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Wheat as a Feed for Beef Cattle

Cooperative Extension South Dakota State University

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WHEAT as a feed for beef cattle

Cooperative Extension Service: South Dakota State University and U. S. Department of Agriculture in Cooperation with the South Dakota Wheat Commission
Wheat has not been considered an important feed grain for beef cattle because yields and prices usually have not been favorable in relation to the major feed grains of corn, sorghum and barley. However, lower prices, increased yields or new varieties are causing a swing to greater use of wheat for beef feed.

Some new wheats are being developed specifically for feed grain. In addition to increasing amounts of wheat going into the feed channels, considerable quantities of damaged and off-quality wheat and wheat screenings are available for livestock feeds. They would have little value except for this purpose.

Because of the lesser importance of wheat among the feed grains, livestock feeders have been generally less informed as to its feeding value, supplements needed and management problems under various conditions of use. However, a considerable amount of research has been conducted on these problems during the last several years. This publication partially summarizes this information and makes suggestions for feeding wheat in various types of rations for beef cattle.

**Chemical Composition of Wheat**

Essential nutrient content and the availability or digestibility of these nutrients are important considerations in choosing a livestock feed. Several types of wheat vary somewhat in average chemical composition. A variation within and between types of wheat can be expected; thus a chemical analysis should be made when it is important to know rather accurately nutrient content.

Hard red spring, hard red winter and durum wheats are somewhat higher in protein than the soft types (See Table 1). Otherwise, differences in chemical composition are not of great importance from the standpoint of livestock feeding.

Wheat, in comparison to No. 2 yellow dent corn, is higher in protein and fiber, but lower in ether extract (fat) and energy or total digestible nutrients (TDN). Hard wheat has approximately 150% as much protein as corn, while soft wheats have approximately 120% as much protein as corn. Protein of wheat is of high quality for beef cattle. When use is made of the greater amount of protein, the high protein content of wheat would add to its value in comparison to corn of lower protein content.

Digestible energy values for wheat (Table 1) are about 97% that of corn grain. A slightly higher content in fiber and lower content in fat in comparison to corn would indicate a lower energy value. However, reported net energy values for wheat are about 108% of those for corn grain.

**Problems Associated with Feeding Wheat**

Wheat has a reputation of being more “touchy” to feed than other feed grains. Problems are greater from depressed feed intake, acidosis and other digestive disorders, and abscessed livers. These problems increase with increasing levels of grain in the ration, and they also appear to increase with length of time high levels of wheat are fed. They are the main basis for recommendations on limiting the amount of wheat in the ration, mixing it with other grains and for feeding some roughage.

More caution should be used in increasing cattle to a full feed of a ration which contains a large amount of wheat. Once on full feed, feed should be kept before the cattle all the time. It is not advisable to change back and forth from wheat to other feed grains when feeding high concentrate rations.

**Processing Methods for Wheat**

It is generally recommended that wheat should be coarsely rolled or ground when feeding to beef cattle. Preparation to a powdery material appears to reduce feed intake and to increase digestive problems. In addition to dry rolling or grinding, methods of processing which have been investigated include steam rolled, steamed flaked, popped, popped and rolled (micronized flaked), and pelleted. Results of the research have not shown any pronounced and consistent advantage for these processing methods over the coarsely dry rolled or coarsely ground grain.

When wheat is mixed with other grain, whether mixing should be before or after processing depends on how well the grains process together. Barley and rye could be processed under more conditions with wheat than could corn or sorghum.

**Wheat Alone or Mixed**

Wheat has been satisfactorily fed as the only grain to beef cattle, even in high-concentrate rations. However, since problems in keeping cattle on feed and digestive troubles appear to increase with increasing levels of wheat in the ration, it is commonly recommended that wheat be limited to 50% of concentrate portion of the ration. This is a rather safe level and has been reported to result in a greater value for wheat in comparison to other feed grains than when fed at higher levels. On the other hand, it may be advisable and economical to feed higher levels depending on the supply and price of wheat in relation to other grains.
Wheat can complement other grains making a mixture more valuable than the grains alone. In addition, problems commonly attributed to high levels of wheat are reduced merely by the diluting effect of the other grains. Energy values of rations composed of large amounts of corn or high fiber grains (barley and oats) would be improved by including wheat. Corn and sorghum grains contain less protein than is recommended in many beef cattle rations. Using wheat with these grains would reduce the need for supplemental protein and result in an added value for the wheat. This property of wheat would have little, if any, additional value when it is fed with the higher protein grains (barley, rye and oats).

**WHEAT WITH VARIOUS LEVELS AND TYPES OF ROUGHAGE**

Research with various types of roughages and concentrate to roughage ratios is much more limited for wheat than for corn. Since wheat seems to present more management problems than corn, it could be fed as the only grain more safely in high roughage than in high concentrate rations. Research has indicated it to have a higher feed value in relation to other feed grains under conditions of higher levels of roughage. Limited research also indicates wheat to have a higher feed value in relation to other feed grains when fed with corn silage than when fed with hay. Apparently palatability is improved with the moist forages. Rations with large amounts of wheat probably should contain at least 15% roughage from the standpoint of safety and efficiency in utilization of wheat.

Under conditions of wintering with low protein roughages, the high protein content of wheat would add considerably to its value. Using a net energy value of wheat as 108% that of corn grain, it would take about 94 pounds of corn grain and 14 pounds of a 40% protein supplement to equal in protein and energy value 100 pounds of wheat having about 14% protein.

