

# HIGH CONCENTRATE-LOW STARCH STARTING DIETS

Don Gill<sup>1</sup>, Mike Van Koevering<sup>2</sup> and Fred Owens<sup>1</sup>

## Story in Brief

Compared with starting diets containing a high amount of roughage, a high concentrate diet that was low in starch produced much faster gains without increasing morbidity or mortality. Starting rations for shipped highly stressed cattle have traditionally been diluted with large amounts of roughage. This reduces the possibility of acidosis and morbidity. High amounts of roughage reduce the gain of the starting cattle. Consequently, feed cost per unit of gain is high. An 85% concentrate ration with 43% of the diet as corn distillers grain was formulated at a dietary starch level similar to the starch level found in feedlot starting rations containing 50 to 60% grain. Feed required per unit of gain was reduced by 75% compared to starting diets based on prairie grass hay and protein supplement. With the hay diets, gain improved slightly as the level of protein supplement was increased from 1.5 pounds per day to 4 pounds.

(Key Words: Receiving Rations, Beef Calves, Corn Distillers Grain.)

## Introduction

High roughage starting diets have been used extensively in experiments at Pawhuska, OK whereas higher concentrate starting diets have been popular in trials at Clayton, NM. For optimal animal health, high roughage starting diets are preferred, but high roughage diets cause handling problems for feedlots and reduce rates of gain (Richey et al., 1981; Lofgreen, 1982). Several factors could be responsible for this difference. These differences include ruminal fermentation or concentrations of absorbed nutrients such as VFA, glucose, amino acids or minerals. That animal health may differ is not surprising because the secretion of interferon by IBR-stressed steers is lower for steers fed concentrate than those fed roughage (d'Offay et al., 1992). Because starch in high concentrate diets is the component primarily responsible for acidification of the rumen and rapid volatile fatty acid production, we formulated a concentrate diet based on a feedstuff with the starch removed (distillers grain). The diet was fed in two experiments with different truckloads of cattle (86 and 97 steers) at Pawhuska.

---

<sup>1</sup>Regents Professor <sup>2</sup>Former Graduate Student

**Table 1. Performance and health during 28 day receiving study.**

Diet Supplement	Ad lib hay 1.5 lb 40%CP	Ad lib hay 2 lb 40%CP	Ad lib hay 4 lb 20%CP	Limit hay & low starch
Feed, lb/d	13.2 <sup>b</sup>	13.7 <sup>b</sup>	16.0 <sup>a</sup>	12.4 <sup>c</sup>
Hay, lb/d	11.7 <sup>a</sup>	11.7 <sup>a</sup>	12.0 <sup>a</sup>	1.3 <sup>b</sup>
Supplement, lb/d	1.5 <sup>d</sup>	2.0 <sup>c</sup>	4.0 <sup>b</sup>	11.1 <sup>a</sup>
Gain, lb/d	.77 <sup>b</sup>	.81 <sup>b</sup>	1.05 <sup>b</sup>	1.85 <sup>a</sup>
Feed/gain	27.3	29.6	27.4	7.3
Gain/feed (times 100)	5.7 <sup>b</sup>	5.7 <sup>b</sup>	6.5 <sup>b</sup>	14.9 <sup>a</sup>
Morbidity, %	32.7	30.4	12.9	21.6

a,b,c,d Means with different superscripts differ ( $P < .05$ ).

## Materials and Methods

The test diet consisted of 43% corn distillers grain, 36% rolled milo grain, 10% cottonseed hulls, 5% alfalfa pellets, 4% molasses plus vitamins, minerals and monensin. Calves fed this diet were given access to hay on the first day but hay supply was restricted to 1 lb per head daily thereafter. Three control diets consisted of free choice access to prairie hay plus either 1.5 or 2 lb daily of a 40% protein supplement or 4 lb of a 20% protein supplement. The protein supplement was based on soybean meal plus wheat middlings. All steers were weighed on arrival and at 28 days with 10 to 13 steers being fed in each of the eight pens in each of the two trials. Standard vaccine and health treatments were employed. Morbidity was detected or confirmed by body temperature (rectal temperature over 104°F being considered sick). Standard medical treatments were employed. Data were analyzed using a linear model that included the main effects of diet, and load.

## Results and Discussion

Results are presented in Table 1. Rate and efficiency of gain (gain/feed) were markedly superior for calves fed the concentrate diet as would be expected from their higher energy intake. For calves given access to hay, hay intake tended to be similar regardless of the amount of supplement fed. Morbidity was no greater for calves fed the concentrate diet than for calves given ad libitum access to hay. This suggests that the high starch content of receiving diets may be responsible for the increase in morbidity often noted with concentrate diets. Further studies with other grain-substitute feeds low in starch content (middlings, corn gluten feed) and a high-starch control diet will be conducted. If results prove repeatable, feedlots may find it useful to substitute low starch feeds for part of the grain and most of the roughage in starting diets. A high-starch control diet has not yet been compared. Compared with high roughage diets, concentrate feeds low in starch content should enhance performance of shipping-stressed calves and simplify feed handling while not increasing morbidity. Recently, the milo in the test diet has been replaced with corn. Both pellet quality and animal acceptance of the feed are improved. The pellet is being fed without hay after the first few days with no apparent problems.

## Literature Cited

- D'Offay, J.M. et al. 1992. Conference of Research Works on Animal Diseases. p 41. Chicago, IL.
- Lofgreen, G.P. 1982. Clayton Livestock Research Center Progress Report. p 46.
- Richey, E. J. et al. 1981. Okla. Agr. Exp. Sta. Res. Rep. MP-112:81-83.