ALTERNATIVES FOR FUNGUS INFECTED TALL FESCUE

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Tall fescue (Festuca arundinacea Schreb.) is the most important cool-season grass grown in the United States, providing the primary ground cover on approximately 35 million acres. Adapted to a wide range of soil and climatic conditions, it is used for livestock feed, lawns, turf and conservation. Tall fescue is relatively easy to establish, persistent, and relatively free of disease and insect pests. It produces high dry matter yields when properly fertilized and compares favorably to many other cool-season grasses in its chemical analysis.

In 1931, Dr. E.N. Fergus, University of Kentucky Agronomy Department, collected seed from an old tall fescue field in Menifee County, Kentucky, and after extensive statewide testing, the variety Kentucky 31 was released in 1942. This variety now occupies the majority of U.S. fescue acreage. Despite the many positive attributes of this grass, several features of Ky 31 have been less than ideal. Animal performance on Ky 31 has been erratic and often less than what producers and researchers desire. Ky 31 has relatively low palatability and "something" occasionally leads to lameness of cattle grazing tall fescue. Also, "fat necrosis," (the presence of masses of hard or necrotic fat, primarily in tissue of the abdominal cavity) has been associated with cattle grazing tall fescue pastures heavily fertilized with broiler litter. "Summer syndrome," "summer slump," "fescue toxicity" and "fescue toxicosis" are terms widely used to denote poor performance by animals grazing tall fescue during the summer.

Endophytic Fungus Discovered

In June 1973, Dr. Joe Robbins, USDA, Athens, Georgia, visited the Hays farm at Mansfield, Georgia and observed fescue pastures being grazed by two separate herds of cattle. One herd exhibited many of the symptoms associated with summer syndrome, while cattle in the adjacent pasture appeared healthy with no summer syndrome. During the next three years Dr. Robbins and Dr. C.W. Bacon examined pastures on the Hays farm in search of a causative agent of summer syndrome. In 1976, plants from the poor-performing pastures were found to be 100% infected with an endophytic fungus (Acremonium coenophialum) while plants from the unaffected pasture were less than 10% infected with the endophyte. This association marked a major breakthrough in finding the cause of the fescue-endophyte-summer syndrome relationship. Subsequently, fescue samples from research programs in Kentucky, Maryland, Alabama, Missouri and Virginia were analyzed for endophyte content. Samples from each state showed poor performing pastures to be highly infected with the endophyte while better performing pastures were less than 50% infected.

Endophyte Distribution

Subsequent surveys in states within the fescue region have shown that over 90% of the tall fescue fields which were sampled contained high levels of the endophyte. Researchers from the University of Kentucky reported 83% of fescue fields sampled in Kentucky contained over 50% infection with 53% of the fields over 80% infected.

Animal Responses

Animals consuming fescue containing the endophyte have shown some or all of the following responses: (1) lower feed intake; (2) lower weight gains; (3) lower milk production; (4) higher respiration rate; (5) higher rectal temperature; (6) increased water consumption; (7) rough hair coat; (8) more time spent in shade; (9) excessive salivation; (1O) greater urine volume; (11) reduced prolactin level; (12) reduced reproductive performance; and (13) nervousness. These responses have been shown with animals consuming pasture, hay, silage, green-chop and seed.

Although all of the above responses are important, weight gain, milk production and conception are of particular economic significance. Workers at the University of Kentucky showed a 39% reduction in forage intake and a 27% decrease in milk production during the summer by lactating dairy cows that consumed endophyte-infected fescue. Cows consuming endophyte-infected fescue lost weight, while animals consuming non-infected fescue gained weight.

Similar results have been found in grazing studies with beef cattle. Although data are not conclusive, it appears that for every 10% increase in fescue endophyte level, there is likely to be a reduction of 0.1 lb average daily gain by growing beef animals grazing such fields.

Reducing or eliminating the endophyte from the animals diet results in increased performance. Beef production per acre has been increased from 1/4 to 1 lb/day by reducing or eliminating endophyte from the diet. The magnitude of the increase depends on several factors.

Additional work is needed to determine the endophyte effect on reproductive performance. Work in Kentucky shows a 26% increase in conception rates with beef cows grazing endophyte-free fescue compared to highly infected fescue pastures. Studies are underway to more fully determine endophyte effects on reproduction.

