

Minimizing Tall Fescue Toxicity

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Tall fescue is one of the major cool-season grasses grown in Indiana. Agronomically, tall fescue is an excellent forage crop. The crop responds well to fertilization, has excellent seeding vigor, can withstand heavy grazing pressure, has a massive root system that aids in erosion control, survives drought and flood, and can be stockpiled for winter grazing. Laboratory analyses also indicate that tall fescue is as high in quality as other cool-season grasses such as orchardgrass and smooth brome grass.

Unfortunately, because of tall fescue toxicosis much of the benefit of the grass's superior agronomic characteristics is wasted. Ruminant livestock and horses seldom have performed as well on tall fescue as they have on other cool-season forages. Livestock have been noted to exhibit one or more of the following symptoms when consuming tall fescue pasture or hay: nervousness, rough hair coat, elevated body temperature, reduced forage intake and weight gain, low conception rate, excessive water consumption and urine volume, reduced milk production, and more time spent in the shade.

PROBABLE TOXIN SOURCE

There is new information, however, that promises to redeem tall fescue's lowly status in livestock circles. Researchers at the University of Georgia believe they have succeeded in isolating the cause of the toxin that has given livestock performance problems. Prompted by earlier work done in New Zealand, the Georgia scientists identified the endophytic fungus *Acremonium coenophialium* in pastures where fescue toxicosis had been experienced.

Subsequent research at other universities supports the Georgia findings. A long-term study at Auburn University found that there were more grazing days per acre when the herbage was fungus-infected than when it was fungus-free. Cattle found the infected forage less palatable and, therefore, consumed less forage. Calves grazing infected pasture had temperatures approximately 2°F greater than calves grazing fungus-free pasture, and the average daily gain was 0.82 pound higher on the fungus-free pasture (Table 1). Significant research data from the University of Kentucky indicates that cattle have depressed gains and elevated body temperatures when grazing fungus-infected pastures in mid-summer and late-fall or when fed fungus-infected hay (Table 2-4).

Method of Transmission

Acremonium coenophialium is an endophytic fungus, that is, a fungus that lives within a plant's intercellular spaces. The endophytic fungus overwinters within the plant itself, and fungus growth occurs in the spring as tiller growth resumes on the fescue plant. The seed

head becomes becomes infected, the seed acquiring the endophytic fungus. Since the primary means of transmission is the seed source itself, this explains why a large percentage of the fescue pastures are infected.

The fungus does not appear to move quickly from an infected area to a bordering non-infected area, however. This is encouraging for producers who have never planted tall fescue before and are able to find a low-endophyte seed source.

Table 1. Beef Response When Grazing Endophytic Fungus-Free or Fungus-Infected Tall Fescue Pasture.*

Treatment	Year				Average
	1978-79	1979-80	1980-81	1981-82	
Grazing Days/Acre					
Fungus-free	250	284	188	238	240
Fungus-infected	328	326	247	343	311
Average Daily Gain (ADG), lb.					
Fungus-free	1.42	1.53	2.32	2.01	1.82
Fungus-infected	0.57	0.72	1.75	1.03	1.00
Beef Gain/Acre, lb. (Grazing Days/Acre x Daily Gains)					
Fungus-free	355	436	437	478	426
Fungus-infected	186	235	431	352	301
Body Temperature, °F					
Fungus-free	102.70	102.70	103.30	102.50	102.80
Fungus-infected	104.80	104.80	104.90	103.50	104.50

*Hoveland et. al 1984 Auburn University

Table 2. Daily Gains and Body Temperatures of Beef Steers Grazing Different Tall Fescue Pastures During the Summer.*

Variable	Tall Fescue Cultivar			
	Endophyte KY-31	Low Endophyte KY-31	John- stone	Kenhy
ADG, lb,	0.99	1.54	1.96	1.84
Body Temp. °F	105.70	104.30	104.60	104.20

*Boling et at 1984 University of Kentucky

Table 3. Daily Gains and Body Temperatures of Beef Steers Grazing Endophytic Fungus or Low- Endophytic Fungus Tall Fescue Pastures During the Fall.*

Variable	Pasture Treatment	
	Endophyte KY-31	Low Endophyte KY-31
ADG, lb,	1.69	2.35
Body Temp., °F		
Dec. 8	104.30	103.60
Dec. 22	103.40	102.60

*Boling et at, 1984, University of Kentucky,

Table 4. Heifer Response When Fed Endophytic Fungus or Low-Endophytic Fungus Tall Fescue Hay.*

Variable	Hay Type		
	Endophyte KY-31	Low Endophyte KY-31	Low Endophyte Kenhy
ADG, lb.	0.61	1.08	0.89
Hay Intake, lb./day	11.30	12.00	11.70
Hay/Gain. lb.	18.60	11.20	13.30

*From [n] et al 1984 University of Kentucky

CONTROL METHODS

New Seedings

Fungus free plants have been obtained by heat treating infected seed, chemical treatment of seed, harvesting seed from fungus-free plants, and planting seed that has been stored for one year. *The most practical way available today to reduce the fescue toxicosis problem with new seedings is to plant seed that is either totally free of or contains a low level of the endophytic fungus.* Aged seed can be low in germination, and seeding costs may be high if germination declines markedly during storage. If aged seed is to be planted, a germination test should be conducted. A seed sample should also be sent to the Auburn University Fescue Toxicity Diagnostic Center to verify if the seed is actually low in the endophytic fungus. Information about the Fescue Toxicity Diagnostic Center can be acquired through the Cooperative Extension Service.

Some low-endophyte fungus seed sources that are adapted to Indiana conditions and that are, or will be, available in Indiana include 'Kenhy,' 'Johnstone,' 'Forager,' and 'Fawn.' Kenhy and Johnstone were developed by the Kentucky Agricultural Experiment Station and USDA-ARS. Forager was developed by FFR Cooperative and is marketed through the Indiana Farm Bureau Cooperative, Inc. system. Fawn was released by the Oregon Agricultural Experiment Station.

The seed tag should be checked to make sure that the seed is actually rated as low endophyte. Seed that is certified to contain less than 5 percent of the endophytic fungus should be purchased and planted to assure that a low-endophyte pasture or hay crop is established.

Established Stands

Currently, there are no systemic fungicides that can be economically applied to reduce endophytic fungus presence in an established, infected pasture. The best way to reduce the fescue toxicosis problem is to renovate the existing stand with an adapted legume. It has been demonstrated in several states that including legumes in a tall fescue pasture can dilute or mask the effects of tall fescue grown alone. Indiana's best forage-livestock producers are making great improvements in including legumes in their established

fescue pastures so animal performance is not hampered. Cooperative Extension Service publications AY-251, "Improving Pastures by Renovation," and AY-253, "Forage Selection Guide for Indiana, will help producers renovate their tall fescue pastures.

Fescue toxicosis problems in infected pastures are increased with heavy nitrogen applications in the form of commercial fertilizer or poultry manure. Therefore, nitrogen should be not applied to tall fescue when the endophytic fungus is present.

If an infected tall fescue crop is to be replaced with a new, low-endophytic fungus seeding, the old crop must be destroyed. A small grain or row crop should be grown for at least a year before reintroducing the improved tall fescue variety. The established stand will be killed by tillage and/or herbicides.

Conservation tillage practices should be used where soil erosion is a concern. On sites where conservation tillage practices are not possible because of steep slopes, the infected tall fescue crop should not produce seed the year prior to seeding with the low-endophyte variety. The old sod can be killed after the year of no seed production by applying one pint of paraquat per acre two weeks before planting and another pint per acre at planting. A no-till drill should be used to plant the low endophyte seed.

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