Bermudagrass for Grazing or Hay

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Bermudagrass is a valuable forage for many livestock operations because the species offers a wide range of management options. Within its area of adaptation, bermudagrass is hardy enough to survive with little care, but it can respond quickly to more intensive management. Bermudagrass produces extensive root systems and is somewhat drought tolerant. Bermudagrass also responds well to nitrogen fertilization and produces an abundant amount of dry matter for either grazing or hay production when soil moisture is adequate.

Animal performance can be good with proper grazing management and careful attention to hay production practices. Management schemes will depend on livestock prices, input costs, and the goals of the producer. Producers should bear in mind that bermudagrass nutritive value is seasonal. During the first 4 to 6 weeks of growth, nutritive value is high and stocker gains in excess of two pounds per day are possible. There is a sharp reduction in forage nutritive value, however, during midsummer and livestock performance declines accordingly.

Establishment

Bermudagrass will grow under a wide range of soil conditions, but it is best adapted to well-drained sites. Bermudagrass is less sensitive to soil pH than many forage species but typically responds to lime applications when soil pH falls below 5.0.

A soil sample should be obtained for analysis before establishment time. Bermudagrass is typically planted in spring or early summer; thus, soil samples should be obtained for analysis during late winter or early spring. Lime is slow to affect soil pH and should be applied well before planting. Adequate nitrogen, phosphorus, and potassium should be applied just prior to planting bermudagrass and should be incorporated into the soil if at all possible. Potassium and phosphorus applications are most effective if incorporated into the soil during the seedbed preparation.

Bermudagrass establishment is most successful when a firm, moist, well-prepared seedbed is used. Rolling will ensure good soil contact with seed or sprigs and enhance soil moisture conditions during dry weather.

Bermudagrass may be established either by planting seed or sprigs (stolons and/or rhizomes). Seeded varieties of bermudagrass are easily established, and one variety, Guymon, is cold hardy. Vegetatively established varieties such as Midland, Tifton 44, Hardie, and Greenfield have varying degrees of cold hardiness and length of time required for coverage following establishment. Purchase and plant the highest quality seed or sprigs that you can and pay particular attention to the variety. Some varieties, such as Coastal, are only adapted to extreme southern Oklahoma. Sprigs should be moist, fresh, and of the known variety you wish to establish. Seeded varieties are usually planted at 4 to 8 pounds of pure live seed per acre; vegetatively propagated varieties are usually sprigged at rates of 15 to 30 bushels per acre. Higher seed or sprig rates may result in faster stand establishment under some conditions.

Weed control may be important in the successful establishment of bermudagrass. Grazing or mowing bermudagrass during the establishment phase may help control weeds and provide cattle with forage of high nutritive value. In some instances, a pre-emergent herbicide for control of broadleaf weeds may be necessary along with a post-emergent treatment. Check with your county Extension agent for the proper herbicides and application rates required to control weed species in bermudagrass.

Close attention to proper fertility at the establishment stage of bermudagrass will help to reduce the time required for coverage and may allow for limited livestock grazing or hay harvest in the establishment year.

Improving Established Bermudagrass

Old bermudagrass stands may be revitalized with less effort and cost than is required for planting new stands. Therefore, before investing money in re-sprigging or planting alternate forage crops, a producer should first compare the economics of improving their existing resources.

The primary reason for a weak bermudagrass stand is inadequate soil fertility. When properly fertilized, bermudagrass will often crowd out most weed species and maintain a vigorous, healthy stand. Without proper fertility, bermudagrass pastures can become weed infested. This results in a
reduced carrying capacity of the management unit and decreased animal performance.

Depending on the level of weed infestation, the producer must decide whether a simple modification in fertilizer practices will bring about the desired change or whether the use of a herbicide is justified. Many times, producers utilize herbicides when a more economical means of controlling weeds is available. If, however, the weed infestation comprises more than 20% of the existing vegetation, a herbicide treatment may be the most appropriate alternative. When properly used, herbicides are safe, economical, and can reduce weed competition.

Effective herbicidal weed control requires proper identification of target weed species, selection of the most effective herbicide, and treatment at the appropriate time. Regardless of the herbicide used, always follow label directions. For specific information on pasture weed control options and assistance in weed identification, check with your county Extension agent and refer to OSU Extension Facts F-2771, Weed Control in Pastures.

Regardless of whether the producer alters the present fertility program and/or uses a herbicide, old stands of bermudagrass quickly respond to improved management. Producers should be prepared to utilize the extra forage produced either by grazing or removal as a hay crop.

