UK COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE

# The Economics of Rotational Grazing

**Agricultural Economics — Extension No. 05-02**
February 2005

**By:**

R.W. ELDRIDGE, KENNETH H. BURDINE, AND RICHARD TRIMBLE

University of Kentucky
Department of Agricultural Economics
400 Charles E. Barnhart Bldg.
Lexington, KY 40546-0276

Phone: 859-257-5762
Fax: 859-323-1913
http://www.uky.edu/Ag/AgEcon/

**The Economics of Rotational Grazing**

R.W. Eldridge, Kenneth H. Burdine, and Richard Trimble

Agricultural Economics – AEC 2005-002
February 2005

Many beef cattle producers have implemented rotational grazing systems to improve grazing efficiency and productivity. Producers across Kentucky have been able to increase stocking rates and pasture utilization by dividing relatively large pastures into smaller paddocks. 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 a lower animal output per acre than could be achieved through a rotational grazing system.

Agronomists at the University of Kentucky have generally defined rotational grazing as the use of several pastures with one being grazed while the others are rested (Henning et al ID-143). On the contrary, conventional or continuous grazing systems allow livestock access to the entire pasture area, letting them decide where, what, and how long to graze.

It would be impossible to develop a blanket statement addressing how profitability would change from the implementation of a rotational grazing system on all Kentucky farms. One method of evaluating a rotational grazing system for a particular operation would be to use a partial budget. This method of budgeting allows producers to compare increased costs and decreased revenue to increased revenue and decreased costs.

**Increased Costs**

The cost of converting pasture lands dedicated to continuous grazing into lands that will be effective in a rotational grazing system can vary greatly from farm to farm. A significant portion of the variability in this initial cost comes from how the pasture is laid out. Each paddock will obviously need access to water and any mineral mix or supplement being fed to the livestock. This may be achieved by designing the paddocks so that each of them can access the same water and mineral source. If this design isn't feasible due to the layout of the pasture land, waterers may have to be purchased for all paddocks and underground lines installed to each one individually. In this case, the producer could use a portable mineral feeder to move in rotation with the cattle.

With good boundary fences and access to water for each paddock in place, the cost of separating the paddocks is minimal. Perhaps the most cost effective method is to string one strand of electric wire on fiberglass or plastic posts to divide the field into an adequate number of paddocks. In most cases, one electric fence charger and possibly some extra wire to connect each paddock to the charger (depending on how the paddocks are designed and whether electric fences are used for boundary fencing) will cover the entire rotational grazing system.

Although it increases initial costs, the use of alleyways to separate and move the cattle may be a worthwhile investment. For example, an alleyway going through the center of the farm with paddocks on each side may allow the farmer to move cattle to a nearby barn or working corral without going across other paddocks. The key point to remember when implementing a rotational grazing system is to choose one that is right for the farm and the farmer.

The benefits of a rotational grazing system cannot be realized without increasing stocking rates and/or the amount of hay harvested off the farm. This increase in stocking rates will come with extra labor and capital investments. For instance, a cow-calf operation is likely to see decreased annual returns for the first few years as they retain and/or purchase more heifers in order to expand the herd. Backgrounders can expand more rapidly, as producers can just buy more calves. As the investment in the number of stocker cattle increases, producers will realize an increase in their interest expense from the additional financing. As with any livestock operation, the labor and management requirements will increase as the number of head increases. This is especially true when making the transition to a rotational grazing system. It is recommended that livestock are switched every 3-5 days in most rotational grazing systems. Over the course of the grazing season, this 3-5 day rotation will account for several labor hours rotating cattle from paddock to paddock.

**Increased Revenue**

Table 1 is a typical scenario for buying stockers in the spring and placing them on pasture for the summer. The example uses a stocking rate of 1/hd per acre, gaining 1.5/lbs per day, with a grazing season lasting from April to September. Although this system has been successful for many summer backgrounders, the stocking rate and total pounds of gain per acre could likely be increased by implementing a rotational grazing system. Table 2 illustrates an example of the increased stocking rates and pounds gained per acre that the same producer might achieve by implementing a rotational grazing system on this particular farm. These increases are estimates based on farm trials where stocking rates and animal output per acre increased two-fold (George, et al California Agriculture, Vol 43 Num 5).

**Table 1. Continuous Grazing Scenario**

| Continuous Grazing | April - September |
|---|---|
| Total Acres | 80 |
| Number of Head | 80 |
| ADG (lbs) | 1.5 |
| In Weight (lbs) | 500 |
| Out Weight (lbs) | 750 |
| Days on Pasture | 167 |
| Pounds Gain per Acre | 250 |

**Table 2. Rotational Grazing Scenario**

| Rotational Grazing | April – July | July – October |
|---|---|---|
| Total Acres | 80 | 80 |
| Number of Paddocks | 8 | 8 |
| Acres per Paddock | 10 | 10 |
| *Stocking Rate (head per acre) | 2 | 1.13 |
| **Stocking Density (head per acre) | 16 | 9 |
| Days Grazing per Paddock | 4 | 4 |
| Days Rest Period per Paddock | 28 | 28 |
| Number of Head | 160 | 90 |
| Average Daily Gain (lbs) | 2 | 1.25 |
| In Weight (lbs) | 500 | 700 |
| Out Weight (lbs) | 700 | 825 |
| Days on Pasture | 100 | 100 |
| Pounds Gain per Acre | 400 | 141 |

*Stocking rate refers to number of head / total acres
**Stocking density refers to number of head / acres per paddock

Notice in Table 2 that 70 head are removed in the month of July. In a typical year, forage production will decrease during the summer months. To get the maximum production from the available forages, stocking rates should adjust with forage production levels. In Table 1, the ADG was 1.5 pounds over the entire grazing season. Notice in Table 2 that the ADG is 2 pounds for the first half of the season and then 1.25 pounds later in the season. This is just an estimate, which will vary from farm to farm. The weather also plays a significant role in the amount of available forage going into the second half of the grazing season.

