EXTENSION
BEEF CATTLE RESEARCH UPDATE
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Effects of Supplemental Fat and Roughage Level on Performance, and Health of Newly Received Feedlot Calves

The response and performance of feedlot cattle during the overall feeding period is affected by their health and performance response during the receiving period. The receiving period is crucial to the economic outcome of cattle feeding. In general, starting cattle on high roughage diets results in lower incidences of morbidity and mortality. Whereas higher concentrate diets generally improve performance, thus reducing cost of gain.

A 2005 review of several receiving trials conducted at the Clayton Livestock Research Center (Clayton, NM) during the 1970's and 1980's concluded that the optimum dietary strategy for starting lightweight, highly stressed, newly received cattle on feed would be to feed a 50 to 75% concentrate milled diet.[1] This allowed cattle to perform well without economically important negative effects on receiving period health. A 2016 survey of consulting feedlot nutritionists showed in receiving diets, 30% or greater (dry matter basis) roughage was used most frequently in the diet.[2]

An alternative to feeding newly received calves high concentrate diets as opposed to high roughage diets would be to feed supplemental fat. The 2016 survey reported that added fat was used by 11.3% of the nutritionists' clients in receiving diets. The concentration of added fat recommended by the nutritionists in receiving diets was only 0.35% of dry matter (DM) and the nutritionists most frequently recommended that no added fat (0.0%) be used in receiving diets.

In recent research conducted at the Clayton Livestock Research Center, researchers "hypothesized that increasing fat content in diets containing greater amount of roughage would be an alternative to increase energy intake and growth performance and reduce the negative effects of stress on the immune function of newly received calves".[3] The objective of this study was to evaluate the effects of dietary fat and roughage level on intake, growth performance, and health of newly received feedlot calves.

This 58-day study used 72 crossbreed male calves (initial shrunk body weight = 441 lb) that were sourced from commercial auctions and transported approximately 808 miles into one commercial trailer from Delhi, LA to the Clayton Livestock Research (16 hours on truck). The calves were blocked by shrunk body weight (BW) and assigned to 24 pens (3 calves/pen and 6 pens/treatment). The experiment used a 2 × 2 factorial arrangement of treatments, consisting of two roughage levels (wheat hay at 30% or 60% (DM basis) combined with 2 levels of supplemental fat (yellow grease at 0% or 3.5% (DM basis).

The effects of roughage level and supplemental fat levels on growth performance, morbidity, and mortality are shown in Table 1. No effects of roughage level x supplemental fat interactions were detected for any variable analyzed in this study ($P \geq 0.31$). Dietary roughage level did not affect DM intake ($P = 0.85$). Calves fed 30% roughage tended to have greater average daily gain (ADG; 3.24 vs. 2.65 lb) and final BW (628 vs. 593 lb) than calves fed 60% roughage ($P \leq 0.08$). Feed efficiency (Gain to Feed ratio) was greater for calves fed 30% roughage than calves fed 60% roughage ($P = 0.01$; 0.249 vs. 0.204).

Dietary roughage level did not affect morbidity and mortality ($P \geq 0.11$) during the study. However, there was a numerical increase in the number of calves fed 30% roughage that required a third treatment for bovine respiratory disease (BRD; $P = 0.14$; 11.1% vs. 2.78% for 30% and 60% roughage, respectively). The number of antimicrobial treatments for BRD was also numerically greater for calves fed 30% vs. 60% roughage ($P = 0.11$; 1.75 vs. 1.34, respectively).

Table 1. Growth performance, morbidity, and mortality of newly received feedlot calves fed diets containing different roughage levels (wheat hay; 30% or 60%; DM basis) and supplemental fat (yellow grease; 0 or 3.5%; DM basis).

	Roughage Level		Fat Level		P-value	
Item	30%	60%	0%	3.5%	Roughage	Fat
Growth performance						
Initial BW, lb	441	439	441	441	---	---
Final BW, lb	628	593	595	626	0.08	0.13
DMI, lb/day	13.23	13.05	12.94	13.32	0.85	0.64
ADG, lb	3.24	2.65	2.67	3.22	0.07	0.09
Feed efficiency[1]	0.249	0.204	0.207	0.246	0.01	0.03
Cattle treated for respiratory disease[2], %						
First treatment	50.0	47.2	44.4	52.8	0.82	0.49
Second treatment	19.4	11.1	8.33	22.2	0.32	0.10
Third treatment	11.1	2.78	5.56	8.33	0.14	0.62
Number of treatments required	1.75	1.34	1.51	1.58	0.11	0.78
Mortality, %,	8.33	2.78	5.56	5.56	0.31	1.00

Adapted from Smithyman et al., 2021.
[1]Gain-to-feed ratio (lb/lb).
[2]Calves were observed daily for bovine respiratory disease (BRD) signs.

Feeding 3.5% supplemental fat did not affect DMI (P = 0.64) but tended (P = 0.09) to increase ADG compared with the 0% supplemental fat (3.22 vs. 2.67 lb). Feed efficiency was greater for calves fed 3.5% vs. 0% supplemental fat (P = 0.03; 0.246 vs. 0.207). Feeding supplemental fat tended (P = 0.10) to increase the number of calves requiring a second treatment against BRD compared with no supplemental fat (P = 0.10; 22.2 vs. 8.33%). Although the total number of antimicrobial treatments required to treat sick calves (P = 0.78) and the mortality rate (P = 1.0) were not affected by supplemental fat.

These researchers concluded that “feeding 30% roughage diets or adding 3.5% of yellow grease as supplemental fat increased feed efficiency during the feedlot receiving period”. “Adding 3.5% yellow grease (DM basis) as supplemental fat had some impact on morbidity rate, and roughage level did not affect the number of antimicrobial treatments for BRD, despite the numerical increase in the percentage of retreatments”.

[1] Rivera, J.D., M.L. Galyean, and W.T. Nichols. 2005. Review: Dietary roughage concentration and health of newly received cattle. Prof. Anim. Sci. 21:345-351.

[2] Samuelson, K. L., M. E. Hubbert, M. L. Galyean and C. A. Löest. 2016. Nutritional recommendations of feedlot consulting nutritionists: The 2015 New Mexico State and Texas Tech University survey. J. Anim. Sci. 94: 2648-2663.

[3] Smithyman, M. M., V. N. Gouvêa, M. O. Oliveira, H. J. M. Giacomelli, D. L. Campbell, F. Batistel, R. F. Cooke and G. C. Duff. 2021. Effects of supplemental fat and roughage level on intake, growth performance, and health of newly received feedlot calves. Transl. Anim. Sci. 5: S25-S29.