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Managing tall fescue toxins with legumes

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Most folks involved with the forage–livestock industry have a love–hate relationship with tall fescue. On one hand, it is one of the most persistent cool-season forage grasses in Virginia. On the other hand, animals regularly get sick if they consume too much of it. About 90% of tall fescue pastures are endophyte-infected in Virginia, and this toxic fescue probably costs the livestock producers millions of lost revenue every year.

The toxicity actually comes from endemic fungus, *Neotyphodium noenophialum*, that grows inside the fescue plant. This mutualistic fungus produces chemicals (alkaloids) that negatively affect livestock in many ways, often producing a malady termed fescue toxicosis. Alkaloid chemicals make fescue aversive to animals so that they eat less. Reproductive problems and increased heat stress are also common symptoms. Even though alkaloids are problematic for livestock, the same chemicals increase the survival of tall fescue plants by making them highly resistant to drought, grazing pressure, disease, and insects.

Toxic tall fescue can be managed to reduce animal health problems, but it is not easy. Alternative forages are available to replace toxic tall fescue, but pasture renovation is very expensive and often unsuccessful. Some recent research studies point to some new ways to deal with tall fescue. It has long been known that some legumes contain chemicals called condensed tannins. Probably the most familiar legumes in Virginia are birdsfoot trefoil, *Sericea lespedeza*, and crown vetch. When consumed by animals, condensed tannins in legumes can bind to proteins like the alkaloids that make tall fescue toxic. In fact, recent evidence suggests that condensed tannins may help detoxify alkaloid toxins, make forage more palatable, and help reduce heat stress in cattle. In addition to possible fescue detoxification, tannin-containing legumes also are well known to help prevent bloat and reduce parasite loads in animals. Condensed tannins may even help boost animal immune responses.

So if tannin-containing legumes have all these great benefits, why don't we see them everywhere? Well, there are several reasons. For one thing, legumes like birdsfoot



| Cattle grazing tall fescue. Courtesy of Flickr/Noble Foundation.

trefoil and *Sericea lespedeza* are not easy to manage. Establishing these legumes in pasture is difficult, and managing them once established can be tricky. It is also good to remember that while condensed tannins can be beneficial in modest concentrations, if levels get too high, they can be toxic to animals as well. Complicating matters even more is that fact that condensed tannins are quite variable in their chemical structure. The specific forms, or polymers, of condensed tannins that produce beneficial effects in animals are still not well understood.

Nevertheless, if these legumes can help offset the negative effects of the alkaloids in tall fescue, livestock producers could have a “natural” and cost-effective avenue for coping with fescue toxicosis. More work needs to be done though, and my research group is beginning work to explore questions about tannin-containing legumes in pasture situations. In the next few years, we hope to shed some light on these interesting legumes and the potential for dealing with fescue toxicity. &

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