growth and adequate immune function in cattle.

Alfalfa is also a good source of alpha-tocopherol or vitamin E. Vitamin E shares a close relationship with the trace mineral selenium, in which selenium works to recycle vitamin E. Together, these two nutrients are required for the prevention of white muscle disease, which can affect calves.

Alfalfa is also a good source of B-vitamins such as riboflavin and niacin. However, rumen microbes are also capable of synthesizing these vitamins to meet the requirements of cattle.

Minerals. Concentrations of many essential minerals such as calcium, magnesium, potassium, sulfur, iron, copper, cobalt, manganese, zinc, and selenium in alfalfa meet or exceed the requirements for beef cattle. However, a significant proportion of Ca, P, Cu, Zn, and Fe is found in the neutral detergent fiber (NDF) fraction of alfalfa. Although concentrations are adequate, the mineral may not always be bioavailable to cattle. Due to the unknown bioavailability of minerals in forages and other feedstuffs, it is important to always provide an adequate mineral supplement to prevent deficiencies of one or more minerals.

Harvest Management of Alfalfa

Livestock producers raising alfalfa have several options for utilizing the forage as part of the feeding program. Historically, alfalfa has been conserved as hay or haylage. However, the increase in intensive rotational grazing and the development of more grazing tolerant varieties has increased the opportunity to incorporate alfalfa into grazing systems. More detailed information on grazing alfalfa will be discussed later in this publication.

Compared to grazing, harvesting alfalfa as hay or haylage allows all the forage to be harvested at the same stage of maturity and can reduce harvest losses. The first cutting should occur by the time alfalfa has reached late bud to avoid lodging. Subsequent cutting should be harvested at the 1/10th bloom stage, when approximately one stem in ten has visible flowers. Observe stands carefully to determine the actual stage of maturity as the first flowers may not appear at the top but at lower positions along the stem. Allowing alfalfa to increase in maturity results in greater fiber and lignin concentrations and reduced cell wall digestibility. Under ideal growing conditions, alfalfa can often be harvested every 4-5 weeks following the first cutting, resulting in 3-5 cuttings annually, depending on latitude and climatic conditions. Longer periods of growth between cuttings can increase stand longevity and yield, and the resulting lower quality is usually adequate for beef cow maintenance.

It is important to minimizing aggressive handling when harvesting alfalfa. This helps to avoid leaf shatter and maintains quality in the stored forage. Once harvested, maintain forage quality by storing hay under cover and off

Using wide raking equipment like this tandem bar rake will help to minimize wheel traffic across hayfields.

the ground. Baleage should be inspected periodically for damage to the silage film and any holes patched immediately with a UV-stabilized tape designed for silage film.

Alfalfa persistence and productivity requires timely management. Fields should be scouted for pests such as insects and weeds to avoid quality and yield losses. Maintaining soil fertility by replacing nutrients removed from hay production is also vital to stand persistence and productivity. Alfalfa does not require nitrogen fertilizer; however, significant amounts of potassium, phosphorus and other nutrients are removed with hay and haylage production and therefore must be replenished. Be certain to consult your local extension agent or agronomist on requirements for sulfur, boron and molybdenum or other nutrients that may be deficient in your region.

To maximize yield, minimize wheel traffic from equipment across hay fields, which damages the crown of alfalfa and leads to soil compaction. Alfalfa should be allowed to replenish root reserves before fall dormancy to ensure winter survival. Be certain to consult local recommendations on timing of the last cutting. A good guide is to take the last cutting four to six weeks before the average killing frost (<26°F).

Alfalfa is an excellent source of nutrition for livestock with higher nutritional needs.

