FINAL REPORT TO DAKOTA COMMODITIES
NORTHEAST MISSOURI GRAIN AND GOLDEN TRIANGLE ENERGY

Jim Williams, Professor, Beef Cattle Nutrition
Blaine Corners, Ph. D. Graduate Student

Forty-eight head of Angus crossbred heifers (258.1 kg) were randomly assigned to four 2-acre tall fescue pastures. The heifers were either placed on Kentucky-31 tall fescue, which was infected with endophyte(HE), or phyter tall fescue which had a low level of endophyte infection (LE). Within each pasture, 12 heifers were assigned to four treatments which were: 1) Control- .24 lbs. of soyhulls supplement; 2) 1 lb. of DDGS; 3) 2.0 lbs. of lb. of DDGS; and 4) 3.0 lbs. of DDGS. As shown in Table 1, soyhulls, molasses, limestone, and trace mineral salt made up the control, while DDGS was added to the treatment supplements. The supplements were fed to provide 1, 2, or 3 lbs of DDGS per animal daily with adjustments made based on body weight deviation from the mean of each treatment. The pastures were clipped approximately 8 inches from the ground in order to remove seed heads prior to placing heifers on pasture.

The forage availability was measured in each pasture by randomly placing a .1 M square quadrant in the pasture at 10 different locations prior to grazing and after heifers were removed from the pasture. Heifers remained on the tall fescue pastures for 10 to 14 days prior to rotation to another clipped pasture.

At 0800 hrs daily, heifers were taken off pasture and placed in stanchions in order to feed the supplemental treatments. They were individually fed the supplemental treatments for 30 minutes, and then placed back on pasture. Refusals of supplement were recorded throughout the study in order to determine actual dry matter intake of supplement as presented in table 2. On day 1, heifers were vaccinated with Pyramid 4 plus Presponse, vision 7, and Piligard pinkeye vaccines. They were implanted with Synovex-H and dewormed with Cydectin pour-on endectocide. Fly tags were inserted in the left ear and changed every 28 days.

Animals were weighed on two consecutive days at the start and end of the 70-day grazing study in an attempt to minimize fluctuation in animal weights. Weights were also taken on days 28 and 56 of the trial. As shown in table 2, the dry matter intakes of supplement and crude protein were tabulated for each treatment. The gain to protein intake ratios were tabulated for the DDGS supplement relative to the soyhull control. The trial started June 11, 2001 and was completed August 20, 2001. The design of the trial was 4 X 2 factorial arrangement with endophyte level and level of supplementation as main effects. Main effects and interactions were analyzed as a split-plot in time using SAS. Overall performance was analyzed as an ANOVA using SAS. The level of endophyte in the tall fescue pastures did not affect ($P > .05$) daily gains of heifers; there were also no pasture by treatment interactions. As a result, the effects of level of DDGS as a supplement on daily gain of heifers will be presented in Table 3.

Results and Discussion

As expected, heifers had increasing actual supplemental dry matter intakes as level of DDGS increased (Table 2). These dry matter intakes were 4.7, 9.6, and 14 fold greater than that for the soyhulls control. As shown in Table 3, beginning weights of heifers were similar among treatments. The final weights of heifers were numerically greater ($P < .16$) for the 2 and 3 lbs of DDGS treatments as compared to soyhulls and 1 lb of DDGS treatments. The addition of 1 and 2 lbs of DDGS linearly increased ($P < .02$) average daily gain as compared to the soyhulls control. The addition of 3 lbs of DDGS resulted in no further increase in average daily gain of heifers. The ability of 1 and 2 lbs of DDGS to increase average daily gain of heifers was attributed to the additional protein and energy available to heifers relative to that provided by the tall fescue pasture. From these data, one may infer that 2 lbs of DDGS were sufficient to meet protein and energy requirements of heifers grazing tall fescue pastures exposed to these environmental conditions. As shown in table 2, the average daily gain relative to daily supplemental protein intake was expressed relative to gain and protein intake from the soyhulls control. The gain to protein intake ratios for the 1 and 2 lbs of DDGS treatments were numerically greater ($P < .14$) than that of the 3 lbs. of DDGS treatment, reflecting the differences in protein intake relative to rates of gain for heifers. The failure of 3 lbs. of DDGS to elicit a further increase in average daily gain may be attributed to the effects of the elevated ambient temperature in July and August in increasing energy required to metabolize the additional protein from the 3 lbs. of DDGS fed to heifers. Similar responses to excess dietary protein fed to growing cattle grazing tall fescue have been observed in our laboratory (Williams, 1999).

As shown in Table 3, there were no differences in cost of gains among the levels of DDGS fed to heifers. The lack of differences in cost / lb of gain among treatments was attributed to the large variation in cost / lb of gain among animals due to the variation of average daily gain. When treatment costs / lb of gain were expressed as total treatment costs / total weight gain, the 2 lbs of DDGS has the lowest cost / lb of gain ($ .294 relative to the soyhulls control, 1 lb of DDGS and 3 lbs of DDGS treatments ($ .556 / lb, $ .36 / lb of gain, and $ .356 / lb of gain, respectively). The low daily gains for the SH treatment resulted in the highest cost of gains. In summary, 2 lbs. of supplemental DDGS resulted in the greatest gains and lowest cost of gain for heifers grazing tall fescue pastures.

Table 1. Supplement Composition (DM Basis).

Item	Soyhull	1DDGS	2DDGS	3DDGS
Ingrediet, %				
DDGS		95.17	94.98	95.93
Soyhulls	95.35			
Limestone		2.16	2.69	1.81
Molasses	2.04	2.02	2.01	2.04
TM Salt[a]	2.61	0.65	0.32	0.22

[a] Contained 10% Fe min., 10% Mn min., 10% Zn min., 2% Cu min., 500ppm Co, 1000ppm I and 1500ppm Se.

