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Factors in Marketing Corn

This NebGuide discusses grain standards for corn and how they effect the value of corn

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Grading standards have been established for corn, wheat, barley, oats, rye, sorghum, flax seed, soybeans, triticale, and mixed grain. Grade requirements are designed to describe grain and provide the foundation for pricing. Within a defined range, grain standards inform buyers and sellers about the general characteristics of the grain being graded. Thus, a uniform system of grading is essential for the orderly marketing of grain.

Standards for Corn

Corn shall be any grain which consists of 50 percent or more of the whole kernels of shelled dent corn and/or shelled flint corn (*Zea Mays*) and may contain not more than 10 percent of other grains for which standards have been established under the United States Grain Standards Act.

Grades and Grade Requirements for Corn

Corn shall be divided into the following three classes: Yellow Corn, White Corn, and Mixed Corn.

Yellow Corn.

This class shall be yellow-kerneled corn and may contain not more than 5 percent of corn of other colors (*Table I*).

White Corn.

This class shall be white-kerneled corn and may contain not more than 2 percent of corn of other colors.

Mixed Corn.

This class shall be corn which does not meet the color requirements for either of the other two

classes of corn.

| Table I. Grade requirements for corn. | | | | | |
|--|-------------------------|---|-----------------|------------------------|-------------|
| | | -----Maximum limits of----- | | | |
| Grade | Minimum test wt. | Broken Corn and Foreign Material | Moisture | Damaged Kernels | |
| | | | | Total | Heat |
| | <i>lbs/bu</i> | <i>pct.</i> | <i>pct.</i> | <i>pct.</i> | <i>pct.</i> |
| 1 | 56 | 2 | 14.0 | 3 | 0.1 |
| 2 | 54 | 3 | 15.5 | 5 | 0.2 |
| 3 | 52 | 4 | 17.5 | 7 | 0.5 |
| 4 | 49 | 5 | 20.0 | 10 | 1.0 |
| 5 | 46 | 7 | 23.0 | 15 | 3.0 |
| Sample* | | | | | |
| *Sample grade shall be corn which does not meet the requirements for any of the above grades; or which contains stones; or which is musty, sour or heating; or which has any commercially objectionable foreign odor; or which is otherwise of distinctly low quality. | | | | | |

Moisture Content -- Test Weight Relationship

Test weight is defined as the weight required to fill level a volume bushel (32 quarts) of corn. This means that a storage bin will hold less corn by weight with a test weight of 54 pounds compared to 56 pounds.

Studies in Iowa and Illinois show the effect of moisture content on the test weight of corn. For example, corn harvested at 24 percent moisture and dried to 15 percent moisture increased in test weight by three pounds per bushel. Corn harvested at 20 percent moisture increased by two pounds per bushel when similarly dried (*Table II*).

| Table II. Moisture content--test weight relationship when dried to 15 percent moisture. | |
|--|--------------------------------|
| Harvest Moisture Content | Increase in Test Weight |
| <i>Percent</i> | <i>lb/bu.</i> |
| 18 | 1.5 |
| 20 | 2.0 |
| 22 | 2.5 |
| 24 | 3.0 |
| 26 | 3.5 |
| 28 | 4.0 |

The correction table is based on normal quality, newly harvested corn. The researchers point out that the increase in test weight may be less than that shown for corn with more than 10 percent broken kernels; for corn damaged by drought, disease or weather; for immature corn harvested after a killing frost; and,

sometimes, for corn dried at air temperatures of 180°F or higher.

Corn Price Discounts Schedules

The price for corn has historically been based on No. 2 corn (minimum test weight, 54 pounds per bushel; maximum moisture, 15.5 percent; maximum broken corn and foreign material, 3.0 percent; maximum total damage, 5.0 percent; maximum heat damage, 0.2 percent). The marketing system does not provide for a premium for corn that grades higher than No. 2.

Price discounts vary between markets and change with different crop and market conditions. Grain sold to specific industries is subject to specific quality requirements and discounts.

