Reconstituted Wheat for Finishing Beef Cattle

Ryan Christiansen and Donald G. Wagner

Story in Brief

Wheat reconstituted and fed by two different methods was compared with dry rolled wheat (DRW) in 90 percent concentrate rations for finishing beef cattle.

Wheat was reconstituted in the whole kernel form to 30 percent moisture and stored for 21 days prior to feeding. The reconstituted wheat was then fed in either the whole form with no further processing (WRW) or rolled prior to feeding (WRRW). Thus, the treatments compared were DRW, WRW and WRRW. Wheat represented 70 per cent of the total ration on a D.M. basis.

During the 129 day feeding period, average daily feed intakes (90 percent D.M. basis) were 11.9, 16.5 and 12.8 lb. on the DRW, WRW and WRRW treatments, respectively. The heifers on the WRW consumed significantly ($P<.01$) more feed than those on the other treatments. The average daily gains were 1.67, 2.07 and 2.00 lb. and the pounds of feed per pound of gain 7.15, 7.99 and 6.42 on the DRW, WRW and WRRW treatments, respectively. The heifers on the DRW gained significantly slower ($P<.01$), and the heifers on the WRW required significantly ($P<.05$) more feed than those on the other treatments.

In brief, this study suggests that reconstituted wheat may be more palatable than dry rolled wheat producting greater feed intakes and gains and, therefore, somewhat better feed efficiency.

Introduction

Wheat is a major economic crop in Oklahoma. During the past few years wheat has been competitive in price with other grains for feedlot cattle. Much of the previous work done with high concentrate rations for finishing cattle involved corn or milo. Reconstitution has proven useful for significantly increasing the feeding value of milo when done under proper conditions. Research evaluating reconstituted wheat is limited. Two previous studies investigating reconstitution of wheat for feedlot cattle suggested less response than is normally obtained from reconstitution of milo.

The objective of this experiment, therefore, was to further evaluate

and compare the use of reconstituted and dry rolled wheat for finishing cattle.

Materials and Methods

Forty eight uniform, choice Angus feeder heifers averaging 437 pounds were selected for this experiment. During the preliminary period, the animals were gradually adapted to a 90 percent concentrate ration.

After the preliminary period the heifers were randomly alloted to three treatments with four pens of four heifers each per treatment (16 animals per treatment).

The three treatments were as follows:

1) Dry rolled wheat (DRW)
2) Whole reconstituted wheat-fed whole (WRW)
3) Whole reconstituted wheat-fed rolled (WRRW)

The dry rolled wheat was processed by rolling the grain through a 12 V 18" roller mill. The reconstituted wheat treatments were obtained by reconstituting wheat in the whole form to 30 percent moisture. The reconstituted grain was then stored in air tight, plastic bags for 21 days prior to feeding. Temperature during storage was a minimum of 70° F. The whole reconstituted wheat-fed whole (WRW) was fed in the whole form with no further processing prior to feeding. The whole reconstituted rolled wheat (WRRW) was rolled prior to feeding. The roller mill described previously was used.

Compositions of the experimental rations are presented in Table 1. All rations were formulated to contain the composition indicated on a D.M. basis. The rations were formulated to be approximately 90 percent concentrate rations containing 5.0 percent cottonseed hulls and 5.0 percent pelleted, alfalfa meal. Wheat represented 70.0 percent of the total ration on a D.M. basis. Dry rolled milo was included in each ration at a level of 14 percent on a D.M. basis. The non-grain components were combined in a premix and mixed with the wheat and dry rolled milo at the time of feeding. Diethylstilbestrol was fed at a level of 10 mg per

Table 1. Ration Composition

Ingredient	Wheat Rations[1] Percent
Wheat	70
Milo	14
Premix[2]	16

[1] Formulated on a dry matter basis.
[2] Contained cottonseed hulls, pelleted alfalfa meal, soybean meal, urea, dicalcium phosphate, calcium carbonate, salt, aureomycin, vitamin A and diethylstilbestrol.

head per day. Feed was prepared and fed daily in quantities adequate to permit availability of feed until the next feeding.

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

Initial and final weights were taken full with a 4 percent shrink. The feeding period lasted 129 days. At the end of the trial, specific gravities were determined on each carcass to determine net energy values of the feed using the comparative slaughter technique.

Results and Discussion

The proximate analysis data for the wheat treatments are presented in Table 2. As indicated, the average moisture contents for the dry rolled wheat (DRW), whole reconstituted wheat-fed whole (WRW) and whole reconstituted wheat rolled (WRRW) were 10.7, 36.1 and 34.3 percent, respectively. Particle size and weights per bushel are given in Table 3.

Table 2. Proximate Analysis of Wheat

Feed	Dry Matter	Crude Protein[1]	Ash[1]	Ether Extract[1]	Total CHO[1,2]
			%		
Dry rolled wheat (DRW)	89.3	12.5[3]	1.7	1.4	84.4
Whole recon. wheat (WRW)	63.9	12.7[3]	1.8	1.3	84.2
Whole recon. rolled wheat (WRRW)	65.7	12.5[3]	1.8	1.3	84.4
Milo	88.2	10.0[4]	1.0	2.6	86.4

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

Table 3. Particle Size and Density of Processed Wheat

	4mm	2mm	1mm	500 micron	250 micron	125 micron	Through 125 micron	Wt. per Bu[1]
	% Retained						Through	lb.
DRW	0.8	36.9	40.4	11.8	5.0	2.4	2.7	38.2
WRW	12.1	86.8	0.8	0.2	0.1	0.0	0.0	35.5
WRRW	78.8	19.7	11.1	0.2	0.1	0.1	0.0	29 0

[1] Test weights reported on 90% D.M. basis.

