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Practical Management and Uses for Summer Pastures

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Forages are the foundations of a successful cow-calf program. In general, the better the ranch's forage system, the greater the resulting animal production. Forage systems provide the QUANTITY and QUALITY of feed needed to meet the cattle's nutritional needs by a sustainable year round program. Adequate climatic conditions, responsive soil types and adapted forage species in the Eastern half of Texas allow for intensive forage production. Successful forage systems require both long and short term management, and are constructed with emphasis on maintaining forage quality as well as quantity in grazed pastures with extra forages harvested as hay or silage.

The key to a successful forage program is balancing the following throughout the year:

- ✗ Quantity and quality of forages available.
- ✗ Seasonal requirements of the cow and calf.
- ✗ Optimal supplemental feeding programs.

The success for matching these three aspects on a day-to-day basis will result in improved animal performance including increased weaning weights.

Animal performance is partly a result of the **intake of digestible nutrients** by the cow and calf. Improved genetics will only be expressed, if nutrition is not limited. Intake of digestible nutrient depends on the **quantity** or availability of the forage and the **quality** or digestible nutrient component of the forage eaten. The problem with forage systems in Texas is that forage quantity and quality vary greatly and are constantly changing in the pasture throughout the season. Management to maintain forage quality, while at the same time providing forage quantity and matching both with animal requirements to minimize or eliminate supplemental feeding, should be the goal of forage production.

Relationship between Quantity, Quality and Animal Intake

Animal intake is usually controlled by physiological responses to changes in energy metabolism in the animal's body — providing the feed is high enough in energy to surpass energy requirements. Most of our grasses, however, are not that high in energy! Therefore on most pastures, physical factors regulate intake of forage. These include gut fill, bulk of the forage, capacity of the animal, ability of the animal to handle undigested materials and time forage is in rumen. Figure 1 indicates how these functions regulate intake. As noticed, low quality forages will limit intake regardless of the quantity of forage present.

Also selectivity by the animal is more important on lower quality forages. Generally animals select leaves over stems and young leaves over older leaves. As a rule of thumb, animals will select a diet that is 2% higher in protein and 9% in TDN than hand clippings when sampling summer pastures.

The lower the quality of the pasture, the more quantity of forage is needed to insure maximum selectivity of high quality forage parts. As quantity on these pastures become low due to heavy stocking or climatic conditions, animals are forced to eat a less digestible diet.

Animal performance will suffer accordingly. This occurs frequently with summer pastures in Texas.

Figure 1. Relationship between quantity and quality of forage and animal intake.

Quantity/ Animal	Quality	Grazing Time	Ruminating Time	Factor Limiting Intake
High	High	Short	Short	Metabolic
High	Low	Long	Long	Gut fill
Low	High	Long	Short	None or fatigue
Low	Low	Long	Long	Fatigue

Maintaining Forage Quantity and Quality in Texas Pastures

Management for high forage quality is especially important on warm season forage plants. The quality of most of the warm season forages just barely meets animal's requirements, or is below requirements. Hence a 1% increase in digestibility in a warm season forage will result in a 5% increase in animal performance.

Plant Species and Variety

Generally legumes are the highest quality forage plants available to producers. Legumes are followed by cool season annual grasses (oats, ryegrass, wheat), cool season perennial grasses (fescue), warm season annual grasses (sorghum-sudangrasses, millets), then warm season perennial grasses (bermuda, bahia, klein). Certain forage varieties have been released for their higher forage quality. For example, Tifton 85 bermuda-grass is generally higher in quality than Coastal bermudagrass. Forages vary greatly in quality and it should be remembered that good quality or low quality forage can be produced from most forage species. The limits will vary, but all varieties fluctuate greatly in quality based on climate, fertility and maturity.

Often new grass varieties have been released because of high quantity (produces more pounds per acre, more hay per acre than other varieties). While this is important, it is even more important to know when production occurs, and what quality the forage contains. Tifton 9 bahiagrass was released and produces more ton per acre during the year than Pensacola bahiagrass, yet quality (energy content) is the same.

