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Effect of Post-Weaning Management and Age at Weaning on Calf Growing and Finishing Performance

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Summary

The impact of post-weaning management system and calf age at weaning on growing and finishing performance was evaluated. During the growing phase, cattle in the fast-track system had improved intake, gain, and feed conversion. Although initial finishing weight was similar between systems, slow-track cattle had greater intake, gain, final body weight, and carcass weight. While the impact of age at weaning was negligible, the improvement in finishing performance for slow-track cattle demonstrates the value of different management systems.

Introduction

Early weaning is a sound management practice if forage is limited or cow BCS is decreased. Prior research has indicated early-weaned calves are not only efficient in converting feed to gain, but overall ADG through finishing was also increased by early weaning *(Journal of Animal Science,* 77:323-329). Calves from later-calving (late-spring or summer) cowherds weaned the following spring are well suited to either graze summer pasture or be placed on feed, and the age at which calves are weaned may interact with how cattle are managed post-weaning. Thus, the objectives of this experiment were to evaluate the impact of calf age at weaning and post-weaning management system on cattle growing and finishing performance and carcass characteristics.

Procedure

This experiment was conducted at the University of Nebraska–Lincoln Agricultural Research and Development Center (ARDC) feedlot near Mead, Neb., utilizing summer-born crossbred (Red Angus × Red Poll × Tarentaise × South Devon × Devon) steer and heifer calves (n = 75, BW = 528 ± 80 lb). Cattle originated from cowherds maintained in an intensive management (drylot) system year-round located at ARDC and the Panhandle Research and Extension Center (PHREC), Scottsbluff, Neb. (*2014 Nebraska Beef Cattle Report,* pp. 27-28). Data are reported only for progeny weaned during year 1 of that experiment. Approximately one half of the calves were weaned from their dams in late-September the previous year at 87 ± 19 days of age and fed a distillers-grains and crop-residue-based diet. The remaining half were weaned in late-January at 205 ± 18 days of age. Following January weaning, all cattle were received at ARDC in mid-February. During initial processing, all cattle were vaccinated with Bovi-Shield Gold 5® (Zoetis), treated for internal and external parasites with Dectomax® (Zoetis), and implanted with Ralgro® (Merck Animal Health). The trial was a randomized complete design with a 2 × 2 factorial arrangement of treatments. Cattle were stratified by initial BW and assigned randomly within strata to one of four treatments with two replications (pens, based on location of origin) per treatment. Treatment factors included: 1) calf age at weaning, early weaned (EW) at 87 ± 19 days of age or normal weaned (NW) at 205 ± 18 days of age; and 2) post-weaning management system, fast-track (FT) or slow-track (ST). In the FT system, cattle were adapted to a feedlot finishing diet following a growing period in which cattle were fed for a high (≥ 3.0 lb) ADG. The ST system consisted of a growing period where cattle were fed for a moderate (1.5 lb) ADG, followed by summer grazing smooth bromegrass pastures, and then feedlot finishing in the fall.

Upon arrival and assignment to treatments, cattle in both systems entered a 78-day growing period from March to late-May. All cattle were fed a common diet (Table 1), but the amount fed daily differed between treatments as the intent was to produce different gains during the growing period. Cattle in the FT system were offered *ad libitum* access to the growing diet, while ST cattle were limit-fed approximately 2.0% of BW (DM). Heifers were spayed by a licensed veterinarian during the growing phase. At the end of the growing period, ST cattle were implanted with Revalor®-G (Merck Animal Health), received Ivomec® (Merial Animal Health), and were transported to smooth bromegrass pastures for summer grazing. Concurrently, FT cattle were poured with Ivomec (Merial Animal Health), implanted with either Revalor®-XS (steers, Merck Animal Health) or Revalor®-IH (heifers, Merck Animal Health), and began adaptation to a finishing diet (Table 1).

