



Forages

Developing & Using A Forage System

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In order to hold production costs at a manageable level, the nutrient requirements of most kinds and classes of livestock should be met with pasture to the greatest extent possible. No single forage species will meet the nutrient requirements of all grazing livestock at all times of the year. Therefore, livestock producers should develop *forage systems* that optimize livestock performance at the lowest cost.

What is a forage system?

A forage system is a planned forage program designed and implemented by the manager that seeks to use a mixture of both warm- and cool-season forage species to meet the nutrient requirements of grazing animals on a year-round basis. The climate and soils at the production site, the kind and class of livestock, the manager's aversion to risk, and the overall goals of the production system will determine the choice of species.

What are the advantages of a forage system?

In a forage system, careful consideration is given to growing various *adapted* forage species based on their ability to provide forage of adequate nutritive value *at the time* the grazing animals have specific nutrient requirements. This matching of animal nutrient demand and forage nutrient supply reduces input costs while maintaining or improving animal performance. Some advantages of an appropriate forage system include reduced dependence on supplemental feeds and herbicides, the ability to

adopt alternative production enterprises such as winter stocker programs, and an increased potential for profit from the production system.

What kind of forage system might be used for late winter-calving beef cows?

For this example, assume a production enterprise with a late winter-calving cowherd in East Texas. The forage system could begin with a bermudagrass base. Bermudagrass is well adapted to the sandy, acid soils that dominate the East Texas region and are common to upper Coastal Plain soils across much of the southeastern U.S. Annual precipitation levels in East Texas average over 40 inches. With adequate fertilization, bermudagrass can produce high levels of dry matter of adequate nutritive value that allow good stocking rates combined with good animal performance. Appropriate cross-fencing allows for implementation of a flexible grazing system consisting of multiple paddocks. This flexibility, which is critical in developing any forage system, allows certain pastures to be deferred from grazing. Thus, certain pastures can be designated for accumulation (or stockpiling) of bermudagrass growth for grazing during fall and early winter. In other designated pastures, annual ryegrass could be overseeded into the bermudagrass. Therefore, in this example, which uses only bermudagrass and ryegrass (a warm-season perennial and a cool-season annual, respectively), a forage system could be devised as follows:

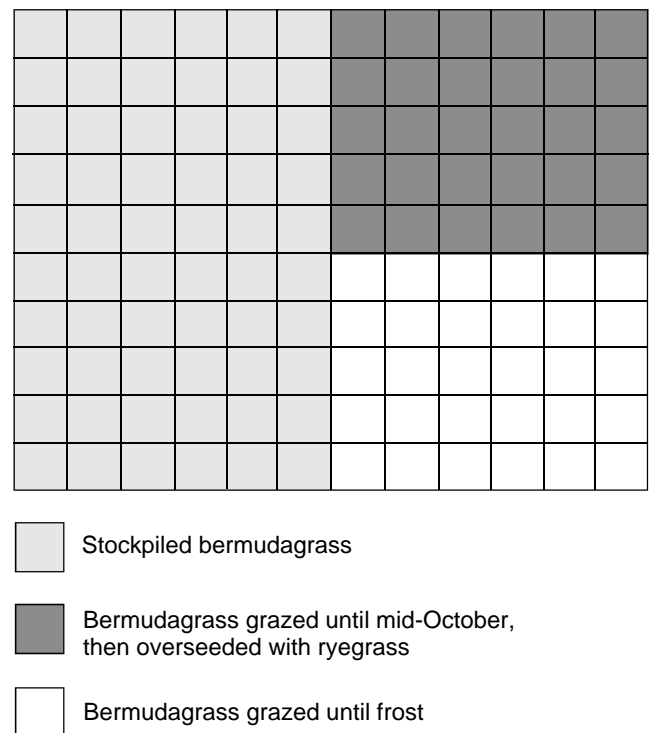
- 1) May through October: Graze growing bermudagrass pastures. During periods of excess forage growth, consider the following options:

