levels of wheat could be very successfully used in many high concentrate feedlot rations than is now the case, providing satisfactory management is employed. It is a known research fact that wheat may be prone to inducing a lower rumen pH and more acidosis than some other cereal grains in some circumstances.

Influence Of Level Of Wheat And Method Of Processing Wheat On The Performance Of Fattening Beef Cattle

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Story in Brief

Two methods of processing wheat, fine grinding and dry rolling, and two levels of wheat, 40 percent wheat and 70 percent wheat, were compared with dry rolled milo in high concentrate rations for fattening beef cattle. The treatments investigated in a 90 percent concentrate ration were 1) dry rolled milo, 2) rolled wheat—40 percent wheat in the total ration, 3) rolled wheat—70 percent in the total ration, 4) finely ground wheat—40 percent wheat in the total ration and 5) finely ground wheat —70 percent wheat in the total ration.

In a 140 day feeding experiment, average daily feed intakes on a 90 percent D.M. basis were 19.1, 17.5, 17.0, 18.7 and 18.6 lb. for the dry rolled milo, rolled—40 percent wheat, rolled—70 percent wheat, ground—40 percent wheat and ground—70 percent wheat treatments, respectively. Average gains were 3.11, 2.91, 2.81, 2.97 and 2.85 lb. per day, and the pounds of feed required per pound of gain were 6.15, 6.09, 6.08, 6.35 and 6.54 for the same treatments, respectively. The values reported for average daily feed intakes, gains and feed conversions were not statistically significant ($P<.05$).

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Introduction

Most research on the utilization of feed grains by fattening cattle has been conducted with corn and to a lesser extent with milo. Very limited work has been done with wheat in recent years. Wheat represents a major economic crop in Oklahoma. Wheat prices have usually been too high during most recent periods in history to permit wheat to be used extensively as livestock feed. During the past two years, however, wheat has been very competitively priced with other grains as an energy source for fattening cattle. Furthermore, high yielding varieties of wheat have also been developed in recent years. Some of these varieties have poor milling and baking properties, but they could possibly be used as livestock feed.

Little or no research has been conducted to determine the best methods of processing wheat when fed in high concentrate rations to fattening cattle. Furthermore, very little information is currently available concerning the effects of feeding different levels of wheat in high concentrate type rations now being widely used in the feedlot industry. The objective of this experiment, therefore, was to determine the value of dry rolled versus finely ground wheat when each was fed at either 40 to 70 percent of the total ration in high concentrate feedlot rations.

Materials and Methods

Equal numbers of Choice Angus and Hereford feeder steers, weighing approximately 600 pounds, were selected for use in the feeding experiment. The steers were gradually adapted to a 90 percent concentrate ration during a three week preliminary period by gradually decreasing the quantity of roughage in the ration.

Following the preliminary period, the steers were blocked into four groups on the basis of breed and weight. A slaughter sample was selected at random from each block to permit net energy values of the ration to be determined using the comparative slaughter technique. The 72 remaining steers were then randomly allotted within blocks to five treatments with three steers per pen (12 animals per treatment). The five treatments were as follows:

1) Dry rolled milo
2) Dry rolled wheat—40 percent in total ration
3) Dry rolled wheat—70 percent wheat in total ration
4) Finely ground wheat—40 percent wheat in total ration
5) Finely ground wheat—70 percent wheat in total ration

The dry rolled milo and wheat were obtained by rolling the grain through a heavy duty 18 x 24" roller mill with a roller spacing of .003 inch. The finely ground wheat was obtained by grinding the wheat

through 1/8" hammermill screen. The wheat was of the Triumph variety, a hard red winter wheat.

The experimental rations consisted of a 90 percent concentrate mixture, formulated on a 90 percent dry matter basis as shown in Table 1. The ration ingredients other than milo or wheat were combined in a premix. The complete ration contained 5 percent cottonseed hulls and 5 percent ground alfalfa hay to produce a 90 percent concentrate—10 percent roughage ration. The milo which was included in the 40 and 70 percent wheat rations (Table 1) was dry rolled. Feed was prepared and fed daily in amounts which would permit availability of feed until the next feeding. Stilbestrol was implanted at the 24 mg level at the initiation of the feeding trial and again after 84 days on feed. The feeding period lasted for 140 days. Initial and final weights were taken after a 16 hour shrink off feed and water.

Results and Discussion

The proximate analysis data for the wheat and milo are presented in Table 2 and the particle size and density data for the wheat in Table 3. As noted in Table 3, the particle size and weights per bushel were quite different for the dry rolled versus the finely ground wheat treatments.

Table 1. Ration Composition[1]

Ingredient	Dry Rolled Milo	Rolled Wheat		Ground Wheat	
		40% Wheat	70% Wheat	40% Wheat	70% Wheat
			%		
Wheat	--	40.0	70.0	40.0	70.0
Milo	84.0	44.0	14.0	44.0	14.0
Premix[2]	16.0	16.0	16.0	16.0	16.0

[1] Formulated on a 90% D.M. basis.
[2] Contained cottonseed hulls, ground alfalfa hay, soybean meal, urea, minerals, antibiotics and Vitamin A.