Some producers believe that bermudagrass yields may be increased by soil aeration, and they periodically till pastures to relieve what is often referred to as a “sodbound” or “rootbound” condition. A three-year study at Chickasha, Oklahoma found that disking or chiseling caused severe yield reductions in 4 out of 6 tests and no significant increase of forage was noted.

Forage Budgeting

Forage budgeting is a process used to identify forage requirements and determine specific yield goals. Forage requirements can be determined by estimating livestock dry matter (DM) consumption over a period of time (i.e., number of head x daily DM consumption x number of days = forage required). OSU Extension Facts F-2584, Forage-Budgeting Guidelines, provides information and a worksheet for assistance in developing a pasture plan.

Once released from weed competition, bermudagrass will require adequate fertilizer to achieve good production. Nitrogen is the primary nutrient determining the yield and crude protein content in bermudagrass forage. Application rates are determined by the amount of forage desired (yield goal). Generally, about 50 pounds of nitrogen is required for each ton of forage produced (Table 1). Some nitrogen is available from mineralization of soil organic matter and other natural sources. This explains why there is some forage production even when no nitrogen fertilizer is applied.

Phosphorus (P₂O₅) or potassium (K₂O) deficiencies can also limit forage production even with adequate nitrogen. An annual soil test is necessary to determine whether or not these nutrients are needed.

Stocking rates on bermudagrass can vary widely, depending on the amount of nitrogen fertilizer applied. Ten years of grazing trials in Oklahoma found the season-long carrying capacity of continuously grazed, unfertilized bermudagrass was 0.9 to 1.3 acres per steer. The initial weight of the steers in these trials averaged 500 pounds; therefore, a 1000-pound cow grazing May through September would require approximately 1.8 to 2.6 acres for the season. Other trials have shown that these stocking rates can be more than doubled with the application of 150 pounds of actual nitrogen per acre.

Forage Nutritive Value

Managing bermudagrass requires an understanding of how bermudagrass grows and how forage nutritive value changes throughout the growing season. Nutritive value refers to those nutrients found in forage tissue, such as crude protein. Nutrient levels are affected by plant maturity, environmental factors (rainfall and temperature), and nitrogen fertilization. Since the producer has no control over environmental factors except in the case of irrigation, the two major aspects subject to producer control are fertilizer and stage of maturity.

There is a direct and positive relationship between nitrogen fertilizer and crude protein. The more nitrogen available to the plant, the higher the level of crude protein to a point. There is also a negative correlation between stage of maturity and nutritive value of bermudagrass (Table 2).

As bermudagrass plants mature, there is an increased quantity of slowly degradable cell wall components compared with more rapidly degradable cell contents. In other words, as the plant increases in maturity, there is less nutrition available in each bite for the grazing animal. Specifically, increased maturity results in a reduced level of the

Table 1. Estimated annual bermudagrass yield with and without nitrogen fertilization.

<table>
<thead>
<tr>
<th>Nitrogen rate (lbs/acre)</th>
<th>Tons DM/acre</th>
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<tbody>
<tr>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>50</td>
<td>1.8</td>
</tr>
<tr>
<td>100</td>
<td>2.8</td>
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<tr>
<td>150</td>
<td>3.4</td>
</tr>
<tr>
<td>200</td>
<td>3.9</td>
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</tbody>
</table>

Table 2. Effect of nitrogen fertility and stage of maturity on crude protein level in bermudagrass.

<table>
<thead>
<tr>
<th>Lbs. of N / Acre</th>
<th>Stage of Maturity</th>
<th>Crude Protein (estimated)</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>4 weeks</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>6 weeks</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>8 weeks</td>
<td>5</td>
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<tr>
<td>50</td>
<td>4 weeks</td>
<td>9</td>
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<td></td>
<td>6 weeks</td>
<td>7</td>
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<td>8 weeks</td>
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<tr>
<td>100</td>
<td>4 weeks</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>6 weeks</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>8 weeks</td>
<td>7</td>
</tr>
<tr>
<td>50% clover</td>
<td>4 weeks</td>
<td>13</td>
</tr>
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</table>
relative crude protein percentage of the bermudagrass, and some of the crude protein becomes fiber-bound and unavailable to the grazing animal.

Another negative aspect associated with maturity is increased lignin content. Lignin is an indigestible compound that complexes with hemicellulose to render this otherwise relatively digestible source of energy unavailable to the animal. The bottom line is that forage nutritive value declines with plant maturity.