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- a. Harvest excess forage mechanically.
 - i. Allow another producer to purchase and harvest excess forage as hay.
 - ii. Harvest excess forage as hay for your own use.
 - b. Use stocker calves to harvest excess forage.
 - i. Purchase stocker calves.
 - ii. Contract graze stocker calves.
- 2) Early to mid-September: Have bermudagrass pastures designated for stockpiling grazed short, rotate cattle to other pastures, fertilize with 60-75 lbs. N/acre. Allow forage to accumulate growth for later grazing.
 - 3) Mid- to late October: Have pastures designated to be planted to ryegrass grazed short. Rotate cattle to other pastures. Lightly disk the pasture and broadcast 25-30 lbs. ryegrass seed. Follow the broadcast operation with a light dragging operation. Allow ryegrass to accumulate growth for grazing beginning in February.
 - 4) Apply 50 lbs. of N/acre to ryegrass about February 1 and again on about March 15. Allocate $\frac{3}{4}$ to 1 acre per cow and allow continuous grazing until the ryegrass is completely utilized.
 - 5) When other bermudagrass pastures are grazed to a final residue height for the season, initiate grazing in the stockpiled bermudagrass pastures. This will usually occur in November. Use an electric wire to allocate 1-2 days worth of forage at a time. Allow animals to consume the top $\frac{2}{3}$ of the forage. Advance the electric wire to allocate more forage. This allocation procedure reduces waste of standing forage in much the same way a hay ring reduces hay waste.
 - 6) When stockpiled forage is completely grazed, consider the following options:
 - a. If annual ryegrass is ready to graze (6-8 inches tall, usually mid- to late February), initiate continuous grazing of ryegrass pastures.
 - b. If annual ryegrass is not ready to graze, consider the following options:
 - i. Feed hay until ryegrass is ready.
 - ii. Consider planting a small amount of small grain pasture to transition cattle from stockpiled bermudagrass to ryegrass.
 - iii. If applicable, consider utilizing a small amount of cool-season perennial grass pasture to transition cattle from stockpiled bermudagrass to ryegrass.

The above scenario illustrates the use of two forage species to provide pasture on a year-round basis during years that adequate precipitation is received. During years that adequate moisture is not received, cattle producers will have to rely on hay to meet animal requirements. Although this is a more costly alternative, during dry years there are generally no other acceptable options. Figure 1 provides an illustration of a forage system of the type described above.

Figure 1. Theoretical 120 acre East Texas ranch forage system involving two species. Stocking rate is estimated at 3 acres per animal unit. Bermudagrass is illustrated being used during both the growing season and the dormant season as a standing hay crop. Ryegrass is used during late winter and spring. Each block represents one acre.



What about a different example involving fall-calving beef cows?

With this second example, continue to assume land ownership in East Texas, but on an operation that has a fall-calving cow herd. With fall-calving cows, nutritional requirements during the fall are increased due to lactation. Since overseeded annual ryegrass primarily produces forage during late winter and spring, an additional forage species may be necessary to provide adequate forage high in nutritive value earlier in the fall-winter season. The inclusion of the small grain rye in combination with the ryegrass will provide earlier and usually more total forage than ryegrass alone. Rye also is well

adapted to the sandy soils in East Texas. Therefore, the forage system would be as follows:

- 1) May through October: Graze growing bermudagrass pastures. During periods of excess forage growth, consider the following options:
 - a. Harvest excess forage mechanically.
 - i. Allow another producer to purchase and harvest excess forage as hay.
 - ii. Harvest excess forage as hay for your own use.
 - b. Use stocker calves to harvest excess forage.
 - i. Purchase stocker calves.
 - ii. Contract graze stocker calves.
- 2) Early to mid-September: Have bermudagrass pastures that are designated for stockpiling grazed short, rotate cattle to other pastures, fertilize with 60-75 lbs. N/acre. Allow forage to accumulate growth for later grazing. Not as much forage will be required as for the late winter calving cow due to rye pasture availability.
- 3) Mid- to late October: Have pastures that are designated to be planted to rye-ryegrass grazed short, rotate cattle to other pastures. Lightly disk the pasture and drill 100 lbs. of rye seed and broadcast 25-30 lbs. of ryegrass seed per acre. Follow planting with a light dragging operation.
- 4) Late October to mid-November: Fertilize winter pasture with 50 lbs. of N/acre.
- 5) When other bermudagrass pastures are grazed to a final residue height for the season and stockpiled bermudagrass is utilized, initiate grazing of winter pasture. This will usually be late December to early January. Allow cows to limit graze the winter pasture about two hours per day. Provide creep access and allow calves unlimited use of the winter pasture. Cows spend the rest of the time on dormant bermudagrass. Some hay may be fed as needed. Using this grazing procedure, one acre of forage will provide grazing for three cow-calf pairs.
- 6) Apply an additional 50 lbs. N/acre to winter pasture on about December 15.
- 7) On February 1 and March 15, make additional 50-lbs. N/acre applications to winter pasture. An additional 50 lbs. of N/acre may be applied on May 1. This will enable ryegrass to remain vegetative longer and provide the initial N fertilization for the bermudagrass.

