Steam Flaked Wheat for Finishing Beef Cattle

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Story in Brief

Steam flaked wheat prepared by two different steaming times was compared with dry rolled wheat in high concentrate rations for finishing cattle. The wheat treatments were: 1) dry rolled (DRW) 2) 6 minute steam flaked (SFW-6) and 3) 12 minute steam flaked (SFW-12). The rations contained 70 percent wheat (DM basis) and were self fed once daily to 36 feeder heifers weighing an average of 499 lb.

In the 150 day feeding period, treatment produced a significant effect on: 1) average daily gain ($P<.05$), 2) feed consumption ($P<.05$), 3) backfat thickness ($P<.01$) and 4) cutability ($P<.01$). Averages for the DRW, SFW-6 and SFW-12 treatments, respectively were: 1) average daily gain: 2.42, 2.87 and 2.89 lb; 2) feed consumption: 14.80, 16.01 and 16.10 lb; 3) feed/unit gain: 6.12, 5.58 and 5.57; 4) backfat thickness: 0.70, 0.99 and 0.95 in; and 5) cutability: 50.24, 47.68 and 48.08 percent. If the SFW-6 and SFW-12 treatments are combined and compared to DRW, there was also a significant difference ($P<.01$) in feed efficiency (5.58 *vs* 6.12 for SFW and DRW, respectively). There was essentially no difference between the two steam flaked wheat treatments for feedlot performance or carcass merit.

Introduction

Wheat represents a major economic crop in Oklahoma with production approaching 150 million bushels annually. This is nearly five 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 $5.00 per bushel, wheat would not, however, be competitive as a feed grain. Nevertheless, there have been periods in recent history when wheat was priced competitively with feed grains, and this may be true again in the future.

Steam flaking is one of the most common methods of grain process-

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in the high plains area. There is limited data comparing dry rolled milo and wheat rations, but very little data on the effect of steam flaking wheat. The purpose of this experiment, therefore, was to determine the value of steam flaking wheat for feedlot cattle.

Materials and Methods

Thirty six Angus, Hereford and Angus X Hereford feeder heifers were given a three week preliminary period to adapt to a 90 percent concentrate ration. Following this period, they were randomly allotted to one of three treatments and then blocked by pen location within two barns. There were four pens per treatment and three animals per pen, making a total of twelve animals per treatment. The average initial weight of the heifers was 499 lb. The treatments were as follows: 1) dry rolled wheat, (DRW) 2) wheat steamed for six minutes and flaked (SFW-6) and 3) wheat steamed for 12 minutes and flaked (SFW-12).

The ration compositions are shown in Table 1. Each ration contained 70 percent wheat and 15 percent dry rolled milo on a dry matter basis. The steam flaked wheat was steamed for either 6 or 12 minutes and then rolled through a heavy duty 18 X 24" roller mill with roller spacings of .003 inch. The dry rolled wheat and dry rolled milo used in each ration were rolled using the same roller. The wheat used was of the Triumph variety, a hard winter wheat commonly grown in Oklahoma. Feed was prepared and fed once daily in an amount to permit feed availability until the next feeding.

All heifers were initially implanted with 200 mg of testerone propionate and 20 mg of estradiol benzoate, and then reimplanted again on

Table 1. Ration Composition[1]

Ingredient	Percent
Wheat	70
Sorghum	15
Cotton hulls	5
Ground alfalfa	5
Soybean meal	3
Urea	0.6
Salt	0.5
Dicalcium phosphate	0.4
Calcium carbonate	0.4
Aurofac-50, mg/kg	123
Vitamin A (30,000 IU/g), mg/kg	110

day 71 of the 150 day feeding period. Once during this trial, rumen samples were taken from each animal; pH values were taken immediately, and a small sample was kept for VFA analysis.

Initial and final weights were taken full with a four percent pencil shrink.

Results and Discussion

The proximate analysis data are presented in Table 2, and the particle sizes of each of the processed grains are given in Table 3. There was no apparent difference in particle size of the steam flaked grains, but there was a difference between the steam flaked and the dry rolled, the dry rolled having a smaller particle size probably due to the shattering of the dry kernal during rolling. This is consistent with previous observations with steam flaked *vs.* dry rolled sorghum.

Table 4 denotes the performance data. Average daily gains were significantly higher on the SFW feedlot treatments ($P<.05$) with no difference between the steam flaked rations. Gains were 2.42, 2.87 and 2.89 on the DRW, SFW-6 and SFW-12 treatments, respectively. Consumption

Table 2. Proximate Analysis Data

Grain	Dry Matter	Crude Protein[1,2]	Ash[1]	Ether Extract[1]	CHO[1,3]
DRW	87.97	14.40	1.82	1.39	81.39
SFW-6	83.84	14.79	1.37	1.50	81.34
SFW-12	84.27	14.53	1.69	1.62	81.16

[1] Values expressed on 100% dry matter basis.
[2] 6.25 X percent nitrogen.
[3] 100 — (sum of figures for crude protein, ash and ether extract).