Table 1. Ingredient composition of diets fed to all cattle.[1]

Ingredient, %	Growing Diet
Corn silage	66.0
MDGS[2]	30.0
Supplement[3]	4.0
Ingredient, %	**Finishing Diet**
MDGS[2]	40.0
High-moisture corn	20.5
Dry-rolled corn	20.5
Corn silage	15.0
Supplement[4]	4.0

[1]All values presented on a DM basis.
[2]Modified distillers grains plus solubles.
[3]Formulated for 200 mg/animal daily of Rumensin®.
[4]Formulated for 450 mg/animal daily for Rumensin and 90 mg/animal daily for Tylan®.

Table 2. Growing performance of cattle by management system and weaning age.

Item	FT		ST		SEM	P-value		
	EW[4]	NW[5]	EW[4]	NW[5]		System[1]	Weaning[2]	S × W[3]
Initial BW, lb	517	538	519	540	16	0.90	0.27	0.97
Ending BW, lb	780	815	637	650	22	<0.01	0.35	0.65
ADG, lb	3.38	3.56	1.52	1.40	0.10	<0.01	0.79	0.24
DMI, lb/day	16.7	17.4	9.7	9.7	0.04	<0.01	<0.01	<0.01
F:G[6]	4.95	4.90	6.39	6.92	—	0.01	0.55	0.42
Off Grass BW, lb	—	—	769	792	—	—	—	—
Grass ADG, lb	—	—	0.95	1.02	—	—	—	—

[1]Fixed effect of post-weaning management system.
[2]Fixed effect of calf age at weaning.
[3]Management system × calf age at weaning interaction.
[4]EW = early weaned.
[5]NW = normal weaned.
[6]Analyzed as G:F, reported as F:G.

Table 3. Finishing performance of cattle by management system and weaning age.

Item	FT		ST		SEM	P-value		
	EW[4]	NW[5]	EW[4]	NW[5]		System[1]	Weaning[2]	S × W[3]
Live Performance								
DOF	172	172	165	165				
Initial BW, lb	780	815	769	792	21	0.49	0.27	0.81
Final BW, lb	1311	1294	1415	1460	22	0.01	0.47	0.19
ADG, lb	3.00	3.11	3.79	3.94	0.19	0.02	0.53	0.93
DMI, lb	20.7	20.9	26.4	25.5	0.8	<0.01	0.72	0.53
F:G[6]	6.90	6.71	6.94	6.45	—	0.59	0.11	0.37
Carcass Characteristics								
HCW, lb	826	816	892	920	14	0.01	0.47	0.19
LM area, in^2	13.5	13.5	13.9	14.2	0.3	0.11	0.69	0.60
12^{th} rib fat, in	0.56	0.65	0.57	0.56	0.04	0.27	0.32	0.23
Calculated YG	3.18	3.54	3.29	3.30	0.20	0.74	0.37	0.38
Marbling[7]	442	400	508	464	21	0.08	0.15	0.96

[1]Fixed effect of post-weaning management system.
[2]Fixed effect of calf age at weaning.
[3]Management system × calf age at weaning interaction.
[4]EW = early weaned.
[5]NW = normal weaned.
[6]Analyzed as G:F, reported as F:G.
[7]Marbling score: 400 = Small, 500 = Modest, etc.

Fast-track cattle began the finishing phase (including adaptation diets) May 24 and were harvested Nov. 13 (172 days on feed), and heifers were re-implanted (Revalor-H, Merck Animal Health) approximately 80 days prior to projected harvest. Cattle in the ST system grazed smooth bromegrass pastures until mid-October, then received the same implant and health regimen as the FT, and began the finishing period Oct. 18. Slow-track heifers were re-implanted approximately 80 days prior to projected harvest and all cattle in the ST system were harvested April 2 the following year (165 days on feed). Cattle in both systems had *ad libitum* access to a common finishing diet that included Optaflexx® (Elanco Animal Health) at 22.2 g/ton DM or 300 mg/head daily for the last 28 days prior to harvest. Weights were collected over a minimum of two consecutive days at both initiation and upon completion of the growing phase to determine gain during that period. Ending BW from the growing period was used as initial BW for the finishing period for FT cattle. Weights (two days consecutive) at the end of summer grazing were used as initial finishing BW for ST cattle. Prior to collecting all weights, cattle were limit-fed (2.0% of BW, DM basis) a diet of 50% alfalfa hay and 50% wet corn gluten feed for five days to minimize variation in gastrointestinal tract fill.

