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Prepartum supplementation influences response to timed artificial insemination by suckled mature beef cows

Abstract

Fat supplementation before calving (i.e., prepartum) can alter reproductive performance of beef cows. These effects do not seem to be related to energy or protein content of the supplement. Chemical structures of some plant fats are similar to chemical structures of certain reproductive hormones; moreover, some fats are precursors to prostaglandin production. Prepartum vegetable fat supplementation has been associated with improved reproductive performance by cows and heifers managed for artificial insemination (AI) breeding. The biological basis for this effect is not clearly understood but is believed to reflect the influence of fat supplements on cyclicity, body weight, body condition, and other factors. Our objective was to evaluate the effects of supplementing whole fuzzy cottonseed or whole raw soybeans on pregnancy rates following ovulation synchronization and timed AI of mature beef cows.

Keywords

Cattlemen's Day, 2008; Kansas Agricultural Experiment Station contribution; no. 08-212-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 995; Beef; Cattle; Artificial insemination (AI)

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PREPARTUM SUPPLEMENTATION INFLUENCES RESPONSE TO TIMED ARTIFICIAL INSEMINATION BY SUCKLED MATURE BEEF COWS

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Introduction

Fat supplementation before calving (i.e., prepartum) can alter reproductive performance of beef cows. These effects do not seem to be related to energy or protein content of the supplement. Chemical structures of some plant fats are similar to chemical structures of certain reproductive hormones; moreover, some fats are precursors to prostaglandin production. Prepartum vegetable fat supplementation has been associated with improved reproductive performance by cows and heifers managed for artificial insemination (AI) breeding. The biological basis for this effect is not clearly understood but is believed to reflect the influence of fat supplements on cyclicity, body weight, body condition, and other factors. Our objective was to evaluate the effects of supplementing whole fuzzy cottonseed or whole raw soybeans on pregnancy rates following ovulation synchronization and timed AI of mature beef cows.

Experimental Procedures

Cows ($n = 188$; average initial body weight = 1239 ± 84 lb) at the Kansas State University Commercial Cow-Calf Unit were stratified by body condition score and body weight and assigned randomly to one of three supplementation treatments: 1) whole raw soybeans, 2) whole fuzzy cottonseed, or 3) a mixture of 50% ground corn and 50% soybean meal (control). Cows were weighed, assigned a body condition score, and assigned to one of four similar pastures in mid-January 2007.

Each pasture contained 47 cows (15 or 16 per treatment).

Supplements were fed to cows beginning 45 days before the first projected calving date (April 1). Cows were gathered from pastures four times weekly at 6:00 am and sorted by treatments into feeding pens. Supplements were hand fed to individual treatment groups at approximately 7 lbs per cow (dry matter basis) at each feeding episode. The daily equivalent was approximately 4 lbs per cow. Supplements supplied similar protein and energy to cows at prescribed feeding rates. At calving, cows were weighed and assigned a body condition score. Calves also were weighed at that time. Thereafter, all cows were fed the control supplement until May 15.

Ovulation was synchronized using the Cosynch + controlled internal drug release (CIDR) protocol and then inseminated by appointment on June 21. Blood was collected 21 and 10 days before initiating the Cosynch + CIDR protocol. Blood samples were assessed for serum concentrations of progesterone to assess estrous cyclicity and prior ovulation. Beginning 10 days after AI, cows were exposed for natural service breeding for 50 more days. Conception to AI and overall pregnancy rates were assessed 33 and 66 days after AI, respectively. Cows were again weighed and assigned a body condition score at the beginning and end of the breeding season. Calf weights were measured at the end of the breeding season.

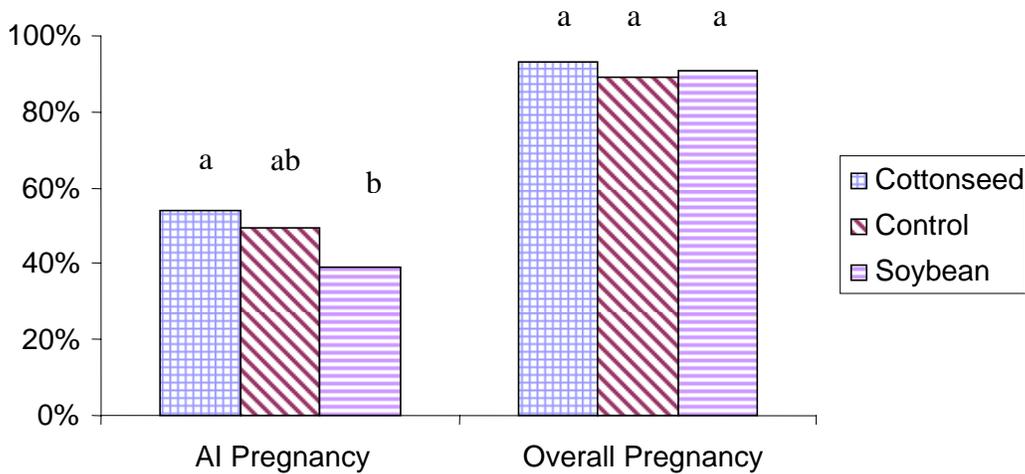
Results and Discussion

Body weight and body condition score of cows at calving was similar ($P > 0.5$) across treatments; however, cows feed whole fuzzy cottonseed lost more body weight and more body condition from the beginning of the trial to calving ($P < 0.03$) than cows fed whole raw soybeans. The proportion of cows that had previous estrous cycle activity (i.e., increased serum concentrations of progesterone) did not differ ($P = 0.85$) among treatments. Conversely, supplementation with whole fuzzy cottonseed was associated with increased AI conception compared with whole raw soybeans ($P = 0.05$) but not compared with the control treatment (Figure 1; $P = 0.58$; 49, 39,

and 54% for control, whole raw soybeans, and whole fuzzy cottonseed, respectively). Final pregnancy rates at the end of the breeding season were similar ($P = 0.74$) among treatments; moreover, no treatment differences ($P > 0.28$) were detected in cow body weight or body condition score by the end of the natural-service breeding season. Calf birth weights and calf weights at the end of the breeding season also were similar ($P > 0.37$) among treatments.

Implications

Source of prepartum supplemental fat fed to mature beef cows can affect conception response to timed AI.



^{ab}Means within a bar cluster without a common superscript letter differ ($P < 0.05$).

Figure 1. The Effect of Supplement Type on Conception to AI and Overall Pregnancy Rate.