

# EVALUATION OF FUNGUS INFECTED, FUNGUS FREE AND NOVEL ENDOPHYTE FESCUES AS ROUGHAGE SOURCES FOR DEVELOPING REPLACEMENT HEIFERS

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**ABSTRACT:** Fescue is the most persistent perennial cool season forage available for use on the Blackland Prairie soils of eastern Mississippi. An estimated 35 to 40 million acres are grown in Mississippi and the rest of the south. 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 have the potential to provide the livestock producer with a forage that has the stand persistence of infected fescue and the animal production positives provided by the fungus free fescue. In this trial two of the novel or introduced endophyte fescues (IE), Georgia 5 and Jesup, were compared directly with their fungus infected and fungus free ecotypes. Infected Ky-31 was used as a standard. Crossbred replacement heifers were used to graze the paddocks. They were supplemented with soybean hulls when forage availability was less than forage needs. Gains for the 161 day trial in 2001 were not different except for endophyte infected Jesup, which was lower than any other fescue and gains recorded for all of the varieties fall within the acceptable range of 1.0 to 1.5 lb/day for replacement heifers. In 2002 heifers were grazed for 139 days and the ADG for all three GA5 varieties and the Jesup introduced endophyte (JIE) were significantly different ( $P < 0.05$ ), from the Jesup E-, Jesup E+ and KY 31 E+. The Jesup E+ variety had an identical ADG in both 2001 and 2002.

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**KEY WORDS:** Fescue, novel endophytes, 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 springs of 2000, 2001 and 2002 at the rate of 60 lb/ac N. The 1999 establishment year, was the second of three years of fall drought experienced in this area 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. Fescue stands were not only affected by the lack of rainfall but also by the fact that a high percentage of the new grass seedlings emerging were ryegrass. There had been no ryegrass planted in these paddocks for over twenty years. Due to the amount of ryegrass existing in the stand, we did not feel confident attributing all of the weight gains made by heifers in spring of 2000 solely to one of the grass types under investigation. Gains for all varieties were satisfactory but due to the ryegrass content, these gains will not be reported. The paddocks were clipped twice during the spring of 2000 to keep ryegrass from producing viable seed and few if any ryegrass seed matured. The stands in the paddocks in the fall of 2000 were essentially ryegrass free. In December 2000, 70 crossbred heifers, averaging 525 pounds each, were weighed and allotted to treatment groups. There were two replicates with 5 animals per replicate assigned to each of the seven grass treatments. All treatments were equally supplemented during the winter with hay and soybean hulls when adequate forage was not available. All paddocks were continually stocked for 161 continuous days beginning in early December through late May. In December 2001, 70 crossbred heifers, averaging 515 pounds were again assigned to these same pastures. They were continually grazed for 139 days, without supplementation, from 12/14/2001 until 5/2/2002. Heifers were bred artificially on a synchronized estrus on 5/2/2002 and turned out with a clean-up bull. The data was subjected to an ANOVA utilizing the SAS system.

**RESULTS AND DISCUSSION:** Gains, finish weights, and breeding percentages for the 161-day trial in 2001 and the 139-day trials for 2002 are given in Table 1. In 2001, heifer gains between varieties were not significantly different except for JE+. Gains for the entire 161 trial fell within the 1.0 to 1.5 pounds ADG, from weaning to breeding, necessary for heifers to reach puberty and to breed to calve as two-year olds. In 2002, the ADG for all three GA5 varieties and the Jesup introduced endophyte (JIE) were different, ( $p < 0.05$ ), from the Jesup E-, Jesup E+ and KY 31 E+. The Jesup E+ variety had an identical ADG in both 2001 and 2002.

Heifers on the endophyte free fescues did not perform as well as expected in the final 21 days of the trial in 2001 and this was thought to be reflective of stand thinning. The drought of 2000 was extremely hard on all vegetation and weakened stands. Stand thinning appeared to continue into 2002 as reflected by the lower gains on the Jesup E- variety, however, the ADG for GA5E- was numerically greater in 2002, despite an apparent stand reduction. In October 2002, a visual estimation of the stands in the E- pastures, by two independent appraisers, and recorded an estimated 25% stand in one GA5E- pasture and 20% in the other. In the JE- pastures, the estimates were 10 % and 15%.

The gains from the endophyte-infected varieties in 2001 were somewhat higher than expected but a cooler spring than usual may have lessened the effects of the endophyte. Average daily gains for the entire trial period in 2002 were not different between the E+ varieties than those in 2001.

Pregnancy rates between varieties did not differ from 2001 except for the introduced endophytes. Both the GA5 and Jesup were higher in 2002 and probably more reflective of the performance of heifers on these fescues. The 90% pregnancy rate recorded for the JE- variety was somewhat surprising due to the low ADG of 1.01 and the low final weight of the heifers. Substantially larger body weight heifers, grazing the E+ varieties, failed to breed.

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**Table 1.** Heifer Gains, finish weights and breeding percentages on Fescue Varieties

<b>VARIETY</b>	<b>AN. NO.</b>	<b>TMT MEAN ADG IN POUNDS</b>	<b>FINISH WEIGHTS IN POUNDS</b>	<b>BREEDING %</b>	
<b>GA5NE</b>	<b>2001</b>	<b>10</b>	<b>1.57</b>	<b>792.2</b>	<b>5/9 55.5%</b>
	<b>2002</b>	<b>10</b>	<b>1.53</b>	<b>735.5</b>	<b>8/10 80.0%</b>
<b>GA5E+</b>	<b>2001</b>	<b>10</b>	<b>1.52</b>	<b>767.0</b>	<b>9/10 90.0%</b>
	<b>2002</b>	<b>10</b>	<b>1.49</b>	<b>715.0</b>	<b>7/10 70.0%</b>
<b>GA5E-</b>	<b>2001</b>	<b>10</b>	<b>1.38</b>	<b>747.5</b>	<b>7/8 87.5%</b>
	<b>2002</b>	<b>10</b>	<b>1.52</b>	<b>725.0</b>	<b>8/10 80.0%</b>
<b>JNE</b>	<b>2001</b>	<b>9</b>	<b>1.54</b>	<b>793.3</b>	<b>2/6 33.3%</b>
	<b>2002</b>	<b>10</b>	<b>1.45</b>	<b>717.0</b>	<b>9/10 90.0%</b>
<b>JE+</b>	<b>2001</b>	<b>10</b>	<b>1.23</b>	<b>746.7</b>	<b>4/6 67.0%</b>
	<b>2002</b>	<b>10</b>	<b>1.23</b>	<b>697.0</b>	<b>7/10 70.0%</b>
<b>JE-</b>	<b>2001</b>	<b>10</b>	<b>1.44</b>	<b>785.8</b>	<b>5/6 83.0%</b>
	<b>2002</b>	<b>10</b>	<b>1.01</b>	<b>639.0</b>	<b>9/10 90.0%</b>
<b>KY31</b>	<b>2001</b>	<b>10</b>	<b>1.39</b>	<b>757.3</b>	<b>6/8 75.0%</b>
	<b>2002</b>	<b>10</b>	<b>1.15</b>	<b>686.5</b>	<b>6/10 60.0%</b>