Influence of Level of Wheat in High Concentrate Rations on The Performance of Fattening Beef Cattle

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Story in Brief

Various levels of wheat were compared in high concentrate (90 percent) rations for fattening beef cattle. The treatments studied were 1) dry milo (no wheat) 2) 42 percent wheat (½ of cereal grain in ration) 3) 63 percent wheat (¾ of the cereal grain in ration) and 4) 84 percent wheat (100 percent of cereal grain in ration).

The average daily gains were 2.56, 2.77, 2.86 and 2.38 lb. on the milo, 42 percent wheat, 63 percent wheat and 84 percent wheat treatments respectively, ($P>.05$). One heifer on the 84 percent wheat treatment was condemmed for ascites at the time of slaughter and gained only .67 lb. per day during the experiment. Removal of this animal from the average reported above, resulted in an average of 2.54 lb. per day for the remaining heifers on the 84 percent wheat ration. The average feed required per pound of gain was 7.46, 6.88, 6.68 and 7.59 lb. on the milo, 42 percent wheat, 63 percent wheat and 84 percent wheat treatments, respectively ($P>.05$). This experiment would suggest that substantially higher levels of wheat can be successfully used than are normally used in high concentrate feedlot rations when accompanied by good management.

Introduction

Wheat represents a very important economic crop in Oklahoma. Due to the low wheat prices during the past few years, wheat has been competitively priced with other cereal grains as livestock feed. Therefore, considerable quantities of wheat are currently being fed in Oklahoma, particularly in beef cattle and swine rations.

Much of the previous work with feeding of wheat to fattening beef cattle was conducted some years ago in which wheat was fed in more conventional, much higher roughage rations than now used throughout much of the high plains cattle feeding area. Rations containing as much as 90 percent or more concentrates are now commonly fed in many feedlots.

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Very little work has been conducted to investigate the use of various amounts of wheat in such rations. Many feedlots would find it economically advantageous for them to use the maximum amount of wheat possible compatible with obtaining satisfactory animal performance. Previous reports and some field observations suggest that high levels of wheat in fattening rations frequently depress feed intakes and gains. If wheat is fed, feedlot rations commonly contain a maximum of 30-40 percent wheat; often, much less is included. The objective of this experiment, therefore was to determine the effect of various levels of wheat in high concentrate rations when fed to fattening beef cattle.

Materials and Methods

Choice Angus yearling feeder heifers, varying from about 525-625 pounds, were selected for use in this feeding experiment. The animals were gradually adapted to a high concentrate ration during a three week preliminary period.

Following the preliminary period, 48 heifers were selected and 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 treatments studied were as follows:

1) milo (0 percent wheat)
2) wheat — 42 percent in total ration (50 percent of cereal grain)
3) wheat — 63 percent in total ration (75 percent of cereal grain)
4) wheat — 84 percent in total ration (100 percent of cereal grain)

The compositions of the rations are given in Table 1.

The wheat in this experiment was of the Triumph variety which is a hard red winter wheat. In the rations containing 42 and 63 percent wheat, dry rolled milo constituted the remainder of the cereal grain portion. In all four treatments, both the milo and wheat were dry rolled through an 18 x 24″ heavy duty roller mill. The rations were all formulated to contain the composition indicated on a 90 percent DM basis. The

Table 1. Ration Composition[1]

	Milo	Wheat		
		42	63	84
	%			
Milo	84	42	21	--
Wheat	--	42	63	84
Premix[2]	16	16	16	16

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

rations were 90 percent concentrate—10 percent roughage mixtures using 5 percent cottonseed hulls and 5 percent ground alfalfa hay as the source of roughage. The rations were fed in self feeders in quantities adequate to last for approximately five days. All animals were implanted with 24 mg of stilbestrol at the beginning of the experiment.

The heifers in the two heaviest blocks were fed for 104 days prior to slaughter; whereas, the heifers in the light weight block were fed for 140 days, giving an overall average feeding time of 116 days for all heifers. Initial and final weights were taken after a 16 hour overnight shrink off feed and water.