Table 2 indicates that bermudagrass should be harvested at approximately four-week intervals or less to provide a balance between adequate nutritive value and forage production. When bermudagrass is properly fertilized and managed to provide forage of less than four weeks of age, the forage will generally meet the nutritional needs of most classes of livestock, dairy animals excluded. Rotational grazing and multiple hay harvests are management options that enable producers to control forage maturity. Livestock that graze mature or improperly fertilized bermudagrass may require protein supplementation. This would depend on the class and species of livestock grazing the bermudagrass.

Grazing Management

There are several alternatives for grazing bermudagrass, and a typical pasture program may utilize several different grazing systems. Producers should develop a system that considers the kind and class of livestock and their respective nutrient requirements, soil productivity and soil tests, and the economics of each grazing option. A grazing system should be developed that provides an optimum balance of harvest efficiency, individual animal performance, resource conservation, and most importantly, the economic return from the total enterprise.

Continuous Grazing

Continuous grazing is the type of system utilized by most producers because it requires the least level of managerial input and is generally the least expensive to implement. Although criticized by some as an ineffective system, continuous grazing has several real advantages relative to other grazing systems, the least of which is enhanced animal performance.

Individual animal performance, whether quantified as live-weight gain, calving percentage, or milk production, is typically highest for livestock in continuous grazing systems under moderately stocked conditions. The improved performance is due to a higher degree of diet selectivity by the animal. Other grazing systems that involve cattle movement between pastures do not allow the animal as much freedom in diet selection. Lack of diet selectivity results in reduced animal performance because the animal is forced to consume forage that it might not otherwise select.

The major disadvantage of continuous grazing relates to the variable growth rate of forages. During early spring, bermudagrass experiences a rapid growth rate and requires a relatively heavy stocking rate to achieve the desired harvest efficiency. Later, during the summer when there is less precipitation, forage growth rate declines and necessitates a reduction in animal numbers. To optimize forage utilization under continuous grazing, a variable stocking rate should be used and may be accomplished by adjusting either livestock numbers or pasture size.

The use of inexpensive electric fencing offers producers the opportunity to rapidly adjust pasture size and maintain a proper stocking rate relative to the forage growth rate. By simply opening or closing gates of a multi-paddock operation, producers may accomplish the same result. Excess forage from the ungrazed portion of the pasture should be cut as hay.

If a variable stocking rate that matches varying forage levels is not utilized, pastures will be overstocked at some times and understocked at other times. Overstocking coupled with a poor fertility may lead to an invasion of weeds and undesirable grasses such as broomedge and threawm. Under these circumstances, animal performance declines and the carrying capacity of the pastures is reduced.

Conversely, understocking results in patch (or spot) grazing. Patch grazing occurs when animals repeatedly graze the same area as soon as regrowth is available. Ungrazed areas in the pasture continue to increase in maturity, decline in nutritive value, and become increasingly less palatable. The decline in harvest efficiency results in wasted forage and decreases the profit potential from the livestock operation.

Rotational Grazing

Rotational grazing requires that a single pasture be subdivided in two or more smaller units (paddocks), though not necessarily equal in size. In a rotational grazing system, livestock are moved from one paddock to another for short periods of time. The concentration of livestock results in a temporarily overstocked condition that allows for a high harvest efficiency. This means that more of the available forage in the grazing unit is consumed by the animals and less of the forage is wasted.

Because of the variable growth rate of bermudagrass, grazing time may vary from as few as 1 to 2 days up to 7 to 10 days per paddock, depending on climatic conditions and the growth rate of the forage. Therefore, producers should realize that rotational grazing systems in which livestock are moved on a calendar basis will not achieve optimum results relative to animal performance or forage utilization. During periods of excess bermudagrass production, producers will need to skip one or more pastures in the grazing rotation and cut the skipped units for hay. Removing excess bermudagrass as a hay crop will help control weed species and prevent mowed areas from becoming overly mature with a resultant decline in forage nutritive value.

Some advantages of rotational grazing include the previously mentioned improved harvest efficiency. The improved harvest efficiency associated with rotational grazing may allow for a slight increase (10 to 15%) in livestock numbers compared with a poorly managed continuous grazing system. Besides increased harvest efficiency, rotational grazing allows for better control of livestock. Potential health problems may be observed at an earlier stage since the producer spends more time with the livestock. Rotational grazing early in the spring may also provide a means to control early weed species.

The primary disadvantage of rotational grazing relates to reduced individual animal performance due to a lack of diet selectivity and is most pronounced when animals are grazing warm-season forages. Another disadvantage of rotational grazing involves the added expense for additional fence construction, although this may be somewhat offset by the...
use of low-cost electric fencing. Additional water development may be necessary and the cost of labor involved in routinely moving livestock are additional considerations.

