

Dealing with Fescue Toxicity

By Jackie Nix

Fescue toxicity is the most costly grass-related disease in the United States. Cattle consuming endophyte-infected fescue experience production losses exceeding \$600 million per year. Fescue is commonly grown throughout the mid-western and southern United States and accounts for over 40 million acres of forage land (See Figure 1). Tall fescue is a cool season perennial grass. Tall fescue has long been associated with a syndrome known as fescue toxicosis (a.k.a. Fescue Foot or Summer Slump). An endophyte fungus within the fescue plant causes fescue toxicosis. This endophyte produces alkaloids that cause adverse symptoms in grazing livestock including: decreased weight gains or even weight loss, decreased feed intake, reduced milk production, higher body temperature, increased respiration rates, rough hair coat, unthrifty appearance, loss of blood flow to extremities, excessive salivation and poor reproductive performance. Symptoms seem to be exacerbated during very warm or cold temperatures. Table 1 illustrates the differences in weight gain in steers on both high- and low-endophyte fescue diets.

Figure 1. Adaptation and Use of Tall Fescue in the US. Shaded areas represent areas where Tall Fescue is of both major and minor use.

Adaptation and use of tall fescue in the U.S.

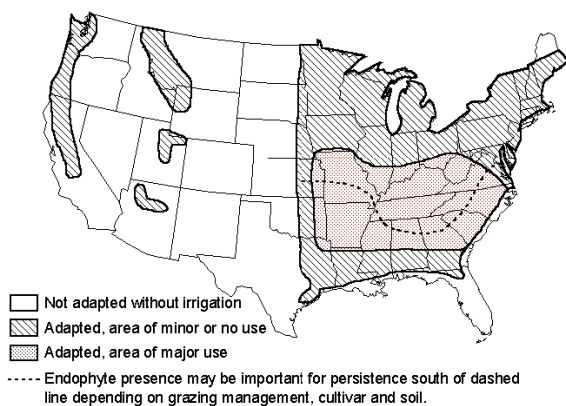


Table 1. Effect of the endophyte on weight gain in steers (taken from MU Guide - Tall Fescue Toxicosis).

Research Location	Gain (lb/day)		Forage Fed
	High Endophyte	Low Endophyte	
Texas	0.99	2.14	Pasture
Alabama	1.41	2.18	Pasture
Georgia	1.02	1.31	Pasture
Alabama	1.00	1.83	Pasture
Missouri	0.97	1.41	Pasture
Alabama	0.44	2.12	Seed
Alabama	0.62	1.46	Hay

The Fescue Endophyte

It is important to understand the relationship between the endophyte and the tall fescue plant. The endophyte is present within the plant starting with the seed. The endophyte can survive in seeds for up to a year. When the seed germinates, the endophyte grows too and infects the seedling at the base of the leaf. Once the plant enters its reproductive stage, the endophyte moves into the stem. As the stem elongates and eventually forms a seed head, the endophyte moves up the stem and into the seeds. Endophyte-infected plants cannot infect non-infected plants. Endophyte-infected fescue can take over a stand when non-infected plants thin giving the endophyte-infected plants a chance to establish. Superior adaptability will often allow the endophyte-infected fescue to out-perform non-infected fescue. It is impossible to visually identify which plants contain the endophyte. However, there are several laboratories across the country that will test for the presence of endophyte. Contact your local Cooperative Extension office or local Sweetlix[®] dealer for more information on having this analysis performed

With this in mind, you might ask yourself, why not just grow endophyte-free or low-endophyte fescue? There are certainly endophyte-free and low-endophyte varieties of fescue available. However, it is not an easy decision to switch from endophyte-infected fescue. The presence of the endophyte gives the fescue plant a significant competitive growth advantage. As a result, endophyte-infected fescue out-survives endophyte-free or low-endophyte fescue varieties in most situations. Because endophyte-infected fescue is quite hearty and tolerant to drought, overgrazing, insects and diseases, it is still abundant in many areas. As a result, fescue toxicity symptoms are still a very real concern for livestock producers in areas where fescue is abundant.