**Decreased Costs**

A rotational grazing system can decrease pasture fertilization costs due to the increased distribution of manure. As travel areas are decreased, manure distribution will increase along with forage utilization. In continuous grazing systems, a large portion of the nutrients from animal waste are concentrated close to shade and water, while the remaining pasture land benefits very little from this nutrient recycling.

Producers may be able to decrease the amount of hay needed by giving paddocks adequate rest to stockpile forages for extended season grazing. Rotational grazing systems also allow for paddocks to be set aside for hay production in years where weather conditions allow for abundant forage production. A continuous grazing system, on the contrary, doesn't lend itself well to stockpiling or haymaking. This set aside or rest period also allows the overall quality of forages consumed to increase due to the fact that grazing levels can be managed efficiently to leave enough behind in the pasture to sustain proper regrowth.

**Partial Budget**

Table 3 illustrates a sample partial budget. Following along with our earlier example, this budget contains estimated revenue and cost changes that would be expected from this particular scenario. Notice the increased costs account for interior fencing and pasture waterers with underground water lines. These investments are annualized over four years with one fourth the cost applied to each of the four years to account for the fact that their useful life is likely to be longer than one production season. The additional investment in feeder steers is also an increased cost. From our earlier example, the producer must purchase 80 more steers and account for the associated variable costs for each additional head. There will also be an increased labor cost associated with rotating the cattle every four days as opposed to no rotating in the previous continuous grazing system. For this particular example, it was estimated that one hour per rotation would be sufficient for moving the cattle and mineral feeder. For 200 days of total grazing, one hour every four days would amount to 50 additional labor hours.

In this example the only decreased revenue will be from the 80 steers that were originally sold in September. The implementation of a rotational grazing system will allow for a longer grazing season where 70 head are sold in July and the remaining 90 head are kept until October. These two sales are accounted for in the increased revenue portion. It is also assumed that due to the increased manure distribution from the rotational grazing system, fertilizer requirements will be reduced. This decrease in fertilizer expenses are accounted for in the decreased costs portion of the partial budget table.

**Table 3. Partial Budget – Implementation of Rotational Grazing**

| Increased Revenue | | Decreased Revenue | |
|---|---|---|---|
| July Feeders (70 @ $700/hd) | $49,000.00 | September Feeders (80 @ $715/hd) | $57,200.00 |
| October Feeders (90 @ $750/hd) | $67,500.00 | | |
| **Total** | **$116,500.00** | **Total** | **$57,200.00** |
| **Decreased Costs** | | **Increased Costs** | |
| Nitrogen (30lbs/ac @ $0.35/lb) | $840.00 | Interior Fencing* | $107.50 |
| | | Electric Fence Charger* | $75.00 |
| | | Underground Water Lines* | $200.00 |
| | | Pasture Waterers* | $375.00 |
| | | Labor (50 hrs @ $8/hr) | $400.00 |
| | | Additional Feeder Steers (80 @ 600/hd) | $48,000.00 |
| | | $45/hd Variable Costs | $3,600.00 |
| | | *annualized over 4yr life | |
| **Total** | **$840.00** | **Total** | **$52,757.50** |
| **Increased Revenue + Decreased Costs =** | **$117,340.00** | **Decreased Revenue + Increased Costs =** | **$109,957.50** |
| **Net Effect: $117,340.00 - $109,957.50 = $7,382.50** | | | |

**Summary**

The partial budget illustrated in Table 3 shows that this particular example led to over $7000 in increased returns above variable costs due to the transition from continuous grazing to a rotational grazing system. Based on our assumptions, the producer would have only realized returns above variable costs of $5,600 from the 80 head in a continuous grazing scenario. Notice in Table 2 how dramatically the pounds gained per acre increased compared to those in Table 1. Over 23,000 more pounds of beef were produced due to the implementation of a rotational grazing system in this scenario. That increase lead to the returns above variable costs that were more than doubled due to the implementation of rotational grazing!

The economics of rotational grazing will vary from farm to farm and producer to producer. These economic benefits will also vary with the price of cattle. Individual producers must analyze their own operation and how it would be affected by such a transition in order to decide whether rotational grazing is an economically sound investment. Producers who are currently using continuous grazing and would like to increase their stocking rate are likely to benefit from the transition in the long run. Kentucky has an abundance of forage land that goes underutilized year after year. It is a proven fact that the implementation of a rotational grazing system can increase pasture utilization and animal output per acre (Henning et al ID-143). Individual producers must analyze their own operation and how it would be affected by such a transition in order to decide whether rotational grazing is an economically sound investment.