Fescue Toxicity Syndrome: The Economics of Coping Vs. Replacing

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Introduction

This morning you have been exposed to a great deal of information concerning toxic fescue. What makes fescue toxic? How does the toxicity impact animals that consume the fescue? And much more!!

The major question that is probably left to be examined and which I will address in my presentation, involves that of economics. Is there an economic method by which producers can attempt to solve the problems associated with fescue toxicity?

As will become obvious shortly, I believe there is an economic method by which producers can solve their fescue toxicity problems. However, there are a few "ground rules" that have to be established before we can examine the economics of the solution.

The Ground Rules

Economic Solution

As we examine the economics of the toxic fescue problem, we are looking for some method by which a producer can eliminate toxic fescue and be "better off" as a result. And by better off, I simply mean that the dollar benefits generated by the solution will be greater than the costs associated with solving the problem. In other words, the producer solution to the fescue toxicity problem will provide positive net economic benefits to the farm business.

A Basic Assumption

Another assumption upon which the analysis will be based is that: The land resource being used to produce fescue is suitable only for the production of fescue. This may seem like an overly restrictive and totally unnecessary assumption, but it is required. The reason for this requirement is to limit our scope of analysis. We are not going to suggest that the land presently being used for fescue production should be switched to the production of tobacco, corn, soybeans, wheat, horticultural crops, or anything else. While any of these crops may provide greater net benefits, than the production of fescue, they are not a relevant consideration in this analysis. We are not examining alternative Agricultural enterprises in this analysis. We are simply looking for a very similar but distinctly different forage source for the producer to use in his business of producing beef.

The Proposed Solution to Fescue Toxicity Problem

The basic solution to the toxic fescue problem which will be proposed and analyzed here is to simply remove the existing endophyte infected fescue stand and replace it with an endophyte free fescue. This will remove the endophyte from the forage and thereby should eliminate the fescue toxicity problem.

If removal of the fescue toxicity problem proves beneficial, then the animals should perform better on the new forage. The economics of this solution process will depend on the extent to which the performance of the animals grazing on the new fescue is improved relative to the cost of making the change to the clean fescue. If the benefits are greater than the costs, then the proposed solution should be worthy of consideration and potential implementation by producers.

An Economic Analysis of the Proposed Solution

The Cost of the Solution

The proposed solution to the toxic fescue problem involves the replacement of an endophyte infected fescue stand with one that is endophyte free. There are numerous methods by which this process can be accomplished. To limit the analysis we will examine only two ways of replacing the fescue: A low cost method and a high cost method. Both methods should achieve the same basic result. They should only differ in the degree to which the final result will be accomplished. The method chosen by the producer would depend to a great extent on his personal preferences and how much he is willing and able to spend on the project.

Under both methods we are only going to remove the existing "dirty" fescue and replace it with clean fescue. The difference between the methods involves how the existing stand is removed and the practices followed in establishing the new fescue.

Table 1 sets out the high cost method of establishing the clean fescue stand. The total cost for replacing the infected fescue using this method is $151.75 per acre. Table 2 describes a lower cost method of accomplishing the same objective. The cost per acre under this lower cost option is $69.75.

TABLE 1. High Cost Method of Replacing One Acre of Endophyte Infected Fescue.

1. Removing Existing Stand:	
3 Qts. Roundup	$ 65.00
Application	5.00
Total Removal Cost	$ 70.00
2. Seeding New Stand:	
15# Seed @ $1.25/#	$ 18.75
80# K20	9.00
120# P205	22.00
2 Ton Lime	17.00
Custom No-Till Drilling	15.00
Total Seeding Cost	$81.75
3. Total Cost of Replacing One Acre of Endophyte Infected Fescue	$151.75

TABLE 2. Low Cost Method of Replacing One Acre of Endophyte Infected Fescue.

1. Removing Existing Stand:	
3 Pts. Paraquat	$ 15.00
2 Applications	10.00
Total Removal Cost	$ 25.00
2. Seeding New Stand:	
15# Seed	$ 18.75
30# K20	3.00
45# P205	8.00
Custom No-till Drilling	15.00
Total Seeding Cost	$ 44.75
3. Total Cost of Replacing One Acre of Endophyte Infected Fescue	$ 69.75

The major difference between the two options is the fertility levels each provide.

