The Economics of Replacing Endophyte Infected Fescue with Novel Endophyte Fescue on Cow-Calf and Beef Stocker Operations

Missouri NRCS Economics Information Sheet 1

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This fact sheet is intended to provide an overview of the economic considerations for planning. For more details, references are provided at the end of the fact sheet and a companion Missouri NRCS Economics Tool 1 (an interactive MS Excel tool) is available. For individual landowner considerations economic assistance for decision making is available through the State Economist. Contact: Lauren Cartwright (lauren.cartwright@mo.usda.gov or (573) 876-9415.

Introduction

Fescue is popular as a cultivated pasture grass because of its relative ease of establishment, drought and grazing tolerance, and long grazing season compared with other cool season grasses. Research has shown that many of these traits that make fescue so popular are due to the presence of a fungus (*Neotyphodium coenophialum*) that lives inside the plant (endophyte). The fungus is transmitted in the seed (1). Toxins typical in endophyte infected (E+) fescue have been shown to cause fescue toxicosis which reduces cattle growth, reproductive performance and health. This reduction in cattle performance results in an excess of $600 million in lost income annually in the US (2). Novel endophyte (NE+) fescue varieties appear to have the survival advantages of the E+ varieties, but with none of the animal toxicity effects (3). This fact sheet lays out some economic factors and planning considerations to take into account when assisting a landowner considering renovating existing E+ fescue pastures.

This fact sheet is a companion to the Missouri NRCS Economics Tool 1, an interactive MS Excel tool. The Economics Tool 1 is developed to have broader applicability than a pasture conversion from E+ fescue to NE+ fescue. The tool allows users to analyze any pasture conversion scenario with the default scenario based upon the research from this fact sheet for fescue conversions.

Key Terms

Fescue toxicosis, endophyte, novel endophyte, renovation, re-establishment

Economic Factors

Benefits of NE+ fescue pastures over E+ fescue pastures

Improved Fertility:

- Conception rates of 67% with high concentration of endophyte infection vs. 86% with low concentration (4).
- 43% increase in pregnancy rates of cattle consuming low vs. high endophyte infected pastures (4).

(note: the above data is from studies comparing E+ pastures versus endophyte free (E-) pastures, the reproductive effects of NE+ are not as well investigated yet)

Better Weight Gain:

- Cattle grazing NE+ fescue gain weight 47% faster than cattle on E+ fescue (2).
- Stockers on E+ pasture gained an average of 1.35 lbs/day vs. stockers on NE+ or E- pastures gained over 2.0 lbs/day (or 0.5-0.8 lbs/day more weight gain on NE+ versus E+ pastures) (2).
- The main differences in heifer growth between E+ and NE+ pastures were during hot weather. One study showed that during hot weather months heifers on NE+ pastures grew twice as fast as those on E+ pastures (2).

Higher Weaning weights:

- Steer and heifer calves grazing NE+ had approximately 50 – 60 lbs greater weaning weights respectively than those on E+ pastures (1).

Lower Cull rates: *(Note: Did not find a specific study comparing NE+ and E+, but 1996 study comparing E+ and low endophyte varieties had the following results)*

- Low endophyte fescue (with clover) pastures experienced 15% and 16% cull rates versus 26% cull rates on E+ (with clover)(5)

Costs of renovation and/or re-establishment

Costs are variable with estimates between $50 and $400 per acre. Costs to consider include seed, fertilizer, cover crop seed (if needed), all costs associated with spreading seed and fertilizer and seedbed preparation, haying if applicable during establishment, deferred grazing and annual maintenance costs.