Dry matter production from bermudagrass occurs primarily from mid- to late-April through October in Texas. Actual beginning and termination of growth is controlled by temperature (night lows above 60-65°F) and day length (13 plus hours of daylight per day). Bermudagrass production decreases or even stops when conditions are below these thresholds. Growth during the season is a response to nitrogen fertilizer and rainfall with high and low production periods occurring and reoccurring often during the season. The response to the resources of moisture and fertility will depend on the species of summer pasture grass and, to a lesser extent, the variety utilized. The better "the fit" between the grass variety and the soil, climatic and management conditions, the better the sustained production.

Seasonal Varieties

Warm season grasses vary greatly in quality during the growing season. Typically these grasses are highest in quality in the spring, declining till August, then increasing to early October and rapidly declining after a freeze. This pattern can result in low or negative animal gains in mid summer (July through August). Plants also become mature more rapidly during July and August which further decreases quality.

Plant Maturity

As forage plants mature, forage quality decreases. Immature plants are composed of mostly leaves, which are very highly digestible. Nutrients found in young, imma-

ture, leafy forages are in a simple, easily digested form. As the plant matures, vegetative growth gives way to reproductive growth and seed heads appear. More mature plants are thus composed of more stem and older leaves which are not as digestible as the immature forage. Nutrients found in old, mature, stemmy forages are in a complex, less digestible, fiber form. Coastal bermudagrass which is 12 inches tall, for example, can be 58% digestible in the top one-third of the plant, 54% digestible in the middle one-third, and only 50% digestible in the bottom one-third of the plant. In result demonstrations, Coastal hay harvested at six weeks of age had only 50% of the crude protein content and 80% of the energy as hay harvested at four weeks of age. Bermudagrass should be harvested every four to six weeks to optimize the quantity/quality relationships. Harvesting every 21 to 28 days is done if quality is desired; but at a reduced quantity level.

Fertilization

Pastures should be fertilized according to a recent (within 2 to 3 years) soil test recommendation. Proper fertilization will enhance vigorous plant growth. A ton of forage with 10% crude protein contains 50 pounds of nitrogen, 10 pounds of phosphorous, 40 pounds of potassium and varying amounts of the other chemical elements needed for growth (i.e. sulfur, calcium, magnesium, iron, zinc, copper, boron, manganese, molybdenum, and chlorine). Without any of these nutrients a ton of forage will not be produced. Most soils have enough nutrients and nitrogen to produce one to two tons of forage per acre. Improved grasses were selected for higher yield potentials and need additional nutrients (especially nitrogen, phosphorus, and potassium) to produce at an economical level. Increasing the amount of nitrogen fertilizer along with other nutrients has increased production for various summer grass species (Table 1).

Increased nitrogen fertilization will increase the forage's protein percentage; but will not change the energy content.

The amount of fertilizer recommended based on a soil test depends on the nutrient content of the soil, the desire of production level (tons/acre, stocking rate) and whether the pasture will be used for hay, grazing or both.

In grazing systems only a small amount of the nitrogen, phosphorus and potassium contained in the forage that a cow eats is retained in the animal's body (Table 2). Most is recycled by urine and/or feces back to the soil. Thus in grazing systems, once phosphorus and potassium levels are brought up to a high level, they should remain there without extra fertilization. Nitrogen will still be required.

In hay systems, every ton removed from the field will remove 50 pounds nitrogen, 10 pounds phosphorus and 40 pounds potassium. This will eventually have to

Table 1. Average production due to nitrogen fertilization (from research in Texas, Alabama, Georgia, Mississippi and Louisiana).

	TONS OF DRY FORAGE PER ACRE			
Nitrogen/Acre* (Pounds)	**Bahia**	**Common Bermuda**	**Coastal Bermuda**	**Klein 75**
0	1.75	1.00	1.33	1.50
50	1.84	1.20	1.46	2.00
100	2.87	2.20	3.61	---
150	3.33	---	---	3.00
200	3.95	---	4.78	---
300	4.65	---	4.73	3.20
400	---	---	5.80	---
600	---	---	6.50	---

**Phosphorous and potassium levels were adequate.*

Table 2. Fertilizer removed by different forage management alternatives.

	Grazing Selling 500 pounds beef/acre	**Hay Removing 6 tons hay/acre**
	Pounds of nutrient removed per acre	
Nitrogen	18	300
Phosphorus	9	60
Potassium	1	240

be replaced by fertilization. Therefore, the best system is rotational grazing and harvesting hay from the excess growth in the spring and fall.

