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MOLASSES-FAT BLEND AS AN ENERGY SOURCE AND CONDITIONING AGENT IN FEEDLOT DIETS

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Summary

Seventy-two yearling crossbred steers were used in an individual feeding trial to evaluate the effects of adding a molasses-fat blend (Synergy® 19/14; Cargill Molasses Liquid Products) to diets at 6 or 12% (dry basis) on growth performance, carcass traits, and feed intake behavior. Dry-rolled corn was processed to a mean geometric particle size of either 2,000 or 3,800 microns. Adding the liquid supplement at 6% to the coarse-rolled finishing ration improved gain (P<.1) and feed efficiency (P<.1). Incorporation of Synergy 19/14 into feedlot rations may help reduce fluctuations in feed intake.

(Key Words: Molasses, Fat, Steers, Finishing, Carcasses.)

Introduction

Molasses and fat are used commonly as conditioning agents in feedlot diets because of their ability to agglomerate fine particles and reduce dustiness. Both are excellent sources of readily available energy and can reduce feed costs when grain prices become inflated. Improvements in emulsion/suspension technology have resulted in mixtures that offer a convenient means of using a single product to incorporate both fat and molasses into cattle diets.

Fine particles and/or dust in the diet influence consumption behavior of feedlot cattle. Fine particles segregate from larger particles or may be physically sorted out because of their floury texture and poor palatability. However, from a nutritional perspective, processing to a fine particle size can improve digestibility. The challenge is to maintain a reasonable balance among feed intake, diet digestibility, and digestive disturbances and still achieve optimum animal performance. Liquid ingredients can help to agglomerate fine particles when diets are highly processed, thereby improving consumption. Our objectives were to: 1) measure performance and carcass traits of feedlot cattle in response to increasing dietary concentrations of a molasses-fat blend and 2) evaluate the potential for using that blend to minimize diet segregation and sorting.

Experimental Procedures

A study was conducted at the Kansas State University Beef Teaching and Research Center using 72 individually fed, British- and Continental-cross yearling steers averaging 828 lb. They were fed a series of transition diets (40 to 92% concentrate) during a 21-day pretrial period, then treated for internal and external parasites and implanted with Revalor-S®. Animals were stratified by weight and assigned randomly, within strata, to each of six treatment groups. Treatments were arranged as a 2 × 3 factorial in 12 replicates. Factors were grain particle size (mean geometric particle size, 2,000 or 3,800 microns) and level of the molasses-fat blend (0, 6 or 12% of dry matter). The molasses-fat blend (Synergy) contained approximately 14% crude protein and 19% fat, as-fed. Diets (Table 1) were fed once daily for a period of 80 days. Rejected (uneaten) feed was collected from each animal at the mid-point and end of the trial, and mean geometric particle size was measured to quantify differences in segregation and/or sorting of the experimental diets. Steers were slaughtered at a commercial abattoir when they were estimated to have an average fat thickness (12th rib) of 0.4 inches.

Table 1. Composition (Dry Basis) of Experimental Diets

	Concentration of Synergy		
Item	0%	6%	12%
Dry-rolled corn	87.15	81.84	76.43
Ground alfalfa hay	8.0	8.0	8.0
Synergy 19/14	0.0	6.0	12.0
Dehulled soybean meal	1.5	1.5	1.5
Urea	.65	.33	-
Limestone	1.33	1.48	1.47
Potassium chloride	.44	.20	-
Salt	.3	.3	.3
Magnesium oxide	.12	.14	.15
Ammonium sulfate	.05	-	-
Vitamin/mineral premixes[a]	.15	.15	.15
Crude protein, %	12.66	12.66	12.66
NPN, %	1.95	2.19	2.44
Crude fat, %	3.92	5.75	7.57
NEm, Mcal/100 lb	.82	.87	.92
NEg, Mcal/100 lb	.55	.58	.62
Calcium, %	.70	.70	.70
Phosphorus, %	.35	.35	.36
Potassium, %	.70	.70	.72
Magnesium, %	.25	.25	.25
Sulfur, %	.16	.26	.37

[a]Diets contained the following concentrations of added vitamins, trace minerals and feed additives (dry basis): 1,200 IU/lb vitamin A; 10 IU/lb vitamin E; .05 ppm cobalt; 10 ppm copper; .6 ppm iodine; 60 ppm manganese; .25 ppm selenium; 60 ppm zinc; 30 g/ton Rumensin®; 10 g/ton Tylan®.