Dealing with Fescue Toxicity

As mentioned above, the alkaloids produced by the endophyte cause several problems for grazing livestock. There are several management options available to cattle producers that graze cattle on fescue pastures to help lessen or alleviate the symptoms of fescue toxicity. These include, replacement of infected fescue pastures, pasture rotation, dilution, and supplementation.

Replacement

Total replacement of infected-fescue pastures can be difficult as well as expensive. When attempting replacement, take a "spray-and smother" approach. First spray the infected field with an effective herbicide, second seed a cover crop to smother the field, then reseed with the desired new forage crop. The smother crop should be a fast growing annual forage (millet or sudangrass in the summer, or wheat, rye or oats for fall planting). It is usually a good idea to renovate small portions of the farm at a time.

Rotation

Rotating cattle off of fescue pastures during hot summer months increases animal performance for several reasons. First, because fescue is a cool-season forage it stops growing during hot summer months. Rotating cattle off fescue onto growing, warm-season pastures simply gives them more to eat. Secondly, high temperatures seem to intensify the negative effects of the endophyte toxins. Moving cattle to non-infected pastures eliminates this interaction. Cattle need to stay off infected-fescue pastures for the entire summer to gain benefits. Taking cattle off for only a few weeks at a time will not greatly reduce summer slump symptoms.

Dilution

Interseeding infected fescue pastures with legumes helps to dilute the total amount of toxins ingested as well as increasing the overall nutritional content of the pasture. These legumes must be managed to allow reseeding each year. And even with special management, many need to be manually reseeded periodically. It is also important to fertilize for the legume (limiting the amount of nitrogen) in order to allow the legumes to thrive.

Supplementation

Research has shown that copper levels are lower in endophyte-infected fescue vs. endophyte-free fescue when grown under identical conditions. These differences are most pronounced late in the growing season (See Table 2). These findings support observations of decreased copper status in cattle grazing infected fescue. In research conducted in Virginia, cattle grazing endophyte-infected fescue exhibited decreased copper status as opposed to cattle grazing endophyte-free fescue. However, the magnitude of this decrease was greater than the difference between the forages. This demonstrates that the endophyte not only decreases the total amount of copper present in the fescue, but also, negatively affects bioavailability of copper for the animal. This makes sense when you consider that the typical symptoms for fescue toxicosis closely resemble those for copper deficiency. These symptoms include rough, discolored hair coats; winter coats that are slow to shed out; decreased conception rates; increased days open; hoof problems; and depressed immunity. For all of these reasons, lowered copper status plays a large part in the fescue toxicosis syndrome. Proper supplementation with a high copper supplement can help alleviate some of the fescue toxicity symptoms.

Why is Copper so Important?

Proper copper nutrition is essential for a healthy immune system in cattle. Copper is needed for proper development of antibodies and white blood cells in addition to antioxidant enzyme production. Copper deficient cattle are more susceptible to infections and do not respond as well to vaccinations. In addition, they tend to be less resistant to parasitic challenge. Studies have shown that cattle receiving proper copper nutrition tend to be less susceptible to infections and have less severe infections when disease does occur.

Reproductive problems cost beef producers about \$15.00 per cow per year. This translates into \$750 per year for a 50-cow herd. It is widely known that copper deficiency in cattle results in reduced reproductive efficiency and performance. Typical copper deficiency symptoms include decreased conception rates, increased days open, increased cases of retained placenta, delayed puberty, and increased repeat breeders in cows and decreased libido and semen quality in bulls.

Proper copper nutrition in pregnant females is critical to the health of newborn calves. Newborns are very dependent on copper acquired during the prenatal period since milk is a relatively poor source of copper. Calves use the copper acquired during the prenatal period to meet their elevated copper demands during the first few months of life. Additionally, copper status in the dam is critical to the production of high quality colostrum. Colostrum provides passive immunity for the calf until its own immune system develops fully. Also, copper nutrition has been shown to be an important component in a newborn's ability to withstand cold stress. Calves born to copper deficient cows experience increased death losses, reduced growth, reduced immunity and poor production efficiency.