A slight modification of straight rotational grazing known as forward creep grazing can be used to enhance growing animal performance. With this system, the livestock herd is split into two groups—“first and last” or “leader and follower” grazers. The first grazers (leaders) are generally younger animals that have a higher nutrient requirement.

The leader group grazes the paddock ahead of the follower group and obtains forage of the highest nutritive value. When about one-third of the forage has been consumed, the first grazers are rotated to a new paddock. The last grazers (followers) are typically mature animals with lower nutrient requirements. This modification of rotational grazing results in improved growing animal performance when compared with simple rotational grazing.

An important point to remember is that grazing systems generally have less impact on animal performance than do soil fertility or stocking rate. There has not been a grazing system devised that will lessen the negative impacts of a poor soil fertility program or an overstocked pasture.

**Bermudagrass and Stockers**

Summer stocker programs on bermudagrass can present a challenge for producers if the bermudagrass is not carefully managed to maintain the grass in an immature and vegetative stage. Under the best of circumstances, however, a protein supplement may be required for young, growing animals during the middle to late summer period. The following management suggestions are designed to increase the probability of financial success with summer stocker programs on bermudagrass.

**Receiving and Cattle Management**

Cattle should be received and managed according to the recommendations found in the *Oklahoma Beef Cattle Manual*. Failure to practice sound receiving programs can result in decreased profitability due to veterinary expenses for treating sick animals and/or death loss.

**Stocking Rate**

Stocker calves that weigh approximately 400 to 500 lbs. may be placed on pasture about May 1 at an initial stocking rate of 900 to 1,100 lbs. of animal liveweight per acre. This assumes 150 lbs. of actual nitrogen per acre or more and adequate phosphorus and potassium are present. A visual assessment of pasture conditions will dictate whether cattle numbers should be increased or reduced, depending on fertility levels and precipitation.

**Pasture Fertilization**

- **Nitrogen** — Sustained moderate to high production from bermudagrass in Oklahoma usually requires 150 to 225 pounds or more of actual nitrogen per acre per year. Depending on producer goals and soil types, nitrogen fertilizer can be applied in one application or in split applications; the first applied about May 1, the second in June, and the final application in late July or early August.

- **Phosphorus and Potassium** — Applications should be made annually based on soil test recommendations.

- **Lime** — Lime materials should be applied as required based on soil test recommendations. Consider applying lime whenever the pH levels in pastures approach or fall below 5.0.

- **Soil Testing** — Annual soil testing is required to closely monitor soil pH and nutrient availability. Minimally, soil should be tested every three years.

**Pasture Rotation**

- Producers should consider a multi-paddock operation if they are not presently using one. The use of more than one paddock will allow more control over the forage-budgeting process. Electric fences are relatively inexpensive to construct and move if the need arises. As few as 3 or as many as 8 paddocks are generally adequate for most operations.

- For a straight rotational grazing scenario, concentrate cattle into one pasture while allowing other pastures to grow. However, consider the first and last grazer system for enhanced growing animal performance.

- The time animals spend in each pasture will vary, depending on the paddock size, stocking rate, and the forage growing conditions. Producers should pay careful attention to pasture conditions and be ready to move animals when necessary.

- During drought, rotation is less critical and may even be discontinued until forage growth resumes. Fences may need to be removed or gates opened to allow cattle access to all of the grazing units.

**Mowing Pastures**

- Remember, it is always more desirable to graze forage rather than simply mow or shred. Mowing costs money, while grazing theoretically makes money.

- Be prepared to harvest excess forage early in the season. This will be hay of the highest nutritive value. If it is not harvested, it will be wasted.

- Pastures may need mowing in late May or early June. If spot grazing or excess forage becomes evident during the grazing period, pastures should be clipped or baled for hay.

**Stockpiling Bermudagrass**

Stockpiling is the process where forage is allowed to accumulate in the pasture to be grazed at a later time when forage growth is limited. Stockpiled bermudagrass can be utilized in backgrounding operations for incoming livestock, for use in drought management, or as dry standing forage for use during the fall and early winter. Consider feeding growing animals a high protein supplement when using stockpiled bermudagrass after July 1. Stockpiled bermudagrass should be fully utilized prior to late December, since there is little nutritive value remaining after this time. Bermudagrass should not be stockpiled for more than one season and less than one growing season is more desirable. The amount of dry matter contained in one hay cutting would be an appropriate amount to stockpile.
Overseeding Bermudagrass Pastures

Bermudagrass pastures lend themselves well to overseeding with cool-season annual forages. These forages are drilled (sod-seeded) directly into the bermudagrass sod during mid to late September. They can provide excellent fall, winter, and spring grazing and reduce the amount of supplemental feed required to carry livestock through the winter.

