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Summary

Four hundred steer calves were used to determine the effect of preconditioning on performance and health of calves fed either a high or low energy diet. In each of 2 years, 200 steer calves were selected from four western South Dakota ranches to participate in the study. Preconditioned (PC) calves were treated according to the South Dakota Beef Cattle Improvement Association and Cooperative Extension Service's guidelines for the "Green Tag" program. Preconditioning and implanting with zeranol produced a heavier calf at market time. No difference in weight loss during transit was noted between the PC and control treatments (CO), but implanted calves lost more weight than those not implanted (5.51 vs 4.92%). Preconditioned calves gained faster (3.04 vs 2.68 lb/head/day) and consumed more dry matter (13.94 vs 11.98 lb/head/day) the first 28 days in the feedlot than CO. Implanted calves had improved average daily gain (ADG) (2.27 vs 1.98 lb/head/day) and feed efficiency (F/G; 5.76 vs 6.55) over nonimplanted calves during this time. By completion of the feeding period, CO calves were more efficient. Feeding a high energy diet (HE 60% concentrate) resulted in increased dry matter intake (DMI; 13.84 vs 12.09 lb/head/day) and F/G (5.18 vs 4.62) during the initial 28 days and improved ADG (3.16 vs 2.94 lb/head/day) and F/G (6.15 vs 6.53) overall compared to calves fed the low energy diet (LE).

(Key Words: Feeder Steers, Preconditioning, Performance, Health, Energy Level, Implanting.)

Introduction

Preconditioning could be defined as an alternative management practice of raising beef calves which better prepares the calf to withstand the stresses associated with marketing. The South Dakota preconditioning program includes the calf being weaned, adjusted to feed and water troughs for at least 30 days before sale, castrated, dehorned and healed, vaccinated for IBR, BVD, PI_3 and 7-way clostridia and treated for parasites.

Advantages to this program are reported as heavier calves at sale time, reduction of transit shrink, reduction in feedlot sickness and death and improvement of feedlot performance. This 2-year study was designed to determine the effect of the South Dakota "Green Tag" program on the performance and health of calves pre- and postshipment.

Experimental Procedure

Ranch. In each of 2 years, 200 steer calves, averaging 442 (year 1) and 490 (year 2) lb, were selected from four western South Dakota ranches each year. Annually at each ranch, calves were weighed and 50 head were identified for use in the study. From the 50 head selected, 25 head were randomly allotted to be preconditioned (PC) and 25 head were designated controls (CO). All calves were ear tagged and PC calves were treated for parasites and vaccinated against IBR, BVD, PI_3 and 7-way clostridia. At this time, during the second year of the study, 12 head from each management group from each ranch were implanted with 36 mg of zeranol. Approximately 14 days later, all calves were weighed. PC calves were weaned and started on a commercial ration[1] plus hay. The CO calves remained with their dams until all calves were shipped 28 to 30 days later to the Sioux Falls Stockyard. All calves arrived at the stockyards on the same day and were sorted and weighed by ranch and treatment group. After an overnight rest with free access to feed, hay and water, calves were reweighed before being shipped to the SDSU research feedlot at Brookings.

Feedlot. Upon arrival at the feedlot, individual calf weights were taken. The CO calves received the same vaccination and parasite treatments as previously administered to their contemporaries. Calves were then allotted into pens of eight head each by ranch, management group and weight. During the second year of the study, allotment was also based on implant group. Steers were then started on either a high energy (HE) or low energy (LE) receiving diet (table 1). Individual weights were taken on day 28 when a diet step-up program was initiated. High and low energy diet groups were continued to slaughter to evaluate the effect of the diets on the two management groups through the feedlot phase. Individual calf weights were taken every 28 days until slaughter. Average daily gain (ADG), dry matter intake (DMI) and feed efficiency (F/G) were determined for 28-day intervals. To determine marketing dates for each pen, an average backfat probe of .40 inch as determined by a Cook's probe[2].

Health. During the initial 28 days in the feedlot, health of all steers was monitored daily. A point system was used to describe apparent health status. This system included 1 point for eye discharge, 1 point for nasal discharge, 1 point for depressed appearance and 2 points for temperature of 105° F or greater. Four or more points in one day constituted morbidity.

