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EFFECTS OF WEANING DATE AND RETAINED OWNERSHIP ON CATTLE PERFORMANCE AND FORAGE DISAPPEARANCE IN SPRING CALVING BEEF SYSTEMS

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ABSTRACT: Weaning calves early from spring calving cows can have multiple impacts on beef production systems. The objective of this three-state study was to evaluate the effects of mid-August (AW) versus early-November weaning (NW) on cow and calf production traits and forage utilization. Three hundred-seventeen cow-calf pairs from the NDSU-Dickinson Research Extension Center (DREC; n=88), SDSU-Antelope Research Station (ANT; n=136) and the University of Wyoming Beef Unit (UW; n=93) were stratified by BW and body condition score (BCS) and assigned to either AW (calves weaned at approx. 140 d of age) or NW (calves weaned at approx. 215 d of age). Cows grazed native range between the two weaning dates. At AW date, a subset of cows from each treatment at DREC were randomly assigned to six 20-ha. pastures (three pastures/treatment) to measure biomass disappearance between AW and NW dates. Steer calves at ANT and DREC were weaned and backgrounded 7.3 wk and finished in a commercial feed yard. Steers at UW were backgrounded 42 d and finished on site. Treatment by location interactions were detected for cow BW change, BCS change, calf ADG, and gain:feed. At each location, AW cows lost less weight (P<0.01) between weaning dates than NW cows. Similarly, cow BCS change was improved (P<0.01) for AW vs. NW at DREC (0.39 and -1.20), ANT (0.34 and -0.02), and UW (-0.05 and -0.78). Forage biomass disappearance, between weaning dates, was reduced by 27.7% (P=0.15) when calves were AW. AW steers at DREC had higher (P<0.01) ADG during backgrounding than NW, and AW steers at DREC and ANT were more efficient (P<.01) during backgrounding. During finishing, AW steers grew slower (P<.01), were less efficient (P<.01) at ANT, and overall were 31 days younger, but required 61 more days on feed to reach harvest endpoint. Weaning spring-born calves at 140 d compared to 215 d reduced forage utilization, improved cow BCS change, and resulted in similar calf performance.

Key Words: Early Weaning, Cow Performance, Forage Disappearance

Introduction

Profit margins in cow/calf production are slim due to high production costs (Taylor and Field, 1995) and lost opportunity to capture value from marketable ranch products (NASS, 1999). Development of systems that lower production costs while adding value to calves would be beneficial to sustaining and improving rural communities in the drier regions of the Western United States. The majority of costs in cow/calf businesses are for harvested feed (Taylor and Field, 1995). Systems that rely more on grazing and less on harvested and purchased feedstuffs have a higher potential to be profitable (Adams et al., 1994).

Body condition of cows at time of calving has been shown to influence subsequent pregnancy rates (Richards et al., 1986), and the body condition score of spring calving cows grazing winter range is influenced by body condition score in the fall (Adams et al., 1987). Lamb et al. (1997) showed spring calving cows grazing native range lost 0.4 of a body condition score if nursing a calf from September to November, whereas cows that had their calves weaned in September maintained condition from September to November. Management of body condition score by weaning early can improve subsequent reproduction and/or reduce the requirements for non-grazed feed inputs that would be required for thin cows.

The Beef Cattle NRC (1996) predicts a spring calving cow lactating in August will have a 9% greater daily intake of range forage than a dry cow. Weaning calves early may allow standing forage to be spared, reducing late season supplemental feed requirements.

Performance of early-weaned calves during the backgrounding and finishing phase is important. Research has shown calves weaned at 100 to 150 days of age were heavier and younger at slaughter than normal weaned (weaned at 225-250 days) calves

(Peterson et al., 1987). Meyers et al. (1999) reported that 40% more early weaned steers graded average choice or higher than their normal weaned counterparts. Carcass quality improvement in early weaned calves managed for maximum economic yield parallels value-based marketing trends (Cattle-Fax, 2003).

The objective of this multi-state investigation is to evaluate the impact of early weaning and retained ownership decisions on the relationship between weaning date and herbage availability, cattle performance, and economic returns.

This report encompasses only the first year of a two-year investigation.

Materials and Methods

Cow herds from the SDSU Antelope Range and Livestock Research Station (136 cows), the NDSU Dickinson Research Extension Center (88 cows) and the UW Beef Unit (93 cows) were used in the study. At each location, spring-born calves were weaned from cows at approximately 140 days (mid-August, **AW**) or 215 days of age (early-November, **NW**). Cow body weight and body condition score changes were monitored between the August and November weaning dates to determine the impacts of weaning on cow performance.