Utilizing Alfalfa in Beef Herds

In beef herds, alfalfa is best utilized by animals with higher protein and energy requirements. Animals with higher nutrient needs include adult cows and young females in early lactation, weaned calves, and adult animals with low body condition. Alfalfa can also be utilized to increase the nutritional plane of young nursing calves through creep grazing or providing alfalfa hay in a creep pen. Alfalfa hay can be limit fed to mature animals during the winter to provide additional protein and energy. Table 1 illustrates the nutritional needs of various classes of beef cattle and the potential supply of nutrients from alfalfa.

When allocating alfalfa to the herd, match the forage quality to the class of animal to best meet their nutritional needs. Lower quality alfalfa should be offered as a supplement to dry, mid-gestational cows with adequate body condition as they have the lowest nutrient requirements. Feeding alfalfa at ¼ to ⅓ of the daily dry matter intake as a source of supplemental protein is often sufficient to balance the nutrient needs for this class of cows. Protein recycling in the ruminant animal also allows for alternate day protein supplementation. Feeding double the daily rates of alfalfa every other day is just as effective as daily supplementation to meet degradable protein requirements.

Developing a creep pen that is large enough to provide calves access to a bale of higher quality alfalfa hay is an effective method for increasing their plane of nutrition. Calves develop a functional rumen near eight weeks of age, at which time forages start to supply increasing amounts of dietary energy and protein. As calves increase

Table 1. Matching nutrient supply from three alfalfa quality levels to the needs of various classes of beef cattle. Pluses and minuses indicate CP requirements are met or are deficient based on the assumed intakes listed in the table. For example, medium quality alfalfa hay meets the CP needs of a 500-700 lb calf at 2 lb/day gain, but not the energy requirements, therefore (+/-).

	Animal Requirement			Alfalfa Quality[1]		
				Low	Medium	High
Class of Cattle	Dry matter intake, lb	Crude protein, lb	TDN, lb	18% CP, 57% TDN	21% CP, 61% TDN	24% CP, 64% TDN
Calf, 500-700 lb, 2 lb/d gain	15.5	1.74	9.8	+/-	+/-	+/+
Calf, 750-1000 lb, 2 lb/d gain	21	2.0	14.1	+/-	+/-	+/-
Calf at finishing 3.5 lb/d gain	26.5	2.6	18.8	+/-	+/-	+/-
Cow, Early lactation	31	3.4	19.7	+/-	+/-	+/+
Cow, Dry mid-gestation	28	1.6	11.0	+/+	+/+	+/+
Cow, Dry late gestation	28	2.0	13.7	+/+	+/+	+/+

[1] Dairy One Forage Composition Library accessed 5/4/2021 with medium = average legume values, low = lower value for normal range and high = upper value for normal range.

in age and body weight, their nutrient requirements increase. Conversely, milk production follows a typical lactation curve and reaches a peak near 6-8 weeks post-partum and continues to decline until weaning. Creep feeding alfalfa can provide energy and protein to support greater performance rates of nursing calves, especially from approximately four months of age to weaning.

Weaned calves managed as feeders can be offered alfalfa to support greater performance. With these animals, energy is often the limiting nutrient (Table 1). Supplementing higher quality alfalfa with a high energy feedstuff such as corn, wheat, oats, barley, or coproduct such as soybean hulls is often needed to produce desired rates of gain.

Often, young females intended for replacement animals are developed differently than other calves from weaning to breeding. These replacement females are often targeted for a rate of gain near 1.5 pounds a day from weaning to breeding to achieve 60-65% of their mature body weight by breeding. Alfalfa can be utilized to develop these replacement females but will often need to be used as a supplement to avoid excessive rates of gain and excessive body condition accumulation. Excessive rates of gain can lead to fat deposition in the birthing canal and udder, increasing the risk of dystocia and reduced milk production. Alfalfa-grass mixed hay may be a more desirable forage option for developing these young females.