All cattle were harvested at a commercial abattoir (Greater Omaha Packing Co., Omaha, Neb.) once determined finished by visual appraisal. On the day of harvest, hot carcass weight (HCW) and liver abscess scores were recorded. After a 48-hour chill, 12^{th} rib fat thickness, USDA marbling score, and LM area were collected. Yield grade was subsequently calculated using the following equation: 2.5 + (2.5 x 12^{th} rib fat) – (0.32 x LM area) + (0.2 x 2.5 [KPH]) + (0.0038 x HCW). Performance on a carcass adjusted basis was calculated using a common dressing percentage (63%) to determine final live BW, ADG, and F:G.

Data were analyzed as a randomized complete design with pen serving as the experimental unit. Model fixed effects included post-weaning management system, age at weaning, and the system × weaning interaction. Since the proportion of steers and heifers was unequal among treatments, sex was initially included as a covariate in the model statement for all variables tested and was subsequently removed if not significant. Location of origin was included in all analyses as a random effect, and significance was declared at $P \leq 0.05$.

Results

Cattle performance data during the growing and summer grazing periods are presented in Table 2. Although the system × weaning age interaction was significant for DMI, no other significant interactions were observed nor were there significant effects of weaning age. As intended, the significantly greater daily DMI by FT cattle resulted in increased gains and ending BW as compared to ST cattle. Likewise, F:G was improved 26% for cattle in the FT as opposed to the ST management system. Slow-track cattle gained approximately 1.0 lb daily during summer grazing, which is lower than previously reported gains for nonsupplemented steers grazing similar pastures (*2013 Nebraska Beef Cattle Report*, pp. 31-32). Given that cattle

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grazed pastures until mid-October, declining forage quality likely limited weight gain.

Finishing performance and carcass variables are presented in Table 3. No significant system × weaning age interactions were observed, nor were there significant effects of calf age at weaning. Although FT cattle gained more during the growing phase, initial finishing BW was similar among treatments due to gain during the summer by ST cattle. Dry matter intake was greater for ST cattle which resulted in increased gain and carcass adjusted final BW compared with FT cattle. However, feed conversion was similar among treatments. The increased final live BW corresponded to greater HCW for ST cattle. *Longissimus* muscle area, 12th rib fat thickness, and calculated YG were not impacted. Interestingly, cattle in the ST system also tended to have greater marbling scores, but additional numbers are needed to determine if this effect is biologically real or merely due to random variation.

In general, ADG during the growing phase was better than anticipated for cattle in both systems, but logical, given the quality of the diet. After having relatively low gains during the summer, ST cattle appeared to compensate when placed on the finishing diet. The FT cattle in the current study were not true calf-feds since they were grown prior to being fed the finishing diet. Conversely, ST cattle are similar to short-yearlings in terms of age at the onset of finishing. However, the difference in finishing performance between the two systems is typical for yearlings and calf-feds, with yearlings usually having greater intakes, gains, and final BW but less efficient. Increased DMI by the ST cattle may be due to age and greater rumen capacity from summer grazing. Additionally, the extended growing period may have allowed cattle in the ST system to increase skeletal growth (frame size), which could possibly explain the increased live and carcass weights even though initial BW at the start of finishing was similar. These preliminary data indicate early weaning has minimal impact on subsequent growing and finishing performance when EW calves are fed distillers grains and crop-residue-based diets. Post-weaning management may have greater influence on economically relevant traits such as final BW and HCW.

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