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## Stockpiled Tall Fescue and the Fungal Endophyte

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### **Why does it matter?**

Deferred grazing or stockpiling of autumn growth in tall fescue can make it a valuable component of grazing systems in the Southeast. When southeastern producers decide to stockpile fescue and minimize supplemental feeding during the winter, the fungal endophyte complicates management decisions. The manager must consider the impact of stockpiling on stand longevity, nutritive value, and harvestable forage as related to profit and return on investment. Also, with profit and investment in mind, the presence or absence of a wild type endophyte or even the novel endophyte may alter the impact of stockpiling on stand longevity, nutritive value, and harvestable forage. Even the negative impact on animal performance of toxins from a wild type endophyte may be altered by stockpiling to decrease toxin concentrations further complicating pasture management decisions.

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### **What was done?**

In a three year study (in cooperation with the USDA-ARS location in Raleigh, NC and the University of Missouri) we tested stockpiled 'Jesup' tall fescue for forage mass, nutritive value, and stand persistence when containing no endophyte, a novel endophyte ('MaxQ'), or a wild-type endophyte (with ergot alkaloids). For each of the 3 fungal endophytes we accumulated forage beginning in mid-August and removed it by grazing in mid-November, mid-December, mid-January, and mid-February



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### **How much forage production did we give up by not using the wild type endophyte?**

The first concern was that we would not produce as much forage during the stockpiling phase if we removed the endophyte or used a novel endophyte like 'MaxQ'. However, we found that the endophyte did not have any effect on the total forage mass or on the amount of forage that we were able to remove by grazing during the stockpiling phase.

We also tested the proportion of leaf, stem, and dead fractions to see if fescue with the wild type endophyte produced a leafier canopy than fescue with the novel endophyte (MaxQ) or without an endophyte. We found no relationship between leaf, stem, or dead proportions and endophyte status.

Another aspect of forage utilization that could have been affected by endophyte status is nutritive value. To test for an effect on nutritive value we estimated fiber composition with neutral detergent fiber, acid detergent fiber, hemicellulose, cellulose, and lignin. We also estimated digestibility, protein, and soluble carbohydrates. None of these estimates of composition differed with fescue containing either the wild type endophyte, the novel endophyte (MaxQ), or no endophyte. The only difference in nutritive value among the three types was the high level of the toxin (ergovaline) from the wild type endophyte.

**How was the available forage affected by stockpiling?**

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Green leaf declined from approximately 2000 lbs/ac in November to approximately 1000 lbs/ac in February. Green stem declined from approximately 600 lbs/ac in November to approximately 300 lbs/ac in February. On the other hand, the proportion of tall fescue that was dead in the pasture increased from approximately 1300 lbs/ac in November to approximately 2200 lbs/ac in February. Consequently the total mass of fescue decreased slightly during the stockpiling period but the major change was in the increased proportion of dead material in the canopy and the decreased proportion of green leaf. The fraction of dead material increased from 20% to over 60% while the fraction in green leaf decreased from over 65% to nearly 30%. That amount of forage removed by grazing ranged from approximately 1000 to 1500 lbs/ac but was not related to fescue endophyte status or to length of stockpiling.

The stands were also evaluated for persistence at the beginning of the trial and after 4 years. All stands were reduced somewhat by the 4 years of stockpiling however the stand loss was greatest in the endophyte free tall fescue and was reflected by increased weed populations.

**How was nutritive value affected by stockpiling?**

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In spite of the relatively large changes in the proportion of leaf and dead in the canopy, the overall digestibility only declined from 76% in November to 68% in February. Protein varied between 12 and 10% during this time. Overall fiber level increased from 27 to 32% between November and February. Carbohydrate also decreased and may alter animal preference. Given the decrease in soluble carbohydrate, and the increase in fiber, the impact on voluntary animal intake might be greater than otherwise expected for the observed change in digestibility.

The digestibility of the fraction of the forage in green leaf did not decline between November and December and lignin actually decreased. Stem was a relatively small proportion of the canopy but the digestibility did not decline and protein increased during the stockpiling phase. The nutritive value of the fraction of material that was dead was poor but did not change with stockpiling.

The toxin (ergovaline) in the tall fescue containing the wild type endophyte declined during the stockpiling phase. It was down by 50% in January and delaying defoliation may provide a means of utilizing fescue with high levels of toxins from wild type endophytes but at a loss in nutritive value.

**Summary**

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The 'Jesup' tall fescue with the novel endophyte (MaxQ) performed well and shows promise for incorporation in Southeastern grazing systems. With the exception of content of the toxin ergovaline, fescue with the novel endophyte (MaxQ) was similar to the fescue with the wild type endophyte. Stockpiling tall fescue provided a viable means of conserving forage for defoliation in midwinter. The estimates of digestibility and protein were adequate to support animal growth and stand persistence was similar for fescue with the wild type and novel endophytes.

**Research Team and Contact information**

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