Young females with their first and second calves require a slightly higher plane of nutrition than mature cows. These young females are approximately 80% of mature size at first calving and require additional nutrients to support their growth in addition to nutrients needed for lactation and reproduction. Alfalfa can provide increased protein and energy to maintain body condition or replenish lost body tissue to increase reproductive success in these younger females. Higher energy intake is often key to optimizing beef production, and a grass-alfalfa mixture can work well for meeting the nutritional needs of this class of animals.

Dried alfalfa can also be processed into alfalfa cubes, pellets, and meal. Al-

Alfalfa is an excellent forage for weaned calves to support greater performance.


Alfalfa can be processed into cubes which can be a convenient supplement for cattle on low quality diets.

falfa cubes can be used as a supplement for range cattle grazing low protein forages.

Alfalfa pellets and meal can be incorporated into grain mixes as a forage and protein source for growing and finishing diets for beef cattle. For decades, whole shelled corn and alfalfa pellets were utilized to finish lambs in the upper Midwest. This management trickled over into the beef finishing operations of the region with alfalfa hay or haylage providing a source of fiber and protein in growing and finishing diets of beef cattle.

Alfalfa is especially valuable in forage-based finishing systems. One of the challenges to forage-based finishing systems is maintaining adequate rates of gain during the winter months in geographies where year-round grazing is not available. The higher energy and protein concentrations of alfalfa make it a valuable component in the diets of these cattle. Alfalfa can produce increased rates of gain when compared to grass hay.

For cattle raised in a hybrid grain on grass system, incorporating nutrient dense alfalfa into the diet can reduce the amount of supplemental grain needed to achieve targeted rates of gain. Note that different rumen microbial populations digest forages compared to those that ferment starch from grains. When grain supplementation is increased, greater starch intake can negatively impact forage utilization by lowering rumen pH and shifting microbial populations towards starch fermenting bacteria. By supplying a larger portion of the nutrients from forages for forage-finished beef systems, the rumen environment is maintained to favor forage utilization.

Alfalfa complements grain-based finishing diets. The starch from grains is rapidly digested in the rumen by the microflora. These highly fermentable carbohydrate diets require sufficient ruminally available peptides and ammonia for the rumen microbes. Alfalfa's high protein concentration and protein digestibility make alfalfa an ideal forage component in finishing diets. Alfalfa hay is incorporated into finishing diets to stimulate rumination and aid in maintaining rumen health.

Interseeding a cool season grass such as orchardgrass is a good way to extend the life of an alfalfa stand and incorporate alfalfa into the feeding program for beef cattle. Interseeding a grass can increase stand density and reduce weed encroachment.

Interseeding

The greatest opportunity for incorporating alfalfa into the feeding program of beef herds is likely through interseeding alfalfa with a grass species. Interseeding can extend the life of a stand. After 3-4 years of a monoculture stand of alfalfa, the stand can begin to thin and interseeding with a grass can increase yields over the next few years. Planting a grass with alfalfa can provide a better match to the nutrient requirements of beef cattle. Grasses can have greater cell wall digestibility than alfalfa, increasing energy derived from a mixed stand.

Interseeding a grass can increase stand density and reduce weed encroachment. Commonly interseeded grasses include orchardgrass, tall fescue, and bromegrasses depending on the region of the country. A mixed grass-alfalfa stand may lower the risk of soil erosion as well. Mixed stands are better suited for grazing as the risk of rumen bloat is reduced. The addition of grasses to alfalfa stands can also aid in drying the forage when baled in large packages such as round and large square bales. When harvesting mixed stands, forage quality and botanical composition may be slightly different for cuttings. Generally, the first cutting contains a greater proportion of cool-season grass while later cuttings tend to favor alfalfa. Lower cutting heights will shift the botanical composition of subsequent cuttings towards alfalfa; higher cutting heights will favor grass regrowth. Testing each cutting will provide nutrient information to best match the forage to the beef cattle nutrient requirements.

