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Effects of growth promoting implant strategies on performance of pre- and postweaned beef calves

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ABSTRACT

One hundred crossbred steers (BW = 166 ± 26.6 kg) were stratified by birthdate over 2 yr and assigned to 1 of 3 treatments: NI: not implanted; WN: implanted only at weaning with 40 mg of trenbolone acetate + 8 mg of estradiol; and CF: implanted twice—once with 100 mg of progesterone + 10 mg of estradiol at calfhood vaccination (100 d of age) and once at weaning with 40 mg of trenbolone acetate + 8 mg of estradiol. Calf BW was recorded at weaning and on d 28, 45, and 80. At d 80, intramuscular fat, fat thickness over the 12th rib, LM area, and rump fat were measured via ultrasound. Because of dry conditions, calves in yr 1 were early weaned, whereas calves in yr 2 were weaned normally. Data were analyzed separately for 2 yr using a linear model. In yr 1, CF had greater prewean BW gain (P = 0.04) compared with their counterparts, and WN and CF had greater ADG 28 d after weaning and a tendency ($P < 0.14$) for greater ADG after weaning. In yr 2, CF and WN had greater BW, ADG, and total BW gain for the overall postweaning period ($P \leq 0.05$). Both CF and WN had greater lifetime ADG compared with NI in both years ($P \leq 0.04$). All 3 treatments differed ($P = 0.05$) among each other in yr 2, with CF and WN having the least amount of intramuscular fat. Results suggest that variable results to growth promoting implants are noted when applied at different stages of calf production.

Key words: beef calf, growth promoting implant, weaning

INTRODUCTION

The use of growth promoting implants to improve beef cattle productivity is well documented (Kuhl, 1996). In a review of research conducted in the 1970s, growth promoting implants increased BW gain up to 10 kg through a season in grazing cattle (Sewell, 1990) and led to anywhere from 10 to 16% improvement in ADG (Gill et al., 1995). In addition, Selk (1996) determined that implanting suckling beef calves can increase ADG 0.5 kg/d in steers and 0.5 to 0.6 kg/d in heifers from implanting (at calfhood vaccination) to weaning. Reimplanting steer calves twice during the suckling phase increased ADG by about 1.3 percentage units compared with a single implant (Selk, 1997). Despite these benefits, only 11.9% of cow/calf operations implant their calves at any point before and at weaning (NAHMS, 2008). This lack of use might be due to variable responses noted by cow/calf producers who implant. Duckett and Andrae (2001) noted a more consistent response for implanting is observed in stocker cattle than with suckling calves, possibly due to stockers typically having a greater plane of nutrition and being at a later stage of growth and development. Cattle must have adequate nutrition before implants can positively influence feed efficiency and gain. Gill et al. (1986) demonstrated that calves implanted in the winter did not respond to implants until forage qual-

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ity increased. Similarly, Rumsey and Hammond (1984) were unable to detect a response to growth promoting implants when diets were energy restricted. Although many studies have demonstrated the lifetime effect of growth promoting implants (Calkins et al., 1986; Duckett and Andrae, 2001; Platter et al., 2003), because of the segmented nature of the beef industry there are many producers who do not retain ownership for that period of time. Approximately 49% of beef cow/calf operations sell calves immediately at weaning, with only 30% retaining calves 1 to 61 d after weaning for preconditioning programs (NAHMS, 2008). Despite data demonstrating lifetime benefits (Platter et al., 2003), inconsistent reports have been noted with implanting suckling calves (Mader et al., 1985; Gill et al., 1986); moreover, with duration of the stress response noted at weaning (Loyd et al., 2011), it is unclear whether response to growth promoting implants would be noted following weaning. Therefore, it is uncertain whether producers who have a limited ownership period (at weaning or for a period after weaning) would benefit from the use of growth promoting implants at specific segments of ownership. Thus, the scope of this project was to examine the effects of implants given to beef steers before and at weaning.

MATERIALS AND METHODS

All procedures were approved by the Institutional Animal Care and Use Committee of Mississippi State University. All studies occurred at the Mississippi Agricultural and Forestry Experiment Station, White Sand Branch Unit, in Poplarville (lat 30.796628, long −89.688874).