Stress increases an animal's mineral needs and tends to exacerbate existing mineral deficiencies. This is especially important with weaned calves. Studies have shown that copper deficient calves have more health problems, gain weight less efficiently and have lower net returns. For this reason it is vital that calves receive adequate mineral nutrition BEFORE weaning because even a proper mineral program cannot overcome existing mineral deficiencies once stress sets in. Calves going into stocker or feedlot situations will perform better when they have received adequate copper nutrition prior to weaning.

How Can I Help My Cattle Avoid Fescue Toxicity Symptoms?

Unfortunately, there is no silver bullet that will allow you to avoid the negative effects of the fescue endophyte in all situations. However, by using a combination of the management techniques mentioned above in conjunction with a good mineral/vitamin supplementation program you can reduce the negative impacts of fescue toxicity on your cattle herd. **Sweetlix® CopperHead® Fescue Max with RainBloc®** is a high quality mineral and vitamins supplement scientifically formulated specifically for cattle on fescue forages.

Copper and Zinc

Research has shown that the body utilizes copper better in the presence of zinc. Zinc and copper interact within the body much as calcium and phosphorus interact. Similarly, the ratio of zinc to copper is as important as the absolute levels of either copper or zinc. Ideally the proper ratio of zinc to copper is from 3:1 to 5:1 to maintain optimum mineral absorption of both minerals. **Sweetlix® CopperHead® Fescue Max with RainBloc®** delivers a 3:1 zinc to copper ratio for optimum copper utilization.

Antagonists

Most fescue is grown in areas that contain antagonistically high levels of sulfur, molybdenum or iron. Sulfur, molybdenum and iron bind up copper making it unavailable to the animal. Also, excessive use of sulfur fertilizer can contribute to lowering copper availability for livestock. Contact your local NRCS agent to obtain soil surveys to learn of predominant mineral compositions in your soils. For example, forage surveys in Tennessee have consistently shown elevated sulfur levels in fescue hay, with sulfur levels higher in fescue harvested in the fall vs. the spring (See Table 2).

Table 2. Mineral levels for 50 Tennessee Tall Fescue Samples (taken from Aaron, et. al. University of Tennessee).

	Spring 2001	Fall 2001	Spring 2002
Magnesium, %	0.21	0.31	0.24
Potassium, %	2.65	2.67	2.82
Sulfur, %	0.24	0.31	0.28
Copper, ppm	8.56	6.92	5.31
Zinc, ppm	22.68	28.14	24.1

Bioavailability

Supplement bioavailability is crucial for cattle consuming fescue forages, especially those in areas with high antagonistic mineral levels in soils. Research has shown that a combination of organic and inorganic copper was as effective at maintaining liver copper levels during antagonism as feeding five times the NRC requirement from copper sulfate. For this reason, **Sweetlix® CopperHead® Fescue Max with RainBloc®** contains two different organic sources of copper, zinc, manganese and cobalt as well as inorganic sources for optimum bioavailability. The organic trace minerals are chemically bonded to amino acids to create an extremely stable complex that is not degraded in the rumen. Therefore these minerals pass undisturbed to the intestine where they can be readily utilized by the cow for maximum efficiency. Use of two alternate organic mineral sources in addition to inorganic mineral sources maximizes mineral absorption and utilization by cattle consuming fescue forages.

Cattle producers that utilize fescue pastures who also observe rough, discolored hair coats (red tinge on black hair or loss of pigment around the eyes); winter coats that are slow to shed; decreased conception rates; increased days open; hoof problems and/or depressed immunity should consider use of **Sweetlix® CopperHead® Fescue Max with RainBloc®**. Ask for the **Sweetlix® CopperHead®** line of minerals by name at your local feed store or call 1-875WEETLIX (1-877-933-8549) to learn more about this and other Sweetlix® supplement products for cattle.

References available upon request.

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