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R.H. Pritchard
South Dakota State University

A.R. Taylor
North Dakota State University

S.M. Holt

K.W. Bruns
University of Nebraska

H.M. Blalock

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Time of suckling implant influences on weaning weight, post-weaning performance, and carcass traits in steer calves[1]

R.H. Pritchard[2], A.R. Taylor[3], S.M. Holt[4,] K.W. Bruns[5], and H.M. Blalock[6]

[2]Department of Animal Science, South Dakota State University, Brookings, SD
[3]North Dakota State University, Carrington, ND
[4]Nutrition Service Association, Australia
[5]University of Nebraska, North Platte, NE
[6]Quality Liquid Feeds, WI.

SUMMARY

The effect of time of suckling calf implant (SCI) use on weaning weight (WW), post-weaning performance and subsequent carcass traits was compared in steer calves produced on one ranch in western SD. Calves were born in March and April of each year and were reared on native range prior to weaning. The SCI strategies used included: non implanted controls (NI) or implanted with Synovex C either in May (MAY), or August (AUG). Age groups of dams (<4 years or ≥4 years) were managed separately through the breeding seasons. At weaning (late October) all calves were weaned and relocated to the SDSU Ruminant Nutrition Center feedlot. Steers were individually weighed, vaccinated, and treated for parasites and the processing body weight recorded was considered the WW. Steers were sorted into feedlot pens by SCI treatment (8 or 9 steers/pen; 8 pens/treatment; 24 pens/yr). Steers were backgrounded and finished using diets and management typical for this region and included the use of implants uniformly across SCI treatments. Both the MAY and AUG implant treatments increased WW over non-implanted calves. The magnitude of this was response interacted with the age of the dams. Steers nursing mature cows and implanted in May had the greatest increase in WW over NI (40 lb). The WW advantage for steers nursing mature cows and implanted in August was reduced to 17 lb. Timing of implant administration had the opposite effect in young cows and was more beneficial when steers were implanted in August. The weight advantage due to suckling implants persisted through to carcass weight. The SCI treatments did not affect the post-weaning ADG or feed efficiency of the steers and had no adverse effects on Quality Grade of the carcasses produced. There was a substantial benefit to the cow calf producer to match the time of implant administration with the age of the dam with no adverse impact on overall beef production.

INTRODUCTION

It is prudent to occasionally take time to confirm continued efficacy of technologies we have in use as commercial cattle production models evolve. Typically suckling phase implants are administered between the end of calving and onset of the breeding season. With the dramatic improvements in calf growth that have occurred since implants were introduced, this may no longer be the optimal time to administer the implant. Pre-weaning vaccinations administered in late summer create a convenient opportunity to implant calves at an older age. In a preliminary study we saw a significant increase in WW

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when implants were administered during the vaccination process 30 d pre-weaning. The magnitude of the response was sufficient to merit an investigation into the preferred time to administer suckling calf implants. Another consideration regarding the practice of implanting suckling calves is the concern that this practice could diminish post-weaning steer performance. This experiment was designed to evaluate the efficacy of use and timing of suckling calf implants under conditions typical of a western SD cow-calf production system, and to account for potential impacts on post-weaning cattle performance.

MATERIALS AND METHODS

The study was repeated over 2 consecutive years using Angus and Angus x Limousin steer calves from a ranch located in western SD. All experiments were approved by the SDSU Institutional Animal Care and Use Committee.

Calving season on the cooperating ranch was March and April. In May every 3rd bull calf that was restrained for castration, vaccination, and branding was implanted. In August, every 2nd calf restrained during a revaccination process that was not implanted in May, was implanted. This resulted in steer calves (yr 1=194; yr 2=196) allotted into 1 of 3 treatments: 1) no implant (NI); 2) Synovex C (Zoetis, Florham Park, NJ) implant administered in May (MAY); or 3) Synovex C implant administered in August (AUG). Specific dates for implanting suckling steer calves were: Yr 1) May 18 and Aug 29-30; and Yr 2) May 21-22 and Aug. 17 & 18. Dam age was classified as immature dams < 4 years of age (IMM); or mature dams ≥ 4 years of age (MAT). Dam age groups were managed separately on the ranch through the breeding season each year. Cows and calves were managed on native range (without creep feed).

