

FORAGES FOR FEEDING BEEF CATTLE



A profitable cattle operation will be strongly dependent upon a well-planned pasture and forage program. Forages provide about 80 to 90 percent of the required beef cattle nutrients. In cow-calf production, forages often meet all the requirements of the beef cow and her calf.

A forage program may include pasture, hay, silage, crop residues or any combination of these. The most economical forages are usually those that are grazed. By combining plant species which grow at different seasons and on different soils, grazing can supply the forage needs of animals for 180 to 300 days of the year depending on the area of the state. At other times, grazing must be supplemented with hay, silage or deferred grazing.

Components of a Forage System

Potential differences in quality exist among the various types of forages. In addition, differences occur from fertilization practices and the stage of maturity at harvest. The following classifications give a general concept of the quality aspects of Arkansas forage crops.

High-Energy Crops

Corn and grain sorghum silages are usually considered high-energy forages. They are high in total digestible nutrients and are usually too expensive to use for the beef cow. They are more commonly used in backgrounding or finishing rations for steers and heifers.

Intermediate-Energy Crops

This group includes the small grains, ryegrass, clovers, alfalfa, millet, sudangrass and hybrids. These forages are very high quality and are especially high in protein at young stages of growth; but because of their high moisture content, these forages may require supplemental grain feeding to supply necessary energy needs for young cattle. The quality of these forages is actually too good to be economically used in feeding dry beef cows except on a limited basis to help meet protein requirements.

Low-Energy Crops

All perennial grasses such as fescue, orchardgrass, bermudagrass, bahia, dallis and native grasses are relatively low in energy. Protein requirements for the cow can be met with these

forages if utilized at immature stages of growth, but TDN is often too low for high-producing animals such as stocker calves. These grasses are widely used for the beef cow herd. They require the least intensive management for persistent stands and may be grown on land not suitable to row crops or high-producing forages.

Selecting Pasture Mixtures

No single forage species will provide much more than six months of grazing; but by recognizing the growth habit of each species, mixtures can be selected to meet cattle needs for 12 months.

The yield and quality of the forage produced each season of the year depends on (1) the forage species of plant, (2) soil fertility and liming practices, (3) climate, (4) stage of plant growth at harvest and (5) grazing management. To select the best pasture mixture, you must know the characteristics of adapted plants. Table 13 shows the grasses and legumes best adapted to Arkansas and their characteristic yields.

Tall Fescue – *Tall fescue is a tall-growing perennial bunch grass with broad, coarse basal leaves. It is less palatable than other cool-season grasses but is widely adapted to soil conditions in Arkansas. Tall fescue grows very well on poorly drained soils and is relatively drought tolerant. Fescue furnishes abundant grazing during the late fall and spring. The fall growth can be accumulated for grazing during the winter. It is best used from mid-September through June. Tall fescue forage is of poor quality when mature and tough but is quite acceptable when grown with legumes. Varieties that are free of the endophyte fungus are preferred to older infected ones if the species is to be grown on the best fescue soil and excellent management is to be used. Otherwise, endophyte-infected varieties perform better.*

Nontoxic Endophyte-Infected Tall Fescue – Much of the tall fescue grown in Arkansas is infected with an endophyte fungus. This endophyte fungus grows only inside the plant and does not infect nearby uninfected plants. It does grow into the seed during seed development and is thus spread by movement of the seed into new areas in hay, equipment and manure of grazing animals. The endophyte in the commonly grown fescue variety Kentucky 31 produces toxins which reduce animal performance. Symptoms resulting from these toxins are collectively called "fescue toxicosis" and include poor calf weight gain, reduced cow milk production,

TABLE 13. Season growth patterns and yield estimates for grasses and legumes in Arkansas¹