Table 3. Particle Size

Grain[1]	Screen Size[2]						
	4000	2000	1000	500	250	125	Pan
	% retained						
DRW	-0-	44.67	47.67	4.83	1.00	.33	1.50
SFW-6	26.96	41.44	21.74	4.64	.58	.58	4.06
SFW-12	31.62	44.59	16.49	4.59	1.08	.55	1.08

[1] Grains dried to contain 90% dry matter.
[2] Microns.

was very similar on the steam flaked rations, being 16.01 lb on the SFW-6 and 16.10 on the SFW-12 treatments. However, there was a significantly lower ($P<.05$) consumption on DRW (14.80 lb). This may be due to the smaller particle size of the DRW grain resulting in a more floury, dusty ration with a decreased palatability which caused a decreased gain. Molasses or low levels of fat might be beneficial in increasing the palatability of such rations, although it is doubtful if feed intake would have been improved enough to eliminate the advantage of steam flaking.

Feed efficiencies (feed/unit gain) tended to be better on both steam flaking treatments, being 5.58 and 5.57 lb for SFW-6 and SFW-12, respectively, *vs.* 6.12 on DRS. If the feed efficiency data are combined for the SFW-6 and SFW-12 treatments and compared to DRW, there was a significant advantage ($P<.01$) in favor of steam flaking. The improved feed utilization observed with the SFW treatments can be attributed in part to the greater intakes and gains and the subsequent dilution of maintenance. Digestibility may also have been improved slightly.

Carcass characteristics are given in Table 4. Backfat thickness was significantly lower ($P<.01$) and cutability significantly higher ($P<.01$) on DRW compared to either SFW treatment. These differences were

Table 4. Fedlot Performance and Carcass Merit

	DRW	SFW-6	SFW-12
No. heifers	12	12	12
Initial live shrunk wt, lb	509	487	500
Final live shrunk wt	872	922	933
Daily feed, lb[1,5]	14.80[a]	16.01[b]	16.10[b]
Daily gain, lb[5]	2.42[d]	2.87[e]	2.89[e]
Feed/kg gain, lb[1,5]	6.12[g]	5.58[h]	5.57[h]
Dressing percent	62.69	63.07	62.55
Conformation[2]	11.58	11.33	11.17
Marbling[3]	13.50	15.00	14.25
Ribeye area, sq in	12.38	11.62	11.64
Fat thickness, in[5]	.70[d]	.99[e]	.95[e]
KHP fat, percent	2.86	2.96	2.75
Carcass grade[2]	9.00	9.92	9.50
Cutability, percent[4,5]	50.24[d]	47.68[e]	48.08[e]
Abscessed livers	0	2	2

[1] Dry matter basis.
[2] U.S.D.A. grade converted to the following numerical designations: 8=avg good, 9=high good, 10=low choice, 11=avg choice, 12=high choice.
[3] Marbling scores: 11=slight, 14=small, 17=modest.
[4] Percent boneless trimmed retail cuts =52.66 −5.33 (fat thickness) −0.979 (KHP %) + 0.665 (ribeye area) −0.008 (chilled carcass weight).
[5] Values with different superscripts differ significantly:
ab: ($P<.05$)
de: ($P<.01$)
gh: ($P<.10$)

probably observed because all cattle were fed an equal time on feed, with most rapid gains being obtained on the SFW treatments. No other significant differences in carcass merit were observed between treatments.

Influence of Grain Processing on Development of Subclinical Acidosis in Beef Cattle

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Story in Brief

When high concentrate rations are fed to beef cattle they are fermented rapidly with a concomitant rapid depression in rumen pH and occasionally an abnormal rumen lactic acid production. Following unusual over consumption these processes may result in a subclinical acidosis which could affect subsequent levels of feed consumption as well as general health of the animals. The three trials reported here were designed to evaluate the effects of grain processing on these rumen processes.

When the sorghum portion (84 percent) of a beef cattle ration was micronized, the depression in rumen pH following feeding was greater than following feeding of dry rolled sorghum. Lactic acid production peaked between 1 to 2 hrs. after feeding and was greater when micronized sorghum was fed. Lactic acid production was greater as the degree of micronizing was increased, the latter being indicated by decreasing bushel weights (32 to 18 lb/bu.). Depression in pH was not influenced, however.

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