Results and Discussion

Performance is summarized in Table 2. Steers fed the coarse grain had improved gains (P<.05) and greater dry matter intakes (P<.1) and tended to be more efficient (P=.13) than those fed the fine-rolled grain. Cattle fed the coarse-rolled diets with 6% Synergy performed far better than those fed the other treatments. In other instances, adding Synergy to reduced gain (linear P<.05; quadratic P<.05) and tended to reduce feed efficiency (quadratic P<.1). In fine diets, fat thickness at the

12th rib decreased as the amount of Synergy was increased, but the opposite was true in the coarse-rolled diets (interaction, P<.1). Carcasses averaged only 30% Choice across the entire experiment; according to USDA graders, the plant average that week was 35% Choice. Because of high variability and few observations, no significant differences were noted among treatments for quality grade. Adding Synergy to the diet reduced the number of instances in which feed intake decreased more than 5, 10, or 20% from the previous day (Table 3). Particle size of the grain had a less notable impact on variances in feed intake. Processing to the finer particle size tended to result in a greater incidence of feed intake reduction (P<.2) at the 5 or 10% level. Mean geometric particle size of refused feed is shown in Table 4. As expected, coarse rolled diets resulted in fewer fine particles in the rejected feed. Adding Synergy to the diet resulted in a linear increase (P<.01) the size of particles in refused feed,suggesting that it may help to reduce diet sorting and/or segregation.

Table 2. Performance and Carcass Traits of Steers Fed Diets Containing Coarse- or Fine-Rolled Corn with 0, 6, or 12% Synergy

	2,000µ Particle Size			3,800µ Particle Size			
Item	0%	6%	12%	0%	6%	12%	SEM
Initial weight, lb	986	989	988	986	986	986	10
Final weight, lb[a]	1275[d]	1278[d]	1265[d]	1275[d]	1350[e]	1262[d]	21
Gain, lb/day[abc]	3.58[d]	3.55[d]	3.43[d]	3.67[d]	4.41[e]	3.49[d]	.20
Dry matter intake, lb/day	21.6[d]	22.3[de]	22.1[d]	22.0[d]	23.9[e]	22.6[de]	.7
Feed:Gain[abc]	6.10[d]	6.41[d]	6.37[d]	5.99[d]	5.43[e]	6.54[d]	.22
Hot carcass weight, lb[c]	781[d]	775[d]	788[d]	790[d]	827[d]	760[d]	14
Dressing percentage[c]	61.3[de]	60.6[e]	62.3[d]	62.0[d]	61.2[de]	60.2[e]	.5
Fat over 12th rib, in[c]	.45[e]	.40[de]	.35[d]	.33[d]	.39[de]	.39[de]	.04
KPH fat, %	2.7	2.7	2.5	2.2	2.4	2.6	.1
Ribeye area, in^2 [c]	12.8[de]	12.5[d]	12.9[de]	13.3[e]	13.6[e]	12.1[d]	.3
Marbling, degrees	SL^{50}	SL^{44}	SL^{48}	SL^{25}	SL^{20}	SL^{53}	17
USDA yield grade[c]	2.4	2.2	1.7	1.3	1.7	2.5	.2
Percent USDA Choice	50.0	16.7	25.0	33.3	16.7	33.3	

[a]Effect of liquid supplement level (P<.1).
[b]Effect of grain particle size (P<.1).
[c]Interaction between grain particle size and liquid supplement level (P<.1).
[de]Means in the same row with common superscripts are not different at P<.05.

Table 3. Occurrences (per Animal) of a 5, 10, or 20% Reduction in Feed Intake Relative to Intake the Previous Day (First Two Weeks of Feeding Period Only)

	Concentration of Synergy			
Change From Previous Day	0%	6%	12%	SEM
5% Reduction	1.42[a]	.92[b]	.58[b]	.18
10% Reduction	.92[a]	.50[b]	.25[b]	.15
20% Reduction	.46[a]	.17[b]	.17[b]	.11

[a,b]Means in the same row with common superscripts are not different at P<.05.

Table 4. Mean Geometric Particle Size of Refused Feed from Steers Fed Diets Containing Coarse- or Fine-Rolled Corn with 0, 6, or 12% Synergy

	2,000µ Particle Size			3,800µ Particle Size			
Item	0%	6%	12%	0%	6%	12%	SEM
Number of samples	9	11	10	9	11	12	
Particle size, microns	894[a]	881[a]	1180[b]	772[a]	1194[b]	1666[c]	21

[a,b,c]Means in the same row with common superscripts are not different at P<.10.