Measuring Profitability in Grazing Operations

Kenny Burdine, Ph.D.
University of Kentucky

When producers make investments in extending their grazing season, they do so in order to obtain an economic benefit. These benefits usually include a reduction in the number of days that stored feed (typically hay) is fed, an increase in carry capacity or stocking rate, or an increase in production level (rates of gain, weaning weights, etc). While all of these are potential benefits of improved grazing systems, a reduction in winter feeding days is often the simplest way to start. When the grazing season is extended, winter feeding days are reduced, and this cost savings can be weighed against the additional costs incurred. Simply put, if additional grazing days can be added for less than the cost of winter feeding days, they are a good investment.

Given this basic framework, a good place to start when evaluating the profitability of a grazing program is to estimate winter feed costs per day. In most cases, this will consist of feeding purchased or home-grown hay. For the purposes of discussion in this article, I am going to present some specific estimates for winter feeding costs, but readers should understand that all these things are very "operation-specific" and it is always best to work through estimates using actual production costs for the operation in question.

Most cow-calf operations produce their own hay so we can start there. In these cases, hay production expenses include fertilizer, lime, machinery, fuel, labor, and many other items. Producers should estimate hay costs on a per ton basis, then convert this into a cost per winter feeding day by tracking the amount of hay that cows are consuming through the winter. It's also important to consider storage and feeding losses, as they can greatly increase the actual winter feeding costs. The UK Department of Agricultural Economics has a set of forage budgets that can be accessed at http://www.ca.uky.edu/agecon/index.php?p=29 for producers who would like to use an interactive tool to help estimate these costs.

In order to make the discussion more tangible, I ran a quick estimate for hay costs based on current fertilizer prices. By pricing Urea ($425 per ton), DAP ($550 per ton), and Potash ($375 per ton), N, P, and K prices were estimated at $0.46, $0.41, and $0.31, respectively on an elemental basis. Naturally, these prices can be adjusted in the spring for 2019. I further assumed that 60, 60, and 120 units of actual N, P, and K were applied. I also assumed one ton of lime at $15, custom application at $7 per acre, and charged a $50 land rent. Using an assumed grass hay yield of 3.5 tons per acre, this works out to be roughly $46 per ton.

In addition to these costs, machinery, labor, fuel, and maintenance also represent a significant cost to hay production. Since these are so hard to estimate, custom rates were used for Kentucky. Based on our department's 2018 custom rate survey, complete custom harvest (cut,

rake, and roll) for 1,200 bales was $20. This works out to be an additional $33 per ton for these costs. I am being a little light on details, but based on these assumptions, estimated hay production costs would be $79 per ton. And, it is worth noting that smaller operations are very likely have higher machinery and labor costs per ton than custom operators.

In addition to the cost of hay production (or purchase), the cost of winter feeding days are also impacted by hay storage and feeding losses. A lot of hay can be lost in both cases and the range on these losses can be quite wide. As storage and feeding losses increase, cost per winter feeding day increases, as less of the hay fed is actually consumed by cows. Table 1 below estimates winter feed costs per cow for a 1,300 lb cow consuming 2.5% of her body weight per day. Hay costs (prices) shown are $60, $80, and $100 per ton and estimated storage and feeding losses are 15%, 30%, and 45%. For example, an operation that spent $80 per ton producing hay, then incurred 30% storage and feeding losses, would see estimated winter feed cost per cow of $1.86 per day. Producers should start by realistically accessing where they are on this table in order to understand what winter feeding costs per day likely are for their operations. It is also worth noting that labor and machinery to feed hay are not included in these cost estimates.

Table 1. Estimated Winter Feeding Costs per Cow per Day

	Estimated Hay Production Cost per Ton			
Estimated Hay Storage and Feeding Losses		$60 per ton	$80 per ton	$100 per ton
	15% loss	$1.15	$1.53	$1.91
	30% loss	$1.39	$1.86	$2.32
	45% loss	$1.77	$2.36	$2.95

Assumptions: Mature cow weights 1,300 lbs and consumes 2.5% of her BW per day

Now, let's turn our attention to grazing costs. In virtually all situations, grazing costs per day will be lower than hay feeding costs per day, during the typical grazing season. This is where producers have to think marginally about adding grazing days. It often helps to think about the beginning and end of the grazing season. In other words, are there practices that might allow me to gain some days in the beginning of the grazing season or at the end of the grazing season? Regardless, producers must be sure that they are adding those grazing days at a cost below their winter feeding days. Generally speaking, the first hay feeding days are the easiest to replace. At some point, winter feeding days are likely to become the cheapest alternative, and that is where the producer should stop trying to extend the grazing season.

Sometimes additional grazing days can be added on the same forage base. Often, this comes back to improved pasture utilization. Pasture utilization is one of the most critical factors in grazing economics. It refers to the percentage of the forage production that is actually consumed by the animals. Just as there are losses when storing and feeding hay, there are grazing losses that should be considered. If we can improve forage utilization rates, we can stretch the grazing season and decrease our dependence on stored feed.

