Table 6. Slaughter and Carcass Information

	Dry Rolled Wheat (DRW)	Whole Reconstituted Wheat Fed Whole (WRW)	Whole Reconstituted Wheat 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

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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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Treatment produced a significant (P<.05) effect on feed intake, daily gain, feed/unit gain and dressing percent. In general, the head chop treatment produced the highest feed intake, lowest gain, highest feed requirement/lb of gain and lowest dressing percent. Some differences were also noted among the other treatments.

When the feedlot performance data were combined for all cattle, the average daily feed intake (90 percent D.M.) was 19.6, 20.5, 20.2 and 23.0 lb; daily gain was 2.66, 2.81, 2.67 and 2.31 lb; and feed/lb of gain 7.38, 7.28, 7.56 and 9.94 lb on the dry rolled wheat, high moisture-silo preserved, high moisture-acid preserved and wheat head chop treatments, respectively.

Intrduction

Wheat represents a major economic crop in Oklahoma with production approaching 100 million bushels annually in normal crop years. This is nearly four times the quantity of milo raised in Oklahoma. During the past few harvest years (primarily 1969-72), wheat prices were depressed to where wheat was competitive with other grains as an energy source. In the past few months, (1973), wheat prices have moved up substantially. At the present price of approximately $2.50 per bushel, wheat would not, however, be competitive as a feed grain. Nevertheless, there have been periods in recent history when wheat was priced competively with feed grains, and this may be true again in the future.

High moisture harvesting has proven useful as a processing technique for significantly improving the feeding value of milo for feedlot cattle. Little or no research is available, however, concerning the feeding value of high moisture harvested wheat vs. dry wheat. The objective of this experiment, therefore, was to compare high moisture harvested wheat and high moisture harvested wheat head chop with dry wheat for finishing cattle.

Materials and Methods

Forty eight Angus and Hereford feeder heifers, equal numbers of each breed, averaging 695 lb. were selected for use in this trial. The heifers were gradually adapted to a high concentrate ration during a two week preliminary period.

Following the preliminary period, the heifers were blocked into two breeds (Angus and Hereford) and then randomly alloted within breed to four treatments with three heifers per pen and four pens per treatment (two pens of three heifers in each breed-total of 12 animals per treatment). The four treatments compared were:

1). Dry rolled wheat
2). High moisture harvested wheat-preserved in an oxygen limiting silo.
3). High moisture harvested wheat-preserved with propionic acid and stored in a wooden bin.
4). High moisture wheat head chop.

The high moisture harvested wheat head chop (treatment 4) was harvested June 2, 1972. The high moisture harvested wheat grain (treatments 2 and 3) was harvested on June 3 and 4, 1972. The wheat contained approximately 23-24 percent moisture at the time the head chop and high moisture grain were harvested.

The dry wheat grain was harvested several weeks later when the grain contained approximately 11 percent moisture. All grain was of the Triumph variety and harvested from the same field. The wheat head chop was harvested by using a self propelled field chopper equipped with an adjustable cutter head. The header was raised to cut the wheat at a height at which all of the heads could be harvested with a minimum of straw. The harvested head chop material was then processed through a hammermill containing a recutter as it was blown into an oxygen limiting silo for storage. The high moisture wheat grain was harvested with a self propelled combine. The high moisture wheat grain for treatment 2 was stored whole in an oxygen limiting silo. The high moisture grain for treatment 3 was treated with approximately 1.8 percent propionic acid as the moist grain was being augured into a conventional wooden bin for storage.

The dry wheat and the two high moisture wheat grains were rolled through an 18 X 24″ heavy duty roller mill prior to feeding. The wheat head chop received no additional processing after removal from the silo.

The compositions of the experimental rations are shown in Table 1. The rations were formulated to contain the composition indicated on a dry matter basis. Wheat made up 70 percent of the total ration on a D.M. basis in the dry rolled, high moisture-silo preserved and high moisture-acid preserved wheat treatments. The only variable in these three rations was the method of wheat harvesting and preservation. These three rations were formulated to be 90 percent concentrate rations. In the wheat head chop treatment, wheat head chop and supplement constituted the complete ration.

The milo included in the wheat rations was dry rolled. Feed was prepared and fed daily in quantities which permitted feed availability until the next feeding.

