



THE UNIVERSITY OF GEORGIA  
**COOPERATIVE EXTENSION**  
Colleges of Agricultural and Environmental Sciences & Family and Consumer Sciences

## Cutting Costs, Not Corners:

# Managing Cattle in Tough Times



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# Cutting Costs, Not Corners: Managing Cattle in Tough Times

## Introduction

The beef cattle industry is going through quite a dynamic time. Feed prices are volatile, and the economy has affected the demand for beef and the ability for many producers to borrow money to run their operations. Many producers have chosen to exit the business while others are struggling just to break even. The average production cost of a 500-pound steer in 2008 was \$142/cwt – not a number that can sustain beef production.

While costs have recently abated some, the reality is that long-term prices are expected to increase rather than decrease. As a result, cattlemen need to evaluate their systems and determine where they can cut costs in order to become profitable. At times like these, the key is to evaluate the entire system and look for places to improve efficiency without sacrificing performance. Fundamentally, **there is a difference between cutting costs and cutting corners.**

Cutting costs allows producers to survive during trying times and also teaches valuable lessons that may actually increase profits in future years. Cutting corners, on the other hand, may save some money in the short-run but ultimately will have very detrimental effects. A recent survey (Figure 1) of more than 200 successful producers and production specialists indicated that management priorities focus around five major concepts: Nutrition, pasture management, financial management, health, and genetics.

The hardest part of evaluating a management system is knowing where to start. Before any of these areas can be addressed, there must be an avenue of tracking inputs (i.e., keeping records). Records must be kept in order to make progress in management because if something is not recorded, it cannot be changed. This publication addresses management priorities, including:

1. Understanding and controlling basic input costs in the cow herd
2. Evaluating your herd nutritional program
3. Soil testing and fertilization
4. Improving grazing management to increase forage use efficiency
5. Maintaining a sound herd health program
6. Moving genetics forward

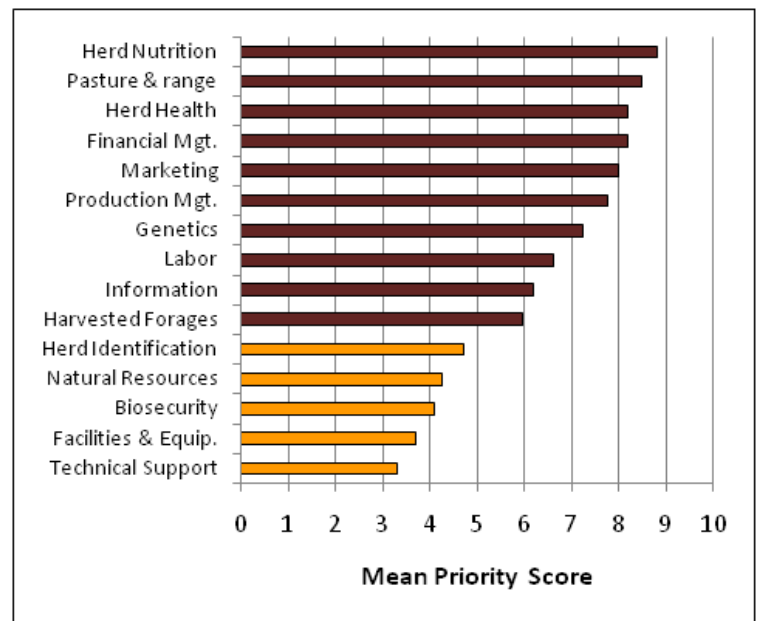


Figure 1. Cow-calf management priorities (Source: T.F. Field, 2008).

# Understanding and Controlling Basic Input Costs in the Cow Herd

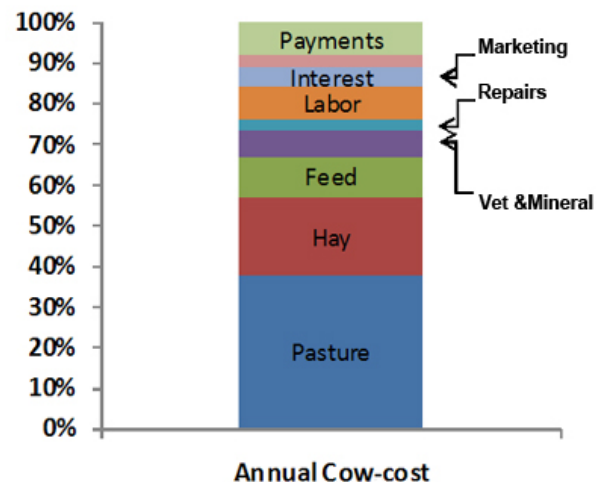
When trying to determine which costs to reduce, producers can improve results when making difficult management choices by following these five steps:

1. Determine the amount of money available to spend.
2. Calculate total cow-calf costs.
3. Divide cow costs into different categories such as pasture, feed, hay production, veterinary care and minerals, labor, etc.
4. Rank these categories in order from highest to lowest.
5. Begin by focusing on the larger numbers first.

Before allocating expenditures, cattlemen must first determine the amount of capital they have to spend. This money will come from one or more of four places; cash/savings, sales of current assets (market livestock, hay, grains, etc.), sales of capital assets (breeding stock, timber, equipment, land), and borrowed capital.

The next two steps can be performed almost simultaneously. Determine the costs of cattle production by category and then sum these for a total cost of cattle production. Budgets for calculating these costs are available at <http://www.secattleadvisor.com>. Categories include pasture, pasture and facilities rent, purchased feed, hay (production, purchases or both), veterinary care and minerals, labor, repairs, operating interest, and fixed costs. Fixed costs will be comprised of annual payments, depreciation plus interest, or some combination of the two<sup>1</sup>, taxes, insurance, and any other associated costs that occur regardless of the level of production. Use the items listed in Figure 2 as a guide.

Once the costs are determined by category they should be ranked in order from largest to smallest. Managers should begin by looking at the larger numbers and focus on reducing these areas first, which will make a larger impact on their costs than by focusing on a few smaller or trivial costs. For instance, in Figure 1, pasture, hay, and feed costs account for almost 70% of total cow costs while vet and mineral costs account for about 8%. By reducing total feeding costs by 10%, cattlemen can save almost as many total dollars as they can by completely eliminating their vet and mineral program. Moreover, the production risks incurred by reducing feed costs by 10% are much lower than eliminating vet and mineral expenses.



**Figure 2.** Ranking of annual cow-costs  
Source: UGA Cow-calf budgets, various years.

<sup>1</sup> Costs for capital items such as breeding stock, purchased land and/or facilities, machinery, etc. can be accounted for by either using the actual principal plus interest payment amount or depreciation plus interest. The main point is that these capital items will need to be replaced at some time and producers should include an appropriate annualized cost in planning for this eventuality.

In reality, none of these steps can be accurately performed without adequate production and financial records. Without good financial records, cattlemen are just guessing at their costs. Not having sufficient production records can lead to retaining unprofitable cows or inferior herd sires.

**WHAT TYPES OF RECORDS DO I NEED?**

The best record-keeping system is the simplest one that meets the management objectives. It really doesn't matter if you use a sophisticated commercial software package or spiral-bound notebook as long as you can make sound decisions with the information you collect.

At a minimum, producers should have financial records that allow them to easily calculate the costs for the categories listed in this section such as pasture (fertilizer, seed, etc.), feed, hay, labor, fuel, repairs, etc., as well as any other costs including rent, payments, real estate taxes, etc.

For production records cattlemen should be able to match calves to dams, as well as know which cows calved. If multiple sires are used, it is also helpful to be able to match sires to calves. Finally, management records that can verify source, age and animal health programs can actually be used to increase the value of the calf crop.

