EXTENSION
BEEF CATTLE RESEARCH UPDATE
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Effects of Physical Activity and Feed and Water Restriction at Reimplanting time on Performance of Finishing Beef Steers

Implants are routinely used in the finishing phase of beef production to improve animal performance and feed efficiency. Data collected during the USDA's National Animal Health Monitoring System's Feedlot 2011 study showed that about 94% of heifers and 91% of steers were implanted at least once in the feedyard.[1] This survey also showed that 79.8% of steers and 98.6% of heifers that weigh less than 700 lb when place on feed are given at least 2 implants. Research reviews reported that implanting in the feedlot on average increases average daily gain (ADG) 18%, dry matter intake (DMI) 6%, feed efficiency 8%, and hot carcass weight (HCW) 5% compared with non-implanted controls.[2,3] The use of multiple implants increases final shrunk body weight (BW), ADG, and efficiency (Gain:Feed) vs. using a single implant.[4] Research published in 2008 noted that cattle consumed 0.44 lb less daily dry matter (DM) for 10 days following a reimplant compared to the 10 days preceding reimplanting.[5] Research has also shown that increased physical activity and locomotion are associated with decreased G:F.[6]

Recent research was conducted at Texas Tech University to determine the mechanisms causing a decrease in DMI after reimplanting and identify a strategy to mitigate the decrease.[7] This study used 200 crossbred steers sourced from Southern Oklahoma (predominantly Bos taurus) with an initial BW of 851 lb. Five treatments were used in a randomized complete block design with pen as the experimental unit (50 pens, 10 pens/treatment). All cattle were implanted with Revalor-IS at the start of the study. Treatments included a Revalor-200 implant on day 90 before feeding with the following management practices imposed:

1) Steers were returned to their home pen immediately after reimplant (PCON)
2) Steers were placed in pens and restricted from feed and water for 4 hours (RES)
3) Steers were walked an additional 0.5 miles after reimplant and then returned home (LOC)
4) Steers were restricted from feed and water for 4 hours and walked an additional 0.5 miles (RES + LOC
5) Steers were given an oral bolus of *Megasphaera elsdenii* (Lactipro; MS Biotec, Wamego, KS) and were restricted from feed and water for 4 hours, and then walked an additional 0.5 miles (LACT).

Megasphaera elsdenii is a lactate-utilizing bacteria that can be beneficial during times of acidosis.[8] Research has shown that steers consuming a high-concentrate diet treated with *M. elsdenii* had a 21% increase in DMI and a subsequent increase in ADG compared to steers that did not consume the *M. elsdenii* containing direct fed microbial.[9] Thus, it has the potential to mitigate decreases in DMI associated with reimplanting finishing cattle.

The effects of the treatments on live and carcass-adjusted growth performance of the steers are shown in Table 1. The various treatments had minimal effects on average daily gain and gain efficiency (Gain:Feed) over the entire feeding period. However, DMI expressed as a percentage of BW was affected by treatment. These researchers reported that as a percentage of BW, DMI was 5% greater (P = 0.01) from reimplant to end for PCON vs. RES, LOC, and RES + LOC treatments. Likewise, as a percentage of BW, DMI was 6.6% greater (P = 0.03) from reimplant to end and 4.0% greater (P = 0.05) overall for the PCON treatment vs. the LOC treatment. Over the entire feeding period, DMI as a percentage of BW was 3.3% greater (P = 0.02) for PCON vs. RES, LOC, and RES + LOC treatments.

These data illustrate that cattle management before, during, and after implanting can markedly influence DMI. These authors concluded that returning cattle to their home pen immediately after reimplanting is an effective method to mitigate a decrease in DMI. In addition, restricting cattle from

feed and water for 4 hours after reimplanting did not alter subsequent DMI. The results suggest that if cattle must be staged in holding pens without access to feed and water for up to 4 hours during the reimplanting process, risk of detriment to DMI is low compared to increased locomotion associated with reimplanting. Increasing locomotion had the greatest negative effect on DMI and subsequent growth performance. "Management strategies to decrease locomotion associated with reimplanting would be beneficial to DMI and overall growth performance of finishing beef steers."

Table 1. The effects of physical activity and feed and water restriction at reimplanting time on live and carcass-adjusted growth performance of finishing beef steers.

	Treatment[1]					
Item	PCON	RES	LOC	RES + LOC	LACT	Contrast[2]
Live weight basis[3]						
Initial BW, lb	849	849	849	858	856	NS
Reimplant BW, lb	1122	1138	1127	1147	1116	NS
Final BW, lb	1380	1369	1365	1398	1341	3†
ADG, lb						
Initial to reimplant	2.95	3.15	3.04	3.13	2.82	3†
Reimplant to end	3.15	2.82	2.91	3.06	2.73	3†, 4†
Overall	3.11	2.95	3.00	3.06	2.91	3†, 4†
DMI, lb						
Initial to reimplant	17.79	17.73	17.20	17.49	17.13	NS
Reimplant to end	18.57	17.93	17.57	18.08	17.18	5†
Overall	18.17	17.82	17.38	17.77	17.15	5†
DMI, % of BW						
Initial to reimplant	1.73	1.71	1.66	1.67	1.66	1*, 5†
Reimplant to end	1.43	1.37	1.35	1.36	1.34	1, 4†, 5*
Overall	1.57	1.54	1.51	1.51	1.5	1*, 5†
Gain:Feed						
Initial to reimplant	0.167	0.178	0.177	0.18	0.166	3*
Reimplant to end	0.167	0.178	0.177	0.18	0.166	3*
Overall	0.173	0.168	0.171	0.173	0.168	NS
Carcass-adjusted basis[4]						
Final BW, lb	1360	1369	1363	1398	1341	NS
ADG, lb	2.93	3.00	2.95	3.06	3.06	NS
Gain:Feed	0.161	0.168	0.17	0.172	0.179	NS

Adapted from Helmuth et al., 2022.

[1]PCON = Steers were returned to their home pen immediately after reimplant; RES = steers were placed in pens and restricted from feed and water for 4 hours and then returned home; LOC= steers were walked an additional 0.5 miles after reimplant and then returned home; RES + LOC = steers were restricted from feed and water, walked an additional 0..5 miles and then returned home; LACT = steers were given an oral bolus of Lactipro and restricted from feed and water, and walked an additional 0.5 miles and then returned home.

[2]Contrasts: 1= PCON vs. the average of RES, LOC, and RES + LOC to evaluate whether there was a difference in DMI associated with varying practices on reimplant day; 2 = RES vs. LOC to evaluate whether restriction from feed and water or additional locomotion caused a difference in DMI; 3 = RES + LOC vs. LACT to evaluate whether administering with an oral bolus of Lactipro was an effective mitigation strategy to prevent a decrease in DMI; 4 = PCON vs. RES to determine what percentage of the decrease of DMI is associated with restricting from feed and water; 5 = PCON vs. LOC to determine what percentage of the decrease of DMI is associated with locomotion.

[3]Shrink (4%) was applied to all BW.

[4]Calculated as HCW divided by overall average dressing percent (65.60%).

*P ≤ 0.05; † 0.06 ≤ P ≤ 0.10; NS = not significant (P > 0.10).

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