Initial and final weights were taken after an overnight shrink off feed and water. The feeding period lasted 72 days.

Table 1. Ration Composition (DM basis)

Ingredient	Dry rolled and high moisture wheat treatments (1,2,3)	Wheat head chop treatment
Wheat	70.0	---
Head Chop	---	95.0
Milo	15.0	---
Cottonseed hulls	5.0	---
Ground Alfalfa	5.0	---
Soybean meal	3.0	3.0
Urea	0.6	0.6
Salt	0.5	0.5
Dicalcium phosphate	0.4	0.4
Calcium carbonate	0.4	0.4
Aurofac-50	112 gm/ton	112 gm/ton
Stilbestrol-2	300 gm/ton	300 gm/ton
Vitamin A (30,000 IU/gm)	200 gm/ton	200 gm/ton

Results and Discussion

The proximate analysis data are presented in Table 2. As noted, the high moisture harvested wheat contained an average of 23.4 percent moisture and the wheat head chop 28.0 percent moisture. Moreover, the head chop contained an average of 63.9 percent grain and 36.1 percent straw and chaff.

Feedlot performance data are presented in Table 3. The data are presented separately in the table for each breed, Angus and Hereford. Due to inadequate numbers of pens, it was impossible to feed all of the heifers in the same barn. Therefore, all of the Angus heifers and one replicate (one pen per treatment) of Hereford heifers were fed in one barn at Ft. Reno; the second replicate of Hereford heifers was fed in a second barn at Ft. Reno. In the analysis of variance a highly significant ($P<.01$) barn effect was obtained.

Due to the error terms in some cases being of rather different magni-

Table 2. Proximate Analysis

Feed	Dry Matter	Crude[1,2] Protein	Ash[1]	Ether[1] Extract
Dry rolled wheat	88.3	12.86	1.76	1.30
HM wheat-silo	76.6	12.46	1.82	0.98
HM wheat-acid	76.6	11.92	1.95	1.20
Head chop	72.0	13.83	5.03	1.22

[1] Values expressed on 100% D.M. basis.
[2] 5.71 X % nitrogen = % crude protein.

Table 3. Composition of Wheat Crop (D.M. basis)

	Percent[1] of Total	Standard Error
Grain	63.9	0.48
Non-grain	36.1	0.48

[1] Grain to non-grain ratio was determined by cutting representative wheat head samples at the same height as the head chop and delineating the grain and non-grain portions by hand shelling and separation.

Table 4. Feedlot Performance

	Dry Rolled Wheat	H.M. Wheat Oxygen Limiting Silo	H.M. Wheat Acid Preserved	Wheat Head Chop
Angus				
No. of heifers	6	6	6	6
Initial wt., lb.	702	706	704	712
Final wt., lb.	894	921	901	886
Daily feed, lb.[1]	20.3	20.7	20.5	22.0
Daily gain, lb.[2]	2.67[3]	2.99[2]	2.82[2,3]	2.35[1]
Feed/lb. gain, lb.[1,2]	7.61[1,2]	6.94[3]	7.27[2]	9.38[1]
Hereford				
No. of heifers	6	6	6	6
Initial wt., lb.	678	683	691	682
Final wt., lb.	870	873	873	845
Daily feed, lb.[1,2]	18.8[2]	19.2[2]	18.3[2]	23.7[1]
Daily gain, lb.	2.66	2.64	2.52	2.27
Feed/lb gain, lb.[1,2]	7.15[2]	7.63[2]	7.84[1]	10.50[1]

[1] Expressed o 90% D.M. basis.
[2] Values without a common letter differ significantly ($P \leq .05$).

tude, it was not possible to pool the error terms for the two breeds when conducting the AOV for some of the feedlot and carcass parameters. Therefore, the feedlot and carcass data are presented by breed.

Treatment produced a significant ($P<.05$) effect on feed intake. The cattle on the wheat head chop treatment consumed the most feed with little difference among the other three wheat treatments.