**MAKING ADJUSTMENTS**

The remainder of this publication addresses ways producers can reduce costs and still remain competitive. Two categories likely to emerge that should be addressed are pasture/feed costs and fixed payments. Pasture and feed costs are covered in the nutrition and forages sections. However, one item that can greatly reduce fixed payments is hay production.

For many medium or small-scale producers the ownership costs for hay machinery are so large that it is virtually impossible for them to ever make a profit, especially if the equipment is relatively new. Therefore, cattlemen who currently produce their own hay may want to consider either purchasing it or finding other ways to reduce their equipment costs.

Instead of raising hay, many cattle operations might be more profitable if they either hire someone else to harvest their hay, or purchase hay. Table 1 shows an example of calculating the cost of producing hay for a given number of cows. If similar quality hay can be purchased for less than the cost of production (green shaded cells), it may be more profitable to purchase hay. The complete budget worksheet can be accessed at <http://www.secatleadvisor.com> by clicking on "Decision-aids/Budgets." If hay is purchased, more land is available to graze, possibly reducing total pasture cost. Stockmen who are committed to hay production may consider leasing or renting equipment instead of purchasing it. They may also consider sharing or partnering with other cattlemen on large purchases such as balers or bale wrappers.

**Table 1.** Calculating cost of hay production (assuming six tons per acre production).

	Number of Cows					
	35	50	100	200	300	500
<b>Tons/cow</b>	2	2	2	2	2	2
<b>Acres required</b>	12	17	34	67	100	167
<b>Total VC<sup>a</sup></b>	\$470	\$470	\$470	\$470	\$470	\$470
<b>VC/Ton</b>	\$80	\$80	\$80	\$80	\$80	\$80
<b>FC<sup>a</sup></b>	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750	\$8,750
<b>FC/ton</b>	\$125	\$88	\$44	\$22	\$15	\$9
<b>TC<sup>a</sup></b>	\$14,350	\$16,750	\$24,750	\$40,750	\$56,750	\$88,750
<b>TC/ton</b>	\$205	\$168	\$124	\$102	\$94	\$89
<b>TC/1,000# roll</b>	\$103	\$84	\$62	\$51	\$47	\$45
<b>TC/Cow</b>	\$410	\$336	\$248	\$204	\$188	\$178

<sup>a</sup> VC = variable cost, FC = fixed cost, TC = total cost.



# Evaluating Your Herd Nutritional Program

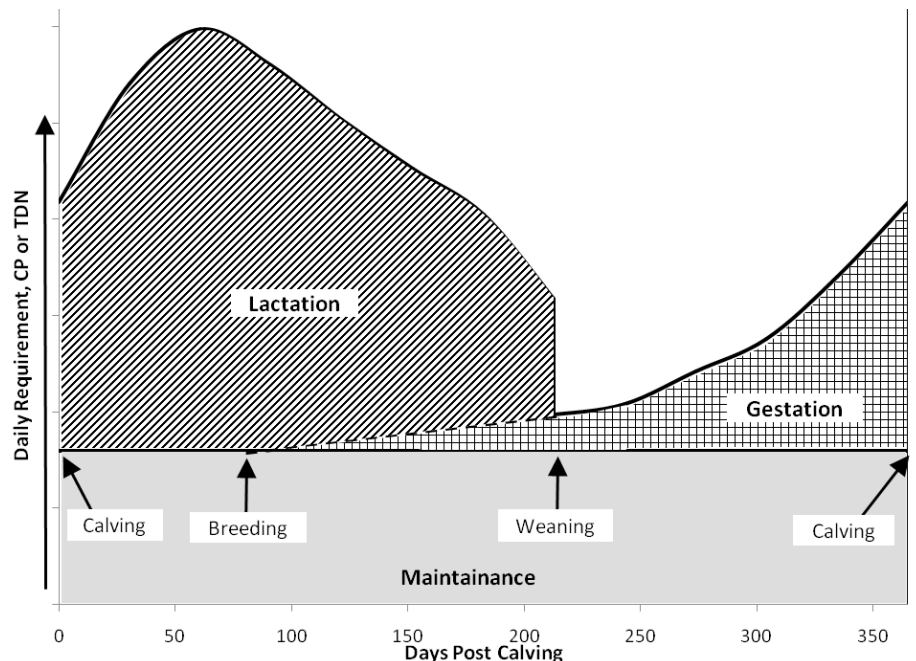
Nutrition represents the largest input cost associated with cattle production, accounting for as much as 70% of the annual carrying cost of a brood cow. As ruminants, cattle are able to utilize a wide range of feedstuffs in addition to forages, so cattlemen have a variety of options when developing a nutritional program. Many producers could improve efficiency in their feed programs by understanding what nutrients they have available in their forages and managing those nutrients so they are allocated properly according to the changing needs of the herd.

## PROGRAM EVALUATION

Evaluating a herd nutritional program and identifying inefficiencies can lead to decreased feed costs. A nutritional program can be evaluated in three basic steps.

- 1. Understand your production system.** The number one goal in beef production is to have a calf per cow every 365 days. If the calving interval extends past this, producers start to lose money quickly. In order to maintain this interval, a cow has approximately 80 days to rebreed after calving. The ability to do this is highly dependent on nutrition. To put this into perspective, a brood cow will prioritize her nutrients in the following order:
  - a. Maintenance
  - b. Growth (heifers)
  - c. Lactation
  - d. Reproduction (cycling).

In other words, the producer's number one priority (a calf every 365 days) is the cow's lowest priority (reproduction). To further complicate the situation, the breeding season comes during the peak of her energy demands due to lactation (Figure 3). Figure 3 illustrates the large fluctuation in nutrient needs of a cow that calves in one year, weans, and calves again the following year. If a herd does not have a controlled breeding season or is not separated by production stage, it becomes quite difficult to manage nutrient needs. However, if these changing nutrient demands are understood, a nutritional program can be tailored to meet these needs.



**Figure 3.** Daily crude protein (CP) and total digestible nutrient (TDN) requirement throughout a 365-d calving interval.

- 2. Understand your forage program.** Under proper management, forages are the cheapest source of nutrients available for cattle producers. Therefore, maximizing the nutrients harvested from forages can tremendously reduce the need for supplements. In many parts of the Southeast, fresh forage can be produced throughout most of the year and can form the backbone of a nutrition program. On average, hay is fed for 120 days during the winter. In some cases forages can provide the majority, if not all, of a herd's needed nutrients.

Handling and understanding the nutrients available from hay may be an obstacle. Typically, a hay producer will get three to four cuttings of hay a year. Inevitably, there will be quality differences between cuttings. If producers will 1) inventory hay by cutting, 2) store it properly to minimize storage losses, and 3) test it by cutting, they will understand the stock and potential range of nutrients available. This will allow them to match nutrients available in hay to the herd's changing nutrient needs.

3. **Develop an economical supplement.** In an ideal situation, supplementation of crude protein and energy will be minimal or unnecessary. However, there will be times when supplementation is needed. The key is to identify feeds that supply the nutrients needed and evaluate those feeds on a price-per-nutrient basis (i.e., correcting for moisture content and nutrient content) using the following equation:

$$\begin{aligned} \text{\$/lb of nutrient} &= \left( \frac{\text{\$/ton}}{\% \text{ dry matter} \times \% \text{ nutrient (CP or TDN)}} \right) \div 2000 \\ \text{Example: } \text{\$/lb of CP from SBM} &= \left( \frac{\$395}{0.90 \times 0.49} \right) \div 2000 \\ &\mathbf{\$/lb \text{ of CP from SBM} = \$0.448} \end{aligned}$$

This allows comparisons across feeds of the actual nutrient in need. The *UGA Feed Cost Analyzer* is available online to help perform these comparisons (<http://www.ugabeef.caes.uga.edu/Tools.html>). Table 2 goes through the exercise of evaluating a few common byproduct feeds compared to corn and soybean meal on a price-per-pound of TDN and CP basis.

