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## CORN GRADES AND FEED VALUE

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Morris J. Bitzer and Dan O. Riddell

Corn is traditionally priced on the basis of U.S. No. 2 grade. However, with the release of CCC-owned corn stocks for Emergency Assistance Programs, there is an increase in corn being marketed as No. 4, No. 5 or Sample grade. It is important for producers to understand corn grading standards and the feeding values of these grades.

## Grading Standards

Standards for the grading of corn are provided for and defined in the "Official United States Standards for Grain," U.S. Department of Agriculture (USDA) Agricultural Marketing Service, Grain Division. Requirements for five numerical grades and the Sample grade specify a minimum testing weight per bushel and maximum limits of moisture, broken corn and foreign material, and damaged kernels which include both total damaged kernels and heat-damaged kernels for each of the six grades (Table 1). The grading standards are supervised by the Federal Grain Inspection Service of the USDA.

Corn is defined in the standards as any grain which consists of 50 percent or more whole kernels of shelled dent or flint corn containing not more than 10 percent of other grains for which standards have been established under the United States Grain Standards Act. Standards have been established for corn, wheat, barley, oats, rye, sorghum, flaxseed, soybeans, triticale and mixed grain.

Classes for corn are determined on the basis of color and are divided into the following: Yellow Corn, White Corn and Mixed Corn. A mixture of White Corn in Yellow Corn is not as objectionable as a mixture of the same amount of Yellow Corn in White Corn. A mixture of more than 5 percent of kernels other than yellow in Yellow Corn or a mixture of more than 2 percent of kernels other than white in White Corn causes the corn to be classified as Mixed Corn.

Table 1.-Grade Requirements for Corn<sup>1</sup>

Grade	Minimum Test Weight Per Bushel (Pounds)	Maximum Limits of			
		Moisture	Broken Corn and Foreign Material	Damaged Kernels	
				Total	Heat-Damaged Kernels
(Percent)					
U.S. No. 1	56.0	14.0	2.0	3.0	0.1
U.S. No. 2	54.0	15.5	3.0	5.0	0.2
U.S. No. 3	52.0	17.5	4.0	7.0	0.5
U.S. No. 4	49.0	20.0	5.0	10.0	1.0
U.S. No. 5	46.0	23.0	7.0	15.0	3.0

<sup>1</sup>Official United States Standards for Grain. USDA. Ag. Marketing Service, Grain Division

U.S. Sample grade corn is that which: **1)** does not meet the requirements for any of the grades from U.S. No. 1 to U.S. No. 5; **2)** contains stones; **3)** is musty or sour; **4)** is heating or has heated; **5)** has any commercially objectionable foreign odor; or **6)** is otherwise of distinctly low quality.

Discounts on grain not meeting grade requirements for No. 2 corn will vary according to the quantities of grain not meeting the requirements for each of the various factors. No. 2 corn must weigh at least 54

pounds per bushel and not exceed the maximum limits allowed for the other factors. The price offered will depend on opportunities for blending the various qualities of corn available to meet certain grades. Because the commercial value of grain is not always reflected by its numerical grade alone, the official grain standards provide for special grade designations. Corn containing weevils is an example of a special grade. If corn is infested with live weevils or insects injurious to stored corn, the word "weevily" is made part of the grade designation. Special grades do not affect the numerical grade, and, when applicable, are supplemental to the numerical grade assigned.

### Feeding Value

The main factors used in determining the feeding value of corn grain are content of total digestible nutrients (TDN) and crude protein. The test weight per bushel and moisture content do not affect the feeding value of the grain on a dry matter basis. Broken corn may not be reduced in feed value. However, broken kernels are more susceptible to mold invasion and insect infestation and will not store as well as sound corn. Foreign material may contribute to damage sustained during storage if it interferes with needed aeration or fumigation. The effect of foreign material on feeding value would be directly related to sustained damage and the type and quantity of foreign material present. Unless certain weed seeds are present, intake by animals would probably not be affected.

Damaged kernels include those kernels and pieces of kernels which have been materially damaged by frost, weathering, disease, mold, sprouting, grinding, heating until discoloration has occurred, or other means not specified. The percentage of total damaged kernels which is due to heat is extremely important in determining feed value since heating can reduce energy and protein availability to consuming animals. The total amount of damaged kernels and the type of damage could reduce animal intake and reduce feeding value proportional to the amount of carbohydrates used up in the damage process. For precise ration balancing, damaged corn should be tested for feed value so that any changes in TDN and crude protein content can be considered. Musty or sour grain would reduce animal intake. Hogs would be more selective with lower feed palatability than beef or dairy animals.

Unless a very serious mold, noticeable heat damage or objectionable foreign odor is present, the feeding value of No. 4, No. 5 or Sample grade corn would not be seriously reduced. On a dry matter basis, there is very little reduction in feeding value of lower grade corn. According to the National Research Council, there is essentially no differences, on a dry matter basis, between U.S. No. 1 corn and U.S. No. 5 corn for percent crude protein (10.2 versus 10.2), percent digestible protein (7.6 versus 7.5) or percent TDN (91 versus 91 ). However, a bushel of U.S. No. 5 corn may contain only 75 percent as much dry matter as a bushel of U.S. No. 1 corn. Therefore, when compared on a per bushel basis, the feeding value of lower grades of corn will most likely be reduced. The magnitude of the reduction will depend on the test weight per bushel and moisture content of the corn.