EXTENSION
BEEF CATTLE RESEARCH UPDATE
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April 2023

Bunk Space Requirements for Growing Beef Cattle Limit-Fed a High-Energy Diet

Research has shown that limit-feeding high energy diets can improve feed efficiency in growing calves compared with traditional high-roughage diets fed ad libitum.[1, 2, 3] Since grain generally cost less per unit of energy than roughage, limit feeding may reduce the feed cost of gain. A concern associated with limit feeding is that bunk requirements may need to be increased when feed is restricted in order to ensure that all cattle can eat simultaneously. Data from a commercial feedyard suggested that bunk allotments of 9 inches per head allowed 55% of cattle to eat at once while 12 inches per head allowed 75% of cattle to eat at once.[1] The current recommendation for 400 – 800 lb beef calves fed once daily is 18-22 inches of bunk per calf.[4]

Kansas State University researchers conducted an experiment with the objective of evaluating the effects of bunk-space allotment on growth performance of growing calves limit-fed a high-energy corn and corn co-product diet during a 58-day receiving period.[5] An additional objective in this trial was to determine if bunk-space allotment during the receiving period impacted subsequent growth performance during a 90-day grazing season in the Kansas Flint Hills. In this experiment, 385 crossbred steers (initial body weight = 473 lb) were purchased in Texas and transported to the Kansas State Beef Stocker Unit. The steers were stratified by body weight and randomly assigned to one of four bunk allotment treatments: 10, 15, 20, or 25 inches of bunk per head for the 58-day receiving period (7 pens per treatment with 12-14 head per pen). The steers were fed once daily at 7:00 a.m. using a Roto-Mix feed wagon at 1.8% of bodyweight (dry matter basis) for the first 39 days and at 2.0% of bodyweight thereafter. The diet contained (dry matter basis) 39.5% dry-rolled corn, 7.5% supplement, 40% wet corn gluten feed, and 13% prairie hay. Steers were individually weighed on days 29 and 58 and pen weights were measured weekly to determine feed offered for the following week. Following the receiving period, steers were blocked by bunk-space treatment, randomly assigned to one of eighteen pastures, and grazed for 90 days.

The effects of bunk space allotment on performance of limit-fed growing calves during the 58-day receiving period are shown in Table 1. These authors reported that body weights (BW), dry matter intake (DMI), or gain-to-feed ratios (G:F) during the receiving period did not differ ($P \geq 0.34$) between treatments. Average daily gain (ADG) increased linearly ($P = 0.03$) with increased bunk space for the first 29 days; however, no trends were observed thereafter. These results agree with previous research that demonstrated limit-fed diets with bunk allotments of 5 - 24 inches per calf did not impact growth performance during growing or finishing periods.[6, 7] Similarly, the commercial feedyard data, showed that bunk allotments of 9 or 12 inches of bunk per head did not impact performance of limit-fed heifers fed twice daily (first half of their daily feed allotment at initial feeding and then the second half 2 hours later).[1] More recent research showed that bunk allotments of 8 or 34 inches per head did not impact final BW, DMI, ADG, or G:F following an 84-day growing period when steers were fed twice daily using the slick bunk protocol.[8] In addition, overall total body weight gains and ADG from the receiving and grazing periods did not differ ($P > 0.57$) between bunk treatments. During the grazing season, ADG increased linearly with reduced ($P < 0.01$) bunk allotment; however, body weights did not differ ($P = 0.91$) between bunk treatments at the completion of the grazing period (Table 2).

Table 1. Effects of bunk space allotment on performance of limit-fed growing calves during a 58-day receiving period.

