Effect of FuzZpellet™ on Feedlot Performance and Carcass Merit of Feedlot Cattle

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Story in Brief

Our data suggest that FuzZpellet included at 15% of the diet DM can replace dry rolled corn, cottonseed hulls (roughage), and fat in high-grain finishing diets without adverse effects on cattle performance. Six percent dietary NDF (DM basis) from FuzZpellet (15% FuzZpellet, DM basis) can replace 6.0% dietary NDF (DM basis) from cottonseed hulls. Numerically, steers fed 15% FuzZpellet had a 5.3% improvement in ADG compared with control steers. However, substituting (DM basis) 7.5% FuzZpellet (3.0% dietary NDF, DM basis) for 7.0% cottonseed hulls resulted in an 11.7% decrease in DM intake, and a 9.0% decrease in ADG. Our data support conclusions of previous research that NDF supplied by roughage is a useful method for exchanging roughage sources in finishing diets.

Key Words: Cattle, Cotton By-Products, Feedlot Performance, Roughage Level

Introduction

One of the greatest costs associated with feeding cattle in feedlots is the purchasing and handling of roughage, which is an expensive source of energy compared with cereal grains. In addition, handling fat (e.g., tallow, yellow grease) requires energy for heating, and recent concerns have surfaced regarding its safety due to its potential for carrying prion proteins responsible for Bovine Spongiform Encephalopathy or Mad Cow Disease. Products such as delinted and pelleted whole cottonseed provide fiber, fat, and protein in one package, and therefore have potential for reducing costs of handling and storing commodities, with no associated health risks. In a recent experiment at Texas Tech University (Mike Galyean, personal communication), 150 crossbred steers were used to determine the effects of whole cottonseed or FuzZpellet™ (Buckeye Technologies, Memphis, TN) on performance and carcass characteristics of finishing beef steers. The control diet contained steam flaked corn, cottonseed meal, alfalfa hay, yellow grease, added vitamin E (to supply approximately 900 IU/steer daily), and typical minerals/supplement. Replacing fat, roughage and cottonseed meal in the diet with whole cottonseed products (in either the whole or pelleted form) resulted in decreased dry matter intake, equal average daily gain, and thereby more efficient gains than a conventional finishing diet. In addition, previous research from Oklahoma State University (Markham et al., 2004) showed that heifers fed 15% FuzZpellet had 6.3% greater average daily gain and were 4.7% more efficient than control heifers. Therefore, it appears that adding cottonseed to finishing diets may improve performance.

Although roughages are an expensive source of energy in feedlot diets, they are included to reduce digestive and metabolic disorders. The optimal roughage level varies with grain source, grain-processing method, and roughage source. For balancing finishing diets, Defoor et al. (2002) and Galyean and Defoor (2003) have suggested that NDF from roughage might be the most useful roughage index. Because the lint in FuzZpellet provides a source of roughage in finishing diets, the purpose of this experiment was to determine cattle performance response when FuzZpellet replaced cottonseed hulls equally vs replacing cottonseed hulls on an equal level of NDF (from the roughage portion of the diet) basis.

Materials and Methods

Forty crossbred yearling steers (avg initial BW = 695 ± 29 lb) were delivered to the Willard Sparks Beef Cattle Research Center near Stillwater, OK. On arrival, steers were individually weighed and ear tagged. On the following day, steers were horn tipped as needed, implanted with Revalor-S (Hoechst Roussel Vet, Clinton, NJ), vaccinated with IBR-PI3-BVD-BRSV (Titanium 5, Intervet, Millsboro, DE), vaccinated with a seven-way clostridial preparation (Vision 7, Intervet, Millsboro, DE), and treated for control of external and internal parasites (Ivomec-Plus injectable, Merial, Duluth, GA). Body weights (unshrunk) were taken on two consecutive days following arrival (d 0 and 1) to determine initial weight. Steers were assigned to one of nine pens (four or five steers/pen; three pens/treatment) in a manner that allowed each treatment to have similar initial BW.

Treatments included: 1) control (CON); 2) FuzZpellet 7.5% (FP7.5); and 3) FuzZpellet 15% (FP15). Diets and nutrient composition are shown in Table 1. Diets were formulated to meet or exceed NRC (1996) nutrient requirements. Monensin (33 mg/kg of diet) and tylosin (11 mg/kg of diet) were fed. Steers were gradually adapted to their final diets using a starter and three step-up diets. Feed refused was weighed at 28-d intervals and as needed (e.g., following inclement weather). In addition, diet and ingredient samples were collected, and DM samples were composited by 28-d periods, allowed to air dry, and ground in a Wiley mill to pass a 1-mm screen. Diet samples were analyzed for N, ash (AOAC, 1996), NDF, and ADF (Goering and Van Soest, 1970). Interim unshrunk BW was determined at 28-d intervals. Steers were slaughtered at a commercial facility. Hot carcass weight, external fat, internal fat, longissimus muscle area, marbling score, yield grade and quality grade were determined.