Table III is a typical discount schedule that might be applied in Nebraska. Discounts assessed at local elevators may differ from those taken by terminal elevators because of insufficient time and lack of equipment to make the necessary tests to determine grade. Local elevators must, however, make allowances for any discounts they will be assessed when they move grain to the terminal elevator or other destinations.

| Table III. Typical price discount schedule for corn. | | | | | | | | | |
|--|------------------------|-------------------------|--------------------------|--|------------------------|--|------------------------|---|------------------------|
| Test Weight | | Moisture Content | | Broken Corn and Foreign Material | | Total Damage | | Heat Damage | |
| Amount | Discount per bu | Amount | Discount From CP* | Amount | Discount per bu | Amount | Discount per bu | Amount | Discount per bu |
| <i>lbs/bu</i> | <i>cts.</i> | <i>pct.</i> | <i>cts.</i> | <i>pct.</i> | <i>cts.</i> | <i>pct.</i> | <i>cts.</i> | <i>pct</i> | <i>cts.</i> |
| 53.9-53.0 | 1.0 | 15.6-16.0 | 1.0 | 3.1-4.0 | 2.0 | 5.1-6.0 | 1.0 | 0.3 | 0.5 |
| 52.9-52.0 | 2.0 | 16.1-16.5 | 2.0 | 4.1-5.0 | 4.0 | 6.1-7.0 | 2.0 | 0.4 | 1.0 |
| 51.9-51.0 | 4.0 | 16.6-17.0 | 3.0 | 5.1-6.0 | 6.0 | 7.1-8.0 | 3.0 | 0.5 | 1.5 |
| 50.9-50.0 | 6.0 | 17.1-17.5 | 4.0 | 6.1-7.0 | 8.0 | 8.1-9.0 | 4.0 | 0.6 | |
| 49.9-49.0 | 8.0 | 17.6-18.0 | 5.0 | Over 0.7%, discount 3 cents for each 1% or fraction thereof. | | 9.1-10.0 | 5.0 | 0.7 | 2.5 |
| 48.9-48.0 | 10.0 | 18.1-18.5 | 6.0 | | | 10.1-11.0 | 6.0 | 0.8 | 3.0 |
| Below 48 lbs discount 3 cents for each 1 lb or fraction thereof. | | 18.6-19.0 | 7.0 | | | 11.1-12.0 | 7.0 | 0.9 | 3.5 |
| | | 19.1-19.5 | 8.0 | | | 12.1-13.0 | 8.0 | 1.0 | 4.0 |
| | | 19.6-20.0 | 9.0 | | | 13.1-14.0 | 9.0 | Over 1.0%, discount 2.5 cents for each 0.1% | |
| | | | | | | | | | |
| | | 20.1-20.5 | 10.0 | | | 14.1-15.0 | 10.0 | | |
| | | 20.6-21.0 | 11.0 | | | Over 15.0%, discount 2 cents for each 1% or fraction thereof up to 30% maximum; over 30%, subject to | | | |
| | | 21.1-21.5 | 12.0 | | | | | | |
| | | 21.6-22.0 | 13.0 | | | | | | |
| | | 22.1-22.5 | 14.0 | | | | | | |

| | | | | | |
|--|--|------|--|---------|--|
| | 22.6-23.0 | 15.0 | | market. | |
| | Over 23.0%, discount subject to market. | | | | |
| * CP means contract price. Source: Cooperative Extension Service, Purdue University, West Lafayette, Indiana. | | | | | |

Broken corn and foreign material includes kernels and pieces of kernels of corn and all matter other than corn which will pass through a No. 12 sieve (12/64 inch round hole) and all matter other than corn remaining on the sieve after screening. Broken kernels do not appreciably affect the nutritional value of corn but are more subject to insect infestation and mold invasion.

Newly harvested corn would not ordinarily contain total damage or heat damage. These generally result from unfavorable storage conditions. The grade requirements provide for a lower tolerance for heat damage than for total damage. Heat damaged kernels are those materially discolored and damaged by heat. Total damage includes such things as insect damage, drier damage, ground and weather damage and various types of mold damage.