Yr 1

In yr 1, 44 crossbred beef calves (*Bos taurus* × *Bos indicus*; average BW = 166 ± 25 kg) were stratified by birthdate and assigned to 1 of 3 treatments: **NI**: no implant; **WN**: implant only at weaning with 29 mg of tylosin tartrate + 40 mg of trenbolone acetate + 8 mg of estradiol (Component, TE-G with Tylan; Elanco, Greenfield, IN); and **CF**: implanted twice; once at calfhood vaccination with 100 mg of progesterone + 10 mg of estradiol (Synovex C, Zoetis, Florham Park, NJ) and once at weaning with 29 mg of tylosin tartrate + 40 mg of trenbolone acetate + 8 mg of estradiol (Component TeG with Tylan, Elanco).

Calving season occurred from December until February. At birth or shortly thereafter (<4 d of age), calves were individually ear tagged, bull calves were surgically castrated, and birthdate and dam information were recorded. At approximately 111 ± 26 d of age, calves were vaccinated with infectious bovine rhinotracheitis, parainfluenza virus-3, and bovine virus diarrhea (**IBR-PI$_3$-BVD**) modified live (Pyramid 5, Boehringer Ingelheim, St. Joseph, MO) and 7-Way clostridial (Clostrishield 7, Elanco) and treated with an anthelmintic (ivermectin and clorsulon; Ivomec Plus; Merial, Duluth, GA), which is typical management at White Sand Branch Unit. Steers in the CF group were implanted with 100 mg of progesterone + 10 mg of estradiol (Synovex C, Zoetis). Additionally, an individual BW was recorded for each calf. Following processing calves were returned to their dams and returned to grazing. At this time, grazing management consisted of rotation between annual ryegrass (*Lolium multiflorum*) and Argentine bahiagrass (*Paspalum notatum* Flugge). In early May, cows and calves grazed out annual ryegrass before getting moved into bahiagrass pastures. In all instances, cows and calves had ad libitum access to a complete mineral mixture (12:12 Mineral, Sweetlix, Mankato, MN; Table 1).

Because of extremely dry conditions in southern Mississippi, it was determined by personnel at the White Sand Branch Unit to early wean the calves in an effort to extend the forage base for the cows; therefore, calves were weaned at 171 ± 24 d of age. At weaning, calves were physically separated from their dams, revaccinated with IBR-PI$_3$-BVD modified live (Pyramid 5, Boehringer Ingelheim) and 7-Way clostridial (Clostrashield 7, Elanco) and dewormed with anthelmintic (ivermectin and clorsulon; Ivomec Plus, Merial), and steers in the WN and CF groups were implanted with 29 mg of tylosin tartrate + 40 mg of trenbolone acetate + 8 mg of estradiol (Component TE-G with Tylan, Elanco). Following processing, calves were collectively moved to a drylot where they had free-choice access to dry hay and were provided 4.54 kg per calf per day of a weaning ration (Table 2). Hay was produced on site and consisted of bermudagrass + bahiagrass mixture (10.4% CP, 51% TDN, based upon pooled averages of hay fed over that year). Cattle were maintained on this feeding regimen for the postweaning period. Following weaning, calves were weighed on d 28, 45, and 80, and at d 80 ultrasound measurements of LM area, fat thickness over the 12th rib, and percentage of intramuscular fat (**IMF**) were obtained. Day 45 was selected as a weigh period, because many producers who background calves before sale will adhere to the 45-d period requested by many buyers. The scope

Table 1. Nutrient composition of beef cow mineral fed to cows and calves[1]

Item	Concentration
Calcium, %	11.25
Phosphorus, %	12.00
Salt, %	14.00
Magnesium, %	1.00
Cobalt, mg/kg	15.00
Copper, mg/kg	800.00
Iodine, mg/kg	35.00
Manganese, mg/kg	3,200.00
Selenium, mg/kg	26.00
Zinc, mg/kg	2,300.00
Vitamin A, KIU/kg	220.26
Vitamin D, KIU/kg	22.03

[1]Based on guaranteed analysis on label.