**Table 2.** Price per pound of CP and TDN calculated based on current feed prices

Ingredient	\\$/ton	% DM	% CP	% TDN	\\$/lb CP	\\$/lb TDN
Soybean Meal	\$ 380	90	49	87	\$ 0.431	\$ 0.251
Corn	\$ 180	90	10	90	\$ 1.250	\$ 0.111
Corn Gluten Feed	\$ 125	90	25	83	\$ 0.256	\$ 0.077
Distillers Grain	\$ 135	90	28	90	\$ 0.268	\$ 0.083
Soybean Hulls	\$ 115	90	12	77	\$ 0.532	\$ 0.082
Whole Cottonseed	\$ 165	90	23	95	\$ 0.367	\$ 0.096

**Note:** With the volatility of today's market, these prices change on a daily basis. Given these prices, it is logical to supplement with corn gluten feed or distillers grain when protein is limiting, or a blend of one of the former with soyhulls if energy is limiting.

## DEVELOP A NEW PROGRAM

After developing a plan to address a herd's nutritional needs, it is important to look at the three concepts together. In Table 3, 1) a herd is broken down into four stages of production, 2) three sources of hay/pasture have been tested and inventoried, and 3) an economical supplement of corn gluten feed and soyhulls has been identified. This step can often be overwhelming because it requires the balancing of multiple rations. The use of a ration balancing program will make this step much easier. The *UGA Basic Balancer* was developed to perform this task and can be found on the UGA Beef Team Web site (<http://www.ugabeef.caes.uga.edu/Tools.html>). By utilizing this tool, you can tailor a nutrition program that matches nutrients from forage to the needed class of production. The result is that supplementation cost decreased by as much as \$0.80/cow/day, which can tremendously cut costs on a feed bill without cutting corners on nutrition.

**Table 3.** Supplement needed (Corn Gluten Feed:Soyhulls, 50:50) to meet the daily requirements of a 1,200-pound cow using three different qualities of forage as a base.

Stage of Production	CP and TDN Requirement	Poor Forage, 7% CP, 45% TDN	Average Forage, 10% CP, 50% TDN	Excellent Forage, 13% CP, 56% TDN
		----- lb of supplement/head/day -----		
Dry Cow	6% CP, 45% TDN	0	0	0
Late Gestation	9% CP, 56% TDN	9	5.5	0
Early Lactation	11% CP, 60% TDN	13.5	10.5	5
Late Lactation	8.5% CP, 55% TDN	8.5	5	0

# Soil Testing and Fertilization

At current prices, fertilizer costs constitute up to 85% of the total variable costs in pasture production and up to 75% of the variable costs in hay production. It is entirely logical to look for ways to reduce fertilizer costs in forage production. However, if the reduction in fertilizer costs results in reduced yield (i.e., less fertilizer often equals lower yields), then the cost of the forage per ton (or pound) can actually go up! The reason for this can be seen in the following equation for calculating the unit cost of forage production:

$$\text{Cost of Forage ( \$/ton)} = \frac{\text{Total Cost ( \$/Acre)}}{\text{Forage Yield (tons/acre)}}$$

Consider Table 4. Let's assume in this example that the field we are dealing with has a yield potential of 6 tons/acre for hybrid bermudagrass hay. Based on current prices, the average cost of production for hybrid bermudagrass hayfields is approximately \$750/acre (or \$125/ton). If production costs are reduced and yields essentially remain the same, the unit cost (\$/ton) decreases (green cells).

However, it is likely that substantial reductions in forage production costs will come from fertilizer expenditures (because fertilization constitutes such a big part of the total variable costs). Indiscriminant reductions in fertilizer use will likely lead to reductions in yield. This may very well result in an increase in the unit cost (\$/ton) of the forage (red cells). **Thus, it is critical to remember that cutting costs in forage production should be done in a way that has a minimal impact on the forage yield.**

**Table 4.** The unit cost of forage produced under different levels of cost (relative to the current average for hybrid bermudagrass hay) at different levels of forage yield.

Yield (tons/ac)	Cost of Production Compared to Average					
	60%	75%	90%	100%	110%	125%
	---- Unit Cost of the Forage (\$/ton) ----					
8	\$56	\$71	\$85	\$94	\$103	\$118
7	\$64	\$80	\$96	\$107	\$118	\$134
6	\$75	\$94	\$113	\$125*	\$138	\$156
5	\$90	\$113	\$135	\$150	\$165	\$188
4	\$113	\$141	\$169	\$188	\$207	\$235
3	\$150	\$188	\$225	\$250	\$275	\$313

\* The average cost of production for a hybrid bermudagrass hayfield is approximately \$750/acre. If the yield goal is 6 tons/acre, the unit cost of the forage is \$125/ton. Consider the scenario where costs are reduced to 90% of the average production costs. If forage yield decreases from 6 to 5 tons/acre, then the cost per ton actually increased from \$125 to \$135 per ton.

## MANAGEMENT TIPS

So, how is it possible to reduce forage production expenses without compromising yield? The following tips can help you reduce fertilizer expenses or at least make your fertilizer investment more efficient.

- 1. Soil Test and Follow Fertility Recommendations.** Without applying fertilizer and/or lime based on the results of a soil test, it is likely that producers are either 1) not applying enough fertilizer/lime and therefore not maximizing the forage yield, or 2) applying more fertilizer than required to meet yield goals and therefore wasting money. Few other practices in the entire cattle enterprise can improve profitability more than soil testing and following UGA fertility recommendations.
- 2. Do NOT Cut Back on Lime.** Keeping an optimum soil pH will ensure that soil tilth is maintained, root development is encouraged, and (most importantly) the nutrients in the soil are freely available to the plants. If the soil pH drifts much below 6.0, the availability of some nutrients in the soil will decrease and, in some cases, other nutrients can reach toxic levels. The availability of nitrogen (N), phosphorus (P), and potassium (K) is severely reduced as the soil pH declines (Figure 4). This can translate to a major waste of your "fertilizer dollar." Table 5 demonstrates the cost of this inefficiency in an example comparing a soil pH of 5.6 vs. 6.2. Although lime applications should rectify soil pH problems for several years, they usually take 6-12 months to affect a substantial change in soil pH. Major adjustments in soil pH should be made well in advance of the addition of large quantities of fertilizer.
- 3. Focus Your Resources.** Apply fertilizer to pastures or fields where soil test P and K values indicate an economic response to the addition of the fertilizer AND the soil pH is in the optimum range. If the soil pH is inadequate, attempts to raise P and K levels will result in a lack of return on the fertilizer investment. Instead, focus on raising the soil pH value in those fields.



- 4. Avoid Using Standardized Blends.** Standardized blends (e.g., 10-10-10, 17-17-17, etc.) of homogenized (uniform particle size) fertilizer products are commonly sold. Unfortunately, these blends are usually more expensive than custom-mixed fertilizer products that have been tailored to a producer's needs (Table 6). Based on current prices, using a custom-mixed fertilizer can save more than \$100/acre compared to a standardized blend when fertilizing a bermudagrass hay field.

**Table 5.** A comparison of the annual value of decreased fertilizer efficiency in a soil where the pH is 5.6 relative to a soil with a pH of 6.2. This example uses a moderate to low amount of fertilizer and represents the cost of inefficient nutrient use incurred in one year.