Weed Control

Weed control in pastures greatly affects forage quantity and quality. Broadleaf and grassy weeds infest many pastures in Texas. Adequate rainfall, large weed seed populations, and a long growing season are conducive for weed growth; but at the expense of forage growth. Many weed species germinate earlier than spring grass greenup, using soil moisture and fertility for rapid growth. Only small amounts of forage are produced in weedy pastures, even with proper fertilization.

Weeds can be controlled or prevented through maintaining a thick, vigorous grass stand, or by using mechanical (shredding or plowing) or chemical methods. In native pastures one pound of grass is produced per each pound of weed controlled. In result demonstration in improved pastures, 2 to 7 pounds of grass was produced for each pound of weed controlled. A study with Dr. Paul Baumann quantified the amount of grass produced in a dry and wet growing season in a weed infested Coastal bermudagrass pasture. The combination of applying a herbicide early (when weeds were 4 to 6 inches tall) and fertilizing according to soil test recommendations resulted in the most forage growth in either year (Table 3). Notice that fertilization without weed control increased weed growth but did little to increase grass production.

Table 3. Forage response to weed control and fertilization methods in a dry (1990) and wet (1991) season.

Treatment	*Yield 1990* *(lbs DM/ac)*	*Yield 1991* *(lbs DM/ac)*
Early herbicide - fertilized	2142	8322
Early herbicide - unfertilized	1330	4988
Late herbicide - fertilized	881	7610
Late herbicide - unfertilized	477	4898
Shredding - fertilized	577	5088
Shredding - unfertilized	341	4787
Fertilizer only, no herbicide	645	2587
Control	377	1385

How to Determine Forage Quality in a Pasture

Since forage quality is important in grazing warm season pastures, hand selecting samples representing the forage that is being selected by the animal should give better results than clipping samples and hand plucked samples. In hay, core sampling of bales is encouraged. For visual evaluation of a pasture for good versus poor quality, evaluate the percent of young leaf material available for animal selection. In general, think like a cow when you look at pastures for forage quality. Look at maturity of the plants, leafiness, density and height of forage, along with the species of forage present.

Other Forage Related Management to Enhance Animal Performance

Calving Season

Shifting calving season is a way to match forage quantity and quality with animal requirements. Calving prior to high forage quality will increase dam's milking ability and growth of the suckling calf. A study of 1,909 records of Simmental-sired calves born to F1 dams from 1975 to 1990 at the Texas Agricultural Experiment Station at Overton showed the effect of fall, winter and spring calving. The pasture system was bermudagrass overseeded with small grains, ryegrass and/or clover.

Table 4. Fifteen year average weaning weights from Simmental-sired calves from different calving season at different stocking rates.

Stocking Rate	Average for all Seasons (lbs.)	Fall	Winter	Spring
		---------- lbs ----------		
Low with creep food		840	751	
Low	652	707	600	512
M	622	668	568	485
H	521	569	492	419

Fall = Sept. 1 to Dec. 15 W = Dec. 16 to Mar. 15 Sp = Mar. 15 to May 31

From: S. J. Gaertner, F. M. Rouquett, Jr., M. J. Florence, J. W. Turner and C. R. Long. TAES Overton Field Day Report, 1992.

It should be noted that without cool season forages in the system, fall calving would not be superior to late winter, early spring calving for re-breeding or increasing weaning weights. Calves born in the hot summer usually results in low weaning weights and cows delaying in re-breeding.

Grazing Systems

A lot of attention has been given to various types of grazing systems in the last few years. While each grazing system has it's place, use of the same grazing system on all forage systems will not always be profitable.

Rotational grazing systems on native rangeland are designed to maintain or increase the presence and vigor of desired plant species. The theory is that as these higher quality desirable plants become more vigorous and predominate in the pasture, livestock performances will increase.

Bermudagrass and bahiagrass do not require periods of rest for stand maintenance and vigor, thus the regimented cattle rotation schedules have not, to date, been an economical alternative to continuously grazed pastures. Rotating bermduagrass pastures hardly ever increase average daily gain. The goal of rotating such pastures is better utilization of forage to increase gain/acre, or to allow for other management practices. When rotating summer pastures remember the effect of maturity on quality. Pastures should be grazed within 21 to 28 days of growth. Hay should be harvested from excess growth.

