

Effects of Processing Field Peas in Creep Feed on Performance of Nursing Calves

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Introduction

Field peas contain high levels of protein (approximately 24.5 % CP) and energy (approximately 88% TDN), and are an attractive, nutrient dense livestock feed for ruminants and non-ruminants. Significant and increasing amounts of peas and other pulse grains are produced annually in the northern Great Plains of the United States and the prairie provinces of Canada. North Dakota leads the United States in field pea production, giving producers in the region a high quality feed grain option for livestock rations. Since field peas are handled as a dry grain legume for livestock feed, they can be stored and processed in a manner similar to other grains. Field peas have been proven to be an attractive ingredient in creep feeds with increased feed intake and gain with increasing inclusion of peas up to 67% of the diet (Anderson, 1999; Landblom and Poland, 2000). The need to process peas in mixed creep feeds has not been explored. Whole grains are usually less digestible than processed grain. Dry rolling has a tendency to split the pea into the hull fraction and the endosperm fraction. The lighter hull fraction may not mix well and possibly adds variation to the diet. The particle size of ground peas is smaller resulting in increased surface area for enzyme and microbial activity. The objective of this study was to compare calf performance when peas were fed whole, dry-rolled, or ground in creep feed to nursing beef calves.



Cows and calves on creep feed study with field peas.

Experimental Procedures

One hundred eleven cow/calf pairs were allotted by weight (cow and calf weight), breed composition, and sex of calf to one of three pea-supplemented diets with three pens or replicates per treatment. The objective was to compare the effect of different processing methods for field peas on nursing-calf performance. Processing treatments were whole, dry-rolled, and ground field peas. Particle size of the peas averaged 700, 3100, and 9250 microns. Particle size was determined by pan-shaker method at the Northern Crops Institute in Fargo, ND. Some of the whole peas were broken or split due to handling and long-term storage. Rolled peas were processed in a Roskamp Model 900 roller mill set to break the peas into approximately four pieces. Ground peas were processed through a Bearcat Hammer Mill with a ½ inch screen. Creep diets were mixed on site utilizing soyhulls as a base with wheat midds and peas. (Table 1). Creep diets contained 16.5 % crude protein and 51.6 MCal/cwt NEg.

Table 1. Diet composition of creep feeds with field peas.

Ingredient	% DM basis
Soyhulls	50
Peas	40
Alfalfa	10
Diet specifications	
Crude protein, %	16.5
NEm, Mcal/cwt	81.2
NEg, Mcal/cwt	51.6
Calcium, %	0.46
Phosphorous, %	0.33

Field peas were included in the creep ration at 40% of the formulation based on interpolation of the optimum level from previous creep feed research (Anderson, 1999; Landblom and Poland, 2000). Cow/calf pairs were housed and fed at the Carrington Research Extension Center feedlot in open drylot pens during the summer of 2004. Each pen was equipped with automatic waterers and fenceline bunks for cows. Creep feed bunks were placed in each pen with a narrow gate entrance to permit calves, but not cows, to enter the creep-feed area. Respective creep feeds were added to the feeders two to three times a week on an as-needed basis. Feed for cows was delivered as a totally-mixed ration once daily to appetite.

Calves were vaccinated for protection against IBR, BVD, BRSV, PI3 (Bovishield-4; Pfizer, Exton, PA), and clostridia (7-way + somnus; Pfizer, Exton, PA) prior to the initiation of the trial. Health status of the cows and calves was monitored during daily feeding. The animals were cared for according to guidelines recommended in the Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching (FASS, 1998). The research project was approved by the Institutional Animal Care and Use Committee.

Data were analyzed using the GLM procedures of SAS (Version 8.0; SAS Inst. Inc., Cary, NC). Pen was the experimental unit.

Results and Discussion

Cow and calf background data and calf performance are reported in Table 2. Calf weights and dry matter intake of creep feed did not differ ($P>.82$) throughout the 56 days of the study. However, average daily gain appeared to be greater ($P<.04$) for rolled peas during period 2 with concomitant effect on overall calf gain ($P<.10$). Feed conversion shows some numerical improvement for the rolled peas as well.

Table 2. Effect of processing field peas in a creep feed diet on performance of calves.

Item	Treatment			St Error	P Value
	Ground	Rolled	Whole		
Number of pairs	36	36	37		
Cow age, years	4.3	4.3	4.2	1.1	0.99
Calf age, days	130.2	128.7	129.6	1.9	0.86
Cow weight					
August 5, 2004	1314.4	1276.1	1288.2	63.0	0.91
September 30, 2004	1346.2	1333	1335.2	47.7	0.82
Calf weight, lbs.					
Birth	97.8	97.3	95.8	2.1	0.76
August 5, 2004	397.1	393.4	394.1	8.3	0.95
September 2, 2004	484.9	484.5	481.6	4.2	0.96
September 30, 2004	571.0	578.7	569.4	10.8	0.82
Average daily gain, lbs./d					
Period 1	3.14	3.26	3.12	0.11	0.64
Period 2	3.07 ^a	3.36 ^b	3.14 ^a	0.08	0.04
Overall	3.11 ^b	3.31 ^b	3.13 ^a	0.07	0.10
Dry matter intake, lbs./d					
Period 1	6.42	6.40	6.47	0.11	0.90
Period 2	7.21	7.35	7.44	0.29	0.85
Overall	6.81	6.87	6.95	0.20	0.89
Feed conversion, lbs./lb.					
Period 1	2.05	1.96	2.07	0.11	0.91
Period 2	2.35	2.18	2.37	0.13	0.72
Overall	2.19	2.08	2.22	0.11	0.23

^{ab} Means in the same row with different superscripts differ.

Similarly, Birkelo et al. (2000) observed no effect of processing (dry-rolled vs. whole peas) on performance when peas were included in a finishing feedlot diet at 10%. However, Bock (2000) reported that when fed at 40% of a high-forage diet, cattle fed rolled peas gained the least ($P < .04$) compared to cattle fed ground and whole peas.

Dry rolling has a tendency to split the peas into a lighter weight hull fraction or a heavier endosperm fraction. Light hulls would hang up in a hopper bottom bin and could alter nutrients in a ration if a large quantity accumulated.

While field peas are a relatively new feed, the price and availability plus the positive research results and field experiences suggest this grain legume should be a component of creep feeds. Some commercial feed manufacturers like peas in their compound rations for the nutrient density as well as the binding properties.

Processing field peas does not appear to be critical, although some benefits were observed. The reduced mixing ability and rolling around of whole peas may be factors in the decision to process peas, although the cost and ease will be major factors to consider.

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