Calf weaning weights were recorded at each location. The steer calves from Antelope Station and Dickinson REC were transported immediately after weaning to the NDSU Hettinger Research Extension Center for backgrounding. The steers were backgrounded either 49 (AW) or 54 (NW) days, using a diet consisting of locally grown forage and a commercial pellet consisting of regionally available co-product feedstuffs (soyhulls, wheat middlings, barley malt sprouts). Two-to-four weeks prior to each weaning date, calves were immunized against calfhood diseases and were administered a booster vaccination at weaning.

Following the seven- to eight-week backgrounding phase, Antelope and Dickinson REC calves were transported to Decatur County Feed Yard, Oberlin, Kansas, for finishing. An ACCU-TRAC® electronic cattle management system was employed at Decatur to determine final end point, based on an external fat depth of 10 mm in the computer model. Steers were slaughtered at a commercial plant and carcass data were collected.

Both steers and heifers from UW Beef Unit were managed in a similar protocol as described for Antelope and Dickinson REC steers. Cattle were backgrounded at the UW Beef Unit, Laramie, Wyoming, for either 43 (AW) or 40 (NW) days. Following the backgrounding period, cattle remained at the UW Beef Unit for the experiment's finishing phase. Cattle were marketed in three groups, March 29, May 10 and May 25, 2004 based on ultrasound backfat depth and percent intramuscular fat measured between the 12^{th} and 13^{th} ribs. Cattle were slaughtered at a commercial plant and carcass data were collected.

Grazing, backgrounding, and finishing performance were analyzed by ANOVA using a PROC GLM of SAS (SAS Inst. Inc., Cary, NC). Since treatment by location interactions were identified, treatment means were compared within location.

Vegetation samples were collected at the Dickinson REC to determine the magnitude of biomass disappearance among cows suckling calves from August to November (NW; n=3 pasture groups) versus dry cows grazing from August to November (AW; n=3 pasture groups). A 240 ha pasture was subdivided into 12 20-ha pastures in a wagon-wheel configuration with central watering. A subset of cattle from each treatment at the Dickinson REC, were rotated into six previously ungrazed pastures at the August weaning date (3 pastures/treatment; 8 cows/pasture).

Clipped forage samples were obtained in the six pastures just prior to the AW date and again at the end of grazing when all cows were removed from the pastures in November. Samples (0.25 m^2) were cut to ground level, using battery-powered electric shears. Samples were oven dried. Forage disappearance was calculated as the difference between pre- and post-grazing estimates.

Analysis of variance was used to evaluate weaning treatment effect on biomass disappearance.

Results and Discussion

In this multi-state weaning date study, early weaning impacted cows positively by maintaining or improving body weight ($P<.01$) and body condition score ($P<.01$) at each location (Table 1).

Early weaned cows at SDSU Antelope Station gained 15 kg from mid-August to the first week of November and improved 0.34 condition score, while normally weaned cows lost 21 kg. and 0.02 body condition score. Cows with calves weaned early in August at the UW Beef Unit gained 10 kg., and maintained body condition from August to November, whereas normally weaned cows lost 29 kg and 0.8 body condition score during the August-to-November period.

At the NDSU Dickinson Research Extension Center, early weaned cows lost 5 kg, but overall, improved 0.39 body condition score, whereas normally weaned cows lost 89 kg and 1.20 body condition score during the same August–to-November period. The 89-kg loss was larger than expected and may have been attributed to a snow storm (approximately 254 cm) one

week before the NW date that partially covered forage until weaning.

The AW system utilized 72% of the available biomass when compared to the NW system. Forage disappearance for cows that had calves weaned early was estimated to be 803 kg per ha, whereas forage disappearance among cows that continued to nurse their calves for an additional 75 days was estimated to be 1109 kg per ha (P = 0.15). The difference in forage utilization was attributed to calf removal and less trampling.

Postweaning backgrounding performance for steers from Antelope, Dickinson and UW is shown in Table 2. Normally weaned steers were heavier at the end of the backgrounding phase (P<.01) at each location. Dickinson calves that were early weaned had a higher (P<.01) average daily gain during backgrounding than normally weaned calves, whereas calves from Antelope had similar gains across weaning dates. In contrast, calves from UW that were early weaned gained less than those that were weaned in November (P< 0.01). Dry matter intake (P<.05) and F:G (P<.01) of AW calves were improved compared to NW at Antelope and Dickinson.

Finishing performance for the two management systems is shown in Table 3. Normally weaned steers were an average 77 kg heavier on arrival (P<.01); however, final harvest weight did not differ. On average, and overall, kill age for AW steers was 31 days earlier (P<.01) than NW steers. However, due to the longer drylot experience associated with early weaning, the AW steers required 61 more days on feed (P<.01). SDSU's NW steers were less efficient during finishing (P<.01) whereas finishing feed efficiency was similar between treatment groups for Dickinson and UW steers.