Stocking Rate

Increasing stocking rates on pastures decreases quantity available for each grazing animal. This will decrease the opportunity of selectivity by the animal, and in stocker animals, decrease the ADG. Gain per acre, however, is increased by heavier stocking as long as some forage quantity is present.

Increasing stocking rates on cow-calf systems decreases the level of forage available to the animal. This restricted forage is more drastic on the performance of the cow as compared to the calf. Milk provides a "buffer mechanism" for the suckling calf which allows for acceptable gains usually at the expense of cow performance under high stocking rates. The effect of cow weight loss of body condition and, hence, re-breeding must be considered.

Higher stocking rates increases gain/acre, but not ADG and weaning weights. Pasture cost per pound of calf gain, however, is lower for higher stocked pastures.

Specialized Management

Creep grazing refers to allowing suckling calves to graze higher quality pastures than those grazed by the dam. Creep gates are placed in the fences of high quality pastures to allow calf grazing. Such pastures may be ryegrass, oats, or clover in the cool seasons, or alfalfa, sorghum or millet in the warm season. Increases of 50 to 100 pounds in weaning weights have been achieved with creep grazing.

First-Last Grazers

Quality of a newly grazed pasture in a rotation system is always higher the first days of grazing than the last days. Maximum selectivity of high quality forage occurs at day 1. As the animals are forced to consume the pasture, lower quality plants and plant parts are eaten. The first grazer concept utilizes this to allow higher quality to be eaten by animals with higher nutrient requirements (young calves, developing heifers, 1st calf heifers). These animals are given first access to the pasture area. After selective grazing occurs, the first grazers are moved to a new pasture, and a second set of grazers are used to consume the lower quality forage left. This concept has been used to increase ADG of stockers on bermudagrass from 1 - 1.2 to 1.5 - 1.6 pounds/day. The concept has also been used with creep grazing, allowing suckling calves access to new pastures via a creep gate prior to the lactating cows.

Texas A&M University Forage Testing Service
Sampling and Mailing Instructions

For this service to be of greatest benefit to you, obtain samples according to the directions below so they will represent the forage sampled.

NOTE: Sample bags and all forms referred to are available from your county agricultural agent.

Hay

It is best to obtain all samples of hay to be tested by using the Penn State or similar type forage sampler. (Check with your county agent for availability of a forage sampler or for information on other sampling methods.)

BALED HAY:

Sample at least 12 bales at random from the same lot of hay by taking core samples from the end of the bales. The core sample's weight varies directly with the tightness of the bale. To obtain the desired quantity of sample, use one-half of full depth. Place the cores in a container and mix thoroughly before filling the sample mailing bag.

LOOSE LONG HAY AND CHOPPED HAY:

Sample to the full depth of the core sampler from at least 12 random locations throughout the mow or stack. With the sampler in vertical position, take the core at the spot where the hay is slightly compressed by the weight of the person operating the sampler. Put the cores in a container and mix thoroughly before filling the sample mailing bag.

PASTURE FORAGE:

Follow instructions in Form D-652, *Procedure for Taking Pasture Forage Samples*.

PELLETED OR WAFERED FORAGE:

Collect samples at random from several locations in the storage area, mix thoroughly and fill sample mailing bag. Break large pellets or wafers before mixing to obtain a representative sample.

Silage

The Penn State or similar type forage sampler may be used to collect samples of silage. Equip the sampler with a stainless steel barrel to prevent corrosion damage when used in silage. Sample at least 12 random locations over all accessible areas of the silage. Collect the core samples in a container and mix thoroughly before filling the sample mailing bag.

Silage sampl es may be obtained by collecting a double handful of silage from at least 12 random locations over all accessible areas of the silage. Mix these thoroughly before the sample mailing bag is filled. When mechanical unloaders are used, collect about ½ bushel of silage as it is fed, mix thoroughly and fill sample bag. **Do not take a sample from the first 3 feet of an upright or from the very end or top of a horizontal silo.**

Mailing

For each sample bag, fill in appropriate information on Form D-1116, *Forage Sample Information Form*, and mail the sample, D-1116, and a check or money order for appropriate fees to:

Extension Forage Testing Laboratory
Soil and Crop Sciences Department
Texas A&M University
College Station, Texas 77843