- Least expensive: producer converting cropland, or already planning to re-establish a stand, so cost is extra seed cost
- Most expensive: Complete re-establishment using combination of chemicals and labor to kill existing stand, may need intermediate cover crop so loss of grazing for a season, then re-seeding with NE+.
- Middle: Various options of renovation including dilution with interseeding legumes, or partial kill and interseeding with NE+

Stand persistence and longevity, reinfestation and dilution impacts

- A study comparing E- and E+ re-infestation concluded that if pasture renovation can reduce E+ fescue percentage to <10% it is unlikely that E+ fescue will re-infest pastures to an extent to cause fescue toxicosis in cattle. Variables to this conclusion; moderate grazing pressure under rotational grazing, relatively wet growing conditions. *(Note: this study was done using E- fescue which has been shown to be much less hardy under grazing pressure and drought conditions than NE+ fescue)* (6).
- A study in the southern Ozarks concluded that pasture toxicity can be reduced substantially for at least 5 years with a single application of glycophosphate followed by establishment of nontoxic perennial cool-season forages (7).
- New study under way to determine if NE+ pasture is advantageous over E+ with clover interseeded (dilution of endophyte). Dilution has shown to be effective in minimizing effects of E+ fescue on animal performance. Study will quantify performance and perhaps provide more management options where NE+ establishment is cost prohibitive (2).
- Previous studies for stocker operations of clover interseeding into E+ fescue pastures have shown improved rates of gain of 0.15 lb/day (9) and 0.29 lb/day (10).
- Previous studies for cow-calf operations of clover interseeding into E+ fescue pastures have shown increased weaning weights of 50 lbs and improved conception rates by 13% (10).
- Previous research on stockers has demonstrated that for each 10% increase in E+ infection there is approximately a 0.05 kg decrease in ADG over the entire grazing season (7).

Results

As a compliment to this fact sheet an interactive MS Excel tool, Missouri NRCS Economics Tool 1, provides results for different scenarios for the Stocker Cattle and Cow Calf Operation. This section provides an overview of some of the possible results using the tool. Please refer to the tool for the specific detailed costs and returns summarized here. The results presented here are based upon default scenarios set up in the tool based upon the literature research cited here.

Stocker Cattle

Scenario 1: Assumptions: Complete re-establishment of E+ fescue pasture to NE+ pasture using a spray, smother, spray, plant technique. Total cost of the renovation is $485/ac. Expected ADG increases 0.65 lbs/day. Stocking Rate is 1.4 AU/ac.

- Based upon calf gains it would take 3.7 years to pay back the cost of establishment.
- If the market realizes an average discount for fescue toxicosis of $7.49/cwt, then it would take 2.3 years to pay back the cost of establishment.

Scenario 2: Assumptions: Dilution of E+ fescue pastures with interseeded clover. Total cost of dilution is $145/ac. Expected ADG increases 0.15 lbs/day. Stocking Rate is 1.4 AU/ac.

- Based upon calf gains it would take 5.7 years to pay back the cost of the interseeding. Assuming an interseeding lasts 4 years, this scenario is not a good investment economically.
- If the market realizes an average discount for fescue toxicosis of $7.49/cwt, then it would take 2.3 years to pay back the cost of the interseeding.

Cow Calf

Scenario 1: Assumptions: Complete re-establishment of E+ fescue pasture to NE+ pasture using a spray, smother, spray, plat technique. Total cost of the renovation is $600/ac. Weaning weights increase 50lbs, conception rates in crease from 67% to 86%, and cull rates decline from 33% to 14%. Stocking Rate is 1.5 AU/ac.

- Based upon increases in weaning weights, improved conception rates and decreased cull rates it would take 2.9 years to pay back the cost of establishment.
- If the market realizes an average discount for fescue toxicosis of $7.49/cwt, then it would take 2.7 years to pay back the cost of establishment.

Scenario 2: Assumptions: Dilution of E+ fescue pastures with interseeded clover. Total cost of dilution is $145/ac. Weaning weights increase 50lbs. and conception rates increase from 67% to 76%. Stocking Rate is 1.5 AU/ac.

- Based upon increases in weaning weights and improved conception rates it would take 1.9 years to pay back the cost of establishment.
- If the market realizes an average discount for fescue toxicosis of $7.49/cwt, then it would take 1.8 years to pay back the cost of establishment.

Conclusions and Planning Implications

Recent studies show that there are measurable benefits to cow-calf and beef stocker operators currently grazing E+ fescue pastures to re-establish or renovate to NE+ pastures. Whether or not the investment in re-establishment is worthwhile or not depends on an analysis of the specific variables involved with the costs of re-establishment and renovation and the magnitude of benefit the producer will see based upon the specifics of the operation.

