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# The Effect of a Wheat Gluten Supplement In a Steer Fattening Ration Comprised of Varying Levels of Wheat

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# THE EFFECT OF A WHEAT GLUTEN SUPPLEMENT IN A STEER FINISHING RATION COMPRISED OF VARYING LEVELS OF WHEAT

A. T. Ralston and N. O. Taylor

Wheat gluten, a by-product of the starch industry, has not previously been used in beef cattle rations. Most commercial wheat gluten ranges from 75 to 85% crude protein and is a good source of many of the more limiting amino acids (Table 1). Because of its amino acid content and its palatability, wheat gluten should have excellent combining ability with cheaper nonprotein nitrogen sources, such as urea. The trial reported herein was conducted to compare a protein supplement based on wheat gluten with a protein supplement of known performance based on cull peas (OSU supplement). The composition of the supplements used is shown in Table 2.

## Methods

Seventy-two steer calves averaging 545 pounds in weight were randomly allotted to six pens. The following three concentrate rations were used: (1) 85% wheat, 15% beet pulp; (2) 70% wheat, 30% beet pulp; and (3) 50% wheat, 50% beet pulp. Two pens received each ration.

The steers were fed for an average of 184 days. During the first 97 days, peavine silage was fed at a gradually reduced rate so that the average intake was 7.1 pounds per head daily on an air-dry basis. All of the animals received one pound daily of OSU supplement during this time. At the end of 97 days, one replicate was placed on the wheat gluten supplement until slaughter and the other replicate was continued on the OSU supplement. Equal numbers from each lot were slaughtered at 168 and 199 days.

Yields of boned, closely trimmed retail cuts from round, loin, rib, and chuck were estimated by the method described in the Federal Register (1962). Data were analyzed statistically by analysis of variance (Snedecor, 1956).

## Results

The summary of average daily gain, feed efficiency, and cost of gains is broken down by periods in Table 3. Although initial gains were quite variable among lots (2.17 to 2.43 pounds per head daily), average gains of all steers on each supplement were almost identical (2.30 to 2.32 pounds). Finish gains were more variable (2.59 to 3.01 pounds) but again average gains for the supplements were almost identical (2.76 to 2.78 pounds). Lots of animals making larger initial gains made smaller finish gains, which resulted in very small differences among the different concentrates fed or between the protein supplements used.

No significant differences were found in feed efficiency or cost of gains. The small difference in cost of gain in favor of the OSU supplement occurred prior to the finishing period.

No significant differences existed in marbling scores, carcass grades, or yield of closely trimmed round, loin, rib, and chuck. Steers fed the higher levels of wheat graded somewhat higher than those receiving more beet pulp. Although 86% of the steers graded low choice or better, the average back fat was only .51 inches. This is reflected in the average yield of 49.1% of trimmed round, loin, rib, and chuck.

Table 1. Summary of Percentages of Amino Acids in Cottonseed Oil Meal (CSOM), Peas, and Wheat Gluten

Amino acid	CSOM <sup>(1)</sup>	Peas <sup>(1)</sup>	Wheat gluten <sup>(2)</sup>
	%	%	%
Arginine	8.0	9.0	4.3
Cystine	2.4	1.3	1.9
Glutamic acid	15.1	---	36.0
Glycine	5.8	---	
Histidine	2.2	---	2.4
Isoleucine	3.7	---	6.0
Leucine	5.3	---	
Lysine	3.9	5.1	2.1
Methionine	1.2	0.9	3.3
Phenylalanine	4.6	---	2.0
Threonine	2.6	---	2.5
Tryptophane	1.2	0.8	1.0
Tyrosine	2.5		4.2
Valine	4.3		3.0

(1) Values from Morrison's Feeds and Feeding, 22 ed.

(2) Values from Centennial Mill (correspondence).

Table 2. Composition of the Protein Supplements Used

Ingredient	Wheat gluten	OSU supplement
	%	%
Molasses	5.0	---
Urea	7.0	7.0
Gluten (1)	15.0	---
Cull peas	---	73.0
White shorts	20.0	---
Mill feed	48.0	---
Dehydrated alfalfa	---	5.0
Cottonseed oil meal (41%)	---	10.0
Limestone	2.5	2.0
Tricalcium phosphate	---	2.0
T. M. salt	---	0.5
Vitamin A (10,000 IU/g.)	0.5	0.5
Bonemeal	2.0	---
Approximate crude protein	38.4	39.5

(1) Gluten furnished 31.25% of the total protein in the supplement.

Table 3. Summary of Average Daily Gains (ADG), Feed Efficiency (FE), and Cost per Hundredweight of Gain by Periods

Wheat:beet pulp	Period	Wheat gluten supp. (1)			OSU supp.		
		ADG	FE	COST/CWT. (2)	ADG	FE	COST/CWT.
		lbs.	lbs.		lbs.	lbs.	
85:15	Initial (3)	2.43	718	\$14.65	2.25	774	\$15.62
	Finish	2.59	764	20.80	2.95	693	18.85
	Overall	2.52	741	17.68	2.57	730	17.36
70:30	Initial	2.17	811	15.98	2.36	735	14.61
	Finish	3.01	682	17.94	2.76	735	19.33
	Overall	2.56	740	17.06	2.54	735	16.99
50:50	Initial	2.29	759	14.43	2.36	738	14.13
	Finish	2.69	759	18.89	2.62	773	19.29
	Overall	2.48	759	16.71	2.49	755	16.70
Average	Initial	2.30	763	15.02	2.32	749	14.79
	Finish	2.76	735	19.21	2.78	734	19.16
	Overall	2.52	747	17.15	2.53	740	17.01

(1) Wheat gluten supplement fed only during the finish period.

(2) Wheat gluten and OSU supplements charged at same price, \$67 per ton.

85% wheat, 15% beet pulp - \$54 per ton

70% wheat, 30% beet pulp - \$52 per ton

50% wheat, 50% beet pulp - \$49 per ton

(3) Decreasing amounts of peavine silage fed during this period.

Table 4. Summary of Marbling Scores, Carcass Grades, and Calculated Yield of Closely Trimmed Round, Loin, Rib, and Chuck

<u>Wheat:beet pulp</u>				
Wheat gluten:	85:15	70:30	50:50	Avg.
Marbling score <sup>(1)</sup>	13.9	13.5	13.8	13.7
Grade <sup>(2)</sup>	16.8	16.5	16.0	16.4
Yield of trimmed cuts(%)	49.4	48.7	49.3	49.1

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OSU supplement:				
Marbling score	14.4	13.5	12.7	13.5
Grade	17.1	16.5	16.0	16.5
Yield of trimmed cuts(%)	49.4	48.8	49.0	49.1

(1) 12 = small, 15 = modest, 18 = moderate.

(2) 14 = good, 17 = choice.

#### Summary

1. Protein supplements based on wheat gluten or cull peas were equally effective with a wheat:beet pulp finishing ration.

2. Wheat as the only grain produced satisfactory gains with efficient conversion that resulted in desirable carcasses.

3. Peavine silage was an excellent conditioner when used prior to a high-concentrate diet.

4. High grading carcasses with little back fat can be produced on wheat rations.

#### Bibliography

"Notice of proposed standards for determinations of quality and meat yield", Federal Register 27:72, 1962.

Snedecor, G. W., Statistical Methods (5th ed.). The Iowa State University Press, Ames, Iowa, 1965.