In late October steers were weaned and immediately shipped 360 mi to the SDSU Ruminant Nutrition Center research feedlot. Upon arrival at the feedlot, steers had overnight (10 h) access to water and long-stem grass hay prior to processing. At initial processing individual body weights were recorded and steers were vaccinated against viral antigens related to respiratory disease using Resvac 4/ Somubac (Zoetis, Florham Park, NJ) and clostridial organisms using Ultrabac 7 (Zoetis, Florham Park, NJ). Steers were treated for internal and external parasites using Dectomax (Zoetis, Florham Park, NJ). The BW collected at this time was considered calf WW. Steers were sorted by implant treatment, then stratified by WW and randomly assigned to a pen resulting in 8 pens per implant treatment, (8 or 9 steers per pen), for 24 pens total each year. Steers were implanted with Synovex S (Zoetis, Florham Park, NJ) a few days (Yr 1=6 d; Yr 2=5 d) following arrival to the feedlot. Steers were then re-implanted at the beginning of the finishing phase (Yr 1=70 d; Yr 2=77 d from initial implant) with either a Revalor S (Merck, Summit, NJ) or a Ralgro (Merck, Summit, NJ) implant. Steers that received a Ralgro implant at the beginning of the finishing phase were re-implanted (Yr 1 = 127 d; Yr 2 = 139 d from initial implant) with Revalor S.

The backgrounding diet consisted mainly of corn silage and dry rolled corn (10.9 %CP; 53 Mcal NE_g/cwt). Finishing diets were primarily corn based ingredients (13.1 % CP; 61 Mcal NE_g/cwt). Feed deliveries were managed according to a clean bunk management system. Calves were fed once daily (beginning at 0800) during the backgrounding and finishing phases. Individual feed ingredients were sampled weekly throughout the study and analyzed for DM, CP, ash, NDF, and ADF to assure they met published nutrient requirements for this class of cattle (NRC). Dry matter intakes were calculated using weekly feed analyses and daily feed batching and delivery information for the feeding period. All BW were collected in the morning prior to feed delivery. Cattle health was monitored daily with treatment practices following approved health protocols.

Cattle were marketed when the majority of the cattle were estimated to average 0.4 in of 12th rib backfat thickness (Yr 1 = 221 d and Yr 2 = 208 d in the feedlot). Unshrunk BW were used to calculate ADG and feed efficiency during the backgrounding phase. Final BW is reported as a carcass adjusted final BW (hot carcass weight/0.625) to correct for potential year effects on fill and mud. This carcass adjusted final BW was used to calculate ADG during the finishing phases of the study.

The overall statistical model (GLM, SAS; SAS Inst. Inc., Cary NC) used to test WW included Year, Age of Dam, SCI, and the interaction of Age of Dam x SCI. The model for evaluating carcass traits included these same independent variables with the post-weaning treatment and the interaction of SCI x post-weaning treatment added to the model. There were no interactions between pre- and post-weaning treatments. This allowed us to consider an individual steer as an experimental unit for the carcass data since SCI and age of dam were specific to each individual. Because the population included more mature cows than young cows the individual steer data are reported as least squares means and separation tests were accomplished using the PDIFF option (SAS). Steer performance in the feedlot was evaluated on a pen mean basis using the same independent variables as were used for evaluating carcass traits.

RESULTS

This study was repeated over 2 yr, on the same ranch, and with similar timelines. The differences in WW between years (Table 1) are probably a consequence of growing season forage availability. It is noteworthy that there was no SCI x Year interaction for WW. The lack of interaction suggests that implants were equally effective in years with more and less favorable grass conditions.

Young cows represented 36% of the total cow population. Steers produced by MAT cows were heavier at weaning ($P<0.05$; Table 1) and yielded heavier carcasses (767 v 811 lb; $P < 0.001$). The impact of age of dam on post-weaning growth efficiency could not be measured because steers from MAT and IMM dams were co-mingled in each pen.

Overall, the use of implants during the suckling phase increased WW by 22 lb ($P<0.05$). There was a significant interaction between age of dam and the timing of the suckling implant (Table 1). In MAT cows the MAY implant increased WW by 40 lb over that of NI steers on MAT cows ($P<0.05$). The WW response to the AUG implant was less (17 lb) in the MAT group. In contrast, steers on IMM cows benefited most from the AUG implant with WW 25 lb heavier than NI steers in the IMM group ($P<0.05$). In the IMM group the MAY implant only increased WW by 9 lb and was not different from IMM group NI steers ($P>0.10$).

We can use this data to reconstruct an idealized suckling calf implant strategy where steer calves on IMM cows are implanted exclusively in August and steer calves on MAT cows are implanted exclusively in May. In the IMM group (36% of the herd) the AUG implant benefit was 25 lb. In the MAT group (64% of the herd) the MAY implant benefit was 40 lb. Using the following equation the increase in WW would be 35 lb.