Nutrient	Amt. Used Annually (lbs/acre)	Unit Price (\$/lb)	Dec. in Efficiency*	Value of Decrease (\$/acre)
N	200	\$0.60	35%	-\$42
P <sub>2</sub> O <sub>5</sub>	50	\$0.30	50%	-\$ 8
K <sub>2</sub> O	150	\$0.67	10%	-\$10
<b>Total</b>				<b>-\$60</b>

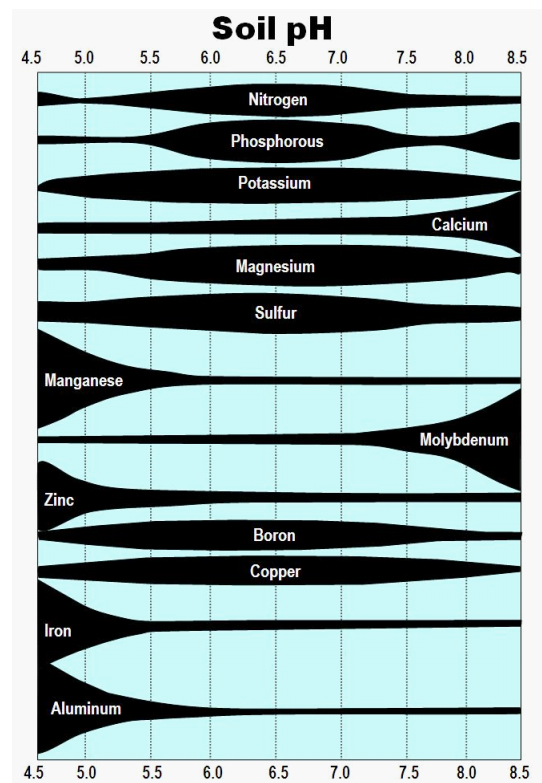
\* Resulting from the lower soil pH.

**Table 6.** A comparison of three common strategies for fertilizing hybrid bermudagrass hayfields.\*

Fertilizer Strategy	Product Used	Amount (lbs/ac)	Product Price (\$/ac)
Standard Blend	17-17-17	1471	\$367.65
<b>Total: \$367.65</b>			
Mixed Fertilizer	Urea (46-0-0)	488	\$85.43
	DAP (18-46-0)	141	\$28.26
	Potash (0-0-60)	375	\$150.00
<b>Total: \$263.69</b>			
Poultry Litter	3-3-2	8000	\$120.00
	Potash (0-0-60)	110	\$44.00
<b>Total: \$164.00</b>			

\* Based on a target fertilizer rate of 250-65-225 (i.e., assumes medium soil test level P & K).

- 5. Use Animal Wastes When Available, but be Strategic.** As noted in Table 6, the use of poultry litter (and supplementing to provide enough K) can substantially reduce fertilization costs. Certainly, poultry litter can be a cost-effective and beneficial fertilizer source. After many years of poultry litter applications, however, nutrients can accumulate to very high levels in these soils. Note from Table 6 that if soil test P and K levels are sufficient and only N is needed, then the total cost of fertilization would be \$85.43/acre (i.e., the cost of urea fertilizer, in this instance). If the poultry litter is produced on the farm, the recommended strategy would be to sell the animal waste and purchase N fertilizer.
- 6. Split Your Nitrogen Applications.** Fertilizer recommendations are given as totals for the season. For some nutrients, the entire amount can be applied with little economic or environmental risk. However, high rates of N applied at the beginning of the growing season can result in unnecessary risk, especially when conditions for leaching, volatilization, late frosts, or drought occur. Split applications of N also reduce the risk of nitrate toxicity. Further, long-term research has shown that yields can be increased by 5-10% and N use efficiency can be as much as 25-30% higher when N fertilizer applications are evenly split among three or four applications (or more) during the season.
- 7. Maintain Good Potassium Levels.** When K is deficient, bermudagrass stand decline is inevitable. Symptoms of stand decline include poor stress tolerance, increased incidence of leafspot diseases, poor vigor, poor winter hardiness, and the death of large, irregularly-shaped patches. When K is readily available, bermudagrass stands are more vigorous, dense, and high yielding.



**Figure 4.** The relationship between soil pH and the relative availability of plant nutrients in mineral soils: The wider the bar, the greater the availability.

# Improving Grazing Management to Increase Forage Use Efficiency

The largest expense for most cattle operations in the Southeast is the cost associated with producing forage. The previous section highlighted the difficulty in reducing costs without causing the forage unit cost to increase. The key to managing these costs is making sure that the operation is using the produced forage as efficiently as possible.

Grazing management is the single most important factor affecting the cost-effectiveness of the forage enterprise. Grazing management will most notably improve efficiency in addition to (among many other advantages) recycling the fertilizer that is applied to the pasture, allowing greater utilization of legume species that may not tolerate continuous grazing, and allowing for an extended grazing season.

## MANAGED GRAZING IMPROVES EFFICIENCY

Take a moment to think about how much of the forage you grow will actually make it into the animal's mouth. Of the total forage that is produced, what percentage do your animals actually use? This percentage is referred to as forage use efficiency.

The first step in getting more out of your forage is to exercise more control over the animal's grazing behavior. If cattle are allowed to freely graze one or two large pastures (i.e., "continuous stocking"), they will select certain areas, avoid other areas, and ultimately create a scenario where relatively little of the forage is actually consumed (Table 7). The key is to ration out the forage. Rotational stocking requires the cattleman to put animals in and take animals out of a pasture in a relatively short amount of time. Simply splitting large pastures into several smaller pastures (or paddocks) and regularly rotating the animals between them can dramatically increase the efficiency of the forage system. Producers who allot daily strips for their cattle (strip or frontal grazing) can increase their efficiency even more, often rivaling our most efficient mechanical harvesting methods.

Because of this increase in efficiency, it is possible to increase the land's stocking rate and carrying capacity. Stocking rate increases of 35-60% have been reported in the scientific literature (Table 8). As a general rule, however, stocking rates should only be increased by 10-25% during the first few years, so as to allow the pastures and forage manager's skills to improve. In the meantime, any excess forage production can be harvested as hay or mowed and returned to the soil.

It is important to note that intensively-managed grazing is unlikely to improve the performance (i.e., gain, lactation, etc.) of individual animals. Forcing the grazing animal to consume forage to a predetermined height eliminates their ability to selectively graze, sometimes reducing individual animal performance (daily gain per head). This is particularly important when animals with high nutrient requirements like stocker cattle or replacement heifers are rotationally grazed on relatively low-quality forages, such as bermudagrass or bahiagrass. Though individual animal performance is reduced, remember that it is the increase in stocking rate that results in higher gain per acre. For producers grazing animals with lower nutrient requirements, like mature cows, this can be a great advantage. In a three-year study conducted in central Georgia, rotational stocking improved cow-calf stocking rates by about 38% and improved calf production per acre by 37% without affecting individual cow or calf performance (Table 9). The higher stocking rates on rotationally-grazed pastures spread input costs across more animal units (i.e., more cow-calf pairs, steers, heifers,

**Table 7.** The range in forage use efficiency of selected grazing and mechanical harvesting methods.

Method	Efficiency*
<b>GRAZING</b>	
Continuous Stocking	30-40%
Slow Rotation (3-4 paddocks)	50-60%
Moderate Rotation (6-8 paddocks)	60-70%
Daily Rotation, Strip Grazing, etc.	70-80%
<b>MECHANICAL</b>	
Hay	30-70%
Silage	60-85%
Green Chop	70-95%

\* Efficiency is defined here as the relative amount of forage production (or potential production) that the animal will actually consume.

**Table 8.** Increase in gain per acre in rotational compared to continuous grazing in studies from various Southern states.

