EXTENSION
BEEF CATTLE RESEARCH UPDATE
Britt Hicks, Ph.D., PAS
Area Extension Livestock Specialist
March 2023

**Feeding Behavior and Activity of Beef Calves During the First Week at the Feedlot: Impact of Calf Source and Commingling Ratios**

Calves transitioning from the ranch to the feedlot undergo numerous stressors within a short time frame, including weaning, transportation, and adapting to new environments and feed sources.[1] These transitioning stressors can increase the risk of bovine respiratory disease (BRD) which is the leading cause of morbidity and mortality in North American feedlot cattle.[2,3] BRD accounts for approximately 75% of morbidity[4] and 50 to 70% of mortality in United States feedlots.[5] Risk factors for morbidity and mortality include commingling calves from various sources upon arrival, and with typical feedlot management, it is often not possible to keep calves from multiple sources separate.[6]

Numerous studies have shown that preconditioning weaned calve for 30 to 45 days post-weaning is beneficial to stocker and feedlot operations (less morbidity and mortality, improved post-weaning performance, and higher carcass quality) as compared to auction-derived and non-preconditioned calves. However, there is limited research assessing the impacts of commingling preconditioned and auction-derived calves at the feedlot and if the proportions of preconditioned to auction-derived calves in commingled pens impact feeding behavior at the feedlot.

For this reason, Canadian researchers conducted a field study to assess the impact of calf source (preconditioned, auction-derived, and calves sourced directly from the ranch) on feeding behavior (time spent eating and ruminating) and activity of beef calves during the first 7 days after arrival at the feedlot.[7] The ranch source calves came from the same source as preconditioned calves but were abruptly weaned and not commingled. An additional objective of this study was to assess the impact of commingling preconditioned calves with different proportions of auction-derived calves (25, 50, or 75%) on feeding behavior and activity during the first 7 days at the feedlot. A subset of calves within each group at feedlot arrival were equipped with an ear tag sensor that continuously recorded ear movement detected by an accelerometer located in the ear tag (Cow Manager® SensOor system, Agis Automatisering BV, Harmelen, the Netherlands). This technology detected ear movement through a sensor in the tag linked to eating, ruminating, active and not active.

The comparison of behaviors of calves in pens of 100% preconditioned, ranch-sourced, and auction-derived calves are presented in Figure 1. These researchers reported that during the first 7 days after arrival at the feedlot that preconditioned calves spent 11% (163.3 min/day) more time eating than ranch source calves ($P < 0.001$) and 15% more (213.7 min/day) time than auction-derived calves ($P < 0.001$). Ranch-sourced calves spent 4% (50.4 min/day) more time eating compared to auction-derived calves ($P < 0.001$).

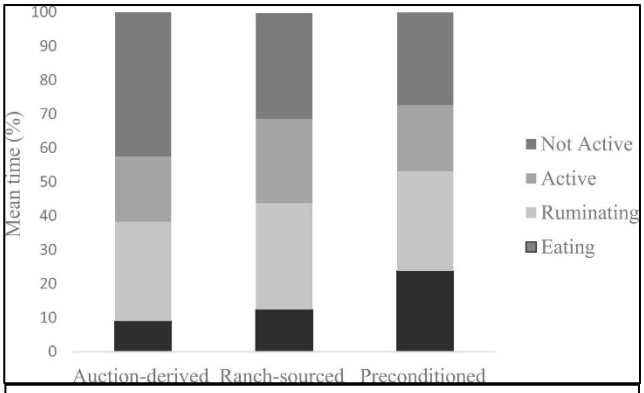


Figure 1. Mean percent time spent eating, ruminating, active and not active of ranch-sourced, auction-derived, and preconditioned calves in the first 7 days at the feedlot.

In addition, preconditioned calves spent 5% less time active (62.7 min/day) compared to ranch source calves ($P < 0.001$), and there was no significant difference in activity compared to auction-derived calves. Ranch-sourced calves spent 6% more time active (66.8 min/day) compared to auction-derived calves ($P < 0.001$). Preconditioned calves spent 4% less time inactive (60 min/day) compared to ranch source calves ($P = 0.017$) and 15% less time inactive (218 min/day) compared to auction-derived calves ($P < 0.001$).