	Treatment, inches				P-value[1]		
Item	10	15	20	25	Linear	Quadratic	Cubic
Body Weight, lb							
Day 0	472	476	474	476	0.76	0.93	0.67
Day 29	525	531	536	536	0.16	0.50	0.92
Day 58	567	573	580	573	0.38	0.29	0.58
ADG, lb/day							
0 - 29	1.79	1.94	2.16	2.07	0.03	0.23	0.38
29 - 58	1.43	1.41	1.54	1.30	0.40	0.15	0.10
0 - 58	1.61	1.68	1.85	1.68	0.22	0.10	0.12
DMI, lb/day							
0 - 29	9.04	9.04	9.06	9.04	0.48	0.12	0.27
29 - 58	10.50	10.50	10.58	10.47	0.89	0.44	0.30
0 - 58	9.75	9.72	9.83	9.75	0.56	0.50	0.12
G:F, lb/lb							
0 - 29	0.09	0.10	0.11	0.10	0.14	0.36	0.68
29 - 58	0.06	0.06	0.07	0.06	0.52	0.46	0.25
0 - 58	0.07	0.08	0.09	0.08	0.13	0.32	0.16

[1]P-value associated with linear, quadratic, or cubic effects of bunk allotment.
Adapted from Duncan et al., 2022.

Table 2. Effects of bunk allotment during the receiving period on subsequent growth performance during a 90-day grazing season and overall performance

	Treatment, inches				P-value[1]		
Item	10	15	20	25	Linear	Quadratic	Cubic
Body Weight, lb							
Day 0	602	611	615	613	0.25	0.38	1.00
Day 90	822	829	825	822	0.80	0.54	0.75
ADG, lb/day							
0 - 90	2.43	2.40	2.29	2.25	<0.01	0.99	0.39
Overall BW gain							
Total gain, lb	351	353	351	344	0.34	0.38	0.96

[1]P-value associated with linear, quadratic, or cubic effects of bunk allotment.
Adapted from Duncan et al., 2022.

In conclusion, these data suggest that bunk allotments of 10, 15, 20, or 25 inches per head had minimal impact on growth performance of growing calves limit-fed a high-energy corn and corn co-product diet during a 58-day receiving period. Reduced bunk space during the receiving period was associated with increased ADG during the subsequent 90-day grazing season. However, final BW and overall BW gains following the receiving period and grazing season did not differ between bunk treatments. Thus, under limit-fed conditions, bunk allotments of 10 inches per head may be used to maximize pen capacity without reducing performance during the growing period.

[1] Lake, R. P. 1986. Limit feeding high energy rations to growing cattle. 1986. In: Owens, F. N., editor. Feed intake symposium proceedings: feed intake by beef cattle. MP121. Stillwater (OK): Okla. Agr. Exp. Sta.; pp. 305–313.

[2] Wagner, J. J., T. L. Mader, L. D. Guthrie, and F. H. Baker. 1990. Limit-fed high-energy growing programs for feedlot steers. Prof. Anim. Sci. 6:13-18.

[3] Spore, T. J., S. P. Montgomery, E. C. Titgemeyer, G. A. Hanzlicek, C. I. Vahl, T. G. Nagaraja, K. T. Cavalli, W. R. Hollenbeck, R. A. Wahl, and D. A. Blasi. 2019. Effects of high-energy programmed feeding protocol on nutrient digestibility, health, and performance of newly received growing beef cattle. Appl. Anim. Sci. 35:397-407.

[4] FASS. 2020. Federation of Animal Science Societies. Guide for the care and use of animals in agricultural research and teaching, 4th ed. Champaign (IL): Federation of Animal Science Societies.

[5] Duncan, Z. M., Z. L. DeBord, M. G. Pflughoeft, K. J. Suhr, W. R. Hollenbeck, A. J. Tarpoff, K. C. Olson and D. A. Blasi. 2022. Bunk space requirements for growing beef cattle limit-fed a high-energy corn and corn co-product diet. Transl. Anim. Sci. 6. Available at: https://doi.org/10.1093/tas/txac096.

[6] Zinn, R. A. 1989. Manger space requirements for limit-fed feedlot steers. J. Anim. Sci. 67:853–857.

[7] Gunter, S. A., M. L. Galyean, and K. J. Malcolm-Callis. 1996. Factors influencing the performance of feedlot steers limit-fed high-concentrate diets. Prof. Anim. Sci. 12:167–175.

[8] Harrison, M. A., and J. W. Oltjen. 2021. Effect of a reduction in linear bunk space on feedlot steer performance and body composition. Trans. Anim. Sci 5:S34–S37.