Results and Discussion

Ranch. Weight gains were similar for CO and PC calves during the initial 14 days when all calves were still with their dams (table 2). During the next 28 to 30 days after PC calves had been weaned, PC calves gained more ($P<.05$) than CO steers (2.02 vs .88 lb/head/day). A ranch x year and treatment group x year interaction existed for initial to shipment weight change. Sale ADG was higher ($P<.05$) for PC than for CO calves. Sale weight was 30 lb heavier for PC than for CO calves. Implanting calves improved ($P<.05$) ADG at the ranch (table 5).

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[1]Zip Feed Mills, Sioux Falls, South Dakota.

[2]Cook's Probe, Cook Laboratory, Lusk, Wyoming.

Preconditioning appeared to have no effect on transit shrink. It is interesting to note that, after the overnight rest at the stockyard, PC calves regained a portion of their shrink; but in transit to the feedlot PC calves shrunk an additional 2.6% (table 3). Transit shrink was higher (P<.10) for the implanted calves than for those nonimplanted (table 5).

Feedlot. During the initial 28 days, PC steers gained more and had higher DMI than CO calves (3.04 vs 2.68 lb/head/day and 13.94 vs 11.98 lb/head/day, respectively; table 4). Steers fed the HE receiving diet had higher DMI and poorer F/G. This may be due to fill caused by differences in fiber content of the two diets more than differences in protein and fat deposition. Implanting proved to be beneficial during the first 28 days in the feedlot. Calves implanted 40 days before arrival had improved (P<.05) ADG and F/G compared to those calves not implanted (table 5).

Table 6 shows the overall performance from initial to final feedlot weight. Preconditioned steers gained and consumed similar amounts compared to CO steers, but PC steers were found to be less efficient (P<.01). No difference was found between the two management groups for days on feed. Feeding the HE diet improved gains and F/G over LE fed calves (3.16 vs 2.94 lb/head/day and 6.15 vs 6.53, respectively). This faster gain resulted in the HE calves being on feed less days than LE calves (226 vs 259).

Health. Preconditioning had no apparent effect on health as shown by the health scores in table 7. Steers fed the HE receiving diet had higher (P<.05) total points and more head days of sickness than the steers fed LE. Preshipment implanting had no significant effect on total health points or number of head days of sickness.

Conclusions

These data suggest that preconditioning of beef calves can produce a heavier calf for market. Benefits of preconditioning continue into the early phases of the feeding trial but diminish by the time cattle reach slaughter condition. Producers should evaluate their own situation thoroughly before deciding whether to incorporate a full preconditioning program, since the program's effectiveness is apparently quite variable. Variation in range condition, vaccination and weaning time, length of time in marketing channels, cost of facilities, labor and feed should be considered in the decision-making process.

TABLE 1. COMPOSITION OF DIETS[a]

Ration	Alfalfa brome	Corn	Molasses	Corn silage	Protein mineral supplement[b]	Crude protein	NEm Mcal/lb	NEg Mcal/lb
Preconditioning (before shipment)	--	--	--	--	--	14.43	.61	.34
Receiving (Day 1-28)								
High energy	39.23	51.85	2.07	--	7.05	14.63	.82	.53
Low energy	10.00	--	--	76.89	13.11	14.56	.73	.46
Grower (Day 29-112)								
High energy	25.00	68.47	3.00	--	3.53	12.41	.91	.61
Low energy	--	--	--	87.35	12.65	12.07	.78	.50
Finishing								
High energy (Day 113-end of trial)	10.00	82.15	3.00	--	4.85	11.05	.95	.65
Low energy								
(Day 113-168)	--	46.17	--	46.18	7.65	11.09	.87	.59
(Day 169-232)[c]	--	64.34	3.50	25.81	6.35	10.78	.92	.63

[a] Percent dry matter basis.

[b] Supplements contain an appropriate amount of soybean meal, trace mineralized salt, dicalcium phosphate, potassium, chloride and limestone.

[c] On day 232, all remaining cattle were placed on the high energy finishing ration to the end of the trial.