According to *Table III*, corn selling at \$2.50 per bushel would be discounted 28 cents per bushel if it had a test weight of 53.5 pounds per bushel, and contained 20.5 percent moisture and 3.5 percent broken corn and foreign material. The discount would include one cent for test weight, 25 cents for moisture (\$2.50 × 10 percent), and two cents for broken corn and foreign material. The corn in our example would meet the requirements for No. 2 corn in total damage and heat damage, and discounts would not be assessed on those factors.

Corn Moisture Conversion

Table IV shows the pounds of shelled corn at various moisture levels required to make one bushel. One standard bushel of shelled corn equals 56 pounds at 15.5 percent moisture, the minimum test weight and maximum moisture content for No. 2 corn.

This table gives pounds per bushel for moisture contents ranging from 11 to 36 percent. For weights at moisture levels below 10 percent and 36 percent or above, use the following equation:

$$\text{Lbs/bu} = [47.32 \div (100 - \% \text{ moisture})] \times 100$$

The figure 47.32 represents pounds of dry matter in one standard bushel of shelled corn.

| Table IV. Pounds of corn required at various moisture levels to equal one bushel (56 lbs. of corn at 15.5% moisture). | | | | | | | | | |
|--|---------------|-------------------------|---------------|-------------------------|---------------|-------------------------|---------------|-------------------------|---------------|
| Percent moisture | lbs/bu | Percent moisture | lbs/bu | Percent moisture | lbs/bu | Percent moisture | lbs/bu | Percent moisture | lbs/bu |
| 11.0 | 53.17 | 16.0 | 56.33 | 21.0 | 59.90 | 26.0 | 63.95 | 31.0 | 68.58 |
| .1 | 53.23 | .1 | 56.40 | .1 | 59.98 | .1 | 64.04 | .1 | 68.68 |
| .2 | 53.29 | .2 | 56.47 | .2 | 60.05 | .2 | 64.12 | .2 | 68.78 |
| .3 | 53.35 | .3 | 56.53 | .3 | 60.13 | .3 | 64.21 | .3 | 68.88 |
| .4 | 53.41 | .4 | 56.60 | .4 | 60.21 | .4 | 64.30 | .4 | 68.98 |