Feed samples were collected periodically for analysis.

Results and Discussion

The feedlot performance data are given in Table 3. As noted, feed intakes were quite uniform among all treatments ($P>.05$), although slightly lower on the all wheat ration. Average daily gains were 2.56, 2.77, 2.86 and 2.38 lb. on the milo, 42 percent wheat, 63 percent wheat and 84

Table 2. Proximate Analysis of Wheat and Milo

Feed	Dry Matter	Crude[1] Protein	Ash[1]	Ether[1] Extract	Carbohydrates[1 2]
			%		
Milo	88.1	9.86	1.63	2.34	86.17
Wheat	89.6	15.07	2.23	1.17	81.53

[1] Expressed on a DM basis
[2] 100 — (Sum of figures for crude protein, ash and ether extract)

Table 3. Feedlot Performance

	Milo	Wheat (Percent) 42	63	84
No. of heifers	12	12	12	12
Initial weight, lb.	591	585	587	596
Final weight, lb.	885	901	912	870
Daily feed, lb.[1 2]	19.1	19.0	19.0	18.0
Daily gain, lb.[2]	2.56	2.77	2.86	2.38[3] 2.54[4]
Feed/lb. gain, lb.[2]	7.46	6.88	6.68	7.59[3] 7.39[4]

[1] Expressed on a 90% DM basis
[2] None of the values indicated were significantly different at the .05 level of probability
[3] Includes all 12 heifers in the treatment
[4] Excludes one heifer which was condemned for ascites at the time of slaughter and which gained 0.67 lb. per day during the experiment.

Table 4. Slaughter and Carcass Information

	Dry Rolled Milo	Wheat (Percent)		
		42	63	84
Dressing percent[1]	62.2	62.2	61.0	69.8
Carcass grade[2]	11.1	10.5	9.9	10.0
Rib eye area, sq. in.	11.9	11.8	11.8	11.1
Fat thickness in.[3]	0.91	0.98	0.90	0.86
Marbling[4]	20.0	18.1	16.8	17.3

[1] Calculated on basis of live shrunk weight and chilled carcass weight.
[2] 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.
[3] Average of three measurements determined on tracing at the 12th rib.
[4] Marbling scores: 1 to 30, 11 = slight, 14 = small, 17 = modest.
[5] None of the carcass traits differed significantly at the .05 level of probability.

percent wheat rations, respectively ($P>.05$). One of the 12 heifers on the 84 percent wheat ration gained only 0.67 lb. per day and was condemned for ascites at the time of slaughter, the cause of which was unknown. This is one possible reason the average daily gain was lower on the 84 percent wheat treatment. The average gains of the remaining 11 heifers on the 84 percent wheat ration was 2.54 lb. per day, equally as good as for the all milo ration but somewhat less than for the wheat—milo mixed rations.

The average feed required per pound of gain was 7.46, 6.88, 6.68 and 7.59 lb. on the milo, 42 percent wheat, 63 percent wheat and 84 percent wheat treatments, respectively ($P>.05$). Assigning an estimated NE_m value of 83 Mcal and an estimated NE_g value of 53 Mcal/100 lb. to the 84 percent wheat ration, together with the use of net energy requirement values for maintenance and gain, it might be possible to estimate within limits the quantity of feed consumed during the experiment by the animal condemned for ascites. While such an assumption would be subject to some question when estimating the feed consumption of a sick animal, such a correction would produce an estimated feed conversion of 7.39 lb. of feed per lb. of gain for the remaining animals on the 84 percent wheat ration as contrasted with an uncorrected value of 7.54 lb. of feed/lb. of gain. Nevertheless, no statistically significant differences ($P>.05$) existed in feed efficiency in either case.

Although not statistically significant, the slightly higher feed conversion values reported on the two mixed milo rations were probably, in part, functions of the slightly greater daily gains on these rations, since it is a well known fact that faster rates of gain usually produce improved feed conversions (lb. feed/lb. gain) in fattening cattle. Volatile fatty acid and lactic acid productions are also being determined on such rations.

In brief, this experiment would also suggest that substantially higher

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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