Grasses and Legumes	Winter Dec.-Jan.-Feb.	Spring Mar.-Apr.-May	Summer Jun.-Jul.-Aug.	Fall Sep.-Oct.-Nov.
Tall fescue, white clover	100-500	2000-4000	1500-3000	1500-3000
Orchardgrass, brome, white clover		2000-5000	1000-2000	1500-2500
Small grain, ryegrass	500-1500	1000-5000	100-500	500-1500
Small grain, ryegrass and crimson clover	500-1500	1500-3500	100-500	500-1500
Small grain, ryegrass, arrowleaf clover, red clover	500-1500	1500-4000	500-1500	500-1000
Bermudagrass, white clover, or red clover		1000-3000	5000-10000	1000-2000
Bahia or dallisgrass, white clover		500-1500	3000-8000	1000-2000
Annual lespedeza		1000-3000		1000-2000
Alfalfa		1000-3000	3000-6000	1000-2000
Sudan grass or millet		2000-5000		1000-3000

¹Estimated forage yields are listed within each 3-month period (lb/A).

lower reproduction rates of breeding animals and lower forage intake. Symptoms from fescue toxicosis are very severe in breeding horses. A major advantage of the endophyte is improved persistence of the grass from increased tolerance to drought, heavy grazing and insects.

Varieties have been developed that are not infected with the endophyte. These fungus-free varieties greatly improve animal performance. However, they are not as persistent as endophyte-infected varieties because of lower tolerance to drought and heavy grazing. Recent research has focused on finding strains of the endophyte that do not produce the toxins but still improve plant persistence. New forage varieties have been developed that are infected with these new “nontoxic” endophytes. Animal performance is similar to that on endophyte-free fescue, but plant persistence is improved.

These new nontoxic fescue varieties are more drought and grazing tolerant but do require more careful management than is needed for toxic fescue. Cattle will graze the nontoxic fescue more closely. Therefore, overgrazing and/or overstocking can happen more frequently on nontoxic fescue. Overgrazing reduces plant vigor and persistence. Reduced plant vigor can lead to weed invasion and thinning of stands. The best management for the nontoxic fescue varieties includes rotational or well-managed grazing, appropriate stocking rates, good fertility and timely pest control.

Orchardgrass – *Orchardgrass is a cool-season, high-quality, perennial bunch grass.* It grows best in well-drained soil and does not tolerate close, continuous grazing as well as fescue. It is best adapted to north Arkansas but may be maintained in south Arkansas for three or more years, if well managed. Orchardgrass works well in mixtures with legumes.

Ryegrass – There are two kinds of ryegrass – annual and perennial. Virtually no perennial ryegrass is grown in Arkansas, primarily because uniform, thick stands are harder to maintain for more than two years. Annual ryegrass is used mainly for winter pastures and early spring grazing. It is the most nutritious high-quality grass available to Arkansas producers. Ryegrass works well in mixtures with small grains or clovers. It may be overseeded into existing bermudagrass pastures.

Small Grains – Rye, wheat and oats are small grains most often used for winter pastures in Arkansas. They furnish high-quality, nutritious forage during late fall, winter and early spring. Rye produces more forage than wheat or oats during the winter but matures earlier in the spring. Wheat extends the grazing season later into spring than rye. Normally oats are used for fall grazing. All of these small grains are suitable for mixing with ryegrass or the annual clovers. Barley and triticale are also occasionally grown in Arkansas. Small grains are often planted in bermudagrass sod.

Bermudagrass – *Bermudagrass is a perennial, warm-season grass that spreads by extensive soil surface runners (stolons) and underground root stocks (rhizomes). It will tolerate close, continuous grazing. Bermuda begins growth late in the spring and goes dormant at the first fall frost. It provides abundant forage during the warm months if moisture is available. Since hybrids are more productive than varieties of common bermudagrass, they are preferred on fields that are deep, fertile and used mainly for hay.*

Dallisgrass – *Dallisgrass is a perennial, warm-season grass which begins growth early in the spring and grows in clumps or bunches. It is noted for its tolerance of wet ground. Few leaves are found on the stems; therefore, it is best suited for grazing purposes. It is a high-quality grass when used for grazing but will not produce as well as bermudagrass. It is best adapted to the southern half of Arkansas. An ergot fungus often infects dallisgrass seedheads and can cause poisoning in livestock.*