Change in WW = (36% x 25 lb) + (64% x 40 lb)

Applying this logic and WW responses shown in Table 1 to other dates, implanting all steers in May would increase WW by 29 lb; and implanting all steers only in August would increase WW by 26 lb.

In the feedlot steers were segregated only by SCI. Additional post-weaning treatments were balanced across SCI. These additional post-weaning treatments did not impact steer performance and there were no interactions evident (*P* > 0.20) between pre- and post-weaning treatments. This allowed us to focus on the impact of SCI on subsequent performance.

The SCI had no effect on ADG or feed efficiency in the receiving, backgrounding, or finishing phases of production (Table 2). Treatment means were quite similar and the study was sufficiently sensitive to have detected responses of <5% for ADG or F/G. The added WW caused by SCI was still evident as heavier BW at the end of backgrounding (*P* <0 .05).

The numerical rankings of HCW reflected the rankings for WW, but were not significantly different. A contrast of Non-implanted vs Implanted did show a tendency for suckling implants to increase HCW (783 v 791 lb; *P*=0.10). Collectively at weaning, implanted calves weighed 22 lb more than non-implanted calves. At this stage of growth the dressing percentage of steer calves is about 55%. This would equate to 12 lb additional carcass weight in the implanted calves. Final HCW were 8 lb heavier for these groups, suggesting the added growth due to suckling implants was likely retained throughout 200+ days post-weaning phase of growth.

All other aspects of carcass traits including marbling and YG were quite similar whether or not the suckling calves received an implant (Table 3).

CONCLUSIONS

Administering implants causes a significant increase in the WW of steer calves. This response can be maximized by using an implant strategy that considers the age of the dam. There was no evidence that the use of implants in suckling steer calves has any adverse effects on post-weaning performance or subsequent carcass traits.

Table 1. Impact of time of suckling calf implant administration and cow age on weaning weight of spring born steer calves. [1, 2]

	Main Effects		
Year	**1**	**2**	
n	194	196	
WW, lb	538^{a} (3.9)	571^{b} (3.9)	
Cow Age	**Immature**	**Mature**	
n	143	247	
WW, lb	530^{a} (4.4)	580^{b} (3.4)	
Implant	**None**	**May**	**August**
n	130	128	132
WW, lb	540^{a} (4.8)	564^{b} (4.8)	561^{b} (4.8)

	Cow Age x Implant Time[3]					
Implant	**None**		**May**		**August**	
Cow Age	**Immature**	**Mature**	**Immature**	**Mature**	**Immature**	**Mature**
n	45	85	50	78	48	84
WW	518^{a} (7.9)	561^{c} (5.7)	527^{a,b} (7.5)	601^{e} (6.0)	543^{b} (7.6)	578^{d} (5.8)

[1] Weaning weight measured as feedlot arrival BW

[2] Least squares mean (standard error)

[3] Cow age x implant treatment ($P < 0.01$)

[a,b,c,d,e] Means lacking a common superscript differ ($P < 0.05$)

Table 2. Impact of suckling phase implant treatments on post-weaning steer performance[1]

	Suckling Implant Treatment			
	None	**May**	**August**	**SEM**
Receiving Grower				
End grower BW, lb	759^{a}	779^{b}	772^{b}	3.41
ADG, lb	3.46	3.49	3.45	0.053
DMI, lb	15.27	15.76	15.48	0.167
F/G	4.44	4.54	4.50	0.044
Finishing Phase				
Final BW, lb[2]	1265	1280	1276	6.1
ADG, lb	3.77	3.73	3.75	0.042
DMI, lb	21.70	21.66	21.98	0.174
F/G	5.77	5.83	5.88	0.056

[1] Pooled two year data represented by 16 pens of 8 steers per treatment

[2] Calculated as HCW/0.625 to correct for fill and mud

Table 3. Impact of suckling implant treatment on subsequent carcass traits[1]

	Suckling Implant Treatment			
	None	**May**	**August**	**SEM**
HCW, lb	783	789	794	5.5
REA, in^2	12.65	12.78	12.88	0.103
Ribfat, in	0.48	0.44	0.47	0.011
KPH, %	1.98	1.93	1.87	0.041
Marbling[2]	581	565	571	83
Yield Grade	3.02	2.90	2.94	0.050

[1] Individual carcass basis

[2] 400 = slight°; 500 = small°