A rotational grazing system can generally be defined as the use of several pastures with one being grazed while the others are rested. On the contrary, conventional or continuous grazing systems allow livestock access to the entire pasture area and let them decide where, what, and how long to graze. In most cases, Kentucky pastures employing continuous grazing systems are too large for efficient management and forage utilization. In such instances, cattle overgraze more palatable forages and areas close to shade and water, while other sections of the pasture are underutilized. This leads to lower animal output per acre than could be achieved through intensive grazing.

The benefits of rotational grazing are well documented for the cow-calf operation. When cattle are grazed intensively, or rotationally, they are given access to a smaller amount of forage at any given time. Cattle are forced to use the forage that is present more efficiently and hence, utilization rate increases. In other words, cattle use a higher percentage of the available forage in the field. However, quantifying these benefits has always been a challenge.

For the cow-calf operator, improved utilization means increased carrying capacity of the forage base. Either more cows can be run on the same acreage, or the same number of cows can be run and the productivity of the animals grazing the pasture improves. Employing a higher stocking rate (more cows on existing acreage) clearly has a potential benefit as more pounds of calf are sold per acre. However, if additional cows are added, they come at a cost, and it is very difficult to quantify the value of these additional pounds without considering their cost of production. There are times in the cattle cycle when calf prices will be below production cost. At times like these, adding additional cows is not profitable regardless of how many additional pounds of calf are produced per acre. Yet, most rotational grazing studies cite increased pounds of calf sold per acre as the primary benefit of intensive grazing.

Each cow-calf producer has a different cost structure. A low-cost cow-calf producer may have breakeven price of $80 per cwt on 500 lb calves. A high cost cow-calf producer may have a breakeven price of $120 per cwt on a 500 lbs calf. Clearly, adding additional cows is going to affect these two individuals much differently. If the price of 500 lb calves is $100 per cwt., the low cost producer increases his income by adding cows, while the high cost producer will actually see his income go down. In this analysis, we will assume that stocking rate is unchanged and benefits are achieved through lower stored feed needs.
It is useful to have a baseline scenario from which to evaluate any question such as this. The assumptions of the baseline scenario are outlined in the box below. For the purposes of this discussion, we will assume that the producer is running 50 cows on 100 acres. We will also assume that 4 tons of available forage is produced per acre and that 35% of that forage is being utilized in the continuous grazing system. By moving to intensive grazing, we make the assumption that utilization rate increases from 35% to 50%. The benefits discussed in this analysis will come from these baseline assumptions.

**Baseline Scenario**
- 50 cows running on 100 acres (2 acres per cow-calf unit)
- 4 tons of available forage per acre
- Continuously grazed – 35% utilization rate
- Intensively grazed – 50% utilization rate

**Increased Cost of Intensive Grazing**

If the assumption is made that the cow-calf operation consists of 100 acres, we can examine the increased cost of converting the 100 continuously grazed acres to 100 intensively grazed acres. The assumption is also made that the 100 acre field is roughly square with only an exterior fence. The animals are continuously grazing a single 100 acre paddock. This is depicted in Figure 1 below.

**Figure 1. Continuous Grazing Pasture Layout**

In order to convert this continuously grazed pasture to intensively grazed paddocks, the producer would need to invest in fence and a portable water and mineral system. Based on the assumed size of the field, converting it into 8 equal sized paddocks would require 8,348 feet of cross fencing (2087 feet x 4), as pictured in figure 2. If a step-in post is used every 25 feet, the producer would also need to purchase 334 step-in posts.
The watering system would also represent a significant cost. To make rotation easier, the producer would likely purchase 2 – 60 gallon watering tanks, 2 flow values, 4 couplers, and would need about 1250 feet of PVC pipe. Finally, the producer would need a portable mineral feeder that can be moved from paddock to paddock with the cattle.