Typical cool-season forages that are overseeded into bermudagrass include the cereal grains plus ryegrass or one of the annual clovers, such as arrowleaf or rose clover. The cereal grains are planted at 90 to 100 lbs. of seed per acre in combination with ryegrass at 25 to 30 lbs. per acre. Arrowleaf or rose clover is usually planted at 8 to 12 lbs. of seed per acre.

Prior to establishment, it is critical that bermudagrass be grazed or mowed short. This will reduce the competition for sunlight between the germinating cool-season plants and any accumulated bermudagrass. Likewise, during the spring of the year, ryegrass in particular needs to be grazed or mowed short to prevent a delay in bermudagrass growth. Ryegrass is an aggressive reseeding forage of high nutritive value and, if managed for reseeding, can provide a volunteer stand for many years to come.

Some producers have successfully established warm-season annual forages into bermudagrass to enhance the forage nutritive value of summer stocker programs. Although the selection of suitable forages is small, species such as crabgrass provide excellent summer grazing of higher nutritive value than bermudagrass. Crabgrass may be managed for reseeding for several years, which further reduces the cost of utilizing the annual.

Hay Management

Planning for a predetermined amount of hay is easier if hay production is managed separate from grazing. If used as a means of controlling spot grazing and forage maturity, hay production is a secondary benefit. A disadvantage of harvesting hay from pastures being grazed is predicting the quantity and quality.

Managing hay separately from grazing may not require additional pastures or more acres. If fertilizer and moisture are adequate, bermudagrass growth often exceeds that required by livestock early in the year. Hay production can likely be planned so that some pastures can be hayed early and grazed later when the dry summer months appear.

Split applications of nitrogen may not be necessary if the primary goal is hay production. Under adequate moisture conditions, research at the Eastern Research Station at Haskell, Oklahoma found no difference in bermudagrass dry matter yield between 200 lbs. of actual nitrogen applied in one application or applied in split applications of 100 lbs. each. Based on these results, it appears appropriate to apply up to 200 lbs. of nitrogen in one application in early to mid May.

Split applications would still be advisable for grazed conditions or on rocky or sandy soils where nitrogen is subject to leaching.

To maximize fertilizer efficiency, it is important to utilize improved grasses according to their yield potential. By fertilizing for higher yields per acre, some producers could produce their annual hay requirement from fewer acres. This could save equipment and phosphorus and potassium costs, since less acreage is required to produce an equivalent quantity of hay. When yield goals are increased, only the nitrogen requirement increases—phosphorus and potassium recommendations remain the same.

Summary

The most critical aspects of managing bermudagrass are a proper fertility program, stage of maturity at harvest, and in the case of grazing, the stocking rate. The producer has complete control over these management options and careful attention to all three can result in a profitable bermudagrass-based enterprise.

Decisions regarding fertilizer should generally be to either apply no fertilizer or fertilize for optimum production. In many cases, it may be more economical and efficient to increase the fertilizer rate on fewer acres of better ground. The amount of production may equal or be even higher, but expenses may be reduced. Reasonable nitrogen fertilizer rates appear to be 150 to 200 pounds of actual nitrogen per acre in split applications of 50 lbs. each for grazing or one application for early summer hay production. More nitrogen fertilizer can be utilized when using improved bermudagrass varieties in areas of eastern Oklahoma receiving higher precipitation amounts or when bermudagrass is irrigated.

Ideally, the grazing management should be designed to ensure that bermudagrass is harvested at an optimum stage of maturity based on the kind and class of animals that will consume the forage. For growing animals, the accumulated bermudagrass forage should not exceed three weeks of age. When considering bermudagrass for either a hay harvest or grazing by mature animals, accumulated bermudagrass should not be in excess of 4 to 5 weeks of age. Bermudagrass that is overly mature will have low nutritive value, and protein supplementation will be necessary to meet maintenance and/or growth requirements for certain classes of livestock.

Bermudagrass, where adapted, can play a vital role in livestock production programs. The species has the ability to tolerate a wide range of growing conditions and is more tolerant of close grazing and relatively heavy stocking rates than many other forage grasses.

Bermudagrass also has the ability to produce large quantities of dry matter for either grazing or hay. However, it is not a magic plant. Bermudagrass does require a sound fertility program and other management inputs. Given the management it requires, bermudagrass can provide the warm-season perennial grass base for a profitable production system.
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