Bahiagrass – *Bahiagrass is a deep-rooted, perennial, warm-season grass best adapted to the southern two-thirds of Arkansas. It is noted for its ruggedness and tolerance of drought. Bahia forms a dense sod, and forage quality is often lower than that of bermuda.*

Johnsongrass – *Johnsongrass is a tall, coarse, perennial grass with broad leaves that spread by rhizomes and seed. It is drought resistant and widely adapted to most soils in Arkansas. Johnsongrass will not tolerate close, continuous grazing and is used primarily as a hay crop. When plants are less than 18 inches tall or after plants have been killed by cold weather, the prussic acid content of Johnsongrass may be poisonous to cattle.*

Sudangrass and Sorghum-Sudangrass

Hybrids – *These summer annual grasses produce abundant forage during the hot, droughty season of the year. They are adapted to most soils in Arkansas and respond to high levels of fertilization, especially nitrogen. They are best suited for hay production or rotational grazing. Prussic acid and nitrate poisoning are potential hazards.*

Alfalfa – *Alfalfa is a perennial legume best adapted to well-drained soils. It is best utilized as hay, or it may be rotationally grazed. Alfalfa furnishes abundant forage in the spring and summer with good fertilization, lime and management practices.*

White Clover – *White clover is a low-growing, short-lived, perennial legume well suited for grazing in mixture with perennial grasses. It is well adapted and the most widely used pasture legume.*

Red Clover – *Red clover is a short-lived, perennial cool-season legume best utilized as a hay crop or for rotational grazing. It is an ideal forage species for growing in mixtures with cool-season grasses or winter annuals. It makes more early season growth than white clover. It also grows more in the warm, dryer months.*

Crimson Clover – *Crimson clover is a winter annual that grows on well-drained soils. It is best used in mixtures with winter annual grasses or seeded on dormant bermudagrass sod. Its very early spring growth matches well with small grains.*

Arrowleaf Clover – *Arrowleaf clover is adapted throughout the state but does best in the southern two-thirds. It is a cool-season winter annual. Arrowleaf is most often used for grazing but will make high-quality hay. Quality of arrowleaf clover is high, and it mixes very well with the other winter annual grasses.*

Annual Lespedeza – *Annual lespedeza is a summer annual legume quite useful in pastures in July, August and early September. It is productive under low fertility management and makes an excellent hay or grazing crop.*

Crabgrass – *Crabgrass is an annual warm-season grass. It is often considered a weed but provides good quality pasture. Stocker cattle gains are higher on crabgrass than on bermuda or bahiagrass. Crabgrass can be grown in mixture with winter annuals to provide summer grazing after the winter annual pasture is finished.*

Forage Quality

Forage quality is largely influenced by age of forage at harvesttime and by soil fertility. The amount of hay, pasture or silage an animal eats is primarily controlled by the fiber content of the forage. Fiber is the limiting factor in forage intake and satisfactory animal performance. Forage quality is highest for leafy, vegetative plants.

Almost all forage species grown in Arkansas can be excellent quality, but every species including alfalfa can be very poor quality if allowed to become too mature as shown in Table 14. The differences that exist in crude protein and TDN content in hay are primarily a result of differences in fertilization, weed control or stage of maturity at harvest.

TABLE 14. Crude Protein and TDN Content of Hay Samples Tested at the University of Arkansas Diagnostic Laboratory (1985-2004)

Species (No. Samples)	% Crude Protein		% TDN		Dry Matter %
	Avg.	Range	Avg.	Range	
Alfalfa (370)	18.4	6-33	61	37-78	88
Bahiagrass (234)	9.9	4-21	59	46-77	88
Bermudagrass (3,664)	12.9	1-33	61	40-88	87
Fescue (869)	11.3	4-22	54	42-70	87
Mixed grass (2,724)	11.2	2-24	53	37-83	87
Orchardgrass (145)	13.5	7-23	57	45-67	87
Ryegrass (256)	12.2	3-27	56	36-68	86
Sorghum-sudangrass (276)	11.3	3-20	62	42-83	84

Hay

Pastures can provide the most economical feed supply and should be used during as many months as possible. However, grazing may not be available for a 30- to 90-day period during the winter months, and some feed must be harvested and stored for winter feeding. Hay is the most common form of stored forage for beef cattle.

