Effect of Pulse Grains on Performance of Newly Weaned Steer Calves

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Abstract

Field peas, chickpeas, and lentils (pulse grains) are marketed as dry, whole or split seeds primarily for human consumption. Surplus grain, off quality grains, and screenings which contain high levels of protein (22 to 30% CP on a DM basis) and energy (45 to 60 Mcal/cwt NEg), are an attractive, nutrient dense livestock feed. The objective of this study was to determine if replacing a portion of a typical corn and canola meal diet with pulse grains would improve feed intake, gain, and feed efficiency of newly weaned feedlot cattle. One hundred seventy six mixed breed steers from 40 different ranches in North Dakota and Montana (initial BW 560.2 ± 40.9 lbs.) were allotted by weight and source to one of four receiving diets (Table 1) containing either chickpeas, field peas, lentils, or corn and canola meal as a concentrate and protein source. Experimental diets were fed for 40 days, after which cattle were fed a common diet containing approximately 68.4 percent concentrate on a DM basis. Effect of receiving diets on subsequent performance was evaluated for the 7-week period following the end of the trial.

Table 1. Receiving diets with pulse grains.

Item	Control	Field pea	Chickpea	Lentil
Ingredients	----------% DM basis----------			
Corn	39.30	32.43	30.46	32.91
Canola meal	9.42	2.22	2.28	-
Field peas	-	16.26	-	-
Chickpeas	-	-	16.80	-
Lentils	-	-	-	17.31
Alfalfa	26.87	27.13	27.79	27.37
Corn silage	21.47	19.18	19.94	19.75
Barley malt sprouts	1.00	0.94	0.93	0.90
Dicalcium phosphate	0.04	0.04	0.04	0.04
Limestone	0.27	0.26	0.25	0.25
YeaSacc 1026	0.87	0.82	0.81	0.78
Deccox	0.44	0.42	0.41	0.40
Nutrient composition				
Crude protein, %	15.86	15.75	16.35	16.19
Calcium, %	0.69	0.66	0.67	0.64
Phosphorus, %	0.45	0.41	0.41	0.40
NEm, Mcal/cwt	80.0	80.2	78.2	78.9
NEg, Mcal/cwt	51.8	52.0	49.7	50.5

Three weeks prior to feedlot entry, cattle were vaccinated for protection against IBR, BVD, BRSV, PI3 (Bovishield-4; Pfizer, Exton, PA), and clostridia (7-way + somnus; Pfizer, Exton, PA). Upon arrival at the CREC feedlot (October 11, 2003) cattle were implanted with Synovex-S (200 mg progesterone, 20 mg estradiol; Fort Dodge Animal Health, Overland Park, KS), re-vaccinated, ear-tagged, weighed, and allotted to treatment. Cattle fed chickpea-, field pea-, or lentil-based diets during the first 20-day period gained 25.9% faster (3.12 vs. 2.48 lbs/d) and consumed more dry matter per day (11.9 vs. 10.2 lbs/d) compared to cattle fed the corn-canola meal-based diet ($P < 0.01$, Table 2). Feed efficiency did not differ ($P > 0.32$) among treatments for the first 20-day period. During the second 20-day period, no difference in gain, dry matter intake, or feed efficiency occurred ($P > 0.38$), indicating that an advantage for feeding pulse grains exists during the first three weeks of receiving newly weaned cattle. Protein level was the same among the four treatments in this trial, indicating that protein from pulse grains may be more palatable or digestible compared to protein from canola meal or corn. When measured for the entire 42-day receiving period, cattle fed pulse grain-based diets gained 9.2% faster (4.02 vs. 3.68 lbs/day; $P < 0.05$), and tended ($P = 0.11$) to consume more dry matter per day (16.3 vs. 15.0 lbs/day) compared to cattle fed the corn/canola meal-based diet. At the termination of the receiving study, cattle were penned as treatment groups (4 pens, ~44 head per pen) and placed on a common corn-based finishing diet. Cattle previously fed pulse grains continued to follow a trend for increased gains for the 7-week period after the termination of the receiving trial.

Table 2. Performance calves fed pulse grains in receiving diets and post-trial effects.

						P <.05
						P Value
Item	Control	Field Peas	Chickpeas	Lentils	SE	Pulse vs. Control
Weight, lb.						
Initial	558.5	559.4	561.7	561.3	40.9	0.96
Intermediate	610.6	626.2	627.3	625.8	41.1	0.74
Final	712.9	727.4	735.3	733.4	46.1	0.72
Post-trial (7 weeks)	882.4	926.7	933.3	931.1	--------	----------
Daily dry matter intake, lb/d						
Period 1	10.2[a]	11.8[b]	11.8[b]	12.2[b]	0.5	0.01
Period 2	19.4	19.9	20.1	20.9	0.8	0.38
Receiving overall	15.0	16.0	16.2	16.7	0.7	0.11
Post-trial (7 weeks)	22.0	23.3	22.1	20.9	--------	----------
Average daily gain, lb/d						
Period 1	2.48[a]	3.18[b]	3.12[b]	3.07[b]	0.16	0.01
Period 2	4.87	4.82	5.14	5.12	0.29	0.64
Receiving overall	3.68	4.00	4.13	4.10	0.16	0.05
Post-trial (7 weeks)	3.46	4.07	4.04	4.03	--------	----------
Feed efficiencey, lb/lb						
Period 1	4.1	3.7	3.7	4.0	0.4	0.32
Period 2	4.0	4.1	3.9	4.1	0.1	0.68
Receiving overall	4.1	4.0	3.9	4.1	0.1	0.27
Post-trial (7 weeks)	6.4	5.7	5.5	5.2	--------	----------