For planning, some things to consider are:

- Dilution is an option to reduce up front expenses, but may not offset all of the performance reductions associated with fescue toxicosis.
- In situations where cropland is being converted or landowner is already planning to re-establish a pasture, research indicates that NE+ establishment benefits will quickly outweigh the costs if the alternative option the landowner was considering was E+ fescue.
- In situations where re-establishment costs are part of the equation, it is important to consider factors such as expected market prices for cows, and the landowner's expected payback period (break even time).
- Fescue toxicosis seems to have a seasonal component. Benefits may be realized by management alone if landowner has non E+ fescue pastures that can be grazed during the hot weather months without having to do any renovation/re-establishment.
- A landowner specific partial budget analysis and/or alternatives analysis can be conducted to help with planning by utilizing the companion Missouri NRCS Economics Tool 1 and contacting your state economist.

References

(1) Andrae, John. (2003). *Novel Endophyte Infected Tall Fescue*. Cooperative Extension Service, The University of Georgia College of Agriculture and Environmental Sciences. http://pubs.caes.uga.edu/caespubs/pubcd/C861.htm. Accessed December 2006.

(2) Hall, John B. (2005). *The Cow-Calf Manager: Livestock Update, November 2005*. Virginia Cooperative Extension, Virginia Tech. http://www.ext.vt.edu/news/periodicals/livestock/aps-05_11/aps-469.html. Accessed December 2006.

(3) Burdine, Kenneth H. and Richard Trimble. (2005). *The Economics of Replacing Endophyte Infected Fescue*. Agricultural Economics Extension University of Kentucky. http://www.uky.edu/Ag/AgEcon/pubs/ext_aec/ext2005-01c.html. Accessed December 2006.

(4) Zhuang, Jun, et. al. (2005). *Economic Analysis of Replacing Endophyte-Infected with Endophyte-Free Tall Fescue Pastures*. Agronomy Journal 97:711-716. http://agron.scijournals.org/cgi/content/abstract/97/3/711. Accessed December 2006.

(5) Schmitt, Patsy A. (1996). *Dollars Lost with Use of "Dirty" Fescue Pastures: An Economic Comparison between Endophyte-Infected Fescue and Other Alternative Forages*. Department of Agricultural Economics Purdue University. http://www.agry.purdue.edu/ext/forages/rotational/past/dollars_lost_dirty_fescue.htm. Accessed December 2006.

(6) Tracy, Benjamin F. and Ian J. Renne. (2005). *Reinfestation of Endophyte-Infected Tall Fescue in Renovated Endophyte-Free Pastures under Rotational Stocking*. Agronomy Journal 97:1473-1477. http://agron.scijournals.org/cgi/content/abstract/97/6/1473. Accessed December 2006.

(7) Coblentz, W.K. et. al. (2006). *Using Orchardgrass and Endophyte-Free Fescue Versus Endophyte-Infected Fescue Overseeded on Bermudagrass for Cow Herds: I. Four-Year Summary of Forage Characteristics*. Crop Science 46:1919-1928. http://crop.scijournals.org/cgi/content/abstract/46/5/1919. Accessed December 2006.

(8) Gunter, S.A. and P.A. Beck. (2004). *Novel endophyte-infected tall fescue for growing beef cattle*. Journal of Animal Science 82(E. Suppl.):E75-E82. http://jas.fass.org/cgi/reprint/82/13_suppl/E75.pdf Accessed December 2006.

(9) Roberts, C. and J. Andrae. (2004). *Tall Fescue Toxicosis and Management*. Online. Crop Management doi:10.1094/CM-2004-0427-01-MG. http://www.plantmanagementnetwork.org/pub/cm/management/2004/toxicosis/ Accessed March 2007.

(10) Isaacs, S. *What Do I Get From My Clover Dollar?*. Online Agricultural Economics Department, University of Kentucky. http://uky.edu/Ag/Agronomy/Department/wp/isaacs.pdf Accessed March 2007.

(11) Barnhart, S.K. (2004). *Interseeding and No-till Pasture Renovation*. Iowa State University Extension. Agronomy; Crops, Soils, Climate. http://www.extension.iastate.edu/Publications/PM1097.pdf Accessed March 2007.