Table 2. Proximate Analysis of Milo and Wheat

Feed	Dry Matter	Crude Protein	Ash[1]	Ether Extract	Carbo-[1 2] hydrates
			%		
Milo	87.0	11.0	1.50	2.00	85.5
Wheat	88.0	12.9	1.95	1.55	83.6

[1] Values expressed on a D.M. basis.
[2] 100 — (Sum of figures for crude protein, ash and ether extract).

Table 3. Particle Size and Density of Processed Wheat

	Screen Size							
	4 mm	2 mm	1 mm	500 micron	250 micron	125 micron	125 micron	Wt. per bu.
	% Retained on Screen						through	lb.
Fine grind (1/8" screen)	0	1.6	32.8	32.6	18.4	10.4	4.2	49
Dry rolled	3.1	48.7	26.8	10.6	6.6	2.8	1.4	32

The feedlot performance data are presented in Table 4. As noted the average daily feed intakes during the 140 day feeding period were 19.1, 17.5, 17.0, 18.7 and 18.6 pounds per day for the dry rolled milo, rolled—40 percent wheat, rolled—70 percent wheat, finely ground—40 percent wheat and finely ground—70 percent wheat treatments, respectively. Average gains were 3.11, 2.91, 2.81, 2.97 and 2.85 pounds per day, and the lb. of feed/lb. gain were 6.15, 6.09, 6.08, 6.35, and 6.54 for the same treatments, respectively. The above values for daily gain, feed intake and feed/pound of gain were not significantly different ($P<.05$) among treatments. Net energy values using the comparative slaughter techniques are also being determined for each of the treatments.

In comparing the performance of cattle on the rolled wheat versus ground wheat treatments, however, the 24 cattle (8 pens) on rolled wheat (treatments 2 and 3) required 6.08 lb. of feed/lb. of gain as contrasted with 6.44 lb. of feed/lb. of gain for the 24 cattle on ground wheat (treatments 4 and 5). This represents a difference of 5.9 percent in feed efficiency. Considering that an average of 55 percent of the total ration was

Table 4. Feedlot Performance (140 Days)

	Dry Rolled Milo	Rolled Wheat		Ground Wheat	
		40%	70%	40%	70%
No. of steers	12	12	12	12	12
Initial weight, lb.	609	596	600	604	620
Final weight, lb.	1044	1003	994	1019	1019
Daily feed, lb.[1,2]	19.1	17.5	17.0	18.7	18.6
Daily gain, lb.[2]	3.11	2.91	2.81	2.97	2.85
Feed/lb. gain, lb.[2]	6.15	6.09	6.08	6.34	6.54

[1] Expressed on a 90% D.M. basis.
[2] None of the values for feed intake, gain or feed per lb. of gain were significantly different at the .05 level of probability.

wheat (40 + 70/2=55) in comparing the main effects of grinding vs. rolling in this instance (remaining components of the rations were identical in both cases), the data would suggest that rolling improved the utilization of the wheat component by an average of 10.6 percent (5.9/55 = 10.6) over grinding in this experiment. While this may seem like a small amount, this represents about the same magnitude of increase in feed efficiency which is frequently expected by proper steam flaking, reconstitution and the like of milo grain as contrasted with rolling or fine grinding of milo for fattening beef cattle. Rolling of wheat would, therefore, appear to be superior to grinding as a processing technique on the basis of the values indicated above. However, further research is needed to support or refute the above observation before valid conclusions can be drawn.

In comparing levels of wheat in the ration, irregardless of method of processing, the 40 percent wheat ration produced average daily feed intake, gain and feed conversion values of 18.1, 2.94, and 6.22, respectively as compared with values of 17.8, 2.83 and 6.31 respectively for the 70 percent wheat rations. The results of this experiment would suggest that much higher levels of wheat can be satisfactorily used in feedlot rations than are commonly fed in the industry without serious deterioration of feedlot performance if good management is practiced.

As noted in Table 5, no significant differences ($P<.05$) were obtained for any of the carcass traits.

Table 5. Slaughter and Carcass Information

	Dry Rolled Milo	Rolled Wheat		Ground Wheat	
		40%	70%	40%	70%
Dressing %[1,5]	60.8	60.4	60.2	60.8	60.4
Carcass grade[2,5]	10.8	10.5	11.1	11.6	11.3
Ribeye area,[5] sq. in.	12.1	11.7	11.6	11.9	11.5
Fat thickness, in.[3,5]	0.8	0.7	0.8	0.8	0.8
Marbling[4,5]	16.7	15.9	17.6	18.5	18.8

Calculated on basis of live shrunk weight and chilled carcass weight.
U.S.D.A. carcass grade converted to following numeral designations: high prime–15, average prime–14, low prime–13, high choice–12, average choice–11, low choice–10, high good–9, average good–8, low good–7.
Average of three measurements determined on tracing at the 12th rib.
Marbling scores: 1 to 30, 11 = slight, 14 = small, 17 = modest.
None of the carcass traits were significantly different at the .05 level of probability.