produce the same degree of increase in the nutritive value of wheat for feedlot cattle as does reconstitution of sorghum grain.

Table 6. Slaughter and Carcass Information

	Dry Rolled Milo	Dry Rolled Wheat	Ground Reconstituted Wheat	Rolled Reconstituted Wheat	Whole Reconstituted Wheat
Dressing%[1]	59.2	60.0	59.3	59.8	58.7
Carcass grade[2]	9.4	9.4	10.5	9.1	9.7
Ribeye area, sq. in.	12.19	12.26	12.06	12.30	12.09
Fat thickness, in.[3]	0.85	0.78	0.78	0.76	0.82
Marbling[4]	14.8	14.3	14.0	13.7	15.4
Cutability, %	47.9	48.3	48.3	48.53	47.74

[1] Calculated on basis of live shrunk weight and chilled carcass weight.
[2] U.S.D.A. carcass grade converted to following numerical 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.
[3] Average of three measurements determined on tracing at the 12th rib.
[4] Marbling scores: 1 to 30, 11 – slight, 14 = small, 17 = modest.

Influence Of Reconstitution On The Feeding Value Of Wheat For Finishing Cattle

Ryan Christiansen and Donald G. Wagner

Story in Brief

Wheat reconstituted by two different methods was compared to dry rolled wheat and dry rolled milo in high concentrate rations fed to finishing heifers in a 136 day feeding period. The treatments investigated in 90 percent concentrate rations were: 1) dry rolled milo, 2) dry rolled wheat, 3) whole-reconstituted wheat and 4) rolled-reconstituted wheat. In the reconstituted treatments the wheat was reconstituted to 30 percent moisture and stored for 21 days prior to feeding. The whole-reconstituted wheat was stored in the whole form and rolled just prior to feeding, while the rolled reconstituted wheat was rolled prior to reconstitution and storage. The wheat made up 70 percent of the total ration on a 90 percent D.M. basis.

Average daily feed intakes (90 percent D.M. basis) for the heifers on the dry rolled milo, dry rolled wheat, whole-reconstituted wheat and rolled-reconstituted wheat treatments were 17.6, 14.6, 14.7 and 15.8 lb., respectively, with the animals on the dry rolled milo treatment consuming significantly ($P<.05$) more feed than those on the three wheat treatments. Average daily gains were 2.78, 2.65, 2.49, and 2.70 lb. on the same treatments, respectively. None of the values for average daily gains were significantly different ($P>.05$) between treatments.

The average feed required per pound of gain was 6.34, 5.51, 5.90 and 5.86 lb. for the dry rolled milo, dry rolled wheat, whole-reconstituted wheat and rolled-reconstituted wheat treatments, respectively. All these values were significantly different among each treatment at the .05 level except for no significant difference ($P>.05$) between the whole-reconstituted wheat and rolled-reconstituted wheat treatments.

Introduction

In Oklahoma, wheat represents a major economic crop for farmers and is currently competitively priced with other grains used in feedlot rations, particularly during certain seasons of the year. Much of the previous work done with high concentrate beef cattle rations has involved either corn or milo. Research evaluating the use of reconstituted wheat for finishing beef cattle is very limited. A previous study investigating reconstitution of wheat for feedlot cattle suggested less response from reconstituting wheat than is normally obtained from reconstituting milo.

The objective of this experiment, therefore, was to further evaluate and compare the use of two different methods of reconstituting wheat with dry rolled wheat and dry rolled milo.

Materials and Methods

Forty-eight Angus feeder heifers averaging 408 pounds were selected for this experiment. During the three week preliminary period the animals were gradually adapted to a 90 percent concentrate ration.

After the preliminary period, the heifers were blocked into three groups on the basis of weight and then randomly allotted within blocks to four treatments with four heifers per pen (12 animals per treatment). The four treatments compared were as follows:

1) Dry rolled milo
2) Dry rolled wheat
3) Whole-reconstituted wheat
4) Rolled-reconstituted wheat

The dry rolled milo and dry rolled wheat were processed by rolling the grain through a 12 x 18" roller mill with a roller spacing of .003 inch. The reconstituted wheat treatments were obtained by reconstituting the wheat, whole or rolled, to 30 percent moisture by mixing the wheat with water in a cement mixer. The grain was then stored in airtight, plastic bags for 21 days before feeding. Temperature during storage was maintained at a minimum of 70° F. The rolled-reconstituted treatment was rolled before reconstituting; whereas, the whole-reconstituted wheat treatment was stored whole and rolled prior to feeding.