**DAMAGED AND OFF-QUALITY WHEAT AND WHEAT SCREENINGS**

Wheat which has been damaged from sprouting, frost or other means is frequently available for feeding to livestock. Research data on such wheat is rather limited. Degree of damage and the feeding value can be quite variable. Some research has shown that sprouted or frosted grain, pound for pound, to be equal to good quality wheat.

General appearance, test weight, fiber content and ash content are means of estimating the likely feeding value of damaged wheat and wheat screenings. Marked reduction in the test weight caused by spoilage, sprouting or frost damage of immature grain would result in a lower feeding value from the grain.

Wheat screenings composed largely of small and broken grain will have a feed value approximating that of good quality grain. On the other hand, large amounts of dirt, broken stems and chaff may be present. These lower the feeding value and can be detected by visual inspection, the test weight, and analyses for fiber and ash.

**SUPPLEMENTS NEEDED WITH WHEAT**

The major difference between wheat and corn in chemical composition as shown in Table 1 is in protein content. Similar differences would exist between wheat and the sorghum grains. However, differences in protein content between wheat and barley, rye or oats would be much less.

Wheat furnishes good quality protein for cattle. When wheat is used in place of corn in rations needing a protein supplement, less supplemental protein should be fed. This gives some extra value to wheat since protein supplements are more expensive than grain. The amounts of corn and protein supplement needed to equal the protein content of 100 pounds of wheat are shown in Table 2. The amount of the corn and supplement in the ratios shown to equal 100 pounds of wheat in feeding value on basis of various factors discussed may vary from around 108 to 120 pounds.

Wheat has somewhat more calcium than corn grain. However, the calcium content is much below recommended requirements for beef cattle and a calcium supplement is needed unless liberal amounts of legume roughage are included in the ration. The phosphorus content of wheat exceeds recommended requirements for beef cattle. Rations with 50% or more of wheat and good quality roughage should contain adequate amounts of phosphorus for beef cattle.

While higher than corn in most of the other minerals (Table 1), this would not be a large factor affecting the value of wheat as a feed grain. Supplementation with trace mineral salt would be adequate to take care of the trace mineral needs.

Vitamin content of wheat is not shown in Table 1. The B-vitamins contained in wheat are not important in its feeding value for cattle. Wheat, as well as the other feed grains, is low in carotene or vitamin A activity. A vitamin A supplement will often be needed. Total requirements for growing and fattening beef cattle are about 2,000 I.U. per 100 pounds of body weight daily or about 1,000 I.U. per pound of total ration. Lower amounts may be adequate depending on the amount and quality of roughage in the ration.
FEEDING WHEAT AND ITS VALUE

Wheat should be considered as a substitute for other grains when it is priced favorably. This will likely occur at different price relationships for a farmer growing mostly corn and also feeding cattle, a farmer growing mostly wheat and also feeding cattle, or a cattle feeder buying grain.

The value of a specific feed can not be determined very accurately until it has been consumed. Choices of values to use in estimating the worth of a feed are tables of average composition and digestibility, chemical analyses with calculations of digestible nutrients from average values of utilization, use of feed replacement equations, or percentage values of one feed in relationship to another. The most accurate evaluation of a feed is the dollar value calculated on basis of content in energy and other essential nutrients. This is done under procedures when rations are computer formulated on a least-cost basis. However, many smaller cattle feeders want a more simple method of determining the relative value of various feeds.

A percentage figure giving the value of one feed in relationship to another is a convenient and useful value. However, it is not often that the relationship can be expressed very accurately by such a simple method. Usually one grain can not be substituted for another without some changes in the nutritive value of the ration. More frequently changes in levels of roughage, protein supplement and even mineral and vitamin supplements are required to maintain rations approximately equal in feeding value.

In comparison to corn and sorghum grains, cattle fed wheat frequently have gained at a lower rate but with an improvement in feed efficiency. While values reported for wheat in relationship to corn and sorghum grains have been variable, the range generally has been around 108% to about 120%, compared to corn and 115% to 125% compared to sorghum. Values near the higher range have been obtained when wheat was fed at about 50% of the concentrate portion of the ration and when fed in rations with 50% or more roughage. Also, the value of wheat in relationship to corn and sorghum grains would be higher when use is made of the higher amount of protein in wheat by feeding less protein supplement. Comparative value with barley has been about the lower one quoted for corn without any apparent improvement from mixing wheat and barley.

The above range in values of wheat in relationship to other grains appear to be reasonably good ones for estimating the economy of including wheat in the ration. Percentage values quoted are on a weight basis (pounds) rather than volume (bushels) and for grains of about equal moisture content. Wheat should be considered at the higher values when fed in limited amounts under conditions favorable for its maximum value. Higher levels of wheat should be considered as the price relationship with other grains approaches the lower value. Suggestions made as to preparation and precautions in feeding discussed should be followed.

Table 2. Corn Grain and 40% Protein Supplement to Equal 100 lbs. Wheat in Protein Content

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<th>Protein content of wheat in %</th>
<th>Corn Grain lb.</th>
<th>40% Protein supplement lb.</th>
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Table 1. Chemical Composition of Corn and Wheat Grains (Dry Basis)*

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<tr>
<th>Ash, %</th>
<th>Crude fiber, %</th>
<th>Ether extract, %</th>
<th>Nitrogen-free extract, %</th>
<th>Protein (N x 6.25), %</th>
<th>Digestible protein, %</th>
<th>Digestible energy, kcal/lb.</th>
<th>Total digestible nutrients, %</th>
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