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# Wheat Tailings in Feedlot Finishing Diets

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Summary

One hundred twenty-eight yearling steers (average initial weight 854 lb) were fed one of four finishing diets containing (dry matter basis) either 1) 83% high moisture corn, 2) 44% high moisture corn and 37% high moisture wheat tailings, 3) 82% high moisture wheat tailings, or 4) 42% high moisture corn and 40% dry wheat tailings. Wheat tailings consisted of small wheat kernels removed during cleaning that had low test weights (41.5 to 52.0 lb/bushel) and high vomitoxin levels (17 to 42 ppm). High moisture wheat tailings were coursely cracked, reconstituted to 29% moisture, and ensiled. Dry wheat tailings were cracked only. Average daily gain declined up to 25% ($P<.01$) with increasing levels of high moisture wheat tailings as a result of a linear decline in dry matter intake ($P<.05$). Feed efficiency tended to worsen ($P<.14$). However, calculated net energy values for high moisture wheat tailings were similar to that of corn. Dry wheat tailings, on the other hand, resulted in similar intake ($P>.20$) but 15% lower average daily gain ($P<.01$) than high moisture wheat tailings fed at a comparable level and net energy values were approximately 75% of corn. Wheat tailings, regardless of form or level, decreased quality grade ($P<.05$) but did not affect dressing percent, yield grade, or liver abscesses ($P>.20$).

Key Words: Wheat Tailings, Finishing Diets, Steers

## Introduction

Head blight (scab) is a recurring problem in the Northern Plains. Excessively wet growing conditions promote fungal infection of small grains resulting in shriveled kernels that often contain mycotoxins such as vomitoxin. Infected wheat is usually cleaned, concentrating the shriveled kernels in what are referred to as "tailings." Wheat tailings are characterized by low test weights and variable vomitoxin levels.

Mildly scabbed wheat appears to be utilized efficiently in high concentrate finishing diets. However, the feeding value of more severly affected wheat found in tailings is uncertain and may depend on diet level and processing.

The objectives of this study were to determine the effects of increasing levels of wheat tailings in finishing diets on yearling cattle performance and to compare coarse cracking with reconstitution plus ensiling as methods for processing wheat tailings.

## Materials and Methods

Three loads of wheat tailings were received during the course of the study. Test weights were 43.5, 41.5, and 52.0 lb/bushel, respectively. The wheat tailings were coarsely cracked with some whole kernels still evident after processing. A portion of the wheat tailings were reconstituted with enough water to reduce dry matter content to approximately 70% and stored in a silage bag.

One hundred twenty-eight yearling steers (average initial weight 854 lb) used in a previous growing trial were weighed, reimplanted with Revalor[3] and allotted to pens (8 head per pen, 4 pens per treatment). Experimental treatments consisted of finishing diets containing (dry matter basis) either 1) 83% whole, high moisture corn (HMC), 2) 44% HMC and 37%

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high moisture wheat tailings (HMWT), 3) 82% HMWT tailings, or 4) 42% HMC and 40% dry wheat tailings (DWT). Finishing diet compositions are shown in Table 1. Dry corn was used in the diets during the final 23 days of the 101-day trial after supplies of high moisture corn were depleted. Four receiving/step-up diets were fed from day 1 through 19. The finishing diets were formulated to contain at least 12% crude protein, .57% Ca, .38% P, and .74% K.

Initial and final weights were determined after an overnight shrink off feed and water. Carcass data were collected on a subsample of 12 steers from each treatment. All data were statistically analyzed in a manner appropriate for a completely random design.

Table 1. Finishing diet compositions (dry matter basis)

| | Treatment | | | |
|---|---|---|---|---|
| Item | 100 HMC — | 50 HMC 50 HMWT | — 100 HMWT | 50 HMC 50 DWT |
| High moisture corn | 82.71 | 44.10 | — | 42.08 |
| High moisture wheat | — | 37.45 | 81.90 | — |
| Dry wheat | — | — | — | 40.31 |
| Molasses blend | 3.10 | 3.28 | 3.49 | 3.13 |
| Corn stalks | 8.23 | 8.70 | 9.27 | 8.30 |
| Soybean meal | 2.81 | 1.53 | — | 1.46 |
| Ground corn | — | 1.69 | 2.79 | 1.62 |
| Urea | .80 | .43 | — | .41 |
| Limestone | 1.03 | 1.43 | 1.45 | 1.38 |
| Dicalcium phosphate | .38 | .20 | — | .19 |
| Potassium chloride | .28 | .36 | .33 | .34 |
| Trace mineral salt | .47 | .59 | .56 | .56 |
| Premix[a] | .19 | .24 | .21 | .21 |
| Dry matter, % | 75.95 | 71.86 | 67.34 | 80.91 |
| Crude protein, % | 12.03 | 13.64 | 15.72 | 13.84 |

[a]Provided 28 g of monensin, 8.2 g of tylosin, and 4,500,000 IU of vitamin A per ton of diet dry matter.