Final harvest end point for steers at Antelope and Dickinson were determined using the ACCU-TRAC® electronic cattle management system (ECM) whereas the UW used ultrasound fat depth and percent intramuscular fat to make the determination. Fat depth at the UW was 2.75 mm greater (P<.05) for the early weaned steers. Yield and quality grades did not differ at Antelope and Dickinson. Carcass measurements for the three sites did not differ for hot carcass weight or rib-eye area. However, early weaned steers had greater yield (P<.05) and quality grades (P <.10) at UW that resulted when the early weaned group was fed to a higher degree of finish. The number of Choice grading steers was low for NDSU and SDSU cattle, suggesting that final end point determination using the ECM system underestimated days on feed needed to attain higher quality grade.

Implications

These data suggest that weaning spring-born calves 75 days early (140 versus 215 days) can reduce late summer native forage utilization and improve cow body condition without negatively impacting postweaning calf performance.

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Table 1. Body weight and condition score change among early and normally weaned cows located at the NDSU-Dickinson REC, SDSU-Antelope Station and UW-Beef Unit (2003).

	NDSU Dickinson REC		SDSU Antelope Station		UW Beef Unit	
Item	Weaning Period		Weaning Period		Weaning Period	
	Early	Normal	Early	Normal	Early	Normal
August Cow Wt., kg	583	605	609	603	548	564
November Cow Wt., kg[a]	578	515	624	582	557	535
Cow Wt. Change, kg[a]	-5	-89	15	-21	10.0	-29
August BCS	5.52	5.52	5.63	5.65	5.43	5.59
November BCS[a]	5.91	4.32	5.97	5.63	5.38	4.82
BCS Change[a]	0.39	-1.20	0.34	-0.02	-.05	-.78
August Calf Wt., kg[b]	175	184	185	183	201	198
November Calf Wt., kg	-	247	-	264.	-	276

[a]Treatments at each location differ (P<.01)
[b]Treatments at Dickinson location differ (P<.10)

Table 2. Summary of backgrounding performance for early and normally weaned steers at the NDSU-Dickinson REC, SDSU-Antelope Station and UW-Beef Unit (2003)

	NDSU Dickinson REC		SDSU Antelope Station		UW Beef Unit	
Item	Early	Normal	Early	Normal	Early	Normal
No. Steers	40	38	36	35	26	23
Days on Feed	49	54	49	54	43	40
Start Wt., kg[a]	185	251	188	272	202	282
End Wt., kg[a]	262	325	258	347	243	326
ADG, kg[b]	1.56	1.36	1.43	1.39	0.97	1.16
DM Intake, kg[c]	5.44	5.67	5.31	5.99	5.28	7.44
F:G[d]	3.43	4.17	3.71	4.31	5.47	6.45
G:F, kg/100kg[d]	29.15	23.98	26.95	23.20	18.28	15.50

[a]Treatments at each location differ (P<.01)
[b]Treatments at Dickinson and UW locations differ (P<.01)
[c]Treatments at Dickinson and Antelope locations differ (P<.05)
[d]Treatments at Dickinson and Antelope locations differ (P<.01)

Table 3. Feedlot finishing performance and carcass measurements. (Decatur County Feed Yard, Oberlin, Kansas, and UW Livestock Center, Laramie, Wyoming)

	NDSU Dickinson REC		SDSU Antelope Station		UW Beef Unit	
Item	Early[a]	Normal	Early	Normal	Early	Normal
Receiving Wt., kg[b]	254	318	255	338	243	326
Harvest Wt., kg	516	533	504	533	553	560
Kill Age[b]	364	404	371	405	417	436
Days at Feed Yard, da[b]	188	129	183	133	224	150
ADG, kg	1.39	1.67	1.36	1.47	1.40	1.55
F:G[c]	5.20	5.18	5.18	5.86	6.07	6.17
G:F, kg/100kg[c]	19.23	19.31	19.31	17.06	16.47	16.21
Hot Carcass Wt., kg	326	327	319	329	334	333
Rib-eye Area, sq. cm.	78.6	82.8	78.4	80.1	74.6	78.5
Fat Depth, mm.[d]					13.75	11
Yield Grade,[d]	2.61	2.54	2.68	2.7	2.76	2.45
Quality Grade[e]	2.95	2.78	3.00	2.8	4.95	4.38
Percent Choice, %	26.4	25.7	13.9	23.5	85.7	59.1

[a]Two steers died of bloat during finishing.
[b]Treatments at each location differ (P<.01)
[c]Treatments at the Antelope location differ (P<.01)
[d]Treatments at the UW Beef Unit differ (P<.05)
[e]Treatments at the UW Beef Unit differ (P<.10)