Brief Research Update: Improving Reproductive Performance of Beef Cattle Through Fat Supplementation

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Introduction

Previous studies have shown that adding supplemental fat to the diet of beef cows can have a beneficial effect on reproduction. Although simply increasing the energy content of the diet can have a beneficial effect, especially for thin cows, fat supplementation has been shown to improve reproduction independent of increased energy intake. However, results have not been consistent; while some studies have shown improved pregnancy rates, other studies haven't been able to produce this improvement. This difference in results may be due to the different types of fat used, the timing of supplementation relative to breeding, or other dietary factors that may affect the nature of the fat absorbed by the cow.

In Kentucky, and the rest of the Southeastern US, one of the primary factors limiting pregnancy rates in beef cows is the presence of endophyte in the majority of tall fescue pastures. The way in which the chemicals produced by these endophytes affect reproduction is not clear. However, research information suggests that some of the hormonal effects of the endophyte are opposite those seen when adding supplemental fat to the diet. Thus, dietary fat supplementation may be particularly beneficial for beef cows grazing endophyte-infested tall fescue pastures.

Many spring calving cows in Kentucky are maintained in small herds that continuously graze pastures dominated by endophyte infected fescue by producers with off-farm jobs. In these situations, producers may not have the labor to provide supplements on a daily basis and may not have the financial and technical resources to alter pasture composition in an attempt to reduce the negative impact of fescue toxicosis. Likewise, larger operations may not be able to justify these inputs, and certainly would like to avoid the decreased fertility associated with fescue toxicosis. One approach to minimizing labor inputs for supplementation is to use a liquid supplement that can be fed on a free-choice basis. This experiment was conducted to assess the effect of a high-fat liquid supplement on pregnancy rates and associated physiological responses in heat-stressed, spring-calving, lactating beef cows grazing endophyte-infested tall fescue.

Methods

One hundred thirty Angus cows (initial body weight = 1247 lb; initial body condition score = 5.6 on a 1 to 9 scale) at 2 locations (80 cows at the UK Animal Research Center, 50 cows at the UK Princeton Research Center) were allotted to 8 (ARC) and 4 (Princeton) endophyte-infested tall fescue pastures. Pasture groups were balanced for calf birth date, calf sex, cow age, cow body condition score, and cow weight. Within each location, half of the groups were randomly assigned to receive either a commercial liquid supplement containing approximately 22% fat (MIX-30, AgriDyne, Inc) or a corn/soybean meal supplement (control) fed to provide similar amounts of metabolizable energy and crude protein. Supplementation started 30 days before breeding and lasted through the last day of the 60-d breeding season. Cows were offered MIX-30 twice weekly on a free choice basis up to 6 lb/hd/d; control groups were fed supplement daily with intakes adjusted twice weekly to match intakes observed with the MIX-30 groups.

Results

Results are shown in Table 1. The effects of the supplementation treatments were similar at the two locations (treatment x location interactions P > 0.10). Cows receiving MIX-30 gained more weight (P = 0.06), and body condition (P < 0.01) than cows receiving the control supplement. Cows receiving MIX-30 had higher pregnancy rates (P = 0.02) than cows receiving the control supplement as determined by ultrasound 35 d after end of breeding season. Cows receiving MIX-30 had lower final body temperatures (P < 0.01) and a greater body temperature decrease (P < 0.01) compared to cows receiving the control supplement. At ARC, cows receiving MIX-30 had lower serum thyroxine concentrations (P < 0.01) than cows receiving the control supplement; serum thyroxine levels were not checked at Princeton. Final calf weights and calf average daily gains were unaffected (P > 0.10) by treatment.

This experiment showed that free choice provision of a commercial liquid feed supplement with 22% fat, from 30 days prior through the last day of a controlled breeding season improved pregnancy rates of cows grazing endophyte infected pasture in the face of severe heat stress compared to cows provided a corn-soybean meal supplement with similar levels of energy and protein. Although the way in which fat exerts effects on pregnancy rates is still unclear, it is possible that part of the response on endophyte-infested fescue is related to decreases in heat stress.

Cost Comparison

At the time of this writing, Mix 30 was quoted at $130/ton f.o.b. Richmond KY. At an intake level approximating those used in this study of 5lb/hd/d, this would cost $0.33/hd/d. Over a 90 day feeding period as used in this study, this supplement would cost $29.70 per cow. Based on the analysis provided in company literature it would take 2.5 lb/hd/d of a 58:42 SBM/corn mix to provide the same amount of calories and crude protein. At $2.60/bu for corn and $181/ton for 48% SBM, this would cost $0.18/hd/d or $16.20 per cow over a 90 day feeding period as used in this study. On a 100 cow herd this comes to a direct feed cost of $2970 for Mix 30 compared to $1620 for corn/SBM. Based on the results of this study, over a 100 cow herd there would have been an additional 19 pregnancies if supplemented with MIX 30 versus corn/SBM supplementation. At a 95% weaning rate this would mean another 18 calves to market; at a value of $375/calf, this equates to an additional $6750.

Table 1. Effect of fat-containing, liquid supplement vs. control supplement on cow and calf response variables.

	Supplement		SEM[a]	P-value[b]
	Control	Mix-30		
Cow weight, lb				
Initial	1264	1230	21.5	0.25
Final	1276	1262	22.0	0.66
Change, lb	11	32	7.9	0.06
Cow body condition, 1-9 scale				
Initial	5.75	5.39	0.12	0.04
Final	5.59	5.62	0.13	0.88
Change	-0.18	0.22	0.08	0.0009
Calf weight, lb				
Initial	237	235	6.3	0.80
Final	377	374	7.8	0.77
Change	140	139	3.1	0.98
Cow body temp, °F				
Initial	102.5	102.4	0.09	0.31
Final	102.7	101.9	0.12	<0.0001
Change	0.15	-0.50	0.12	<0.0001
Pregnancy Rate, %	56.4	75.3	6.0	0.03
Serum Thyroxine, ng/mL[c]	40.2	35.1	1.0	0.0007

[a] Standard error of the mean.

[b] Probability of a greater F-value for the treatment comparison.

[c] Thyroxine concentrations for cows at ARC only, cows at Princeton not sampled.