TABLE 2. EFFECT OF PRECONDITIONING AND RANCH ON PRESHIPMENT WEIGHT CHANGE

Period ADG, lb/head/day	Treatment		SEM
	Control	Preconditioned	
Initial 14 days	.88	.77	.07
PC weaning to shipment	.88[a]	2.02[b]	.04
Initial weight to shipment	.99	1.64	.03
Initial weight to stockyard exit weight	.44[a]	.97[b]	.06

Period ADG, lb/head/day	Ranch				SEM
	1	2	3	4	
Initial 14 days	.80	.69	.88	1.04	.09
PC weaning to shipment	1.39	1.40	1.39	1.82	.06
Initial weight to shipment	1.17	1.14	1.24	1.71	.04
Initial weight to stockyard exit weight	.53	.64	.36	1.10	.08

a,b Means in the same row with different superscripts differ (P<.05).
c,d Means in the same row with different superscripts differ (P<.10).

TABLE 3. EFFECT OF PRECONDITIONING AND RANCH ON TRANSIT SHRINK

Shrink, %[a]	Treatment		SEM
	Control	Preconditioned	
Ranch to stockyard	5.63	6.24	.79
After overnight rest	5.33	4.81	1.28
Ranch to feedlot	6.75	7.44	.19

Shrink, %[a]	Ranch				SEM
	1	2	3	4	
Ranch to stockyard	6.28	6.25	7.75	4.35	1.05
After overnight rest	5.49	4.67	7.02	4.09	1.69
Ranch to feedlot	7.02	6.10	8.59	6.66	.27

a 1-(destination weight ÷ origin weight) x 100.

TABLE 4. CUMULATIVE 28-DAY FEEDLOT PERFORMANCE

	Treatment		Diet		
Item	Control	Preconditioned	High energy	Low energy	SEM
ADG, lb	2.68[a]	3.04[b]	2.90	2.82	.07
DMI, lb	11.98[a]	13.94[b]	13.84[a]	12.09[b]	.15
F/G	4.79	5.01	5.18[a]	4.62[b]	.13

	Treatment x diet				
	Control		Preconditioned		
Item	High energy	Low energy	High energy	Low energy	SEM
ADG, lb	2.69	2.66	3.11	2.98	.10
DMI, lb	12.90	11.06	14.78	13.11	.21
F/G	5.14	4.45	5.23	4.79	.19

[a,b] Means in the same row with different superscripts differ ($P<.01$).

TABLE 5. EFFECT OF IMPLANTING ON PRESHIPMENT WEIGHT CHANGE, TRANSIT SHRINK, 28-DAY FEEDLOT PERFORMANCE AND HEALTH SCORES

Item	Nonimplanted	Implanted	SEM
Ranch			
ADG, lb	1.01[b]	1.17[c]	.04
Transit shrink[a]			
% shrink	4.92[d]	5.51[e]	.26
Feedlot			
ADG, lb	1.98[b]	2.27[c]	.08
DMI, lb	12.94	12.98	.20
F/G	6.55[b]	5.76[c]	.21
Total points	190	162	2.52
No. head day of sickness	9	5	

[a] 1-(destination weight ÷ origin weight) x 100.
[b,c] Means in the same row with different superscripts differ ($P<.05$).
[d,e] Means in the same row with different superscripts differ ($P<.10$).

TABLE 6. CUMULATIVE FEEDLOT PERFORMANCE

	Treatment		Diet		
Item	Control	Preconditioned	High energy	Low energy	SEM
ADG, lb	3.06	3.03	3.16^a	2.94^b	.03
DMI, lb	19.10	19.48	19.41	19.17	.17
F/G	6.24^a	6.44^b	6.15^a	6.53^b	.03
Days on feed	243.75	241.50	226.00^a	259.25^b	3.04

	Treatment x diet				
	Control		Preconditioned		
Item	High energy	Low energy	High energy	Low energy	SEM
ADG, lb	3.16	2.96	3.15	2.91	.04
DMI, lb	19.18	19.02	19.64	19.32	.24
F/G	6.06	6.42	6.24	6.64	.05
Days on feed	227.67	259.83	224.33	258.67	4.30

a,b Means in the same row with different superscripts differ ($P<.01$).

TABLE 7. INITIAL 28-DAY FEEDLOT HEALTH SCORES

	Treatment		Diet		
Item	Control	Preconditioned	High energy	Low energy	SEM
Total points	518	498	576^a	440^b	1.57
No. head days of sickness	9	16	15	10	

	Treatment x diet				
	Control		Preconditioned		
Item	High energy	Low energy	High energy	Low energy	SEM
Total points	280	238	296	202	2.22
No. head day of sickness	3	6	12	4	

a,b Means in the same row with different superscripts differ ($P<.05$).