Figure 2. Intensive Grazing Pasture Layout

<table>
<thead>
<tr>
<th>Item Purchased</th>
<th>Quantity Purchased</th>
<th>Cost per Unit</th>
<th>Total Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Fencing</td>
<td>8,348 feet</td>
<td>$0.03 per foot</td>
<td>$250.44</td>
</tr>
<tr>
<td>Step-in Posts</td>
<td>334 posts</td>
<td>$2.50 per post</td>
<td>$835.00</td>
</tr>
<tr>
<td>60 Gallon Portable Watering Tanks</td>
<td>2 tanks</td>
<td>$125 each</td>
<td>$150.00</td>
</tr>
<tr>
<td>Portable Mineral Feeder</td>
<td>1 feeder</td>
<td>$250</td>
<td>$250.00</td>
</tr>
<tr>
<td>Couplers</td>
<td>4 (one for 2 paddocks)</td>
<td>$20 each</td>
<td>$80.00</td>
</tr>
<tr>
<td>Flow Valve</td>
<td>2 (one per tank)</td>
<td>$60 each</td>
<td>$120.00</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td></td>
<td></td>
<td><strong>$1,685.44</strong></td>
</tr>
</tbody>
</table>

Estimating the cost of this system is difficult and will be highly variable based on location, type and quality of products purchased and the individual needs of the operation. Table 1 below outlines the cost assumptions made for the purposes of this analysis. Clearly, expenses could be higher or lower, but these assumptions represent the best estimates available at the time of this writing. Table 1 shows the total cost for converting the 100 acre continuously grazed pasture to intensive grazing to be $1,685.44 or $33.71 dollars per cow. These costs would be realized regardless of how many cattle were being managed on the 100 acres, and regardless of how the benefits of improved utilization are captured.
Benefits of Rotational Grazing

The baseline producer should see some cost saving by feeding less hay since more total forage is available and he/she now has the ability to manage that forage resource more efficiently. Most data show that under an intensive grazing system such as the one described in this discussion, forage utilization rates can be increased from 35% to more than 50%. This would increase the available forage from 5,600 lbs per cow to 8,000 lbs per cow. At 25 lbs of dry matter per cow per day, this is easily a large enough increase to extend the grazing season by 60 days or more if managed properly.

The daily cost of feeding stored feed has been discussed in many previous publications. Production costs for grass/legume hay can easily exceed $65 per ton when both variable and fixed costs are included. Given feeding and storage losses, hay feeding costs can quickly reach $1 per day or more. If we assume that hay is fed 60 days less per year, this represents a decreased cost of $60 per cow or $3000 for the herd. This is almost double what was assumed for additional costs.

Additional benefit could also come from decreased fertilizer needs. Cattle naturally recycle a large percentage of the nutrients they consume. In a continuous grazing system, cattle tend to deposit these nutrients in shady areas and around water sources. Through intensive grazing, we get a much better distribution of these nutrients and may actually decrease the amount of fertilizer needed per acre. This potential benefit is not quantified in this discussion.

Summary

Based on the assumptions laid out above, the cost of setting up an intensive grazing system for this 50 head beef cow operation was recovered in one year by feeding less hay. Using the assumptions outlined above, conversion cost was $33.71 per cow. If hay feeding costs are $1 per day, the baseline producer needed to increase the grazing season by 34 days to offset the investment in the first year. In reality, the investments made in intensive grazing are multi-year investments, making the system even more appealing.

In the proceeding analysis, improved forage utilization was used to decrease the amount of stored feed that was fed. This was done in order to quantify the impact of the change. However, it is really up to the producer as to how to use the additional carrying capacity that comes with increase utilization. The producer could choose to run more cows per acre and continue feeding hay as they always have. In that case, benefits would come from profit from additional calves being sold, rather than decreased stored feed costs. This flexibility is one of the most attractive benefits of rotational grazing. High-cost producers may choose to feed less hay and lower their cost of production, while
low-cost producers may choose to expand cow numbers and increase their total returns.

Kentucky has an abundance of forage land that goes underutilized year after year. Intensive grazing is one way to better utilize our forage resources and potentially increase the efficiency of a cow-calf operation. The costs and benefits of rotational grazing will be highly variable across farms and clearly depend partially on calf prices. It is difficult for individual cow-calf producers to have much impact on the prices they receive for calves. Therefore, managing production costs is crucial in order to maintain profitability. Intensive grazing is one way for producers to lessen their dependence on stored feed and lower their cost of production.