

EVALUATION OF FUNGUS INFECTED, FUNGUS FREE AND NOVEL ENDOPHYTE FESCUES AS ROUGHAGE SOURCES FOR STOCKER CATTLE

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ABSTRACT: Fescue is the most persistent perennial cool season forage used in the northern part of Mississippi, especially on the Blackland Prairie soils of eastern Mississippi. An estimated 35 to 40 million acres of fescue are grown in the southern regions of the United States. The negative effects (reduced growth, milk loss, heat problems, failure to shed hair, etc.) associated with infected fescue are well known. The increased growth, milk, heat tolerance, and other positives provided by fungus free fescue are also known but these positives are offset by stand persistence problems. The novel or introduced endophyte fescues appear to have the potential to provide the livestock producer with a forage that has the stand persistence of infected fescue and the animal production provided by fungus free fescue. In this trial two of the novel or endophyte fescues, Georgia 5 and Jesup, were compared directly with their fungus-infected ecotypes (Georgia 5 E+ and Jesup E+), in addition to Ky-31E+ fescue. Crossbred steers weighing ~500 pounds were used to graze 5 ac paddocks for the 196 day trial from the fall of 2003 through the spring of 2004.

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KEY WORDS: Fescue, novel endophyte, fungus free fescue, infected fescue, heifers.

MATERIALS AND METHODS Fourteen, five-acre paddocks were planted no-till to Georgia 5(infected)(GA5E+), Georgia 5(fungus free)(GA5E-), Georgia 5 Novel Endophyte(GA5NE), Jesup(infected)(JE+), Jesup(fungus free)(JE-), Jesup Novel Endophyte(JNE) and Kentucky 31(Ky31) in the late fall of 1999. There were two replicates of each grass type. The paddocks were sprayed twice with Roundup® to kill the existing vegetation before seeding and P and K fertilizer was applied according to soil test recommendations. Nitrogen applications were made in the spring at the rate of 60 lb/ac N. The 1999 establishment year was the second of three years of fall drought experienced in this region of the southern U.S. and the no-till seeding was delayed until early November due to the lack of rainfall. Once planted, seedlings did not emerge until mid-December of 1999 and due to a mild winter, seedlings continued to emerge into the late winter and early spring of 2000. Rainfall was well below normal in 2000, with recorded rainfall being approximately one-half of normal.

The JesupE- and Georgia 5E- varieties were replaced due to stand loss in the fall of 2003 with Jesup 584 and ArkPlus. The 2003 Arkplus plantings did not establish, and they were sprayed with glyphosate and replanted in the fall of 2004. The Jesup 584 stands were not grazed in the spring of 2004 due to poor root development from excessive rainfall experienced in the winter of 2004. In the 2003-2004 study, 5 crossbred steers, averaging approximately 500 pounds were placed on 5 ac paddocks of Georgia 5 infected (GA5E+), Georgia 5 Novel Endophyte (GA5NE), Jesup

infected (JE+), Jesup Novel Endophyte (JNE) and infected Kentucky 31 (Ky31E+) and grazed from 11/11/03 until 5/25/04. Animals were not placed in grazing paddocks until forage accumulation was 8-9 inches tall. Individual body weight, hair condition score (1=slick; 5=long hair with mud) and rectal body temperature were collected at trial initiation, termination and every 28 days during the trial. Animals were weighed every 28 days to measure not only daily gain, etc., but to ascertain animal well-being. At trial termination a chute exit speed was also recorded for each animal as an estimate of docility (1=calm; 3=wild) that has been associated with feedlot performance and carcass merit. If groups or individuals within a group were to significantly lose weight within any weigh period, then supplementary nutrition would be provided to all animals in that treatment. If incurred, supplement cost will be recorded for use in calculating costs/# of gain. A complete mineral mix was provided at all times, but no supplemental hay or concentrate was provided.

In the summer of 2004, after the fescues had entered what is termed, summer dormancy, 4 heifers averaging approximately 450 pounds were placed on these same 5 ac paddocks described above to ascertain each forage's ability to withstand summer grazing. Heifers continually grazed these cool season forages for 75 days from 6/24/04 until 9/7/04. Bermudagrass, crabgrass, dallisgrass and other warm season forages also volunteered in the fescue stands. Weights were recorded when the heifers were put on the paddocks and when they were removed, but since weight gain was not the primary objective of this evaluation, animals were not weighed on a 28-day schedule. The data were subjected to an ANOVA utilizing the SAS system.

Two trained appraisers made independent forage stand evaluations in the fall and spring of each year by following a zigzag pattern across each paddock and then returning to the gate area by approximately bisecting the long axis of the paddock. Estimates were recorded to the closest 5% and the mean of the two estimates was recorded as the percent stand for each paddock.

RESULTS AND DISCUSSION Average daily gains, start and finish weights for the 196-day fall/spring (F/S) trial in 2003-2004 and the 75-day summer trial (ST) for 2004 are presented in Table 1.