Compositions of the experimental rations are given in Table 1. All rations were formulated to contain the composition indicated on a 90 percent D.M. basis. The rations were formulated to contain 90 percent concentrate, with five percent cotton seed hulls and five percent pelleted alfalfa meal. For the three wheat treatments, wheat constituted 70 percent of the total ration on a 90 percent dry matter basis; dry rolled milo was included at a level of 14 percent in the wheat rations. The rations were formulated to be isonitrogenous. Diethylstilbestrol was fed at the level of 10 mg per head per day. Feed was prepared and fed daily in quantities adequate to permit availability of feed until the next feeding. Any feed which was refused during each feeding period was weighed back to assure a supply of fresh feed at all times.

Rumen fluid samples were collected on all the heifers twice during the feeding period for rumen pH and VFA determinations. pH values were determined on the rumen fluid samples immediately upon sampling. The rumen samples were then processed and stored for later VFA analyses.

Initial and final weights were taken full with a 4 percent pencil shrink. The feeding period for this experiment lasted 136 days. At the termination of the feeding trial, specific gravities were determined on each carcass to determine the net energy values of the feed using the comparative slaughter technique.

Table 1. Ration Composition[1]

Ingredient	Dry Rolled Milo Treatment	Wheat Treatments
Wheat	--	70.0
Milo	84.0	14.0
Premix[2]	16.0	16.0

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

Results and Discussion

The proximate analysis data for the milo and wheat treatments are presented in Table 2. As can be noted for the table, the average moisture contents for the dry rolled milo, dry rolled wheat, whole reconstituted wheat and rolled reconstituted wheat were 87.24, 88.43, 68.64 and 67.71 percent, respectively. Particle size and weights per bushel are given in Table 3.

The feedlot performance data for the 136 day feeding period are shown in Table 4. The average daily feed intakes on the dry rolled milo, dry rolled wheat, whole-reconstituted wheat and rolled-reconstituted wheat treatments were 17.6, 14.6, 15.8 and 14.7 lb., respectively. The heifers on the dry rolled milo consumed significantly ($P<0.5$) more feed per day than those on the three wheat treatments. The average daily gains on the dry rolled milo, dry rolled wheat, whole-reconstituted wheat and rolled-reconstituted wheat treatments were 2.78, 2.65, 2.70 and 2.49 lb., respectively. These differences for rate of gain were not significant ($P>.05$). The significantly lower feed intakes on the three wheat treatments with nearly the same rates of gain were reflected in the pounds of

Table 2. Proximate Analysis of Milo and Wheat

Feed	Dry Matter	Crude Protein[1]	Ash[1]	Ether Extract[1]	Total CHO[1,2]
	percent				
Dry Rolled Milo	87.2	10.55[3]	1.26	1.56	86.63
Wheat		12.67[4]	2.44	1.20	83.89
Dry Rolled	88.4				
Whole-Reconstituted	68.6				
Rolled-Reconstituted	67.7				

[1] Values expressed on 100% D.M. basis.
[2] 100 — (Sum of figures for crude protein, ash and ether extract).
[3] 6.25 x percent Nitrogen = percent crude protein.
[4] 5.71 x percent Nitrogen = percent crude protein.

Table 3. Particle Size and Density of Processed Wheat

	Screen Size							
	4mm	2mm	1mm	500 micron	250 micron	125 micron	Through 125 micron	Wt. per Bu.
	% Retained						Through	lb.
DRM	0.1	7.5	73.8	9.2	3.0	2.1	4.6	37.8
DRW	0.1	45.7	33.5	9.5	4.4	2.8	3.9	34.6
RRW	8.4	77.6	12.4	0.9	0.4	0.2	0.1	30.0
WRW	28.5	65.8	4.7	0.7	0.2	0.1	0.0	28.7

Table 4. Feedlot Performance[1]

