

Cow-Calf Cost Estimates for Forage and Fertilizer

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Estimating Forage Requirement

Many cattle producers/forage managers may be familiar with, or at least have heard the term "Animal Unit". It is often referred to as AUD for Animal Unit Day, or AUM (Animal Unit Month). It is a method of standardizing the forage requirement for different classes and species of grazing animals. The standard used is the amount of forage required per day for a 1000-pound cow and assumed to be 26 pounds. Some, if not most, cattle producers may feel more comfortable thinking in terms of pounds of forage instead of AU's. Based on this, an AUM is 780 pounds and an AUY (Animal Unit Year) is 9360 pounds of forage.

When developing a forage plan for a cow/calf operation, it is helpful to begin by estimating the amount of forage required per cow unit on a yearly basis. Remember to adjust for the extra baggage associated with each cow. In other words, all cows don't weigh 1000 pounds and each cow is responsible for her share of the bull, replacements, or calves retained after weaning. The forage requirement per cow becomes more than the standard 9360 pounds per year required for just the 1000-pound cow.

Table 1. Comparison of various herd mixes for a spring-calving cowherd (1000-pound cows, 11% replacement rate, heifer retention 17%, 1 bull/20 cows)

Herd Management	AUM/mature cow/year	Forage needs	
		lbs/cow	tons/cow
100% Cows, Retain Replacements	17.6	13,728	6.9
Sell All Calves, Purchase Bred Heifers	15.3	11,934	6.0
Increase Cow wt. 100 lbs.	18.9	14,742	7.4
Retain Steer Calves	21.4	16,692	8.3

The forage estimates in table 1 provide an insight for the acreage and forage yields necessary to provide the forage required by a cowherd. For example,

assume that a native range pasture site or unfertilized bermudagrass/fescue pastures will provide approximately 1200 pounds of useable forage for grazing (typical for an eastern OK upland prairie). Without fertilizer, you would need 10 to 14 acres per cow unit depending on which of the above management schemes best represents your cowherd. Using this example, it is easy to see why someone that is stocked between 5 and 7 acres per cow, but does not apply fertilizer, is forced into feeding hay about ½ of the year.

Estimating the Annual Fertilizer Requirement

Table 1 illustrates that a typical cowherd will require approximately 6 to 8 tons of forage per cow unit annually depending on the management scheme. The forage base for most beef cow operations in eastern Oklahoma consists of bermudagrass and fescue. These introduced forages will respond to additional fertilization. So the amount of fertilizer applied depends on how much forage is needed.

In general, you can expect to increase forage yield of bermudagrass or fescue about 1 ton for every 50 to 60 pounds of actual nitrogen applied. With sufficient fertilizer, a good (thick) stand of bermudagrass/fescue, and a soil with average to above average water holding capacity, you can reasonably expect to produce up to 4 tons per acre. More than 4 tons per acre might be possible but at higher risk of an emergency caused by adverse weather conditions.

If attempting to achieve year round grazing, it will be necessary to apply nitrogen fertilizer at least two times per year. A basic fertilizer schedule is an application in early May for summer grazing and again in late August or early September for winter grazing. Applications of nitrogen fertilizer tend to increase as stocking rate increases. Another suggestion is to fertilize with at least 100 pounds of nitrogen per acre per year or not at all. Fertilizer use efficiency is better at rates between 50 and 200 pounds of actual nitrogen per acre.

Table 2. Nitrogen fertilizer estimate to produce the annual forage required by the different management scenarios listed in table 1 for a mixed bermudagrass and/or tall fescue forage based system.

Acres/cow unit	Forage needed tons/acre	Nitrogen lbs/acre	Nitrogen lbs/cow unit
10 - 14	0.6	0	0
5	1.2 - 1.6	30 - 50	150 - 250
4	1.5 - 2	50 - 70	200 - 280
3	2 - 2.7	70 - 105	210 - 315
2	3 - 4	120 - 170	240 - 340
1.5	4 - 5.3	170 - 235	255 - 353

Some important points regarding the information in table 2:

- Although not mentioned earlier, it is assumed that a current soil test will be taken to determine soil pH and that phosphorus and potassium will be applied as recommended.
- Numbers in table 2 are provided only as a guide. Visit with your County Extension Educator for assistance in adjusting the numbers to match your resources.
- In each column, the low number is for a 1000-pound cow, and her share of the bull. The high number is for a 1000-pound cow, her share of the bull, and steers retained through the stocker phase.
- Some nitrogen fertilizer cost will be offset by a savings in land or rental expense.
- At stocking rates less than 1 cow per 3 acres, doubling the nitrogen fertilizer rate per acre and only fertilizing half the acres is recommended to improve fertilizer use efficiency. Consider rotating the areas fertilized each year to gradually build phosphorus and potassium levels in all pastures. Where soil pH, phosphorus, and potassium levels will allow, legumes should be considered in the bermudagrass/fescue pastures that do not receive nitrogen fertilizer.
- Stocking rates in excess of 1 cow unit per 2 acres are possible but allow very little margin to compensate for adverse weather conditions and will probably require more stored hay reserves than the lighter stocked examples.

Annual Forage Cost per Cow Unit

Assumptions for this comparison: rented native and unfertilized pastureland at \$10 per acre. Rent for bermudagrass/fescue pasture suitable to manage for higher production level with fertilizer, \$15 per acre. An application of 50 pounds each of phosphorus and potassium per acre, \$18 per acre. Nitrogen is valued at 25¢ per pound of actual nitrogen. Fertilizer prices are based on 46-0-0 at \$230/ton, 18-46-0 at \$265, and 0-0-60 at \$185. Custom hay harvesting of a 60-day hay supply (1 ton), charged at \$25 per cow.

The fertilizer cost estimates in table 3 are based on applying fertilizer on only half the available acreage at the 4 and 5 acre per cow stocking rates and for the low requirement option at the 3 acre per cow stocking rate. An option if the yield required per fertilized acre is still reasonable. The result is more total forage, because the unfertilized acreage still produces something, and a cost savings because, the phosphorus and potassium required per acre is only applied where nitrogen is applied.

All available acres are fertilized for the high forage requirement at 3 acres per cow and the 1.5 and 2 acre per cow options. In table 3, the unfertilized acreage is credited for 1200 pounds per acre and subtracted from the forage yield that requires additional fertilizer.

Table 3. Forage cost estimates per cow unit for management scenarios in Table 1.

Acres/Cow Unit	Rent \$/Cow	Hay \$/Cow	NPK \$/Cow	Total Cost \$/Cow
10 - 14	100 - 140	25	0	125 - 165
5	75	25	81 - 106	181 - 206
4	60	25	80 - 105	165 - 190
3	45	25	79 - 131	149 - 201
2	30	25	95 - 120	150 - 175
1.5	23	25	90 - 114	138 - 162

The numbers provided in the previous tables are only estimates but illustrate that the total forage for a cow unit should typically range between a low of \$125 to a high of \$206 per cow unit. The range is due to the difference in cow units between different management schemes. The amount of forage expense charged to each cow increases with an increase in cow size above 1000 pounds and also if some of the calf crop is retained as replacements or through the stocker phase.

The Eastern Research Station is currently stocked at 1 cow unit per 2.5 acres. The cows are larger than 1000 pounds. For the past 2 years, forage costs for the station have been \$135 and \$115. If you include the land cost of \$15 per acre used in table 3, the cost would have been \$173 and \$152. This is comparable to the figures listed for the 2 and 3 acre per cow stocking rates in table 3.

**There is no cheap way to feed a cow but for many eastern Oklahoma producers it can be cheaper with a good management plan.
How does your operation compare?**

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