Ranch-sourced calves spent 11% less time inactive (158 min/day) compared to auction-derived calves ($P < 0.001$). No differences among groups were reported for overall time spent ruminating.

In the pen-level comparison of ratios of commingled preconditioned and auction-derived calves, the pen average of 25% preconditioned:75% auction-derived spent 6% less time eating (118.1 min/day) compared to the 50%:50% pen ($P < 0.001$) and 2% (95.4 min/day) less time eating compared to the 75% preconditioned:25% auction-derived pen ($P < 0.001$). No difference between the 50%:50% pen and the 75% preconditioned:25% auction-derived pen for time spent eating was reported. For time spent not active, the 25% preconditioned:75% auction-derived pen spent 7% more time (154.1 min/day) not active compared to the 50%:50% pen ($P < 0.001$) and 2% more time not active (131.7 min/day) compared to the 75% preconditioned:25% auction-derived pen ($P < 0.001$). No difference for time not active were reported between the 50%:50% and 75%:25% pen. No differences between all pens for time spent ruminating and time spent active were reported.

In the comparison of ratios of commingled preconditioned and auction-derived calves, 100% preconditioned calves spent 5% more time eating (66.1 min/day) compared to preconditioned calves in the 75% preconditioned pen ($P = 0.009$) and 5% more-time eating (78.2 min/day) compared to preconditioned calves in the 25% preconditioned pen ($P = 0.002$). No significant difference in time spent eating was observed between preconditioned calves from the 100% and 50% preconditioned pens. No significant differences among preconditioned calves were observed for time spent ruminating, active and not active from the 100%, 75%, 50% and 25% preconditioned pens.

In conclusion, these results show that preconditioned calves spent significantly more time eating in comparison to the ranch-source and auction-derived calves. This suggests that preconditioning calves at the ranch could positively impact feeding behavior in the first week after arrival at the feedlot. Furthermore, when comparing pens commingled with preconditioned and auction-derived calves, overall, pens with a higher proportion of preconditioned calves spent more time eating compared to the pen with the lowest proportion of preconditioned calves. These authors noted that "understanding the feeding behavior and activity of preconditioned calves and when commingled with other sources of calves provides insight into how preconditioning could improve the health and performance of calves at the feedlot, and this could allow for more investment to use preconditioning practices at the ranch".

---

[1] Cooke, R. F. 2017. INVITED PAPER: Nutritional and management considerations for beef cattle experiencing stress-induced inflammation. Prof. Anim. Sci. 33: 1-11.

[2] Ball, J. J., E. B. Kegley, J. Sarchet and J. G. Powell. 2019. Comparison of treatment protocols for bovine respiratory disease in high-risk, newly received beef calves. Appl. Anim. Sci. 35: 278-283.

[3] USDA-APHIS. 2013. Page 28 in Feedlot 2011 Part IV: Health and Health Management on U.S. Feedlots with a Capacity of 1,000 or More Head. USDA–APHIS–Veterinary Services, Fort Collins, CO. Available at: https://www.aphis.usda.gov/animal_health/nahms/feedlot/downloads/feedlot2011/Feed11_dr_PartIV_1.pdf.

[4] Edwards, A. J. 1996. Respiratory diseases of feedlot cattle in the central USA. Bovine Practitioner 30:5–7.

[5] Loneragan, G. H., D. A. Dargatz, P. S. Morley and M. A. Smith. 2001. Trends in mortality ratios among cattle in US feedlots. J. Am. Vet. Med. Assoc. 219: 1122-1127.

[6] Loerch, S. C. and F. L. Fluharty. 1999. Physiological changes and digestive capabilities of newly received feedlot cattle. J. Anim. Sci. 77: 1113-1119.

[7] Hodder, A., E. Pajor, F. van der Meer, J. Louden, S. Thompson and K. Orsel. 2023. Feeding behaviour and activity of beef calves during the first week at the feedlot: Impact of calf source and commingling ratios. Appl. Anim. Behav. Sci. 258. Available at: https://doi.org/10.1016/j.applanim.2022.105810.