State	% Increase
Arkansas	44
Georgia	37
Oklahoma	35
Virginia	61

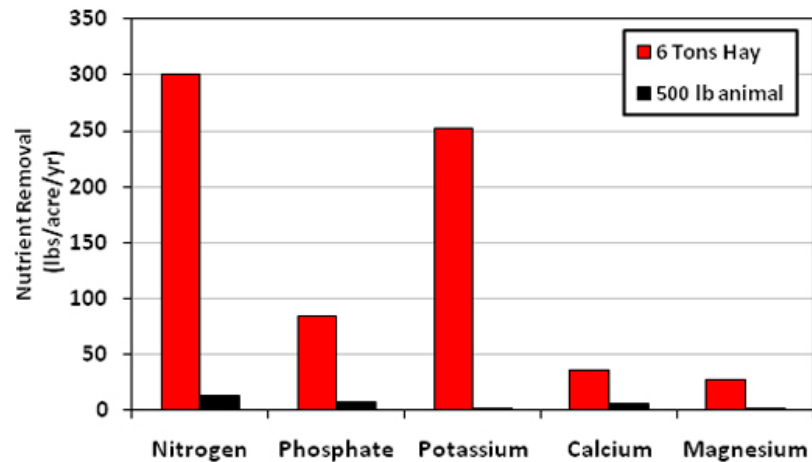
etc.), thereby decreasing cost per cow. This is especially true of rotationally-grazed bahiagrass pastures where studies have shown that calf gains are not increased but more cow-calf units can be carried per acre and result in a decreased cost per cow (e.g., Hammond et al., 1997; Hill et al., 1998).

Covering all the aspects of setting up and implementing an efficient grazing system is beyond the scope of this publication. However, there are a number of websites, publications, and books that provide specifics on how to set up more intensively managed grazing systems. The UGA Management-intensive Grazing website (<http://www.caes.uga.edu/topics/sustainag/grazing/index.html>) is a good starting point and serves as a clearinghouse for more information on this subject.

### RECYCLING NUTRIENTS IN PASTURES

The vast majority of the nutrients consumed by the grazing animal will be deposited back on the pasture (Figure 5). Of course, without some manipulation of the animal's grazing habits (and therefore its defecating and urinating habits), the nutrients will not be well distributed. Poor grazing management can lead to excessive amounts of nutrients around water sources, mineral feeders, shade, and gates.

By improving the management of the animal's grazing, the cattleman can help to ensure that those nutrients are more uniformly distributed in the pastures (Table 10). In well-managed systems, this may mean that relatively little fertilizer will need to be added. If legumes are also used and the soil is already fertile, there may not be a need to fertilize except when renovating a pasture.



**Figure 5.** Annual rate of nutrient removal from a bermuda-grass hayfield producing 6 tons of hay per acre or a pasture producing one 500-pound calf per year.

**Table 9.** Effects of rotational stocking on performance of beef cattle grazing bermudagrass and endophyte-free tall fescue in central Georgia.

Item	Continuous	Rotational	Difference*
Cow weight at calving, lbs	1037	1017	NS
Cow weight at weaning, lbs	1090	1071	NS
Stocking rate, cows/acre	0.50	0.69	+38%
Pregnancy rate, %	93	95	NS
Weaning weight, lb	490	486	NS
Calf production, lb/ac	243	334	+37%

\*NS = not statistically significant

**Table 10.** The effect of grazing intensity on manure distribution in pastures.

Number of Paddocks	Rotation Frequency	Years to get 1 pile/sq. yard
1	Continuous	27
3	14-day	8
12	4-day	4-5
24	2-day	2

Source: Lory and Kallenbach, 2002.

## USING LEGUMES FOR ADDED N AND FORAGE QUALITY

The value of biological N fixation by forage legumes can be quite significant (Table 11). When the legumes represent more than 30% of the available forage, this fixed N can provide enough N to meet the needs of the grasses that are growing with the legumes. Of course, the prerequisite for this is that the legumes are allowed to thrive.

**Table 11.** The value of N fixation from an acre of certain legume species at different prices for commercial N fertilizer.

Species	Annual N Fixation (lb of N/acre)	Cost of N Fertilizer (\$/lb of N)					
		\$0.50	\$0.60	\$0.70	\$0.80	\$0.90	\$1.00
		Annual Value of the Fixed N (\$/acre)					
Alfalfa	100 - 300	\$50 - 150	\$60 - 180	\$70 - 210	\$80 - 240	\$90 - 270	\$100 - 300
Red clover	75 - 200	\$38 - 100	\$45 - 120	\$53 - 140	\$60 - 160	\$68 - 180	\$75 - 200
White clover	50 - 125	\$25 - 63	\$30 - 75	\$35 - 88	\$40 - 100	\$45 - 113	\$50 - 125
Annual clover	50 - 150	\$25 - 75	\$30 - 90	\$35 - 105	\$40 - 120	\$45 - 135	\$50 - 150

### Management is Required

Mixed stands of grasses and legumes generally require more management. This may include annual or periodic planting of legumes into the pasture, maintaining fertile soils, and maintaining a canopy height and density that allows the legumes to compete with the grass. It is in this latter aspect that grazing management is so important. Cattle tend to graze legumes before anything else. As a result, maintaining legumes in a continuously stocked pasture is nearly impossible. In contrast, maintaining legumes in rotationally stocked pastures can allow adequate recovery between grazings and allow legumes to better compete with the grass.

### Using White Clover in Georgia Pastures

There are two primary methods to best incorporate legumes in Georgia cattle production. The first of these recommended practices is the use of white clover as a companion to tall fescue and, in many cases, tightly grazed bermudagrass or bahiagrass. The variety selection process is critical. If the stand is likely to be closely grazed, then ‘Durana’ should be used. ‘Durana’ is a UGA variety that was bred to be exceptionally persistent in pastures that are typically grazed very short. If pastures are rotationally stocked and typically have more residual forage after grazing, then ‘Patriot’ should be used. ‘Patriot’ is also a UGA-bred variety that was selected for persistence, but it grows more upright and maintains itself better in competition with taller-growing pastures than ‘Durana’ or other white clover varieties. Two other varieties that can be successfully used as a substitute for ‘Patriot’ in this case are ‘Will’ (Limestone Valley/Mountain and Piedmont regions) and ‘Osceola’ (Coastal Plain region). Though neither of these varieties will be as persistent as ‘Patriot,’ they can work in instances where a short duration is acceptable because of expected renovation or when a need for herbicide use is anticipated within one or two years of planting.

It is worth noting that one other major benefit of more intensive grazing management is that rotationally stocked pastures usually have fewer problems with weeds. As a result, these pastures will need fewer (or at least less frequent) herbicide applications, which will allow legumes to be maintained in the stands for longer periods.

### Use Annual Legumes in Winter Annual Pastures

The second of the most widely applicable ways of using legumes in Georgia is to plant winter annual legumes with the winter annual grasses. Though the majority of the N-fixation potential will not be realized until later in the spring and summer,<sup>2</sup> these annual legumes can contribute 50-150 pounds of N per acre. Furthermore, these species can contribute substantially to the forage production during the winter and early spring (see the section on “Reducing Dependency on Stored Forage”).

The two most commonly used winter annual legumes are crimson clover and arrowleaf clover. Crimson clover is an early maturing clover that matches well with pastures that are planted to rye or early maturing ryegrass varieties. Though older

<sup>2</sup> When planting winter annual legumes with winter annual grass crops, be sure to provide recommended levels of N fertilization to the grass during the establishment phase and in early winter months. Once the legume stand develops and contributes about 40% of the total available forage, N fertilization levels can begin to be reduced.

varieties like ‘Dixie’ and ‘Tibbee’ are fairly reliable, newer varieties such as ‘AU Robin’ and ‘Flame’ can produce forage earlier and will mature more quickly (i.e., they are able to reseed sooner and do not interfere as much with the subsequent growth of bermudagrass or bahiagrass sods).

