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K-STATE Research and Extension

CATTLEMEN'S DAY 2018

Programming a Variety of Gains Is Possible by Controlling Intake of a Single High-Energy By-Product-Based Diet Early in the Receiving/Growing Period Without Affecting Efficiency

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Introduction

Programming more efficient gains early in the feeding period is possible when utilizing limit-fed high-energy diets based on fermentable corn by-products such as wet corn gluten feed. The replacement of corn in the diet with corn by-products decreases the health risks associated with rapid starch digestion while maintaining total energy intakes sufficient for desired gains. Evidence from recent trials conducted at the Beef Stocker Unit supports this rationale; however, to our knowledge, research has not been conducted analyzing the effects on performance when one high-energy diet is limit-fed at increasing levels of controlled intake. If efficiency is maintained and average daily gain increases with increasing intake, then one diet could be used to achieve a variety of gains.

Experimental Procedures

A total of 400 Angus × Hereford heifers (body weight = 451 ± 18 lb) were assembled and shipped from a single source in Chinook, MT, to the Kansas State University Beef Stocker Unit, Manhattan, KS, (1,256 mi) over 7-day period from October 25 to 31, 2016. The heifers were used to determine the effects of 4 intakes using the 60 Mcal net energy for gain/100 lb dry matter (Table 1) diet used in prior experiments at the Beef Stocker Unit in a randomized complete block design with each of 4 loads representing a block. Treatments consisted of the 60 Mcal net energy for gain/100 lb dry matter diet offered at 1.9, 2.2, 2.5, or 2.8% of body weight on a dry matter basis daily. On arrival, all animals were vaccinated for common clostridial and viral diseases and treated for internal and external parasites. On day 14, all animals were revaccinated for common respiratory diseases. Individual animal weights were measured on arrival, days 0, 14, and at conclusion of the study (day 49). A pen scale was used to measure weights on days 7, 21, 28, and 35 and dry matter delivery adjusted on a pen basis weekly according to updated cattle weights. On day 35, all animals received a 50 Mcal net energy for

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gain/100 lb dry matter diet for two weeks to equalize differences in gastrointestinal tract fill. Performance was calculated from 0 to each weigh day, and pen was the experimental unit. Animals were observed twice daily for illness and treated according to the protocol of the K-State Beef Stocker Unit.

Results and Discussion

Performance results from the experiment are in Table 2. Final average daily gain increased linearly ($P<0.01$) with increasing intake. These results were expected and can be attributed to the overall increase in energy intake as more feed was offered. In addition, final dry matter intake increased linearly ($P<0.01$) by design of the experiment, as intake was the treatment administered. Most interestingly, final feed to gain ratio at the conclusion of the study was not affected by dietary treatment ($P=0.98$). We speculated that with intakes at 2.8% of body weight, the benefit in efficiency often realized when limit-feeding would be diminished, as a theoretical ad libitum intake would be similar to this value given the characteristics of the cattle. Because gain increased linearly, while efficiency remained acceptable, a new approach to programming gain early in the growing period is possible. Based on these results, producers could potentially offer one diet from entry to the feedlot through the growing phase without the inconvenience and conflicts associated with step-ups and/or diet manipulation. However, it is important to note that because a diet was offered for ad libitum intakes at the end of the study, compensatory gain from the more limited cattle could have affected results. In addition, the overall high concentrate level of the 60 Mcal net energy for gain/100 lb dry matter diet could decrease the number of step-up diets needed for adaptation to a finishing diet. In conclusion, programming a variety of gains in the receiving and growing period is possible utilizing a single a high-energy diet based on wet corn gluten feed without sacrificing performance.

Table 1. Experimental diet[1]

Ingredient	% of dry matter
Alfalfa	6.50
Prairie hay	6.50
Dry-rolled corn	39.50
Wet corn gluten feed	40.00
Supplement pellet[2]	7.50
Total	100.00

[1]Diets formulated to supply 60 Mcal net energy for gain/100 lb dry matter.
[2]Supplement pellet was formulated to contain (dry matter basis) 10% crude protein, 8.0% calcium, 0.24% phosphorus, 5.0% salt, 0.55% potassium, 0.25% magnesium, 1.67% fat, and 8.03% acid detergent fiber.

Table 2. Effects of intake on performance

Item	Feed offered, % of body weight daily[1]				Standard error of mean	P-value		
	1.9	2.2	2.5	2.8		Linear	Quadratic	Cubic
Number of pens	8	8	8	8				
Number of animals	100	99	100	101				
Body weight, lb								
Day 0	467	465	468	465	10	0.57	0.88	0.16
Day 49	597	606	620	625	14	<0.01	0.68	0.46
Final								
Average daily gain, lb/day	2.7	2.9	3.1	3.3	0.10	<0.01	0.71	0.81
Dry matter intake, lb/day	12.1	13.2	14.2	15.0	0.20	<0.01	0.39	0.63
Feed to gain ratio, lb/lb	4.6	4.6	4.6	4.6	0.01	0.98	0.94	0.94

[1]Diet was formulated to contain 60 Mcal net energy for gain/100 lb dry matter and offered at 1.9, 2.2, 2.5, or 2.8% of body weight daily. Animals were weighed weekly and feed delivery adjusted accordingly.