Corn Quality Problems Could Mean Opportunity for Cattle Feeders

Dan Loy and Garland Dahlke
Iowa Beef Center
Iowa State University Extension and Outreach

Discounts for off-grade and damaged corn can hamper its marketability and price. However, in many cases this less marketable or unmarketable corn has near normal feeding value. Because of the late planting and extremely wet growing conditions, much of this year's corn crop is hampered by low test weight and high moisture. Damaged corn can be related to many factors including:

1. Low test weight due to hail, frost, drought or immaturity.
2. Damaged or broken kernels and foreign material.
3. Sprout damage
4. Discoloration and heat damage.
5. Mold
6. Moisture

Low Test Weight

Several years ago, a University of Minnesota study reported on corn grown to varying stages of maturity. This study produced corn with test weights of 35, 47, 55 and 58 lb./bu. The digestibility of the 47 lb. corn was within 5% of the heavy corn. The lightest test weight corn (35 lb./bu) was significantly lower in feeding value, but still within 10%. Several studies with swine in recent years have reported no effect on feeding value due to test weight. Research has indicated that low test weight corn actually may be higher in protein than normal corn.

However, experience from last year and early reports from this year indicate that this may not be the case. Testing is the only way to know for sure on any given lot of grain. In summary, for feedlot cattle, corn testing in the high 40's will likely be within 95% of normal in feeding value. Corn in the high 30's to low 40's will be within 90% of normal in feeding value, enough to justify adjustment in roughage levels, or blending in order to maintain feedlot performance.

Heat Damage and Discoloration

As the 2019-2020 corn crop comes out of storage, the excess moisture, broken kernels and molds present on the grain at harvest can contribute to varying degrees of quality issues for livestock. One issue is the effects of heat generated by corn that has been stored too wet. Corn that has undergone significant heat (caramelization) changes from yellow to tan to brown and eventually to black in color and this color change is directly proportional to the heat damage that the grain has experienced. A mild heating actually improves starch digestibility similar to what is observed in steam flaking and produces a flavor that is quite acceptable to cattle. As the process continues however digestibility begins to decline.

With whole kernel storage however, most of the damage occurs at the surface and if the kernel is split open, the starch is often still quite "white" and digestible. Corn stored as ground or rolled may have a significantly reduced digestibility under the same conditions since the starch was not protected. A low cost, 7-hour starch digestibility test which is available from most commercial feed testing laboratories can quickly provide the feeding value of this grain. Heat damaged protein can occur under these conditions. Mild heating will increase the rumen bypass fraction, but here too more heat will then start to render the protein unavailable to the animal. Commercial feed testing laboratories can be used to determine the extent of heat damaged protein so ration adjustments can be made. Realistically in many feedlot rations today, adjusting for heat damaged protein is not difficult with a little urea, distillers grain or corn gluten feed. Generally, corn that is damaged primarily by heat, with little evidence of mold present, feed analysis shows little reduction in energy content for cattle feed.

IOWA STATE UNIVERSITY
Extension and Outreach
Iowa Beef Center

Mold

Mold is the most difficult factor to account for. The effect on feedlot cattle can range from none to palatability problems to the toxic effects of mycotoxins. A visual assessment may indicate mold, but this does not mean mycotoxins are present. Likewise, no visual mold may be seen, but mycotoxins still may be present and often these mycotoxins were already there at harvest.

Mycotoxins will not be eliminated or reduced in storage. Testing likewise is not clear cut since there are over 400 mycotoxins known to exist. Generally, though, if the basic mycotoxin test like that for vomitoxin or aflatoxin produce positive results we can be assured there are other mycotoxins present as well.

Mold spores can be respiratory irritant for both man and beast alike, and in general mold decreases palatability so it is advisable to avoid feeding these feeds to stressed calves or other livestock that may be more susceptible to respiratory disease. Mold becomes a case by case situation for recommendations on how to feed through it, but the first thing to do is to arrest the mold formation so that it does not get worse. This can easily be done by encouraging a good fermentation in the bunker silo, thus grind or roll the grain with adequate moisture, pack hard and cover.

Moisture

A wet fall or an untimely early harvest due to hail damage leads to feed that might be too wet. Kernel breakage during harvest and storage can lead to fines. Both these factors can contribute to acidosis related problems in feedlot cattle on high grain rations. Careful feed bunk management, including more frequent bunk cleaning, monitoring dry matter intake and perhaps increasing the amount or particle size of the roughage source may be required.

Use a Sharp Pencil

As mentioned earlier, off-trade or damaged corn can be an opportunity for cattle feeders to reduce feed costs if managed properly. But keep in mind, even though the corn in question may be normal or near normal in feeding value, some discounts are justified on the basis of density (test weight) and moisture. When comparing prices of corn, convert them to the price per pound of dry matter. As an example, compare the following two loads of corn:

Price	Moisture (dm)	Test wt	Price/lb	Price/lb DM
$3.64	15% (85%)	56	$.065	$.076
$3.00	18% (82%)	46	$.065	$.079

At these prices the $3.64 corn is the better buy in terms of price per pound of dry matter.

Adding the energy factor into the calculation

Price	Moisture (dm)	NEg/lb DM	Price/lb DM	Price/lb Mcal NEg
$3.64	15% (85%)	0.97	$.076	$.078
$3.64	15% (85%)	0.88	$.076	$0.86
$3.00	18% (82%)	0.97	$.079	$.081
$3.00	18% (82%)	0.88	$.079	$.090