Good quality hay can be obtained from forage that is cut at the proper stage of maturity and cured properly before baling and storage. The stage of maturity at cutting can alter the nutrient content, digestibility and palatability of high-quality forage. Good processing techniques, such as crimping or conditioning, to speed drying and avoid leaf shatter prior to baling are necessary. This is particularly critical for such legumes as clovers, lespedeza and alfalfa. Rapid drying also limits the chance of weather damage to the forage that reduces hay quality.

Hay can be stored successfully in both conventional small square bales and large, round bales. Due to rather high rainfall in Arkansas, all forages harvested and baled in conventional bales require shelter from the weather. Large, round bales may be stored outside with less reduction in quality and dry matter if packaged and stored correctly. However, to minimize storage losses, all hay should be stored in a barn or under cover.

Forage Feeding Hay Options

Hay can be fed successfully in many ways. It may be spread on the ground or fed in bunks or racks. The major task in properly feeding hay is to limit waste. Hay losses during feeding can be expected with any system and can range from 10 to 30 percent. Losses occur from trampling, leaf shatter, chemical and physical deterioration, fecal contamination, overconsumption and refusal.



FIGURE 15. Net wrapping can reduce losses for bales stored outdoors.



FIGURE 16. Tarps protect round bales from the weather.



The type of bale, amount to be fed and weather conditions influence the best feeding method.

If there is considerable variation in hay quality, more efficient feeding will result by grouping the hay according to quality, grouping the cattle according to nutrient requirements and matching hay quality with animal nutrient needs.

Silage

Using silage for feeding beef cattle in Arkansas is limited largely to backgrounding or finishing programs. Silage is relatively high-energy, high-cost feed that can be used more economically when fed to high-producing animals. It is not widely used for feeding beef cows in Arkansas because their feed requirements can be furnished with lower quality forages at less cost.

Practices necessary to produce high yields and good quality silage are similar to those required for

hay or grain. Silage fits well into a mechanized feeding program. Specialized equipment is essential for harvesting, storing and feeding of silage. Ensiling forages eliminates much of the problem of field loss due to bad weather at harvest. Less field loss due to spoilage and the harvesting procedures enable the preservation of more nutrients per acre than is possible with hay.

Crop Residue

Crop residue is that part of plants that remains in the field after grain is harvested. It is usually low-quality and fibrous but may be used for forage. The residue left after harvesting milo, corn, small grain, soybeans, rice or cotton should not be overlooked as a feed. It serves mainly as an energy source. It can be a very economical feed to fill some of the seasonal voids in pasture availability. If there is any question about residue from herbicide or insecticide use on the crop, check the pesticide label and contact your county Extension agent.

The feeding value of fodders remaining after corn, milo or other grain sorghum production may be quite high. Digestibility of the grain sorghum stalks just after grain harvest may be as high as 60 percent. Often a beef cow's nutrient requirement can be furnished by supplementing grain sorghum residue with protein and minerals. Some other crop residues such as small grain, rice or cotton are of much less value, but with supplementation may still be used as the forage base in some phases of beef cattle production.

Matching Forage with Animal Needs

The nutritional requirements for different classes of cattle can be supplied through forages but only with a well-managed system.

