Feeding High Quality, Low Test Weight and Sprouted Wheat

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Wheat grain has long been recognized as an excellent energy feed resource for livestock. Because wheat is generally used for human food consumption, it is typically priced higher than feed grains, such as corn and milo on an equal weight basis. Higher prices result in modest use as a feed grain during most years. However, during periods when the wheat market is depressed or feed grains are scarce (and high priced), wheat can be used as an economical feed source for beef cattle. Other situations that increase the use of wheat grain in cattle rations are low test weight and sprout damaged wheat. Market discounts for low test-weight and sprout-damaged wheat can be substantial enough to encourage cattle producers to consider this feed resource in their beef cattle rations.

Feeding wheat to beef cattle

Table 1 shows the nutrient density of wheat and wheat products compared to several other concentrate feeds. Wheat generally contains less moisture and higher protein compared to corn. Another advantage that wheat may have over corn is that the protein has higher degradability in the rumen compared to the protein in dry rolled corn (77 and 45 percent, respectively, NRC, 1996). The energy (TDN and NE values from Table 1), calcium and phosphorus concentrations are very similar between these two grains. Similar to most feed grains, with the exception of soybean hulls, wheat contains a relatively low concentration of calcium and a high concentration of phosphorus. Corn does provide approximately one-half the vitamin A requirement of growing cattle (if fed as the major component in the ration), whereas wheat provides no vitamin A activity.

Wheat grain must be rolled or coarsely ground in order to optimize utilization by ruminant animals. In one experiment, starch digestibility of a high-grain whole-wheat diet was 83 percent compared to 99 percent when the wheat was rolled. In another experiment, digestibility of starch in mixed diets containing whole wheat was only 60 percent compared to 86 percent for the same diet when the wheat was rolled and crushed.

The starch contained in wheat grain is more rapidly fermented compared to the starch in corn grain. Consequently, wheat grain should be limited to 30 to 50 percent of the complete ration for beef cattle to minimize the risk of acidosis and bloat. Finely ground wheat should be avoided in beef cattle diets to maximize intake and prevent acidosis. Extremely fine grinding results in separation of fines in dry rations, causing reduced intake and increased secondary fermentation in the feed bunk. When adapting cattle to wheat-containing rations, gradually increase the grain portion of the diet over a 25- to 30-day period.

Table 1 also gives diet nutrient density required for a medium frame steer to gain 2.5 pounds per day. The energy density of wheat and corn is much higher compared to that required by growing steers. Consequently, these feeds must be blended with other feeds that contain more fiber or roughage value and less energy in order to minimize digestive problems such as acidosis and founder. Whole shelled corn grain may

Table 1. Nutrient density of various concentrates and diet nutrient density required for beef steers.

Feed	*Dry Matter (percent)*	*TDN (percent)*	*NE maint. (mcal/cwt)*	*NE gain (mcal/cwt)*	*Crude Protein (percent)*	*Ca (percent)*	*P (percent)*
Corn	88	90	102	70	9.8	.03	.32
Wheat	90	88	99	68	14.2	.05	.44
Corn gluten feed	90	80	88	59	23.8	.36	.95
Milo	90	82	91	61	12.6	.04	.34
Soybean hulls	90	77	84	55	12.2	.53	.18
Wheat middlings	89	79	90	59	18.7	.17	1.01
Wheat cleanings	90	66	76	48	13.0	.06	.38
500 Lb Steer, 2.5 lb ADG*		74	79	51	12.5	.56	.27

*Nutrient requirements of a 500-pound medium frame steer gaining 2.5 pounds per day. NRC, 1984.

be limit (or program) fed to achieve similar rates of gain with little or no roughage, but this practice is not recommended for wheat grain. For further information regarding program feeding, see OSU Extension Current Report CR-3025.

Wheat can be fed as a supplement to increase rate of gain for stocker cattle receiving hay or silage-based rations. It is recommended that no more than one percent of body weight be used in these situations. Always be certain that the animal's protein requirement is met when feeding grain in combination with moderate to low quality roughages or forages.

Wheat does not contain enough protein to replace protein supplements commonly used in combination with moderate to low quality roughages. Whereas wheat contains only 14 percent protein (dry matter basis), beef cow and stocker cattle supplements used in these situations generally contain 20 to 40 percent protein.

When Should You Consider Feeding Wheat?

By using current prices for corn and soybean meal, one can estimate the wheat price at which wheat could be substituted at a breakeven level. Approximately 92 pounds of corn and 8 pounds of 48 percent soybean meal contains equal protein and energy as 100 pounds of wheat. This relationship is used to calculate the breakeven substitution wheat price in Table 2.

Low Test Weight Wheat

Test weight is not a direct indicator of feeding value in wheat, corn, or milo. Low test weight grains have less starch with more concentrated protein and seed coat or fiber. This is the case because protein is deposited in the kernel first. When the starch fill is incomplete due to adverse weather conditions, the protein concentration is elevated from 1 to 3 percent. In various research trials, low-test weight grains produce very similar animal performance results compared to higher test weight grains. In general, when test weight is above 50 pounds per bushel, very few animal performance differences have been noted. With 45 to 50 pound test weight wheat, one should consider the feeding value to be 95 percent of the feeding value of corn.

Sprout-Damaged Wheat

Idaho researchers fed sprout-damaged wheat in backgrounding and feedlot diets to cattle. Sprout-damaged wheat (0, 10, and 25 percent sprouted) composed 35 percent or 65 percent of the concentrate. Feeding different levels of sprouted wheat had no effect on animal performance or efficiency in these experiments. Research conducted at Washington State University found no difference in the feeding value of sprouted wheat compared to unsprouted wheat. Research at Michigan State University indicated that sprouted wheat should not make up more than 20 percent of the total ration dry matter in order to minimize the risk of reduced feed intake. Be sure to have an aflatoxin screening conducted on the grain if mold is present. Sprouted wheat should be efficiently utilized in beef cattle rations, provided that aflatoxin is not a problem.

Summary

Wheat and corn grain have similar feeding values, with wheat having higher protein concentration and more rapidly fermented starch. Due to the rapid fermentation characteristics of wheat, greater feeding management caution and/or lower diet inclusion levels should be used. Producers should feed whichever is cheaper on a processed, bunk delivered basis. Wheat must be coarsely processed in order to optimize digestibility. Low test weight and sprout damaged wheat can be fed to beef cattle with minimal effects on animal performance. Consequently, feeding lower quality or damaged wheat presents an opportunity to recapture some of the lost value.

Table 2. Prices at which wheat could be substituted for shelled corn and soybean meal*

	Corn price, $/bu				
SBM price, $/ton	2	2.5	3	3.5	4
	Wheat price, $/bu				
175	2.39	2.88	3.38	3.87	4.36
200	2.45	2.94	3.44	3.93	4.42
225	2.51	3.00	3.50	3.99	4.48
250	2.57	3.06	3.56	4.05	4.54
275	2.63	3.12	3.62	4.11	4.60

*Adapted from Waller and Ritchie, 1982. Calculated based on 100 pounds of wheat containing equal protein and energy to 92 pounds of shelled corn and 8 pounds of 48 percent soybean meal.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Samuel E. Curl, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0702