Table 1. Composition of experimental diets on a dry matter basis

	% DM		
Ingredient	Control	FuzZpellet 7.5%	FuzZpellet 15%
Rolled corn	78.25	80.90	78.50
Cottonseed Hulls	7.00	---	---
FuzZpellet	---	7.50	15.00
Fat	3.25	1.60	---
Cottonseed meal	9.00	7.50	2.00
Wheat midds	---	.40	2.40
Limestone, 38%	1.25	1.25	1.25

Urea	.78	.38	.38
Potassium chloride	.14	.14	.14
Salt	.25	.25	.25
Rumensin 80	.018	.018	.018
Tylan 40	.013	.013	.013
Vitamin A 30,000	.011	.011	.011
Availa Zn 100	.03	.03	.03
Zinc sulfate	.003	.003	.002
Manganous oxide	.004	.004	.004
Copper sulfate	.002	.002	.002
Nutrient composition, DM basis			
NEm, Mcal/cwt	97.8	101.7	100.7
NEg, Mcal/cwt	62.8	66.5	66.2
Fat, %	6.8	6.5	6.6
NDF, %[a]	18.9	17.1	19.9
NDF, % from roughage[a]	6.02	3.00	6.00
ADF, %[a]	8.98	7.35	9.25
CP, %[a]	14.1	13.5	13.9
K, %	.61	.62	.63
Ca, %	.54	.54	.54
P, %	.34	.37	.38
[a]Values are from analyzed samples. All other values were calculated (NRC, 1996)			

Data for BW, DM intake, ADG, feed efficiency were analyzed as a randomized complete block design using the Proc Mixed procedure of SAS Release 8.02 (SAS Institute Inc., Cary, NC). Pen was the experimental unit. The majority of carcass data was lost due to a scheduling error at the plant (n = 4, 4, and 2 for CON, FP7.5, and FP15, respectively). Therefore, animal served as the experimental unit for carcass data, and results should be interpreted with caution.

Results and Discussion

Initial BW did not differ (P=0.48) among treatments (Table 2). On d 27, BW was greater (P=0.04) for CON and FP15 than for FP7.5. On d 83, 11, and 139 (final BW), BW were greatest (P<0.10) for FP15, intermediate for CON, and least for FP7.5. Interim ADG did not differ (P>0.10) among treatments. However, form d 0 to 139 (finish), ADG was greater for FP15 than FP7.5; CON was intermediate. From d 1 to 27, 56 to 83, 84 to 111, and overall (d 0 to 139), DM intake was greater (P<0.05) for FP15 and CON compared with FP7.5. Because ADG and DM intake were both decreased for FP7.5, no differences (P>0.30) in feed efficiency were observed among treatments across the feeding period.

Carcass data were not collected on the majority of carcasses; therefore, results (not shown) should be interpreted with caution. Hot carcass weight (average = 759 lb) was not (P=0.80) affected by treatment. Ribeye area was greatest (P=0.07) for FP15 (14.5 sq in), lowest for CON (11.5 sq in), and intermediate for FP7.5 (13.5 sq in). Backfat measured at the 12th rib, percentage of kidney, pelvic and heart fat, yield grade, and marbling did not differ among treatments (P>0.47). These results support research by Galyean et al. (2004; personal communication) that FuzZpellet does not influence carcass merit. However, Markham et al. (2004) reported a 23 lb. increase in hot carcass weight for heifers fed 15% FuzZpellet vs control heifers.

Table 2. Effect of FuzZpellet® on feedlot cattle performance

	Treatments[a]				
Item	CON	FP7.5	FP15	SEM[b]	P>F
Heifers	14	13	13		
Pens	3	3	3		
Weight, lb					
Initial	699	698	692	4.2	.48
27-d	822[c]	799[d]	820[c]	5.3	.04
55-d	923	905	935	10.1	.19
83-d	1019[cd]	989[c]	1047[d]	12.3	.04
111-d	1135[cd]	1093[c]	1155[d]	15.5	.07
Final (d 139)	1223[cd]	1176[c]	1242[d]	17.8	.09
ADG, lb/d					
0-27	4.55	3.75	4.73	0.31	.14
28-55	3.75	3.96	4.23	.47	.78

56-83	3.42	3.01	4.00	.34	.20
84-111	4.15	3.70	3.88	.28	.57
112-139	3.14	2.97	3.10	.32	.93
0-139	3.76[cd]	3.45[c]	3.96[d]	.11	.04
DMI, lb/d					
0-27	20.7[c]	18.9[d]	21.0[c]	.40	.02
28-55	19.1	18.0	20.1	1.06	.42
56-83	20.6[c]	16.7[d]	23.0[c]	.92	.008
84-111	22.4[c]	19.7[d]	23.1[c]	.74	.04
112-139	22.3	20.8	23.8	.90	.15
0-139	21.0[c]	18.8[d]	22.2[c]	.54	.01
F:G, lb/lb					
0-27	4.55	5.13	4.48	.31	.33
28-55	5.12	4.75	4.78	.41	.78
56-83	6.22	5.72	5.77	.66	.84
84-111	5.46	5.31	6.03	.36	.39
112-139	7.24	7.11	7.79	.62	.72
0-139	5.59	5.46	5.61	.14	.71

[a]CON = control; FP7.5 = 7.5% FuzZpellet; and FP15 = 15% FuzZpellet

[b]Standard error of the least squares means

[cd]Means without a common superscript differ ($P<0.05$)

Numerically, feeding FP15 in the present experiment resulted in a 5.3% improvement in ADG and 19 lb increase in final BW compared with CON steers, and confirm previous results that pelleted whole cottonseed might be efficacious when included in finishing diets. When FuzZpellet was included at 7.5% of the diet DM (half the roughage level from the roughage source), DMI and ADG were decreased, but feed efficiency was numerically (P=.14) improved (2.6%). These data confirm results of Defoor et al. (2002) that NDF from roughage is a useful index for substituting roughages in finishing diets.

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