The higher cost option will provide a higher level of fertility and should provide for more favorable forage growth. The extent to which it proves beneficial is largely dependent on the fertility program recently followed by the producer with the old endophyte infected fescue stand.

For this potential solution to the toxic fescue problem to be feasible, a producer must generate benefits from the clean fescue to cover all costs of its establishment. If he uses the high cost method of establishing the clean fescue, he must generate returns at least $151.75 per acre greater than he would have had with the dirty fescue. Using the low cost option, the additional returns per acre must be at least $69.75 for the change to be economically feasible.

The Benefits to be Derived from the Solution

For the sake of simplicity we will assume that the producer making the change from endophyte infected fescue to clean fescue will use the new forage in the same manner he has used the dirty fescue. In this example we will limit our attention to the beef producer. He may be running either a cow-calf herd to sell weaned calves as a backgrounding operation. In either case, the farmer is producing beef. Therefore, any increased returns from the new forage will necessarily be derived from the increased sale of beef.

Research has found three basic ways endophyte free fescue can benefit the beef producer. These are:

1. Increased conception rates for mother cows
2. Heavier weaning weights
3. Greater average daily gain for stocker calves

Benefits for the Cow-Calf Operator

Increased Beef Production

Research at the University of Kentucky indicates that producers could expect to produce a greater number of heavier calves from their cow-calf herd if it is grazed on endophyte free fescue. Results indicate producers could get conception rates 19 to 26% greater than those they have experienced on dirty fescue.

In addition, the weaning weights can be expected to increase on clean fescue. One study found the average weaning weight per calf increased 62 pounds.

Combining the increased conception rates for mother cows and heavier weaning weights for calves can have a dramatic impact on total beef production. If we assume that a producer has 100 acres of land devoted to fescue and beef production; how can the change to clean fescue increase his production? If he was grazing 50 cows on this land, he may have been weaning 35 calves that averaged 400 pounds per head at weaning. This would amount to a total production of 14,000 pounds of beef per year. This would be about 140 pounds of beef per acre per year.

This same producer could graze the same 50 cows on the 100 acres that had been converted to endophyte free fescue. If the farmer was able to achieve a 19% increase in conception rate with his mother cows and a 50 pound per head heavier weaning weight with his calves (similar to research results), he should wean 44 calves that weighed 450 pounds per head. That would result in a total production of 19,800 pounds of beef per year. This would be 198 pounds of beef per acre per year.

Comparing the two situations, the producer has increased the production of beef from 140 to 198 pounds per acre per year. And this 58 pounds of increased production is the result of changing from the endophyte infected to the clean fescue. He has eliminated the fescue toxicity problem and his beef production has increased by about 40% per year.

In Money Terms

Assuming the farmer was able to sell his weaned calves at $.55 per pound (the 1981-85 average price of calves in Kentucky), this 58 pound per acre increased beef production would be worth about $32.00. Comparing this one year benefit to either the low ($69.75) or high cost ($151.75) method of replacing the infected fescue stand one can see it would not be economically feasible to make the change.

However, the clean fescue stand will last more than one

year! The life expectancy of a stand of endophyte free fescue is not known. But, there is little reason to believe that, with proper management, it will not last at least 10 years. If it does last 10 years, then the $32.00 per acre benefit the producer recieved the first year should be available each year for 10 years. This would be a total of $320.00 over the 10 years which would seem to make the benefits far superior to either the high or low cost method of establishing the clean fescue.

But, the $320.00 received as 10 payments of $32.00 per year for 10 years is not comparable to the cost of establishing the new fescue today! To make these costs and benefits comparable we must consider the "time value of money." We can make the values comparable over time using the concept of discounting.

Discounting simply penalizes money for not being here today. This cost of being late is often referred to as the "discount rate." In this example, we will assume a discount rate of 10% per year. If we discount the $32.00 benefit to be received each year for 10 years at a rate of 10%, the resulting value of this stream of benefits, in terms of dollars today, is roughly $196.00.