Arrowleaf clover also provides substantial forage, but it is a much later-maturing species. Arrowleaf clover matches better with pastures where an emphasis is placed on late spring growth (i.e., with later-maturing annual ryegrass varieties or oats). When planting arrowleaf clover, be sure to use the appropriate inoculant. Arrowleaf requires a *Rhizobium* species that is different from the inoculants typically used for other annual legume species. The ‘Apache’ variety is more resistant to the virus diseases that can sometimes build up in pastures where arrowleaf clover is commonly used.

Other legume species can work well on most Georgia cattle farms. Though it is beyond the scope of this publication to provide a comprehensive listing of species and scenarios wherein these species can be used, a detailed listing of the major forage legume species can be found in the UGA Cooperative Extension Bulletin “Georgia Forages: Legume Species.”

## REDUCING DEPENDENCY ON STORED FORAGE

One of the most effective ways to reduce costs in the forage enterprise is to “graze more and hay less.” Georgia’s climate allows for a very long growing season in most areas of the state. Many strategies can be used to take full advantage of this long grazing season. Most cattlemen in Georgia can extend the grazing season in one of the following three ways: 1) plant winter annuals as a complement to warm-season perennials (such as bermudagrass and bahiagrass), 2) stockpile tall fescue (north of the Fall Line), and/or 3) stockpile bermudagrass.

### Grazing Winter Annuals

Winter annual forage crops, such as annual ryegrass and small grain crops, can be used to complement the grazing seasons of our warm-season forage base (bermudagrass and bahiagrass). Research has shown that this practice alone can increase the number of grazing days (and decrease the number of days and the amount of hay feeding) by as much as 80 days (Table 12). It is important to realize, however, that these species differ in when these grazing days will be added because they vary considerably in how quickly they will produce enough forage for grazing and how late into the spring they will continue to provide forage. Annual ryegrass, which makes most of its growth in early- to mid-spring, is used quite extensively in Georgia. However, small grains such as rye, oats, wheat, and triticale are also commonly grazed. Rye, oats, and (to some extent) wheat and triticale can be grazed as early as late fall in south Georgia if they are planted early.

**Table 12.** The effect of adding a winter annual forage system to ‘Coastal’ bermudagrass pastures in terms of the number of grazing days and the performance beef cows and calves.

Species Overseeded on Bermudagrass Sod	N Added (lbs/A/yr)	Total Grazing Days	Cows	Calves	
			ADG	ADG	Gain/Acre
			----- (lbs) -----		
Rye-Arrowleaf-Crimson	100	268	0.90	1.91	510
Arrowleaf-Crimson	0	211	1.37	1.94	410
Ryegrass	150	240	0.18	1.76	420
No Annuals	100	187	0.49	1.57	290

It is important to plant winter annuals in a timely fashion. Plan to plant winter annuals as early in the recommended planting range as possible. Of course, weather and soil conditions may not always allow for this, but the earlier they are planted, the earlier they can be grazed. It is also important to avoid grazing too early. Severe stand damage can occur if winter annual forages are grazed before they reach recommended grazing heights (usually 6 inches).

More information on winter annual forage options can be found in the UGA Cooperative Extension Bulletins “Georgia Forages: Grass Species” and “Georgia Forages: Legume Species.” Details on extending the grazing season with winter annual forages can be found in the publication “Extending Grazing and Reducing Stored Feed Needs” (<http://www.caes.uga.edu/commodities/fieldcrops/forages/pubs/ExtendingGrazing.pdf>).



## Stockpiling Tall Fescue

In Georgia, tall fescue can be stockpiled (allowed to accumulate) in pastures and hay fields from August through October and grazed later in the fall and early winter. Tall fescue is an excellent species to stockpile for several reasons. First, it grows well into fall and thus provides substantial stockpiled forage when conditions are favorable. Since it often remains green and productive during this time, stockpiled tall fescue maintains high digestibility and palatability. Despite frost and damp conditions, tall fescue leaves do not deteriorate as quickly as other stockpiled forages. Tall fescue also forms a good sod. This makes it somewhat tolerant of treading (even during saturated soil conditions). As a result, grazing stockpiled tall fescue during the winter will have a minimal impact on its productivity the following season. More specific details on the expectations, requirements, and steps in stockpiling and utilizing tall fescue can be found in the UGA Cooperative Extension Circular “Stockpiling Tall Fescue for Fall and Winter Grazing”

## Stockpiling Bermudagrass

Researchers have determined after many years of experiments in Georgia and other states in the southeastern U.S. that stockpiling bermudagrass is a cost-effective strategy to provide winter forage needs. Economic analyses have consistently shown that stockpiled bermudagrass can be fed for 33-60% of the cost of making and feeding bermudagrass hay made from the same farm. The forage quality of stockpiled bermudagrass can also be fairly good. Research has shown that crude protein (CP) levels are consistently 8-12% (depending on N fertilization), and total digestible nutrients (TDN) start at 55-60% at the beginning of the grazing period and end at 51-54%. Animals with higher energy requirements can be provided stockpiled bermudagrass, but will require energy and protein supplementation. More specific details on the expectations, requirements, and steps in stockpiling and utilizing bermudagrass can be found in the UGA Crop and Soil Sciences departmental publication “Stockpiling Bermudagrass for Fall Grazing” (<http://www.caes.uga.edu/commodities/fieldcrops/forages/questions/042FAQ-stockpilebermuda.pdf>).

## Improved Grazing Management is Helpful when Extending the Grazing Season

One intriguing side effect of more intensive grazing management is that it makes it easier to transition between the forage production peaks (March-April for winter annual and cool season perennial forages and June-August for warm season perennial forages) and valleys (fall and winter months). The reason for this is that the rotationally stocked forages are at various stages of development during these transition periods, which allows the grazing of these forages to continue much later than when the available forage is relatively uniform in its growth stage (i.e., forage in one large pasture under continuous grazing).

A good example of this phenomenon is found in a more in-depth look at the results of the study cited in Table 9. In that study, UGA researchers found they fed an average of 31% less hay to cows in the rotational stocked system compared to the continuously stocked pastures (Table 13). If this hay were valued at \$125 per dry ton, an annual average savings of \$46.88 per cow would be realized for each of the three years. Reductions in supplement costs and labor for feeding hay would also add to the advantage of rotational stocking.

**Table 13.** Pounds of winter hay fed per cow as affected by grazing method during a three-year study. Cows grazed a bermudagrass/endophyte-free tall fescue mixture.

Year	Rotational	Continuous	Decrease
1988-1989	1310	1750	-25%
1989-1990	1480	1900	-22%
1990-1991	2240	3650	-39%
3-year Avg.	1680	2430	-31%

Source: McCann and Hill. 1997

# Developing a Sound Herd Health Program

The primary objective of beef cow-calf producers is having each breeding cow or heifer become pregnant, deliver and wean a live, healthy calf. Health management is a key area that has major impacts on all aspects of successful cow-calf production, including: reproduction and birth of live calves, calf growth and performance, and survival of both cows and calves within the herd.