	Dry Rolled Milo	Dry Rolled Wheat	Whole Reconstituted Wheat	Rolled Reconstituted Wheat
No. of heifers	12	12	12	12
Initial Weight, lb.	409	408	406	410
Daily Feed, lb.[2]	17.55[a]	14.56[b]	15.76[b]	14.71[b]
Daily Gain, lb.	2.78	2.65	2.70	2.49
Final Weight, lb.	788	767	773	749
Feed/lb. Gain, lb.	6.34[a]	5.51[b]	5.86[c]	5.90[c]

[1] 136 days.
[2] Values without a common letter differ significantly ($P < .05$).

feed required per pound of gain, being 6.34, 5.51, 5.86 and 5.90 lb. for the same treatments, respectively. The feed efficiency values for dry rolled milo and dry rolled wheat differed significantly ($P < .05$) from each other and from the reconstituted wheat treatments. The two reconstituted wheat treatments, however, were not significantly different ($P > .05$).

As noted by the figures reported, the average daily gains for the animals on the three wheat treatments (70 percent wheat in the total ration) were .16 lb. per day less than on the milo treatment. Although the differences in rate of gain were not significant ($P > .05$) among the milo and wheat treatments in this experiment, (due likely to inadequate numbers), the slightly lower gain on the three wheat treatments is a trend which is consistent with observations in a number of other experiments conducted at Oklahoma State University in which 70 percent wheat was included in a finishing ration. In general, rations containing this level of wheat usually appear to lower gains approximately .10-.25 lb. per day as compared to all milo rations. Lower levels of wheat would, undoubtedly, produce less effect.

Net energy values for the different treatments are presented in Table 5. The values reported for the NE_{m+g} of the total ration and NE_{m+g} of the grain for the milo treatment were significantly lower ($P < .05$) than for the three wheat treatments. The NE_g values for dry rolled milo, dry rolled wheat, whole-reconstituted wheat and rolled-reconstituted wheat were 104.3, 122.5, 130.6 and 136.9 Megcal./100kg., respectively. The NE_g for dry rolled milo was significantly lower ($P < .05$) than for either of the reconstituted wheat treatments. No difference ($P < .05$) existed in the NE_g among any of the wheat treatments.

Rumen fluid pH values on the dry rolled milo, dry rolled wheat, whole-reconstituted wheat and rolled-reconstituted wheat treatments were 6.5, 5.7, 6.2 and 5.7 for the first sampling and 6.3, 6.8, 7.3 and 7.1 for the second sampling, respectively. These values did not differ sig-

Table 5. Net Energy Values

	Dry Rolled Milo	Dry Rolled Wheat	Whole Reconstituted Wheat	Rolled Reconstituted Wheat
NE_{m+g} Total Ration[1]	132.9[a]	151.2[b]	154.5[b]	159.3[b]
NE_{m+g} Grain[1]	139.3[a]	165.7[b]	170.3[b]	177.5[b]
NE_m Grain[1]	156.4	183.8	195.9	205.4
NE_g Grain[1]	104.3	122.5[a,b]	130.6[b]	136.9[b]

[1] Values without a common letter differ significantly ($P < .05$).

Table 6. Slaughter and Carcass Information

	Dry Rolled Milo	Dry Rolled Wheat	Whole Reconstituted Wheat	Rolled Reconstituted Wheat
Dressing, %[1]	62.04	59.24	61.67	61.35
Carcass grade[2]	9.25	9.08	9.58	10.50
Ribeye area, sq. in.	10.60	9.89	10.37	10.12
Fat thickness, in.[3]	0.81	0.65	0.69	0.71
Marbling[4]	14.66	14.25	15.41	18.41
Cutability, %	48.55	49.52	49.02	49.06

[1] Calculated on basis of live shrunk weight and chilled carcass weight.
[2] U.S.D.A. carcass grade converted to following numerical 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.
[3] Average of three measurements determined on tracing at the 12th rib.
[4] Marbling scores: 1 to 30, 11 – slight, 14 = small, 17 = modest.

nificantly ($P > .05$) between treatments.

As noted in Table 5, no significant differences ($P > .05$) existed between carcass traits.

Briefly, this experiment would support the previously reported study suggesting little if any improvement in the nutritive value of wheat when wheat is reconstituted for feedlot cattle by the methods employed in this experiment. This is in contrast to observations with reconstituted milo.