Alfalfa-Bermudagrass Mixtures for Beef Cows. Bermudagrass is a dominant perennial warm-season grass that accounts for more than 20 million acres of pastures and hayfields across the Southern United States. Bermudagrass is a high yielding forage, which can serve as an excellent perennial base for the diets of ruminants in the tropical southern and lower transition zone of the US, but it does have limitations. For example, high yields of bermudagrass require significant applications of commercial nitrogen, and growth is limited to the hot and humid conditions of summer (~4-5 months of the year). Furthermore, the nutritional value of bermudagrass monoculture is moderate at best. Mixed stands of alfalfa-bermudagrass are usually achieved by interseeding the alfalfa into existing stands of grass. The addition of a perennial cool-season legume species such as alfalfa can enhance livestock performance.

Additional benefits of alfalfa-bermudagrass forage systems include increased seasonal yield potential, improved nutritive value, and extended use of a single unit of land compared to a bermudagrass monoculture. In addition, the legume-grass mixture provides diversity in diet and ecosystem, decreases reliance on external commercial nitrogen application, and provides potential grazeable forage for much of the year. Finally, the addition of alfalfa to existing warm-season sods minimizes the risk of loss of production if the legume addition is unsuccessful. Even if the alfalfa establishment fails, the perennial forage base remains, decreasing the chance of a field being unusable for an entire season. With proper sod preparation and overseeding of bermudagrass with alfalfa in the fall, producers can expect to be utilizing the mixture by late spring of the first year after alfalfa has reached a 25% bloom stage.

Alfalfa and bermudagrass have several similarities in establishment and management. Both forages require fertile, well-drained soils and will not survive in areas of excessive wetness. Both are susceptible to insect pressures that must be monitored and controlled for the greatest stand performance.

Interestingly, soil fertility requirements are similar for alfalfa and bermudagrass with two main exceptions. The pH requirement for bermudagrass is 5.8-6.4, but it is essential to maintain a pH of 6.5 to 7.00 with alfalfa. Although bermudagrass normally has high N requirements, no supplemental nitrogen is recommended for alfalfa-bermudagrass stands if there is at least 30% legume present (on a dryweight basis). Thus, the combination of alfalfa and bermudagrass is a viable option for forage and livestock producers.

Alfalfa-bermudagrass mixtures can be effectively managed as either a stored forage option (i.e. hay or baleage) or in a managed grazing system (when utilizing dual-use hay and grazing alfalfa varieties). While pure alfalfa stands will provide the highest quality forage necessary for top dairy production, alfalfa-bermudagrass mixtures can be well suited for beef producers. Alfalfa-bermudagrass mixtures will provide adequate quality to improve forage intake, dietary nutritional value, and animal performance while decreasing outside feed supplementation. Adding alfalfa to bermudagrass will improve the protein and energy content of the sward, extend the grazing season and provide the high-quality forage needed to meet or exceed animal needs in beef production systems.

Adding alfalfa to bermudagrass pastures will increase forage quality and extend the grazing sseason over grass alone. *Photo: Jennifer J. Tucker, University of Georgia*

Table 2. Average forage quality (%) of alfalfa-bermudagrass mixtures

Item	CP	NDF	ADF	TDN	IVDMD
(%)	18.6	46.5	30.3	66.1	78.5

*5 year average harvested as baleage at UGA-Tifton Campus

While the addition of alfalfa to bermudagrass provides increased quality across the growing season, spring and fall cuttings consistently supply the highest nutrition because they contain a higher proportion of legume. Alfalfa grows best in the early spring and fall with reduced production during the summer months. Alternatively, the bermudagrass grows better during the hot summer months and provides greater stand contribution in July and August. Timely removal of the first harvest as stored forage is important with alfalfa-bermudagrass mixtures since excess alfalfa growth will reduce the vigor and stand of bermudagrass through competition and shading.