## Results and Discussion

Performance data are presented in Table 2. Feed dry matter intake was negatively affected by the replacement of corn with HMWT in the finishing diet. The linear decrease in dry matter intake across treatments 1, 2, and 3 was equal to approximately .5 lb for each 10% increase in HMWT content ($P<.05$). Daily gain declined in a similar manner ($P<.01$) with steers fed treatment 3 gaining 25% less per day than steers fed treatment 1. Steers fed treatment 2 were intermediate. There was only a tendency for poorer feed efficiency with increasing level of HMWT ($P<.14$). On the other hand, steers fed treatment 4 had poorer feed efficiency ($P<.01$) than those fed treatment 2 (HMWT vs. DWT at comparable levels) as a result of similar intakes ($P>.20$) but 15% lower gains ($P<.01$).

Despite poorer performance, diet net energy values calculated from cattle performance and

Table 2. Performance of steers fed finishing diets containing varying levels of dry or high moisture wheat tailings

| Item | Treatment | | | | SE |
|---|---|---|---|---|---|
| | 100 HMC — | 50 HMC 50 HMWT | — 100 HMWT | 50 HMC 50 DWT | |
| No. of steers | 32 | 32 | 32 | 32 | |
| Initial wt, lb | 854 | 854 | 854 | 854 | |
| Final wt, lb | 1176[a] | 1143[b] | 1094[c] | 1100[c] | 9.9 |
| DM intake, lb/day | 22.4[d] | 20.8[de] | 17.9[f] | 20.3[e] | .62 |
| Daily gain, lb | 3.19[a] | 2.87[b] | 2.38[c] | 2.43[c] | .098 |
| Feed:gain | 7.02[a] | 7.23[a] | 7.54[ab] | 8.34[b] | .254 |

[a,b,c]$P < .01$.
[d,e,f]$P < .05$.

feed intake data indicated that HMWT contained as much available energy as corn. Decreased performance with increased HMWT was apparently a function of intake and not altered digestion/ metabolism. Diet levels of vomitoxin contributed by added wheat tailings in treatments 2, 3, and 4 were 10, 23, and 13 ppm, respectively. Previous work has demonstrated that cattle are less susceptible to vomitoxin than other species, with no effects on feedlot performance being found at concentrations of up to 18 ppm. Much higher levels have been fed experimentally to lactating dairy cows without problem, although only for short periods of time. Other mycotoxins may have been present but were not analyzed. Faster rate of gain at a similar intake for steers fed treatment 2 compared to those fed treatment 4 reflects the benefits of reconstitution compared to coarse cracking alone. Calculated estimates of DWT net energy for maintenance and gain were 74% and 77% of corn, respectively.

A subsample of 12 steers from each treatment were slaughtered approximately 12 hours after being weighed off test (29 hours after removal of feed and water; Table 3). Neither dressing percent, yield grade nor liver score differed between treatments ($P > .20$). However, quality grade was .3 to .4 units lower ($P < .05$) for steers fed wheat tailings regardless of level or processing and may be due to the lighter weights at slaughter.

In conclusion, wheat tailings contain available energy comparable to whole corn if adequately processed. However, intake may be reduced, perhaps as a result of mycotoxin contamination, and should be monitored closely when deciding on the appropriate level to feed.

Table 3. Carcass characteristics of steers fed finishing diets containing varying levels of dry or high moisture wheat tailings

| Item | Treatment | | | | SE |
|---|---|---|---|---|---|
| | 100 HMC — | 50 HMC 50 HMWT | — 100 HMWT | 50 HMC 50 DWT | |
| Dressing percent | 63.2 | 63.4 | 62.7 | 62.8 | .40 |
| Quality grade[a] | 4.5[c] | 4.1[d] | 4.1[d] | 4.2[d] | .33 |
| Yield grade | 2.5 | 2.6 | 2.4 | 2.7 | .16 |
| Liver score[b] | .17 | 0 | .08 | .17 | .13 |

[a]4.0 = Select°, 5.0 = Choice°.
[b]0 = no abscesses, 1 = 1 small abscess, 2 = 2+ small abscesses, 3 = severe abscesses.
[c,d]$P < .05$.