Feedlot performance data for the 129 day feeding period are presented in Table 4. The average daily feed intakes (90 percent D.M. basis) were 11.9, 16.5 and 12.8 lb. on the DRW, WRW and WRRW treatments, respectively. The heifers on the WRW consumed significantly ($P<.01$) more feed than those on the DRW and WRRW treatments. The average daily gains were 1.67, 2.07, and 2.00 lb., on the DRW, WRW and WRRW treatments, respectively. The gain on the DRW ration was significantly ($P<.01$) lower than on the two moist grain treatments.

The significantly lower gains on the dry wheat were likely related to the somewhat lower intakes. Possibly increased dustiness of the dry wheat ration or a less desirable ration physical form produced a less palatable ration resulting in lowered intakes and gains. The feed efficiency (feed/unit gain) on the DRW, WRW and WRRW treatments were 7.15, 7.99 and 6.42 lb., respectively. The heifers fed the WRW treatment required significantly ($P<.05$) more feed per unit of gain than those receiving the whole reconstituted wheat rolled prior to feeding.

These results suggest that wheat must be processed or broken by some means prior to feeding. Although not significantly different, the trend for a somewhat lower feed requirement per unit of gain on the WRRW ration (6.42) compared to the dry rolled wheat ration (7.15) might be explained by the somewhat higher intakes and gains on the WRRW. A similar trend was also observed in previous studies. The heifers on the WRRW showed a 19.8 percent increase in gain and a 10.2 percent better feed efficiency over those on DRW. In making energy intake and gain projections for feedlot cattle, an improvement in gain of this magnitude can in itself account for this much difference in feed efficiency even on the same ration. In other words, greater feed intakes

Table 4. Feedlot Performance[1]

	Dry	Whole Reconstituted Wheat	
	Rolled Wheat (DRW)	Fed Whole (WRW)	Fed Rolled (WRRW)
No. of heifers	16	16	16
Initial weight, lb.	428	449	438
Final weight, lb.	642	715	695
Daily Feed, lb.[3,4]	11.94[a]	16.53[b]	12.84[a]
Daily Gain, lb.[3]	1.67[a]	2.07[b]	2.00[b]
Feed/lb. Gain, lb.[3]	7.15[a,c]	7.99[b]	6.42[c]

[1] 129 days.
[2] Values with different superscripts differ significantly ($P<.05$).
[3] Values with different superscripts differ significantly ($P<.01$).
[4] 90% D.M. basis.

and/or more rapid gains on the same ration usually result in an improvement in feed efficiency. This is due largely, but not exclusively, to dilution of the maintenance requirement, a high fixed cost in cattle feeding.

Perhaps reconstituted wheat is more palatable than dry wheat resulting in somewhat better intakes and gains with some consequent increase in feed efficiency. In most reconstituted milo feeding experiments, on the other hand, reconstituted milo has not produced an increase in daily gains over those obtained on dry rolled milo. Rather, daily feed intake is usually somewhat lower while maintaining the same rate of gain. Therefore, the lower feed intakes normally observed on reconstituted milo, while maintaining the same rate of gain, usually result in a better feed efficiency.

Net energy values for the grain are given in Table 5. No significant difference existed between treatments, although the net energy values tended to be lower on the WRW treatment compared to the other two treatments.

Rumen fluid pH values were 5.5, 6.4 and 5.5 on the DRW, WRW and WRRW treatments, respectively. The pH values on the WRW treatment were significantly ($P<.05$) higher than on the other two treatments.

As noted in Table 6, no significant differences existed among any of the carcass traits.

In brief this study suggests that reconstituted wheat may produce somewhat greater intakes and gains than dry rolled wheat, and therefore, somewhat better feed efficiency. Moreover, wheat requires some form of processing and cannot be efficiently fed in the whole form.

Table 5. Net Energy Values

	Dry Rolled Wheat (DRW)	Whole Reconstituted Wheat	
		Fed Whole (WRW)	Fed Rolled (WRRW)
	Mcal/cwt.		
NE_{m+g} of total ration	76.9	64.4	79.3
NE_{m+g} of grain	88.5	70.5	91.8
NE_m of grain[1]	99.9	76.4	107.9
NE_g of grain[1]	66.6	50.9	71.9

[1] Grain refers only to wheat.

Table 6. Slaughter and Carcass Information

	Dry Rolled Wheat (DRW)	Whole Reconstituted Wheat	
		Fed Whole (WRW)	Fed Rolled (WRRW)
Dressing, %[1]	60.4	62.0	61.5
Carcass grade[2]	10.12	9.75	10.06
Ribeye area, sq. in.	9.45	9.56	9.61
Fat thickness, in.[3]	.62	.75	.66
Marbling[4]	22.67	21.08	21.92
Cutability, %	49.46	48.17	48.84

[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.

High Moisture Harvested Wheat and Wheat Head Chop for Finishing Cattle

Donald G. Wagner, Don Croka and Tom Martin

Story in Brief

High moisture harvested wheat stored by two different methods and high moisture harvested wheat head chop were compared with dry wheat for finishing cattle. The treatments compared were: 1) dry rolled wheat, 2) high moisture harvested wheat-stored in oxygen limiting silo, 3) high moisture harvested wheat-preserved with propionic acid in a wooden bin and 4) high moisture wheat head chop.

The high moisture wheat contained an average of 23.4 percent moisture and the head chop 28.0 percent moisture. The head chop contained 63.9 percent grain and 36.1 percent non-grain.

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