Feeding Whole or Rolled Corn in Feedlot Steer Backgrounding and Finishing Diets

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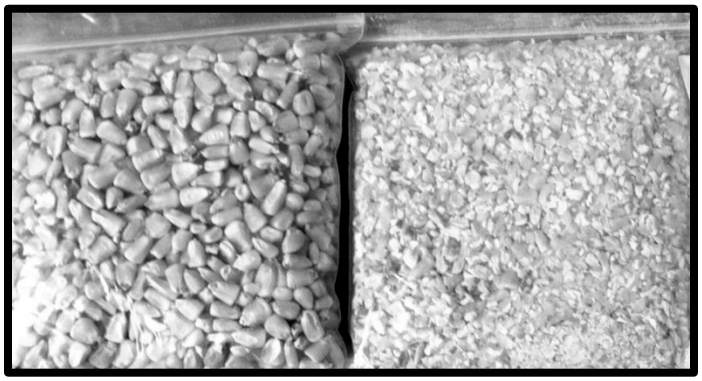
Typically when corn is included in cattle rations, particularly in backgrounding and finishing diets, it is processed by dry rolling, grinding, or steam flaking. In North Dakota the processing method is typically dry rolling or grinding. However, not everyone has the ability to process corn on the farm and it is an added cost. Additionally the body of research that has evaluated corn processing method and levels of processing have yielded mixed results. In some cases there is no difference between animal performance or feed efficiency when corn is rolled or fed whole. In other instances animal performance may be similar but dry matter intake is increased when whole corn is fed, and thus feed efficiency is improved with processing over whole corn. Age, production phase, and dietary forage levels may be factors affecting how whole and rolled corn feed.

Over the past three years the North Dakota State University Carrington Research Extension Center (CREC) has conducted feedlot research evaluating feeding corn whole compared to rolled corn diets. The first two research trials at the CREC were yearling steer feedlot finishing trials with higher than typical forage levels. In the first trial, the forage source was corn silage and dry matter intake was increased in whole corn diets compared to rolled corn diets. In the second trial, hay was the forage source, and dry matter intake was similar among dry rolled and whole corn treatment diets. In both, rolled corn tended to improve feed efficiency. In both trials animal performance and carcass characteristics were similar among corn treatment diets.

In the most recent trial, 189 weaned cross-bred steer calves were used to evaluate feeding whole or rolled corn in diets for the growing and finishing feedlot phases. Corn levels in the diets were similar between whole and rolled corn treatment diets; 25 and 50% of the diet dry matter for growing and finishing periods, respectively (Table 1). Diets were similar in crude protein and energy, between whole and rolled corn diets in both the growing and finishing periods. The growing phase was 61 days and the finishing phase was 79 days for a total of 140 days on feed. The average starting weight was 666 lbs. The steers weighed 863 lbs at the end of the growing period and finished at 1399 lbs (Table 2).



Whole corn, left; rolled corn, right.

Table 1. Growing and finishing diets and diet nutrient composition for steers fed whole or rolled corn

	Growing		Finishing	
	Rolled corn	Whole corn	Rolled corn	Whole corn
Item	Dry matter, percent			
Corn	25.5	25.5	50.9	51.1
MDGS[1]	27.6	27.5	25.9	25.9
Corn Silage	26.2	26.2	12.1	12.1
Straw	18.1	18.0	8.7	8.6
Supplement[2]	2.7	2.7	2.4	2.3
Nutrient composition	Dry matter basis			
Diet dry matter, %	60.7	60.7	68.2	68.2
Crude protein, %	13.4	13.2	13.7	13.3
NDF, %[3]	34.0	33.8	22.2	21.9
TDN, %[4]	51.7	51.7	59.9	60.1
NEm, Mcal/lb[5]	0.78	0.78	0.87	0.87
NEg, Mcal/lb[6]	0.50	0.50	0.58	0.59

[1] Modified distillers grains. [2] Vitamin and mineral supplement including an ionophore. [3] Neutral detergent fiber. [4] Total digestible nutrients. [5] Net energy for maintenance. [6] Net energy for gain.

Table 2. Performance for steers fed growing and finishing diets with whole or rolled corn.

Trt	Rolled Corn	Whole Corn	Standard Error	*P*- value
Initial weight day 0, lb	667	666	1.2	0.65
Weight day 61, lb	862	863	5.01	0.93
Final weight day 140, lb	1396	1403	12.2	0.69
Growing ADG[1]	3.22	3.23	0.09	1.00
Finishing ADG[2]	3.91	3.96	0.06	0.56
Overall ADG[3]	3.70	3.72	0.07	0.80

[1] Average daily gain day 0 to day 61. [2] Average daily gain day 61 to day 140. [3] Average daily gain day 0 to day 140.

In the growing period there were no differences in average daily gain, the cattle gained 3.22 lbs/head/day on both the rolled and whole corn diets. Dry matter intake was not different between whole and rolled corn diets at 18.9 lbs/head/day (Table 3). In the finishing period gains were not different between whole and rolled corn diets at 3.9 lbs/head/day. Dry matter intakes were also not different at 24.0 lbs/head/day. Thus, for both the growing and finishing periods the feed to gain ratio was similar for whole and rolled corn-fed cattle.

Table 3. Feed intake and feed efficiency for steers fed growing and finishing diets with whole or rolled corn.

Trt	Rolled Corn	Whole Corn	Standard Error	*P*- value
Growing dry matter intake, lb/hd/day[1]	18.9	18.9	0.14	0.85
Finishing dry matter intake, lb/hd/day[2]	23.9	24.8	0.45	0.21
Overall dry matter intake, lb/hd/day[3]	22.3	23.0	0.31	0.21
Growing gain:feed[1]	0.172	0.172	0.005	0.98
Finishing gain:feed[2]	0.164	0.160	0.002	0.23
Overall gain:feed[3]	0.166	0.163	0.002	0.26

[1] Growing period day 0 to day 61. [2] Finishing period day 61 to day 140. [3] Day 0 to day 140.

Carcass characteristics were not different between whole and rolled corn-fed cattle (Table 4). Hot carcass weights were 843 lbs with 0.48 inches of backfat. Quality grade was low choice, average yield grade was 2.5, and ribeye area was 13.4 square inches.

- In these trials, consistently across all, the animal performance was similar if whole or rolled corn was fed.
- In one yearling trial, dry matter intake was increased with whole corn, but similar dry matter intakes were measured for whole or rolled corn in the other two.
- In the yearling trials the gain to feed ratio tended to be higher for rolled corn.

Table 4. Carcass perforamnce for steers fed growing and finishing diets with whole or rolled corn.

Trt	Rolled Corn	Whole Corn	Standard Error	*P* -value
Hot carcass weight, lb	842.0	844.9	8.5	0.82
Yield grade[1]	2.5	2.5	0.10	1.00
Ribeye area, sq. in.	13.4	13.4	0.13	1.00
Marbling score[2]	455	451	8.29	0.71
Back fat, in.	0.48	0.48	0.01	1.00

[1]Yield grade is a composite calculation of fat to lean yield in a carcass based on a relationship of hot carcass weight, ribeye area, fat thickness and KPH; Low values = lean carcasses.

[2]USDA Quality grades based on marbling scores of 300-399 = select, 400-499 = low choice, 500-599 = average choice, 600-699 = high choice, 700+ = prime.

In the weaned calf growing and finishing trial the gain to feed ratio was similar with whole or rolled corn.