This value of $196.00 is then directly comparable to our cost of establishing the new stand of endophyte free fescue. If we compare it to the $69.75 (low cost option), we see that the benefits are much greater ($126.25) than the costs. Compared to the high cost option ($151.75), the benefits are smaller ($44.25) but still clearly positive and worthy of consideration by the cow-calf producer.

There is some risk that the farmer may not be able to generate the $32.00 per acre per year benefit from the endophyte free fescue. Assuming that a producer can achieve only 50% of the increases found in University research trials, that is still a $16.00 per acre per year benefit. Discounting this 10 year stream of $16.00 benefits per year at a discount rate of 10% results in a value of $98.00. Compared to the costs of establishing the clean fescue, this is $28.25 greater than the low cost method but $53.75 less than the high cost. And, the increased production required to achieve these results are only one-half of those that have been obtained in research trials.

Benefits for the Beef Backgrounding Operator

Increased Beef Production

As was the case with the cow-calf herd, University research trials have also found increased beef production by grazing stocker calves on endophyte free fescue. Trials at the University of Kentucky and the Alabama Agricultural Experiment Station have found increases in the average daily rate of gain (ADG) of stocker calves ranging from .55 to .97 pound per day.

Assume a producer currently has 100 acres of endophyte infected fescue on which he can graze 150 calves. He may be getting a respectable 1.0 pound per day per calf rate of gain under these conditions. Over a 200 day grazing season this would result in total beef production of 30,000 pounds or 300 pounds of beef per acre per year.

If this farmer replaced this dirty fescue with endophyte free fescue he should increase the ADG of his calves. Assuming he could get an increase of .75 pound per calf per day (roughly the average of University results), this would be an ADG of 1.75 pounds per day. With the 150 calves over 200 days of grazing this would amount to a total beef production of 52,500 pounds per year or 525 pounds per acre per year. This is an increase of 225 pounds per acre per year over the production on the dirty fescue.

In Money Terms

If the producer was able to sell this increased production at $.53 per pound (the 1981-85 average price of steers and heifers in Kentucky), this 225 pounds per acre would be worth about $119.25. However, as was the case with the cow-calf producer, this $119.25 per acre per year increase is not comparable to the cost of establishing the clean fescue. Again, it should last at least 10 years and the $119.25 should be available each of the 10 years. Discounting this 10 year stream of benefits at 10% per year as we did with the cow calf example, the resulting value in terms of todays dollars is about $732.

Comparing this $732 to either the high ($151.75) or low cost ($69.75) method of establishing the endophyte free fescue; we can see that under either situation it should prove quite beneficial ($580.25 or $662.25 per acre) to the producer to convert to the clean fescue. Even if we cut the production benefits by 50% (112.5 pounds per acre per year), the stream of benefits still amounts to $366 for the 10 year period. This is clearly superior to the cost of either method of establishing the endophyte free fescue.

A Comparison of Costs and Benefits of the Proposed Situation

We have briefly examined the cost of converting an endophyte infected fescue stand to one that is free of the endophyte. The estimated cost of this change ranged from $69.75 to $151.75 per acre. The potential benefits of this change to clean fescue have been shown to have a potential value ranging from $98.00 to $196.00 for the cow-calf operator and from $366 to $732 for the backgrounding operator.

Using the situations as they have been described, there is only one in which the producer does not derive a net benefit from the conversion. This is the case of the cow-calf producer that uses the high cost method of replacing his dirty fescue and derives benefits equal to only 50% of those obtained in research trials. In this situation the producer realizes a net loss of $53.75 per acre. In all other cases the producer realizes a net benefit ranging from $44.25 to $662.25 per acre.

It appears that the economic potential of this proposed solution to the fescue toxicity problem should be quite high.

But, as with the solutions to most problems, there are some potential pitfalls.

Closing Cautions

This proposed solution to the fescue toxicity problem has been presented in a somewhat simplified form. There are a couple of notes of caution that producers should be aware of before they decide to implement this proposed solution.