Cows in the first three months of lactation, calves and stocker cattle need high-quality feed. The cows are in a stage of high production, and the calves are growing. These cattle should have access to the best quality forage available. For the cows, low-energy forages such as fescue or bermuda will suffice if grazed closely and mixed with legumes such as clover. Stocker cattle can use closely grazed, immature fescue or bermuda with clover, but good gains will probably require some intermediate-level energy forages such as small grain and ryegrass. Dry cows and cows in late stages of lactation can be used to clean up forage of inferior quality such as mature fescue, bermuda, bahiagrass and crop residues.

In a cow-calf operation, feeding the cow herd is simplified by a limited calving season of 60 to

90 days. This places all cows in or near the same stage of production through the year enabling the proper feed to be supplied. Also, the calving season can be timed to coincide with the season when the greatest amount of high-quality forage is available.

When calves are born throughout the year, the herd is comprised of cows in all stages of production at any given time. Consequently, if cows with the greatest nutrient requirements are furnished their needs, then other cows in the herd are being overfed. If feed is supplied to satisfy the average of the herd or the dry cows in the herd, then cows nursing calves in early stages of lactation are underfed.

Calves can be provided access to higher quality forages while their mothers are restrained on lower quality feed prior to weaning by using a technique called creep grazing. A device built in the fence line or at a gate can be constructed to allow the passage of calves through to high-quality grazing but prevent passage by the cow (see Figure 17). In a paddock or rotational grazing system where electric fence is used, cattle can be given access to creep pastures by simply raising the height of the electric wire.

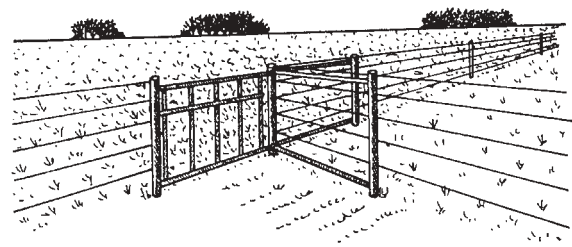
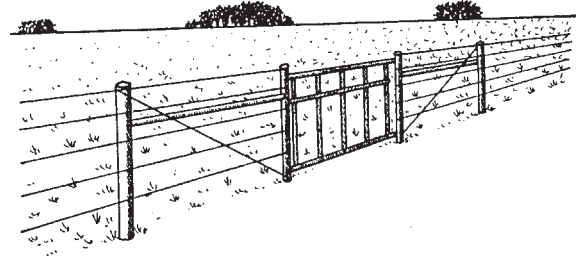


FIGURE 17. Pasture creep gate.

Forages for Stocker or Backgrounding Programs

Most calves are weaned from their mothers at approximately 300 to 500 pounds. Cattle finishing feedlots prefer steers weighing 600 to 800 pounds when placed on feed, and heifers for finishing or breeding should weigh 600 to 700 pounds. Thus 200 to 400 pounds of weight can be added to calves after weaning using feeds that provide economical gain.

Several feeding systems work well in a stocker or backgrounding program using various forages for feed.

Winter Annual Pastures – Since most calves in Arkansas are born in the spring and weaned in the fall, winter pasture is often used to grow calves to a yearling weight. Small grains such as wheat or rye, ryegrass and legumes are high-quality forages that work well in a winter stocker program.

Mixing rye or wheat with ryegrass provides maximum fall and spring grazing. Rye or wheat are most productive in the fall and early spring while ryegrass will extend spring grazing another 3 to 6 weeks. Mixing in clover will improve pasture quality, add an additional month to the spring grazing period and reduce nitrogen fertilizer requirements.

Calves weighing 300 to 400 pounds in the fall can be stocked at a rate of 1.5 animals per acre of pasture in most areas of Arkansas. This stocking rate will often be too heavy during slow growth periods in January and February requiring some supplemental feeding of hay. However, excess pasture will often be available in the spring months to be used by more calves or cut for hay.

Fescue Pasture – Fescue is a permanent winter pasture that has been used successfully to grow or background calves especially in north Arkansas where the climate and terrain are not well suited to annual small-grain pastures. Fescue is a lower quality forage than is provided by small-grain pastures and is best suited for heavier calves with their capacity to consume larger amounts of feed. A good mixture of clover adds greatly to the quality of fescue pasture, but supplemental feeding of grain at a rate of 1/2 to 1 pound per 100 pounds of body weight is usually necessary to achieve gains equivalent to small-grain pasture.