Alternatively, grazing alfalfa-bermudagrass mixtures is a viable option when properly managed using a rotational grazing system or creep grazing scenario. With proper rotation and rest, these mixtures have the potential to provide grazeable forage from spring through fall. As with pure stands, do not cut or graze alfalfa-bermudagrass mixtures in the four to six weeks preceding the date of the usual first killing frost.

For more information about alfalfa-bermudagrass systems including establishment and management refer to the "Alfalfa-Bermudagrass Management Guide" at www.alfalfa.org.

Breeding and Selection of Alfalfa

Alfalfa breeding has brought forth new varieties over the last few decades. Plant breeders have developed varieties with resistance to multiple diseases, insects and nematodes. Genetic modification has resulted in varieties with resistance to glyphosate and reduced lignin concentration. Field and pasture

Selection for deep-set crowns, prolific crown budding and the ability to maintain carbohydrate root reserves during grazing have produced alfalfa varieties with tolerance to wheel traffic and overgrazing.

Grazing alfalfa is a viable option to increase beef production per acre.

selection programs have improved tolerance to wheel traffic and overgrazing by producing varieties with deep-set crowns, prolific crown budding and the ability to maintain carbohydrate root reserves during grazing.

Selection efforts have also resulted in multifoliate varieties with greater than three leaves and an improved leaf to stem ratio, which generally increases digestibility and nutrient content. Breeding and selection programs continue to provide growers with more options. Reviewing university and other forage variety trials is important to select the best varieties to meet desired management and production goals. Also, go to www.alfalfa.org and download the latest edition of the "Alfalfa Variety Ratings" publication, which includes a listing of all currently available varieties in North America, disease and insect resistance ratings, and their winter survival and fall dormancy scores.

Grazing Alfalfa

In addition to hay, alfalfa can be a source of high quality pasture for beef cows. The advent of grazing tolerant varieties has increased producer acceptance of alfalfa as a pasture crop. Alfalfa pastures perform best under rotational grazing that allows a 30 day rest period between defoliations.

Summer Grazing. During periods of extreme heat and reduced precipitation, alfalfa growth is limited and hay yields suffer. Often, plants are allowed to mature waiting for precipitation to support greater yield. However, a combination of decreased production and quality of the hay crop leads to reduced financial returns when harvesting as hay. Grazing is a viable option to harvest alfalfa during these conditions, and eliminates the equipment and handling expenses of hay harvest. Another advantage of grazing is that much of the potassium, phosphorus, and other nutrients are recycled through the urine and feces of grazing animals.

Many producers are concerned with bloat while grazing alfalfa, but there are a number of management strategies to reduce the potential for bloat. Use grass-alfalfa mixtures instead of pure alfalfa, especially when livestock are first adapting to grazing alfalfa. Waiting to graze alfalfa until the mid to late bloom stage greatly reduces the risk of bloat, as mature alfalfa contains less rumen degradable protein, which is

Grazing alfalfa during summer is a good way to harvest a light crop without incurring the expense of mechanical operations.

Grazing alfalfa in the fall after root reserves have been replenished is a good way to utilize late-season growth.

A current soil test that is representative of the field is the best way to know how much lime and fertilizer is needed.