Beef cattle producers should be highly aware of the impacts of disease and poor health upon beef herd production and profitability. Disease impacts income directly through death, infertility, and costs of labor and treatment, and indirectly through production losses and decreased market values. Awareness of the economic costs of disease underscores the importance of sound herd health management. Maintaining a sound herd health program is vital to maintaining a viable beef cattle operation and **“cutting corners in herd health often leads to more costs and losses.”**

Most health programs in cattle operations focus on routine vaccinations, parasite management, and treatment efforts; however, **a comprehensive, preventative herd health program should be tailored around knowledge of cattle diseases, management capabilities, nutrition, environmental stressors, and how these are associated with disease risks.** A sound herd health plan developed in consultation with your herd veterinarian focuses upon three principal areas:

- 1. Prevent the introduction of new disease into a herd.** This is referred to as **“biosecurity practices,”** which can simply mean the security enforced to prevent biological disease from spreading. Producers should be solidly aware of the risks of disease transmission when new animals are added to beef herds, contaminants from infected areas are brought onto the farm, and the potential for diseases to threaten the herd from outside sources. In beef operations, several common infectious diseases often are “purchased” with new cattle or carried by people, vehicles, other animals, equipment, and feeds. A few common diseases that beef producers can bring home include: *Johne’s disease, BVD, Mycoplasma, Trichomoniasis, Leptospirosis, Brucellosis, and Salmonella*. Producers should work with their local veterinarian, seedstock suppliers, Extension specialists and neighbors to become aware of these risks and develop sound biosecurity practices. The best prevention practices may mean testing animals prior to their arrival on your farm.
- 2. Prevent the spread of existing disease within the herd.** Most beef cattle operations have the potential for disease within their herds due to infectious agents that are harbored by healthy carrier animals or exist in the environment (i.e., are endemic). Examples include: *Clostridial diseases, IBR, BVD, Pinkeye, Bacterial pneumonia, Vibrio and Lepto, calf scours viruses/bacteria,* and many more. Control of these disease agents involves practicing sound animal husbandry and management, providing sanitary and clean environments, reducing stressors, correct feeding and nutrition, and reducing the exposure of susceptible animals to heavy challenge with the disease agents. Identifying animals with disease and effective isolation and treatment to prevent spread within the herd is vital. The use of vaccinations may offer additional means to reduce the levels of disease risk and infection rates. Understanding these diseases and consulting with veterinarians will help control and prevent these endemic disease threats.
- 3. Enhancing immunity or disease resistance.** Vaccination is often an effective tool to utilize when the disease is a definite risk and an effective vaccine exists. Vaccinations will help reduce the probability of disease but cannot solely be depended upon for prevention. Several criteria must be considered to determine whether vaccination is either possible or desirable in controlling a specific disease:
  - a. The actual presence of the disease agent in the herd or environment and the factors that will hasten disease.
  - b. The risk of disease and the class of animal at risk.
  - c. An immune response to the vaccine is protective and effective.
  - d. Assurance that the risks of vaccination do not exceed the risks of disease.

The ideal vaccine should confer prolonged immunity, be free of adverse effects, have beneficial cost returns by reducing disease costs, and be safe to handle and safe for exposure to any other animals or humans. When vaccines are used to control disease in a population of animals rather than in individuals, the concept of herd immunity should be considered. Herd immunity is the resistance of the majority of animals to specific diseases and the prevention of epidemic levels of disease and losses. The goal of vaccination is to provide a solid level of resistance to the majority of the cattle, knowing that certain individuals may not have complete resistance to prevent low-levels of disease from occurring. A common misconception is that disease control is dependent on vaccination programs being 100% and lifetime in effect. Disease resistance is only enhanced by vaccination and depends on the total management of all factors that contribute to disease challenge, transmission, and the susceptibility of the animal.

**A vaccination program for beef cow-calf producers should be tailor-made and adaptable to each operation and each disease risk.** Within cow-calf herds in the United States, certain diseases are common and pose risks to nearly all operations. These diseases should be the primary targets for vaccination; vaccines are available with proven efficacy and cost benefits.

- **Clostridial diseases**, (i.e., *Blackleg*, *Malignant Edema*, *Enterotoxemia*, etc.) are prime examples of diseases that may occur in all cattle units. Cattle harbor these organisms within their digestive system and other tissues and the organisms can survive in contaminated environments. All cattle are exposed, but under the necessary predisposing conditions, disease can occur suddenly and usually result in death. Bacterins/toxoids (vaccines) are widely available and efficacious to reduce the risk of these diseases. With proper use of the vaccines, cattle can be readily protected from the occurrence of “Blackleg.”
- **Infectious Bovine Rhinotracheitis (IBR virus)** is a highly prevalent viral infection of all ages of cattle. It causes respiratory, reproductive, neurological, and eye disease problems.
- **Bovine Viral Diarrhea Virus (BVDV)** is the most prevalent and costly viral disease of cattle and is widely detected in beef herds. Bovine Virus Diarrhea causes reproductive, fetal, calfhood, and adult cattle disease conditions as well as chronic, persistently-infected (BVD-PI) calves from fetal infection. Most importantly, the virus causes immunosuppression and increases the likelihood of secondary diseases. The BVD-PI adult or calf is a particular challenge as the animal can look normal for most of its life while spreading the BVDV virus to all of its herdmates. New tests are available to identify these persistently infected cattle and culling is recommended, even when they appear normal.
- **Campylobacteriosis (Vibrio)** and **Leptospirosis** are primarily reproductive diseases affecting fertility and pregnancy survival. *Vibrio* is transmitted by infected bulls; thus, AI can be utilized to reduce risk.
- **Mannheimia-Pasteurella** is a bacteria normally present in the upper respiratory tract of cattle. However, when stressors suppress the immune system, these opportunistic organisms infect the lower respiratory tract and often cause fatal pneumonia, especially post-weaning shipping fever.
- **Bovine Respiratory Syncytial Virus (BRSV)** is a common respiratory disease in cattle and that typically affects calves between six weeks and 13 months of age. BRSV infection commonly occurs after a stressful event.
- **Bovine Respiratory Parainfluenza (PI3)** is another common respiratory disease in cattle. The infection of PI3 is mild; however, it generally works in conjunction with IBR, BVD, and BRSV. This results in a much more damaging and dangerous condition; therefore, vaccines for these diseases are found in combination.
- **Brucellosis** (also called *Bang’s*) is a contagious bacterial disease that causes abortions in cattle and can cause disease in people, which is why testing for *Brucella* is common for sales and interstate shipment as most states in the U.S. are *Brucella*-free. The disease is spread from the vaginal discharge of an infected cow or from an aborted fetus. Bulls infected with brucellosis can also spread the disease to cows during the breeding season.

**Table 14.** Recommended vaccinations to be utilized in most beef cattle operations.

Disease	Calves	Replacement Heifers &		
		Bulls	Cows	Bulls
Clostridial diseases	X	X		
IBR	X	X	X	X
BVDV	X	X	X	X
Campylobacter (Vibrio)		X	X	X
Leptospirosis – multiple strains		X	X	X
Mannheimia-Pasteurella	X			
BRSV	X	X		
PI3	X	X		
Brucellosis			X*	

\*Only vaccinate females for Brucellosis

The basic, highly recommended vaccines are listed in Table 14. Other vaccinations that should be considered for specific, high-risk herds as optional recommendations include:

- E. Coli bacteria
- Coronavirus
- Histophilus somnus
- Trichomoniasis
- Fusebacterium
- Rotovirus
- Mycoplasma bovis
- Moraxella bovis
- Anaplasmosis
- Salmonella

Producers should gain solid knowledge of cattle diseases, risks, and control methods to establish their herd's risks for diseases. Enlisting the advice and recommendations of veterinarians within your region is necessary to build a herd-specific herd health vaccination program. Equally important is to thoroughly understand the proper ages of cattle and times for vaccinations, the proper handling-storage-administration of vaccines, and the proper vaccine form to use in your herd. **Most importantly, sound decisions and practices should be implemented to build a herd health management program that incorporates all aspects of disease control and prevention through the three principles of herd health management.**

Cutting costs on vaccines and other components of disease control may be warranted if evidence suggests a lack of need or effectiveness. You and your veterinarian should thoroughly evaluate the risks and needs of your herd to make such decisions. However, cutting corners on any of the basic tenants of herd health management will often inevitably increase the costs and losses in your cattle operation.

# Genetics and Selection

In a commercial beef cattle operation, selection decisions take two forms: culling unproductive animals and selecting new breeding stock. These important decisions are made every year, but they become even more critical during hard times.