Table 2. Supplement Intake.						
Item	Soyhull	1DDGS	2DDGS	3DDGS	SE	P<
Intake, (g/d)						
Supplement DM$_{a,b,c,d}$	99.7a	469.0b	957.9c	1399.8d	0.709	0.0001
Crude Protein$_{a,b,c,d}$	10.5a	110.9b	226.4c	334.0d	0.168	0.0001
Gain to Protein, kg:kg$_{e}$						
Overall	n/a	2.18	1.72	0.95	0.389	0.14

$_{a,b,c,d}$ Means without a common subscript differ (P<.02)

$_{e}$ Gain to Protein relative to protein consumption and gain of SH control.

Table 3. Perfomance Data.						
Item	Soyhull	1DDGS	2DDGS	3DDGS	SE	P<
Beginning Weight, kg	260	257.2	257.4	260.2	7.3	0.78
Ending Weight, kg	273.8	282.6	294.7	295.6	14.8	0.16
ADG, (kg/d)$_{d}$						
Overall (70 d)	0.2$_{a}$	0.36$_{b}$	0.53$_{c}$	0.51$_{b,c}$	0.06	0.02
Cost of Gain, per lb. $_{d,e}$	1.33	0.532	0.435	0.42	0.34	0.42

$_{a,b,c}$ Means without a common subscript differ (P<.10)

$_{d}$ No pasture, or treatment x time interactions were observed.

$_{e}$ 2 animals were excluded from Cost of Gain calculations due to loss of weight over course of trial.

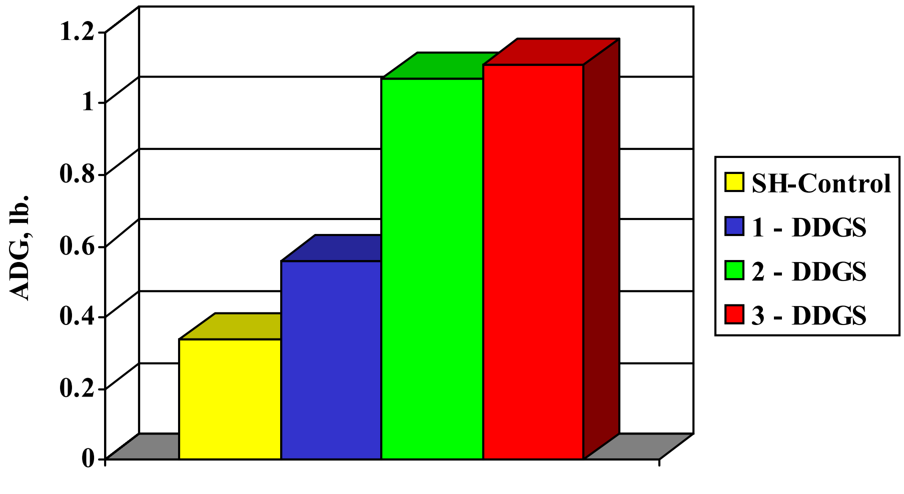
$_{e}$ Costs based on : DDGS, $110/T; Soyhulls, 75/T; Limestone, 184/T; RTM Trace Mineral, 840/T and Pasture Cost, $7.00/30 days.

$_{e}$ Treatment Cost/lb gain: SH, $.556/lb; 1DDGS, .360/lb; 2DDGS, .294/lb; 3DDGS, .356/lb. Calculated as Total Treatment Cost/Total Treatment Weight.

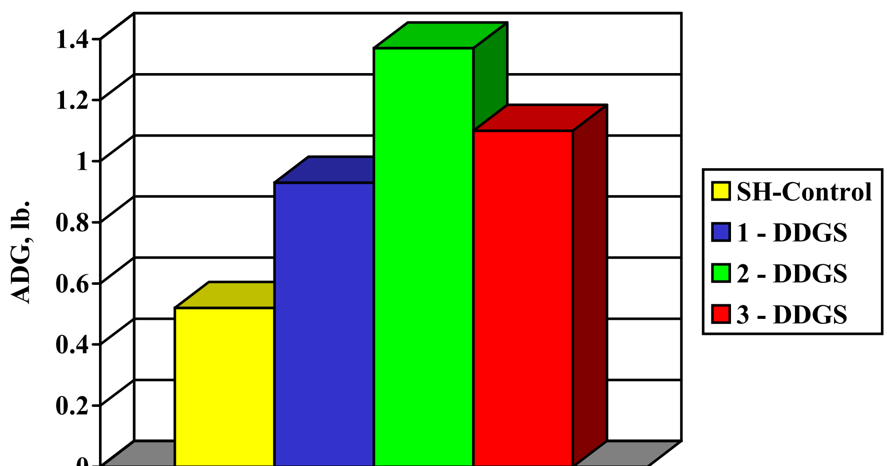
Table 4. Comparison of DDGS Batch 1 and Batch 2.		
Parameter	Batch 1	Batch 2
Dry Matter, %	91.77	89.29
Nitrogen, %	4.3	4
Crude Protein, %	26.87	25.01
ADF, %$_{a}$	10.75	13.99
NDF, %$_{b}$	38.35	38.05
Ether Extract, %	7.35	14.31
Calcium, %		0.04
Phosphorus, %		0.87

$_{a}$ Acid Detergent Fiber

$_{b}$ Neutral Detergent Fiber



ADG on High Endophyte Pastures



ADG on Low Endophyte Pastures