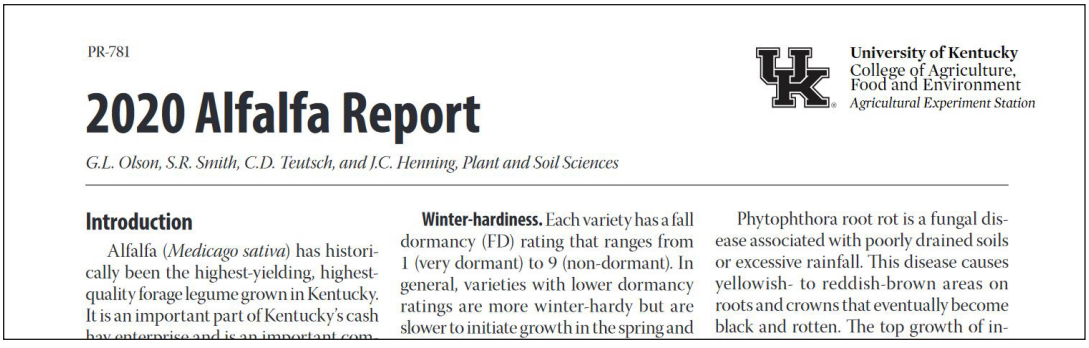
believed to be a factor in frothy bloat. Another effective strategy is using strip or intensive rotational grazing with frequent moves and high stocking density. Under this management, livestock tend to consume the whole plant not just the leaves, increasing fiber intake and lowering bloat risk. Never turn hungry animals into pure alfalfa stands to avoid abrupt changes in the diet. Other management tips to reduce the risk bloat include: do not turn in on alfalfa until later in the day after the dew is gone, consider providing access to good quality grass hay prior to turn-in to limit intake of lush alfalfa, provide an ionphore or poloxalene in a grain supplement, or poloxalene in a mineral block (eg. Bloat Block).

Fall Grazing. Grazing fall regrowth once carbohydrate reserves have been replenished can be an excellent way to utilize alfalfa. Growth slows in fall due to shorter day length. Often, plants will have a high leaf to stem ratio during this time, resulting in premium quality forage. In northern regions, cool nights and light frosts can further hamper growth prior to a killing freeze. In the Midwest and other regions, where air moisture provides dew formation, drying of this forage to hay moisture levels can be quite difficult. Ensiling and grazing are alternative options to hay production during this period. Grazing reduces the harvest expenses with these lower yields.

Removal of the fall top growth is advantageous. Fall harvest removes the stems where pests like alfalfa weevil overwinter. Less aboveground biomass also reduces the formation of heavy thatch which can slow spring growth. However, sufficient top growth should be maintained in more northern climates where the top growth can facilitate the development of a snow blanket, insulating the plants from extremely cold temperatures. Overgrazing during this time of year can also increase the risk of crown damage, especially following precipitation. Therefore, good fall grazing management is key to proper alfalfa persistence and yield the following year. A good rule of thumb is to manage the top growth removal to leave at least 3-4 inches of residual going into winter.

Grazing Throughout the Growing Season. Proper grazing management will enable producers to take advantage of alfalfa's benefits while maintaining stand persistence and reducing animal related disorders In contrast, improper grazing management of alfalfa can lead to a shortened stand life.

Properly grazing alfalfa means utilizing a rotational grazing system. Paddock size should be adjusted so the top growth can be removed in seven days or less. Short grazing periods prevent animals from regrazing the same plants, which is detrimental to alfalfa. Alfalfa pastures should be allowed to rest at least 28 to 35 days between defoliations. Grazing during wet weather should be avoided since alfalfa is very susceptible to soil compaction and trampling. Con-



PR-781

2020 Alfalfa Report

University of Kentucky
College of Agriculture, Food and Environment
Agricultural Experiment Station

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Introduction

Alfalfa (*Medicago sativa*) has historically been the highest-yielding, highest-quality forage legume grown in Kentucky. It is an important part of Kentucky's cash hay enterprise and is an important com-

Winter-hardiness. Each variety has a fall dormancy (FD) rating that ranges from 1 (very dormant) to 9 (non-dormant). In general, varieties with lower dormancy ratings are more winter-hardy but are slower to initiate growth in the spring and

Phytophthora root rot is a fungal disease associated with poorly drained soils or excessive rainfall. This disease causes yellowish- to reddish-brown areas on roots and crowns that eventually become black and rotten. The top growth of in-

Use university variety testing reports from your state or region to select the best variety.

For best results, control weeds like this johnsongrass. The area to the right was sprayed with a labelled herbicide to control the johnsongrass.