Summer Grazing – Grazing stocker cattle on summer pastures such as bermudagrass mixed with clover works well in the higher altitudes of north and west Arkansas and may be successful in the southern part of the state if internal and external parasites are well controlled. Pasture gains will be limited during hot, humid July and August. Yearling cattle, either short yearlings from late calvings the previous year or lightweight yearlings due to poor winter feed conditions, are best suited for summer grazing. Fall calves, weaned in early summer, usually carry too much condition to do well on summer grass. Summer annuals such as millet and sorghum-sudangrass may be planted in some years to supplement shortages of bermudagrass, bahiagrass or bluestem forage. Crabgrass can also provide acceptable gains for stocker cattle during the summer.

Silage – Silage supplemented with grain and additional protein is a good economical forage for growing calves. Corn will produce more TDN per acre than other crops and is the best silage available. Grain sorghum silage can be used also but has about 90 percent of the feeding value of corn silage. Both corn and grain sorghum require fairly fertile soil. Usually, irrigation is also needed to produce corn silage successfully in Arkansas. Grain sorghum, although lower in feeding value than corn, is more drought resistant and may be more desirable as a silage crop on nonirrigated land.

If silage is used as a forage to background calves, the animals are usually penned and their forage supplemented with grain and protein. Silage can also be used to supplement grazing on winter annual or fescue pasture.

Forage Testing

Efficient utilization of forages depends upon a good knowledge of the nutritive content and animal consumption rate. A forage analysis is the best way to determine nutritive content for feeding purposes. The trained eye may rank different forages for quality on a relative scale but is not accurate enough for proper feeding. An animal needs a specified amount of each nutrient each day.

A forage testing service is provided by the University of Arkansas and by private laboratories to determine crude protein, fiber and moisture in forage and feed samples. The Cooperative Extension Service will use the forage analysis to formulate rations (at no cost to you) for specific classes of animals upon request.

Contact the local county Extension office for more information about forage testing.



FIGURE 18. Sampling a hay bale for forage testing.

PASTURE CALENDAR

JANUARY

- Outline spring pasture program (order fertilizer, seed, herbicides).
- Plan 12-month forage needs (6 tons/cow-calf pair).
- Graze winter annual pastures carefully (avoid trampling, overgrazing – limit graze if forage supply is limited).
- Use deferred fescue pasture.
- Soil test – apply lime on frozen ground.
- Set up cash record account.
- Record cost of seeds, fertilizer, herbicides and labor.
- Purchase clover seed for February-March planting.

FEBRUARY

- Plan weed program – get sprayers ready.
- Fertilize fescue, orchardgrass and small grain.
- To increase percent fescue in bermuda pasture, fertilize early.
- Plant red, white clovers – ALWAYS INOCULATE.
- Lime for spring plantings.
- Kill little barley in bermudagrass with herbicides.
- Use good-quality seed (certified).
- Apply preemergence weed control to dormant alfalfa.
- Record all expenses and labor use.

MARCH

- Fertilize cool-season grasses.
- Delay grazing of fall plantings of fescue, orchardgrass and alfalfa.
- Scatter manure (overseed with clovers first).
- Overseed clovers and other grasses into closely grazed pastures.
- Locate hybrid bermuda sprigs for planting in April-May.
- Control little barley, buttercup and other winter annual weeds.
- Plant alfalfa and use herbicide for weed control.
- Record all expenses.
- Feed a high magnesium mineral to minimize grass tetany.

APRIL

- Establish bermudagrass.
- Fertilize warm-season grasses as they begin to grow.
- Order summer annual grass seeds.
- Control weeds before they reach 4-inch height.
- Close gates on some pastures and cut the excess growth as hay in early May.
- Rotate grazing to favor clovers in mixtures.
- Manage winter annual pasture for complete use.
- Watch for grass tetany symptoms.
- Record all expenses.
- Get hay equipment ready for early May use.
- Plant corn early for best silage production.