Level of Endophyte Infestation

This analysis has assumed that a dirty stand of fescue was highly infested with the endophyte. If a producer's level of infestation is low, then the potential benefits of replacing such a stand would be proportionally less than for that of a heavy infestation.

A recent survey of endophyte infestations has found that 58% of all stands tested had endophyte levels of 80% or greater. Thus, it would seem that the risk of replacing a stand with low levels of endophyte infestation are not great. But, the only way to be sure not to make such a mistake is to have the existing fescue tested.

Management Required

Another requirement of endophyte free fescue, which producers should be aware of before they make the conversion, is the need for better forage and grazing management. It is generally felt that endophyte free fescue will not take the abuse which Kentucky 31 has always taken. A producer cannot overgraze the clean fescue as has often been the case with Kentucky 31. Therefore, it will require closer management and supervision than existing fescue stands have needed in the past.

Summary and Conclusions

This presentation of an economic look at a potential solution to the fescue toxicity problem has been brief. But, it does suggest that the introduction of endophyte free fescue should have potential for most beef producers. And it should really help many clean up in more than one way. It will get rid of the endophyte. But, more importantly, it should put dollars in the producers pocket!!

References

1. Bucker, R.C., J.A. Boling, P.B. Burrus, L.P. Bush, Nelson Gay, R.W. Hemken, G.D. Lacefield, and M.R. Siegel, "Agronomic and Animal Performance of Different Tall Fescue Varieties," *Agronomy Notes,* Vol. 18, No. 1, March, 1985. 2. Burrus, P.B., R.C. Buckner, J.A. Boling, L.P. Bush, N. Gay, R. W. Hemken, G.D. Lacefield, J.K. Evans, and M.R. Siegel, "1986 Update of Agronomic and Animal Performance of Different Tall Fescue Varieties," *Agronomy Notes,* Vol. 19, No. 4, 1986. 3. Evans, J. Kenneth, "Impact of the Fescue Endophyte on Beef Production," Unpublished manuscript. 4. Evans, J. Kenneth and Garry Lacefield, *Establishing Forage Crops,* AGR-64, University of Kentucky, Department of Agronomy, April, 1977. 5. Evans, J. Kenneth, Garry Lacefield, T.H. Taylor, W.C. Templeton, Jr. and E.M. Smith, *Renovating Grass Fields,* AGR-26, University of Kentucky, Department of Agronomy, December, 1975. 6. Hopkin, John A., Peter J. Barry, and C.B. Baker, *Financial Management in Agriculture,* The Interstate Printers and Publishers, Inc., Danville, Ill., 1973. 7. Hoveland, Carl S. and Don M. Ball, "With Fungus-Free Fescue, Beef Beats Beans," *Progressive Farmer,* April, 1985. 8. Lacefield, Garry D., "The Endophyte of Tall Fescue," Unpublished manuscript. 9. Lacefield, Garry and Don Ball, "The Fescue Endophyte Story," Unpublished manuscript. 10. Lacefield, G.D., J.K. Evans, and R.C. Buckner, *Tall Fescue,* AGR-59, University of Kentucky, Department of Agronomy, August, 1979. 11. Lacefield, Garry, Duane Miksch, and Curtis Absher, "Forage-Related Cattle Disorders," ASC-57, *Southern Regional Beef Cow-Calf Handbook,* SR 5001, University of Kentucky, Cooperative Extension Service, October, 1980. 12. Pedersen, J.F., C.C. King, S.P. Schmidt, E.M. Clark, and L.A. Smith, "Beef Gains Higher on All Triumph Tall Fescue Than on Kentucky 31," Alabama Agricultural Experiment Station, 1984. 13. Shurley, W. Donald, "1984 Machinery Cost Estimates and Custom Rate Guide," *Kentucky Agri-Business News,* No. 32, University of Kentucky, Department of Agricultural Economics, May, 1984. 14. Wolfshahl, Karl, "Fescue Fungus Hits Your Pocketbook," *Progressive Farmer,* April, 1985. 15. _____, *Kentucky Agricultural Statistics 1985-86,* Kentucky Agricultural Statistics Service, Louisville, Kentucky.