| | | | | | | | | | |
|------|-------|------|-------|------|-------|------|-------|------|-------|
| .5 | 53.47 | .5 | 56.67 | .5 | 60.29 | .5 | 64.39 | .5 | 69.09 |
| .6 | 53.53 | .6 | 56.74 | .6 | 60.36 | .6 | 64.47 | .6 | 69.19 |
| .7 | 53.59 | .7 | 56.81 | .7 | 60.44 | .7 | 64.56 | .7 | 69.29 |
| .8 | 53.65 | .8 | 56.87 | .8 | 60.52 | .8 | 64.65 | .8 | 69.39 |
| .9 | 53.71 | .9 | 56.94 | .9 | 60.59 | .9 | 64.73 | .9 | 69.49 |
| 12.0 | 53.77 | 17.0 | 57.01 | 22.0 | 60.67 | 27.0 | 64.82 | 32.0 | 69.59 |
| .1 | 53.83 | .1 | 57.08 | .1 | 60.75 | .1 | 64.91 | .1 | 69.69 |
| .2 | 53.89 | .2 | 57.15 | .2 | 60.83 | .2 | 65.00 | .2 | 69.80 |
| .3 | 53.96 | .3 | 57.22 | .3 | 60.90 | .3 | 65.09 | .3 | 69.90 |
| .4 | 54.02 | .4 | 57.29 | .4 | 60.98 | .4 | 65.18 | .4 | 70.01 |
| .5 | 54.08 | .5 | 57.36 | .5 | 61.06 | .5 | 65.27 | .5 | 70.11 |
| .6 | 54.14 | .6 | 57.43 | .6 | 61.14 | .6 | 65.36 | .6 | 70.21 |
| .7 | 54.20 | .7 | 57.50 | .7 | 61.22 | .7 | 65.45 | .7 | 70.32 |
| .8 | 54.27 | .8 | 57.57 | .8 | 61.29 | .8 | 65.54 | .8 | 70.42 |
| .9 | 54.33 | .9 | 57.64 | .9 | 61.37 | .9 | 65.63 | .9 | 70.53 |
| 13.0 | 54.39 | 18.0 | 57.71 | 23.0 | 61.45 | 28.0 | 65.72 | 33.0 | 70.63 |
| .1 | 54.45 | .1 | 57.78 | .1 | 61.53 | .1 | 65.81 | .1 | 70.74 |
| .2 | 54.52 | .2 | 57.85 | .2 | 61.61 | .2 | 65.91 | .2 | 70.84 |
| .3 | 54.58 | .3 | 57.92 | .3 | 61.69 | .3 | 66.00 | .3 | 70.95 |
| .4 | 54.64 | .4 | 57.99 | .4 | 61.77 | .4 | 66.09 | .4 | 71.06 |
| .5 | 54.71 | .5 | 58.07 | .5 | 61.86 | .5 | 66.19 | .5 | 71.17 |
| .6 | 54.77 | .6 | 58.14 | .6 | 61.94 | .6 | 66.28 | .6 | 71.27 |
| .7 | 54.83 | .7 | 58.21 | .7 | 62.02 | .7 | 66.37 | .7 | 71.38 |
| .8 | 54.89 | .8 | 58.28 | .8 | 62.10 | .8 | 66.46 | .8 | 71.49 |
| .9 | 54.96 | .9 | 58.35 | .9 | 62.18 | .9 | 66.56 | .9 | 71.59 |
| 14.0 | 55.02 | 19.0 | 58.42 | 24.0 | 62.26 | 29.0 | 66.65 | 34.0 | 71.70 |
| .1 | 55.09 | .1 | 58.49 | .1 | 62.34 | .1 | 66.75 | .1 | 71.81 |
| .2 | 55.15 | .2 | 58.57 | .2 | 62.43 | .2 | 66.84 | .2 | 71.92 |
| .3 | 55.22 | .3 | 58.64 | .3 | 62.51 | .3 | 66.94 | .3 | 72.03 |
| .4 | 55.28 | .4 | 58.71 | .4 | 62.59 | .4 | 67.03 | .4 | 72.14 |
| .5 | 55.35 | .5 | 58.78 | .5 | 62.68 | .5 | 67.13 | .5 | 72.25 |
| .6 | 55.41 | .6 | 58.86 | .6 | 62.76 | .6 | 67.22 | .6 | 72.36 |
| .7 | 55.48 | .7 | 58.93 | .7 | 62.84 | .7 | 67.32 | .7 | 72.47 |
| .8 | 55.54 | .8 | 59.00 | .8 | 62.92 | .8 | 67.41 | .8 | 72.58 |
| .9 | 55.61 | .9 | 59.08 | .9 | 63.01 | .9 | 67.51 | .9 | 72.69 |

| | | | | | | | | | |
|------|-------|------|-------|------|-------|------|-------|------|-------|
| 15.0 | 55.67 | 20.0 | 59.15 | 25.0 | 63.09 | 30.0 | 67.60 | 35.0 | 72.80 |
| .1 | 55.74 | .1 | 59.23 | .1 | 63.17 | .1 | 67.70 | .1 | 72.91 |
| .2 | 55.80 | .2 | 59.30 | .2 | 63.26 | .2 | 67.80 | .2 | 73.03 |
| .3 | 55.87 | .3 | 59.38 | .3 | 63.34 | .3 | 67.90 | .3 | 73.14 |
| .4 | 55.93 | .4 | 59.45 | .4 | 63.43 | .4 | 67.99 | .4 | 73.26 |
| .5 | 56.00 | .5 | 59.53 | .5 | 63.52 | .5 | 68.09 | .5 | 73.37 |
| .6 | 56.07 | .6 | 59.60 | .6 | 63.61 | .6 | 68.19 | .6 | 73.48 |
| .7 | 56.13 | .7 | 59.68 | .7 | 63.69 | .7 | 68.29 | .7 | 73.60 |
| .8 | 56.20 | .8 | 59.75 | .8 | 63.78 | .8 | 68.38 | .8 | 73.71 |
| .9 | 56.26 | .9 | 59.83 | .9 | 63.86 | .9 | 68.48 | .9 | 73.82 |

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