MAY

- Control weeds and brush.
- Fertilize warm-season grasses.
- Plant summer annuals (stagger planting dates).
- Establish hybrid bermuda before moisture becomes limiting.
- Harvest cool-season grasses for hay when flowering begins.
- Graze to use young growth. Harvest excess forage for hay.
- Graze winter annuals and fescue before pasturing bermuda.
- Graze for reseeding of arrowleaf and crimson clovers by removing cattle to allow seed set.
- Keep record of tons of hay harvested.

JUNE

- Last chance to control summer weeds and brush.
- Rotate grazing on summer pastures.
- Last chance to plant bermuda sprigs.
- Fertilize warm-season grasses after each cutting or every 4-6 weeks.
- Let winter annual legumes reseed.
- Plant summer annuals and stagger planting dates.
- Harvest quality hay by cutting every 4-6 weeks.
- Grazing management – use bermuda as it grows, and harvest growth that has not been grazed in 5 weeks.
- Consider irrigation potential.
- Record expenses.
- Keep record of harvested hay or seed and forage test.

JULY

- Fertilize warm-season grasses every 4-6 weeks.
- Watch your grazing management. You may have to reduce animals per acre by letting them graze more land.
- Harvest for quality hay (every 4-6 weeks).
- Consider irrigation potential.
- Plan for fall seedings by preparing seedbed.
- Soil test for fall plantings.
- Apply lime for fall plantings.
- Plan for fall fertilization of fescue to be stockpiled.
- Record harvested hay or grazing days.
- Keep accurate expense record.
- Be prepared to harvest corn silage in the dent stage (chop short and pack well).

AUGUST

- Harvest on schedule for quality hay.
- Fertilize warm-season grasses for stockpiled fall grazing.
- Prepare seedbed for plantings.
- Soil test and lime.
- Plant cool-season grasses, clovers and alfalfa on prepared seedbed.
- Fertilize cool-season grasses (N, P, K).
- Pay attention to seed quality and inoculation of legumes.
- Start stockpiling for winter grazing.
- Keep record of harvested hay and expenses.

SEPTEMBER

- This is pasture improvement month.
- Fertilize cool-season grasses for fall and winter grazing.
- Plant cool-season grasses (watch for army-worm).
- Plant winter annuals and legumes.
- Overseed winter annuals and clovers on closely grazed sod for renovation of old pastures.
- Apply lime especially for renovating.
- Grazing management – completely use bermuda before grazing fescue.
- Forage test each hay cutting separately.
- Keep accurate expense record.

OCTOBER

- Last chance for planting fescue, winter annuals and clovers.
- Forage test hay to determine feed needs for winter.
- Grazing management – finish using bermuda-grass, bahiagrass and dallisgrass before grazing fescue.
- Overseed bermuda with clover, ryegrass, small grain.
- Fertilize winter pastures.
- Add lime, especially if you want to renovate next spring.
- Graze frosted sudans, sorghum (be careful of prussic acid).
- Keep accurate expense record.
- Winter weed control in alfalfa.
- Keep cattle off newly frosted sorghums.

NOVEMBER

- Keep cattle off newly frosted sorghums.
- Last chance to overseed clovers.
- Forage test hay.
- Fertilize winter annual grasses.
- Graze bermuda and crop residues before grazing fescue.
- Keep accurate expense record.
- Plow land for spring plantings of alfalfa, bermuda, etc.

DECEMBER

- Forage test hay.
- Control the grazing of winter annuals.
- Start grazing deferred fescue after everything else is used.
- Review pasture and forage programs for next spring.
- Preemerge weed control in alfalfa.
- Compute total net income or total pounds of gain per acre.
- Keep accurate expense record.

Contact the county Extension office for details and printed materials to supplement many of these points.