Depending on whether the production system involves late winter or fall calving cow herds, the forage systems described above can result in lower winter feeding costs with adequate to good animal performance compared with traditional hay only or hay + supplement strategies.

What about using a legume in the forage system?

To this point only grass species have been considered as a component to the forage system. Many producers, however, have learned that inclusion of an adapted forage legume can provide an additional benefit that grasses cannot: the contribution of nitrogen to the system that can reduce, or in some instances, eliminate the need for nitrogen fertilizer. In East Texas, adapted clovers (such as crimson, arrowleaf, white, or ball clover) or hairy vetch may provide 100 lbs. N/acre per year to the forage system. Also, given the fact that various legumes have different distributions of growth, they provide another way that a producer can influence the quantity and nutritive value of pasture forage available at different times. Using clover to provide nitrogen to the forage system has a higher degree of risk associated with it than simply purchasing fertilizer. Stocking rates may also be somewhat reduced (20-25% at Overton). The overall cost of production, however, can be dramatically reduced, thus making the use of forage legumes an economically viable choice when determining what species should be included in the forage system.

What about another example involving rangeland cow-calf production?

Much of Texas west of the IH-35 corridor is dominated by rangelands. Beef production in these areas depends primarily on native forages. Many of these production systems, however, could benefit from the addition of a small grain and/or ryegrass pasture for winter grazing. Many times there are abandoned crop fields that could be established to winter pasture. Limited grazing of these pastures could serve to reduce the need for crude protein and/or energy supplementation while improving animal performance. Generally, rangelands should be grazed and not used for hay production. Therefore, the addition of a small field of bermudagrass or Old World bluestem for hay production could benefit the rangeland beef producer. An adapted introduced warm-season perennial grass could provide all of the hay required for the enterprise from a smaller production unit, thus minimizing the overall negative impact to the rangeland.

One example of how introduced forages may be beneficial in rangeland cow-calf production comes from the USDA Southern Plains Experimental Range near Woodward, OK. Typical stocking rates for cow-calf production at that location are approximately 20 acres per animal unit year (AUY). With the use of only 1.5 acres of introduced forage (double cropped to warm-season and cool-season annual forage grasses), the rangeland requirement was reduced to only 12 acres per AUY (Sims, 1993). Not only was the land requirement reduced per cow, but net return per acre was almost doubled! (Gillen and Sims, 1998). A little bit of introduced forage can go a long way in rangeland cow-calf production systems when appropriate sites are available.

Summary

Grazing animals should receive most, if not all, of their nutrition from forages that are standing in the field. Any deviation from this strategy can result in reduced profit potential due to the generally higher cost of hay or

reduced animal performance. Hay feeding should be considered a tactical solution to a short-term problem such as drought or ice and/or snow cover days. Supplementation should only be used under specific guidelines involving heifer development, backgrounding stocking cattle, or when forage is in short supply. Development and utilization of a forage system should be a priority goal for all livestock producers.

References

Sims, Phillip L. 1993. Cow weights and reproduction on native rangeland and native rangeland-complementary forage systems. *J. Anim. Sci.* 71:1704-1711.

Gillen, R.L. and P.L. Sims. 1998. Complementary forage systems for the Southern Plains. IRM Producer Education Seminars, NCBA Annual Meeting, Denver, CO.

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