## REDUCING HERD SIZE

Cutting back on the number of cows in the herd is one option for dealing with hard times. In cases of drought or high input costs, the options are to pay more for feed or other items like fertilizer or to reduce these costs by reducing the stocking rate. Culling some of the less productive cows will cut costs and, if it is done carefully, can improve the herd.

The number of cattle that need to be removed from the herd will depend on the situation. In good times, the typical replacement rate in a cow-calf operation is about 15-20% each year. In a severe drought, for example, a larger number of animals may need to be sold. Even in the best of times, culling the right animals is beneficial. The first animals to consider are:

- **Open cows** are the first animals to look at even in the best of times. Cows that are not bred continue to eat without producing a return. It should be standard practice to pregnancy check cows about 45 days after the breeding season. Open cows should be sold after they wean their current calf.
- **Cows with physical defects**, like poor udders and teat confirmation, eye tumors, lameness, or smooth or broken mouths (teeth that are worn down or missing and negatively affect the ability to eat) should be sold.
- **Cows with poor production** are another group to consider when production records are available. Cull cows that have had calves with below-average weaning weights.
- **Wild cows** cause problems in a herd. Selling problem cows can make life easier. Disposition is moderately heritable, and is also associated with poor feedlot performance.

When situations require more severe culling, such as during a major drought, some other factors to consider are:

**Cow age** affects production. The most productive cows are five to ten years old. After cows reach the age of ten, reproductive efficiency drops off rapidly and calf weaning weights decline. Heifers and three-year-olds wean lighter calves and require better quality nutrition and management than older cows. Keeping heifers is necessary to maintain a constant herd size, but in severe situations where major cuts have to be made, focus on saving the best of the mature cows.

**Controlled breeding seasons** where calving occurs in a 70-90 day period makes nutritional management and marketing easier. Many herds are not on controlled breeding programs. In a situation where a large percentage of the herd must be culled, use the opportunity to cull those cows that are not calving at the desired time of year and start a controlled breeding program. In herds that have an established breeding season, cows that calve at the tail end of the season should be considered as potential culls.

## BULL SELECTION

In a commercial beef herd, most of the genetic progress comes through bull selection. Most commercial cattlemen raise their own replacement heifers, and the current bull is the sire of the future cow herd. The herd bull is not the place to cut corners because you will be living with his daughters and granddaughters for many years to come. In addition, producers need to remember they are in the business of selling beef, and at least half of that profitability comes from the bull. The summarized six-year profit comparison from the Tri-County Steer Carcass Futurity in Iowa (Table 15) illustrates this. These data found \$149/head improvement in value of calves sired by the top 25% of sires compared to the bottom 25%. However, improving herd genetics does not have to break the bank, since bull prices tend to follow feeder calf prices. In bad market years, bull prices also tend to drop. The opportunity to buy a good bull at a good price is usually better in a bad economy.

**Table 15.** Sire profit comparison from Tri-County Steer Carcass Futurity, Iowa.

Item	Sire Profit Group		
	High 25%	Low 25%	Average
Delivery weight, lb	692	617	646
Final wt, lb	1229	1143	1181
ADG, lb	3.42	2.92	3.23
Indirect health Cost	\$2.72	\$9.12	\$5.41
Feed Cost/cwt of Gain	\$83.84	\$90.11	\$86.36
Hot Carcass wt, lb	761	699	728
% Low Choice or Better	80.3%	49.8%	68.7%
Carcass Value	\$1,226	\$1,078	\$1,153

From Strohbehn and Busby, 2009



Hanging on to an old bull when it means breeding him to his daughters or granddaughters is not a good way to cut costs. Inbreeding increases the chance of recessive genetic defects showing up in the calf crop. Inbreeding also causes inbreeding depression, which is the opposite of hybrid vigor. The result is a decrease in weaning weights in calves, reduced fertility, and increased death loss.

When selecting a bull, focus on the basics, which can be broken down into three points:

- 1. Start with a healthy bull.** The bull’s most important function is to get the cows bred and put a live calf on the ground. The first step is to buy a sound, healthy bull. Purchase bulls from a reputable breeder who has a good health program and performance records. Make sure the bull is functionally sound (i.e., has good feet and legs and has passed a breeding soundness exam).
- 2. Evaluate performance records.** Performance records on bulls contain a lot of information. Sometimes all of the numbers can be overwhelming. It is important to focus on the major issues. Commercial cattlemen are paid for live weight, usually at weaning or shortly after. High birth weight EPDs or low calving ease EPDs give an indication of calving difficulty. To increase the probability of a live calf, especially when breeding heifers, pay attention to birth weight and calving ease EPDs. In addition, weaning weight EPDs are important to commercial cattlemen. Weaning weight EPDs are expressed in pounds of calf. For example, if bull A and bull B are of the same breed, but Bull A has a weaning weight EPD of + 30 and bull B has a weaning weight EPD of + 40, when bred to the same type of cows, Bull B’s calves should be 10 pounds heavier at weaning (40-30 = 10).

A milk EPD on a bull is an estimate of pounds of calf at weaning produced by a bull’s daughters due to her milking ability. For example, if Bull A has a milk EPD of + 10 and Bull B has a milk EPD of + 15, we would expect daughters of Bull B to produce enough extra milk to wean calves 5 pounds heavier than those of Bull A’s daughters. While extra weaning weight is good, milk production requires additional protein and energy. Care should be taken not to get milk production so high that the added energy demand on the cows causes reduction in reproductive performance.

- 3. Visual confirmation.** Two major factors that affect feeder calf prices are frame and muscle. Feeder calf frame scores are small, medium, and large. After feeding, large-frame steers are expected to reach the choice grade at weights over 1,250 pounds, medium-frame steers are expected to finish at 1,100 -1,250 pounds, and small-frame steers are expected to finish at less than 1,100 pounds. On a bull, medium frame is about 47-49 inches tall at one year of age. Muscle scores in thrifty feeder calves are 1, 2, 3, and 4. Number 1 calves are moderately thick throughout. Number 2 calves are slightly thick. Number 3 calves are slightly thin, and Number 4 calves are very thin.

In the 2005 Arkansas Livestock Market Study, small-frame feeder calves were severely discounted and muscle score had a major effect on market price, as shown in Table 16. Both muscle and frame are highly heritable. Two major things to look at when buying a commercial bull are: 1) Is he at least large enough to produce medium-frame calves when bred to your cows? 2) Is he thick enough to produce mostly Number 1 muscle calves? Frame scores of 4 to 5 (yearling hip heights on bulls of 47-49 inches) are considered medium frame. On bulls in moderate flesh, the best location to evaluate muscling is in the lower hind quarter. Bulls with more thickness in this region, when viewed from the rear, are thought to be heavier muscled. If you do not see much muscle in the bull, he probably will not produce very thick calves.

Culling cows and reducing stocking rates may be the best alternative during periods of drought or economic troubles. Cutting corners on bull selection is not a good idea, since these cuts will affect production for many years. In either case, the most important thing to remember is to focus on the basics.

**Table 16.** The average selling price for feeder cattle based on frame and muscle scores.

Item	Average Selling Price (Value/cwt.)	Discount Compared to Large Frame or Number 1s (Value/cwt.)
<b>FRAME SCORE</b>		
Large	\$118.27	—
Medium	\$118.15	-\$0.12
Small	\$95.43	-\$22.84
<b>MUSCLE SCORE</b>		
Number 1s	\$120.45	—
Number 2s	\$111.31	-\$9.14
Number 3s	\$96.28	-\$24.17
Number 4s	\$82.21	-\$38.24

From Troxel et al., 2007

## Summary

Cattle producers must constantly evaluate their operations to maintain economic livelihood. A well-formulated plan is essential to reducing costs while maintaining productivity. Producers should start by determining the amount of capital they have to work with and identifying the major costs in their operation, and then work through each segment of their management to improve efficiency. Doing this properly will inevitably cut costs and not corners.

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