EXTENSION
BEEF CATTLE RESEARCH UPDATE
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Roughage Level and Supplemental Fat for Newly Received Finishing calves: Effects on Growth Performance and Health

Shipping fever, or bovine respiratory disease complex (BRD), is the most common morbidity and mortality event among feedlot cattle in the United States.[1] The incidence of BRD is greater within the first days after feedlot arrival (receiving period)[2]; usually the first 4 to 8 weeks in which relocated beef cattle adjust to their new environment. This represents the most challenging time regarding both nutritional and health management.[3] During these first weeks, low dry matter intake (DMI)[4], associated with the stress of weaning, marketing, and road transportation, results in inadequate nutrient intake, especially energy, which increases the negative effects of stress on immune function.

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.[5] 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.[6]

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 research conducted at the Clayton Livestock Research Center, researchers "hypothesized that adding fat to receiving diets containing a 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 compared to diets containing greater amounts of concentrate".[7] The objective of this study was to evaluate the effects of supplemental yellow grease in diets containing different roughage levels on intake, growth performance, and health of newly received finishing calves.

This experiment used 72 crossbred steers ((British and British × Continental; initial body weight = 441 lb) in a 58-day receiving period. The steers were sourced from commercial auctions and transported approximately 808 miles in one commercial trailer from Delhi, LA, to the Clayton Livestock Research Center in Clayton, NM (16 hours on truck) and processed immediately after feedlot arrival. Upon arrival, the calves were individually weighed, blocked by off-truck shrunk body weight (BW), and assigned to 24 pens (three calves/pen). 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 observed 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 ($P \leq 0.08$). Gain 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 ≥ 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).

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). Gain 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.

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
Gain efficiency[1]	0.249	0.204	0.207	0.246	0.01	0.03
Health						
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 Gouvea et al., 2023.
[1]Gain-to-feed ratio (lb/lb).
[2]Calves were observed daily for bovine respiratory disease (BRD) signs.

These results indicated that feeding newly received feedlot calves with diets containing 30% roughage (DM basis) increases ADG and gain efficiency compared to diets containing 60% roughage, with no impact on animal health. In addition, adding 3.5% of yellow grease (DM basis) as supplemental fat to receiving diets did not affect DMI, increased gain efficiency, and had minimal impact on the morbidity rate.

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