Alternative Management Strategies

There is little doubt that the endophyte is associated with the quality problems long observed in tall fescue, even though a cause-effect relationship between the endophyte and a toxin has not been shown conclusively. Research suggests at least three areas that should be considered to offset or eliminate the endophyte effect in animal production:

(1) Manage Fescue and Animals to Minimize the Effect

Mature fescue is poor feed. Grazing, mowing, or use of growth regulators such as mefluidide, to keep plants young and vegetative will result in better animal performance than grazing or feeding more mature plants. Likewise, hay harvest in the boot stage will result in better animal performance than if cut later. Other management factors such as chain harrowing, fertilizing, pest control, creep grazing and rotational grazing can result in improved overall pasture management and animal performance thus minimizing the effects of the endophyte.

Avoid grazing endophyte infected pastures during critical times. Don't graze high endophyte pastures just before calving or foaling and just before breeding. If possible, graze other species for around 60 days after calving. Don't use infected fescue with lactating dairy cows.

Effects of the endophyte can be avoided simply by using other cool-season grasses, warm-season grasses and/or legumes. A system of using infected fescue in spring and fall with other grass or grass-legume mixtures for summer grazing will avoid the endophyte effects during the most critical summer slump period.

(2) Dilute the Endophyte Effect

Negative effects on animal performance can be diluted substantially by the presence of other feeds in the diet. A most practical and economical way of diluting the effect is by growing legumes with the infected fescue. Research from many states over the years has shown increased liveweight gains and conception rates when legumes are a significant component of fescue pastures. Even small amounts of legumes in endophyte-infected fescue pastures can sharply increase animal gains. In fact, legumes can give a benefit even in fungus-free pastures.

(3) Replace Infected Stands with Low Endophyte Varieties

Determine the level of infection before deciding to replace an old stand. Your County Agricultural Agent can give you copies of PPA-30, Sampling for the Tall Fescue Endophyte in Pasture or Hay Stands, and can advise you how and when to take samples and where to send them. Accurate sampling is important. Several low-endophyte or endophyte-free varieties are now available and additional varieties will likely become available in the future. Carefully choose a low-endophyte variety. A new variety that is simply "low-endophyte" or "endophyte-free" will be of little or no value if it is not adapted to your area, does not produce well, is susceptible to diseases or other pests, or gives poor animal performance.

Cost of converting from high to low endophyte fescue will vary depending on land class and farming programs. Where fescue is used in rotation with other crops, cost differences will only be the difference between low and high endophyte seed. If row crop production is undesirable or impossible, cost of chemicals, fertilizer, seed and tillage equipment will range from $50 to over $150/acre. It makes sense to begin replacement of stands on soils which have highest yield potentials.

Although many questions remain, the tall fescue research program has resulted in major breakthroughs. Many questions still remain to be answered; however, application of the existing technology will have a dramatic impact on animal agriculture.

Replacing an Infected Stand

Any infected fescue field to be re-established should not be allowed to mature seed during the reestablishment year. Prevent seedhead formation with heavy grazing, clipping or chemicals, so that any seed in the soil will be over one year old when the new low endophyte variety is seeded. Research has shown that the endophyte dies in seed usually within a year, so any volunteer plants from old seed would be endophyte free.

The best way to kill an old stand is to grow corn in the field for one or two years. Use either combinations of conventional tillage and chemicals or no-tillage with chemicals. It is very hard to kill all of the fescue with tillage alone. If the no-till system is used, carefully select chemicals to minimize toxic residue. In any case, leave the sod waterways. Having heavily infected fescue in a waterway is better than having a non-infected gully.

On farms where corn is not grown or on sloping land where row crops are not feasible because of erosion hazards, chemical kill of infected stands followed by no tillage is the only remaining option. Chemical kill-no-till can be used to go directly from fescue to fescue, or other forage crops can be used in a rotation. It is critical that chemicals be used effectively, to try and kill as much of the existing fescue as possible. This requires paying attention to label instructions and striving for optimum environmental and plant conditions that will permit greatest chemical effectiveness.

Research is underway at different locations within the fescue belt on chemicals, rates and time of

application.