Treatment also had a significant effect ($P<.05$) on daily gain. The Angus cattle gained significantly less ($P<.05$) on the wheat head chop than on the other three treatments. Although not significantly different the same trend was evident for the Herefords. Moreover, the Angus cattle gained significantly ($P<.05$) faster on the high moisture-silo preserved wheat than on the dry rolled wheat, with no difference among the two moist wheat treatments. The lower gains on the wheat head chop can likely be attributed to the high roughage content (34.3 percent) of the total ration compared to the 10 percent roughage level on the other three rations. Such a ration might be more desirable in growing cattle programs where a higher roughage level is more suitable. It would be difficult to produce a wheat head chop containing less roughage than that produced in this study.

Treatment produced a significant effect ($P<.05$) on the feed required per unit of gain. As anticipated, the highest feed requirement was on the head chop treatment. No significant difference ($P>.05$) existed, however, among the three wheat grain treatments.

If the feedlot performance data are combined for all cattle, the average daily feed intake would be 19.6, 20.5, 20.2 and 23.0 lb; daily gain 2.66, 2.81, 2.67 and 2.31 lb; and feed/lb of gain 7.38, 7.28, 7.56, and 9.94 lb on the dry rolled wheat, high moisture-silo preserved, high moisture-acid preserved and wheat head chop treatments, respectively.

The 9.94 lb of head chop required per pound of gain represents a very satisfactory feed conversion considering that only 60.8 percent of the total ration was wheat grain (95 percent head chop X 63.9 percent wheat in the head chop = 60.8 percent wheat in total ration). This would result in a grain requirement per pound of gain of 6.04 lb (9.94 X 60.8 percent). The other three wheat treatments contained 85 percent grain in the total ration (70 percent wheat + 15 percent milo). These

Table 5. Slaughter and Carcass Information

	Dry Rolled Wheat	H.M. Wheat Oxygen Limiting Silo	H.M. Wheat Acid Preserved	Wheat Head Chop
Angus				
Dressing, %[1,5]	60.85[1,2]	61.38[1,2]	63.33[2]	58.58[1]
Carcass Grade[2]	9.17	10.00	9.67	8.67
Ribeye Area, sq. in.	10.59	10.64	11.56	11.51
Fat Thickness, in.[3]	.70	.62	.68	.58
Marbling[4]	13.00	15.00	13.67	11.00
Cutability, %	48.65	48.98	48.88	50.54
Hereford				
Dressing, %[1]	60.00	60.33	60.58	58.60
Carcass Grade[2]	8.33	8.17	8.17	7.83
Ribeye Area, sq. in.	11.34	11.43	11.10	11.00
Fat Thickness, in.[3]	.54	.50	.50	.45
Marbling[4]	11.17	10.67	11.17	9.83
Cutability, %	50.41	51.06	50.52	51.45

[1] Calculated on basis of live shrunk weight and hot 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 12th rib.
[4] Marbling scores: 1 to 30, 11=slight, 14=small, 17=modest.
[5] Values without a common letter differ significantly ($P<.05$).

three treatments produced an average feed conversion of 7.40 lb. of feed per pound of gain. This would translate to 6.29 lb of grain (7.40 X 85 percent) per pound of gain. Although the head chop feed conversions may look high, in reality, they are quite acceptable considering the nature of the ration.

Carcass data are presented in Table 5. In general, the cattle on the wheat head chop showed a trend for a somewhat lower dressing percent and carcass grade compared to cattle on the other three treatments.

Animal Wastes as Protein Sources for Ruminants

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Story in Brief

In a continuing effort to determine if animal waste products can conceivably be recycled as feed ingredients, beef feedlot wastes (FLW) and dehydrated (DPW) and fermented (FPW) poultry wastes were tested as sources of crude protein or nitrogen for ruminants. FLW was tested as 40 percent of a growing lamb ration. In contrast to previous findings, the FLW samples tested this year were not only very low in crude protein (<12 percent) but that protein was of low digestibility, 40 percent or lower. This study suggested that composting may decrease the protein value of beef feedlot wastes.

DPW (30 percent crude protein) and FPW (22 percent crude protein) were fed as 15 and 25 percent of a growing-finishing lamb ration. Both products were palatable at those levels. When compared to rations containing soybean meal as the source of protein, rations containing 15 percent DPW and FPW supported similar gains over a 90 day feeding period. At 25 percent DPW and FPW, performance was slightly lower. Organic matter digestibility was not changed by either 15 or 25 percent DPW or FPW. Estimates of digestibility for the crude protein in DPW