Of course, improved utilization isn't free, and these costs should be considered and weighed against those winter feeding costs discussed earlier. Setting up a rotational grazing system will potentially require investment in a fencing and watering system, as well as time spent setting the system up and moving cattle more frequently. Electric fencing (charger, posts, polywire, etc.) is often the cheapest way to set the system up and provides greater flexibility, but producers can also choose to set up paddocks permanently. Similarly, water must be made available in all paddocks, which may require further investment.

Regardless, figure a useful life on these investments, value the time spent setting up and the additional management time (if applicable), estimate the additional grazing days that can be added, and compare the cost of these additional grazing days to the hay feeding days they are replacing. Use table 1 to estimate the value of the winter feeding days that you are likely to replace. For example, if the pro-rated costs of implementing a rotational grazing system were $20 per cow per year, and winter feeding days were costing $1.50 per day, the operation only needs to add an additional 14 grazing days for the benefit of the grazing system to exceed the cost.

Beyond rotational grazing, fall fertilization to stockpile fescue is also a very common practice incorporated by producers to increase grazing days. Nitrogen fertilization can increase fall forage production and stretch the grazing season beyond what it would be without fall fertilization. This practice may work in tandem with rotational grazing, as improved pasture utilization may be the tool that frees up some pasture for stockpiling purposes. When considering the economics of stockpiled fescue, one should consider the cost of the nitrogen, the additional production resulting from the nitrogen, and the all important utilization rate. Figure the cost of additional fall forage production, how much will actually be utilized, and again, put this on a cost per day basis that can be directly compared to the cost of those hay feeding days. Fall fertilization for stockpiling purposes will be more attractive in years when nitrogen response rate is likely be high, nitrogen fertilizer is reasonably priced, and alternative winter feeds (such as hay) are expensive. The Agricultural Economics Department has a publication that looks specifically at fall fertilization for the purpose of stockpiling fescue pastures. A recent guide can be found at:
https://www.uky.edu/Ag/AgEcon/pubs/ProfitStockpilePasturesOld.pdf

From here, there are a large number of potential grazing crops that could provide additional grazing days. For example, as one starts thinking broadly about grazing options, corn grazing is likely something worth consideration. Establishing corn for grazing purposes will represent a significant investment, yet has considerable grazing potential. When looking at an annual grazing crops like corn, one should consider all establishment costs such as seed, fertility, chemicals, and machinery costs. And, once again, additional fencing and water costs, as well as utilization rate should be considered.

In the case of something like corn, one should also consider the opportunity costs of that ground. For example, if we are converting some pasture ground to corn for grazing purposes,

there is a value to the grazing ground. Or, if this is additional ground, we should consider what it might be worth if used to produce corn for grain or rented to a grain producer for that purpose. Similar to how I approached average winter feeding and grazing days, I would also suggest that the costs of additional grazing days on the corn ground be put on a cost per cow per day basis, so they can easily be compared to winter feed costs. This same approach can be applied to any potential annual grazing crop. Other warm season annuals would be forages like Sorghum Sudan or Pearl Millet.

In general, I would make a couple general overlying comments. First, when considering corn, or some of these other summer annuals, sticker shock can be significant. The cost outlays are much higher than what is seen for typical forage crops. However, the production capabilities are also much greater. This makes it very important that costs be scaled to a cost per day so that they can be compared to winter feeding days on an "apples-to-apples" basis.

Second, one should not underestimate the importance of utilization rates. A common mistake that is made when considering grazing costs is to estimate the dry matter production, but not discount that for utilization rate. For example, one might correctly estimate costs and accurately estimate forage intakes and figure a cost per day based on those two factors. However, this would greatly underestimate costs as it effectively assumes 100% utilization. For example, if utilization rates are 66%, then 1.5 lbs of forage must be produced for every lb of intake. When grazing, forage utilization is just as important as forage production. Further, the more money that is spent establishing a new grazing crop, the greater the loss is from underutilization. Put simply, greater forage investments likely justify more effort to improve utilization rates.

Regardless of how one approaches grazing, the key is to look at everything marginally. For any change in the grazing program, estimate the additional expenses, and compare those to the addition benefits (which may be an increase in income or a decrease in expenses). Specifically, if one can add grazing days at a lower cost than the winter feeding days being replaced, profitability can be improved. Livestock producers have faced some incredible challenges over the last several years and the forage program is one area where producers should look for opportunities to improve their bottom line.

References:

Halich, Greg. "Custom Machinery Rates Applicable to Kentucky (2018)". AEC 2018-02. March 2018. http://www.uky.edu/Ag/AgriculturalEconomics/pubs/customratesKY.pdf

Halich, Greg, Ray Smith, and Kenny Burdine. "Profitability of Nitrogen Applications for Stockpiling Tall Fescue Pastures: 2014 Guide." AEC 2014-14. July 2014.

Trimble, Richard. Kenny Burdine, and Steve Isaacs. Improved Grass Legume Hay Enterprise Budget Decision Aid. July 2005 (Updated for 2018).