In the F/S 2003-4 study, steer gains for Ga5N, JN and JE+ were significantly greater ($p < 0.05$) than for Ga5E+ and Ky31E+. Fescue average daily gains of 1.7#/d for the 196-day trial were not as high as producers might expect with ryegrass (2.0-2.25#/d), but total gain for the trial is comparable. Animals grazing ryegrass must generally be removed from ryegrass for 30-45 days during the winter, but steers grazing fescue were able to graze for 196 continuous days without hay or supplement, making season long gains comparable. When a producer compares annual establishment costs of ryegrass (~\$130/a for prepared seedbed and ~\$147/a for no-till) to the perennial novel fescues (sod destruction of infected fescue and reestablishment costs of novel fescues ~\$200/a, prorated over 5 to 7 years (\$40/yr) plus a \$62/yr pasture maintenance cost), the costs/# gain are in favor of fescue. If steers have an ADG of 2.0 lb for 150 days, costs/# of gain are \$0.39 for ryegrass vs. \$0.32 for novel fescues. Additional costs will be incurred for ryegrass since steers generally must receive supplemental feeding and an alternate holding area while they are off of ryegrass during late winter. Additionally, prepared seedbed ryegrass is not practical on the Black Prairie soils due to the wet nature of the soil in winter. There may be forage available on prepared seedbeds, but grazing animals do more forage stand damage while grazing than they receive benefit. The sod provided by the established perennial fescue gives footing for grazing

animals and allows for continual winter grazing, even under wet conditions. Sod is provided in a no-till ryegrass, but it has a high establishment cost, and provides only limited or no fall grazing, thus reducing grazing days and raising the costs of gain. Forage production from a no-till ryegrass system is generally in the spring when there is an overabundance of forage.

Rectal body temperatures for the steers taken on 11/11/03 had only a .5F variation since steers had been grazed and handled as a unit since weaning. Rectal temperatures remained similar throughout the winter and through the April weigh period. However, as forages began to mature in May, with more E+ endophytes in the forage terminals and seed heads, temperatures of the animals on the E+ varieties began to increase as animals ingested more toxins. Temperatures of steers grazing E+ fescues averaged 104.78 vs. 103.3 for those grazing novel varieties. Higher body temperatures are associated with lower gains; dull hair coats that fail to shed in hot weather; and may cause animals to be more aggressive and excitable due to these elevated body temperatures. Excitable animals tend to have higher temperatures than calmer natured animals grazing the same E+ fescues. Docile animals generally gain better than excitable ones in the pasture and the feedlot. Chute exit speed (1=normal - 3=rapid) has been used as a measure of excitability, and has been associated with a higher incidence of dark cutting carcasses at slaughter which greatly devalues the carcass.

Hair length and glossiness add value to cattle when they are marketed since a bloomy coat is an indication of well-being. Animals grazing infected fescue tend to have long, sun bleached reddish hair coats and buyers tend to pay less for them than for bloomy cattle. Hairs coat estimates for 5/25/04 were JN (2.3); Ga5N (1.7); JE+ (2.5); Ga5E+ (2.3); and Ky31E+ (2.7) on a 5.0 scale. The steers that grazed the novel varieties had slicker, shinier hair coats than those grazing E+ and thus makes them more desirable animals.

Summer Trial

In the summer trial, heifers were grazed for 75 days and weighed at trial initiation and termination (Table 1). Heifer gains followed the same pattern seen in the F/S trials done with steers. The heifers grazing novel fescues in the summer had significantly higher gains ($p < 0.05$) than did those on E+ fescues, independent of variety (Table 1). Gain was not the reason for the summer grazing, but it was interesting to see that the patterns continue to hold true for basically year round grazing. Forage stands did not appear to be reduced after summer grazing, but care was taken not to overgraze these cool season forages.

Forage stand evaluations made in the fall and spring of each year are presented in Table 2 for the spring and fall of 2004 and for the fall of 2003. Stand evaluations for 2002 are available but not reported since they did not differ from the fall of 2003. These estimates are made twice annually to evaluate stand persistence under grazing pressure. Even after summer grazing, stands for the novel fescues had only a slight decline, but did not decline to a level below which sufficient forage was available for grazing. Apparent stands may vary from year to year and a stand reduction may not become apparent until estimates continue to decline for two or more estimates in a row.

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Table 1. Steer and Heifer Average Daily Gains, starting and finish weights on Fescue Varieties

VARIETY	AN. NO. TT	TMT MEAN ADG IN POUNDS	STARTING WEIGHTS IN POUNDS	FINISH WEIGHTS IN POUNDS	TOTAL WT. GAIN FOR PERIOD
GA5N Fall 2003	10	1.72	483.7	821.0	337.3
Summer 2004	8	1.46	448.1	564.6	116.5
GA5E+ Fall 2003	10	1.34	510.7	772.8	262.1
Summer 2004	8	1.17	447.5	535.2	87.7
JN Fall 2003	10	1.60	513.7	826.6	312.9
Summer 2004	8	1.41	451.9	557.9	106
JE+ Fall 2003	10	1.57	529.4	837.3	307.9
Summer 2004	8	1.29	454.4	550.9	96.5
KY31E+Fall2003	10	1.29	499.4	751.8	252.4
Summer 2004	8	1.13	446.3	531.4	

Table 2. Estimated stand evaluations for fescues

Variety	Pasture	Fall 04	Spring 04	Fall 03
Ga5E+	5	95	92.5	95
JN 584	6	90	50.0	Planted
ArkPlus	7	Planted		
Ky31E+	8	95	88.5	95
JN	9	90	95	92.5
Ga5N	10	72.5	85	90
JE+	11	88.5	92.5	90
JN 584	12	82.5	50	Planted
JN	13	72.5	82.5	95
Ky31E+	14	96.5	95	95
Ga5N	15	65	92.5	95
Ga5E+	16	82.5	88.5	85
JE+	17	82.5	95	95
ArkPlus	18	Planted		