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The Economics of Renovating Pastures with Clover

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Renovating grass pastures with clover is a common practice for many Kentucky cow-calf producers. There are several benefits of pasture renovation that have clear economic impacts. Research has shown that both forage yield per acre and forage quality are improved. These factors lead to improved animal performance; in the case of the cow-calf operator, this means potentially higher conception rates and calf weaning weights. A second benefit of pasture renovation is nitrogen fixation in the soil. Producers who renovate their grass pastures with legumes are likely to see that less nitrogen fertilizer is needed, which potentially lowers pasture maintenance costs. Finally, renovated pastures see improved summer growth because legumes perform better in the summer than cool-season grasses ([Lacefield, Henning, and Rasnake AGR-26](#)).

Although the benefits of pasture renovation are well documented, renovation is not without costs. Therefore, the individual must decide whether renovation makes sense for his or her operation. The purpose of this publication is to discuss the economic impacts of pasture renovation for the cow-calf producer. Assumptions will be based on applied research results and reasonable cost estimates. Individuals are strongly encouraged to work through a budget scenario for their own operation before making a definite decision.

A partial budget framework will be used to evaluate the pasture renovation decision. In a partial budget framework, it is assumed that a change is being considered which will affect the operation in four possible ways: (1) increased revenues, (2) decreased costs, (3) increased costs, and / or (4) decreased revenues. Clearly, increased revenues and decreased costs have a positive effect on the cow-calf producer's bottom line while increased costs and decreased revenues have a negative effect on the bottom line. The decision rule is quite simple; if the value of the positive impacts are greater than the value of the negative impacts, then the practice is worthwhile. On the other hand, if the negative impacts outweigh the positive impacts, it would not be in the best interest of the producer to implement the change in question.

Increased revenues - In the case of pasture renovation, increased revenues are likely to come from two sources, increased weaning weights and increased conception rates. Field trials in surrounding states suggest that both impacts are likely, however, the level of the increases found in these studies has been variable. A 3-

year study in Indiana found increased weaning weights of 52 lbs as a result of renovating with clover when cows were grazing endophyte infected fescue stands. The vast majority of Kentucky fescue has been found to contain endophyte.

The same Indiana study found increased conception rates of 17% and 20%, while a similar Illinois study found increased conception rates of 14% from the addition of legumes to tall fescue. A 1984 Kentucky trial found increased conception rates of 8.3%. For the purposes of this analysis, weaning weights are assumed to increase by 40 pounds and conception rates are assumed to increase by 10%. Both of these variables will be allowed to vary later in the discussion as we consider the sensitivity of the results to changes in these variables.

Baseline weaning weight on endophyte infected fescue was assumed to be 450 pounds, while baseline conception rate was assumed to be 80%. In the baseline case, average pounds of weaned calf sold per cow was 360 pounds (450 pounds x 80%). With the addition of clover, average pounds of weaned calf sold per cow was assumed to increase to 441 pounds (490 x 90%). These additional 81 pounds were assumed to be worth \$1 per pound (Spring 2005).

Decreased costs

As mentioned earlier, decreased costs associated with pasture renovation include lower nitrogen needs in the soil. According to UK agronomists [Henning and Lacefield](#), less than 10% of Kentucky's forage land is soil tested. Many livestock producers simply do not test and fertilize their pastures. So it is questionable as to whether this decreased cost will actually be realized. Although producers who were not previously fertilizing pastures may not save on this cash expense, they are likely to see improved production from the nitrogen fixation due to the addition of clover. For the purposes of this discussion, decreased costs due to nitrogen fixation will not be considered. However, it should be considered by the producer as he or she considers pasture renovation.

Increased costs

Increased cash costs associated with establishing clover in fescue pastures include seed, fertilizer, lime, and application. University of Kentucky [livestock enterprise budgets](#) (July 2004) estimate these costs to be \$25 per acre per year. For the purposes of this discussion we will use this estimate and assume a stocking rate of one cow-calf unit per two acres. Based on these assumptions, renovation costs were considered to be \$50 per cow.

Decreased revenues -

In the case of pasture renovation, decreased revenues are not likely. Negatives will most likely be expressed in the increased costs discussed earlier.

The previously discussed impacts can be placed on a typical partial budget grid such as the one shown below.

Table 1: Partial Budget Framework

<p>Increased Revenues</p> <ul style="list-style-type: none"> - Weaning wts. (up 40 lbs) - Conception rates (up 10%) <p>81 more pounds sold per cow @ \$1 per lb.</p> <p>\$81</p>	<p>Decreased Revenues</p> <ul style="list-style-type: none"> - none considered% <p>\$0</p>
<p>Decreased Expenses</p> <ul style="list-style-type: none"> - none considered% <p>\$0</p>	<p>Increased Expenses</p> <ul style="list-style-type: none"> - Pasture renovation (\$25 per acre per year) - 2 acres per cow-calf unit <p>\$50</p>
Positive Impact: \$81	Negative Impact: (\$50)
Net Effect: \$31	

Based on the scenario shown above, the positive impacts exceeded the negative impacts by \$31 per cow. One would conclude that pasture renovation with clover would improve profitability based on that particular set of assumptions. However, it is extremely important that the cow-calf operator understand that his situation will not be precisely as the one described above. In order to better enable the producer to evaluate a wider range of assumptions, and to analyze the sensitivity of results based on alternative assumptions, a sensitivity analysis is also included.

Table 2 depicts the net effect of the pasture renovation decision while allowing the increase in weaning weight and conception rate to change. Improved conception rates are permitted to range from 5% to 15%, while increased weaning rates are evaluated from 10 to 50 pounds. Improved conception rates are shown across the top, while increased weaning weights are shown down the left hand side. The value reported is the net effect of pasture renovation per cow, based on those two new assumptions, yet following the same framework described above.

Table 2: Net Effect of Pasture Renovation per Cow (Sensitivity Analysis)

Increase in Weaning Wt.	Increase in Conception Rate				
	+5%	+7.5%	+10%	+12.5%	+15%
+10 lbs.	(\$19.00)	(\$7.50)	\$4.00	\$15.50	\$27.00
+20 lbs.	(\$10.50)	\$1.25	\$13.00	\$24.75	\$36.50
+30 lbs.	(\$2.00)	\$10.00	\$22.00	\$34.00	\$46.00
+40 lbs.	\$6.50	\$18.75	\$31.00	\$43.25	\$55.50
+50 lbs.	\$15.00	\$27.50	\$40.00	\$52.50	\$65.00

Table 2 shows that based on the scenario described, pasture renovation makes sense in most situations. Producers considering pasture renovation should study this table and consider where their operations would most likely fall. Farmers should also consider their cash flow situation, the length of time they intend to run cattle on the pasture, and the current market conditions when making this decision. While this framework was applied to a specific pasture renovation question, the partial budget framework can be applied to many everyday farm decisions. As always, producers are encouraged to discuss this decision with their county extension agent for agriculture and natural resources.

For More Information

For additional information, please contact, [Kenny Burdine](#) or [Richard Trimble](#).

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