A fine, firm seedbed is best for planting alfalfa.

sider grazing tolerant varieties of alfalfa as well to increase persistency. For comprehensive information on how to manage alfalfa under grazing go to the publication "Grazing Alfalfa" at www.alfalfa.org.

Stand Persistence. The number of years that a stand can be maintained is influenced by many factors. A partial list includes variety, soil type and drainage, fertility, cutting management, insects, diseases and weather. Of all the management factors that influence stand persistence, cutting or harvest management can be the most helpful or the most damaging. For best persistence, allow alfalfa to reach the late bud to early bloom stage for the first cutting, allow 28 to 35 days of recovery between cuttings, and do not harvest in the four to six weeks prior to the usual first killing frost. Growth during this fall period produces carbohydrates in the roots which are utilized to provide nutrients to the plant during the winter, increase cold resistance, and to promote spring growth. After a killing frost, alfalfa can be efficiently harvested by grazing or a late silage harvest once the storage of energy in the root system is completed.

Conclusion

Alfalfa is usually thought of as a high quality feed for dairy cattle or a high value hay for the horse market. Alfalfa can also be a high quality forage for beef cattle, either as hay or pasture. Alfalfa will support good weight gain in growing animals and will support mature cows during periods of high nutritional need such as late gestation and early lactation. When mixed with perennial grasses, alfalfa improves overall forage quality and quantity, especially in summer. Beef cattle producers in the U.S. who are not currently using alfalfa should consider incorporating it into their operations.

Agronomic Management Tips for Alfalfa Production in a Beef Cattle Operation

The optimum way to grow and manage alfalfa is very similar, whether harvesting for hay, silage, or grazing. Excellent alfalfa production information is available including "Alfalfa Management Guide" (Undersander et al., 2011) and "Irrigated Alfalfa Management" (Summers and Putnam, 2008). Simply enter these titles into a search engine to download. The following is a brief description of important management considerations:

- Always plant alfalfa on a well-drained soil.
- Use a soil test as a guide for fertilizer applications such as lime, phosphorus (P), potassium (K) and boron (B). It is essential that the pH is 6.5 – 7.0 (not over 7.5) for optimal production. In certain regions of the country, especially those with low organic matter soils, regular tissue testing is important to determine if deficiencies exist for sulfur (S) and molybdenum (Mo).
- Use seed of an improved variety that is climatically adapted, high-yielding, disease and insect-resistant for your region. Use university variety testing reports from your state or region to choose the best variety.
- Most alfalfa seed comes pre-inoculated with the correct strain of rhizobia bacteria to insure N fixation. Make sure to inoculate raw seed or when planting pre-inoculated seed that is past the inoculum expiration date.
- Control broadleaf and grassy weeds during establishment with recommended pre-emergent or post-emergence herbicides. Clipping stands for weed management during the first growing season may be essential, especially for organic producers. Grazing during the establishment period may be feasible to control weeds, but must be done carefully to prevent seedling injury. Using Roundup Ready® alfalfa allows for fairly simple yet comprehensive weed control. Producers may control problem weeds by beginning with pure stands of Roundup Ready® alfalfa and adding desired cool season grasses at the end of the first or second growing season.
- Sow into a firm seedbed with the proper seeding depth at a time of year which allows for optimal germination. Plant no deeper than ¼ inch in heavy soil or ½ inch in light soil. Consult alfalfa management guides or state extension recommendations for specific information relevant to your region.
- No-till seeding works well with alfalfa as long as depth is adjusted to ¼ to ½ inch. Use a no-till drill when seeding into small grain or soybean stubble, but when seeding after corn it is usually best bale off the corn residue or disk and cultipack the field. Seeding into killed sod is an increasingly popular option, as long as there is not excessive residue and seeding depth is properly adjusted.
- Soil test on a yearly basis. Once soil fertility is at an optimal level, testing can be reduced to every other year with alfalfa and alfalfa/grass pastures since most nutrients are recycled through manure and urine when grazing.

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