

# Other Materials

- **Sample Grain Grading Problems**
- **Junior Grain Grading Contest Book**
- **Blank Identification Sheets**
- **Grain Grading Charts**
- **State Scantron Instructions**
- **State Scantron Identification Lists**

## Grain Grading Problems & Worksheet

### Grain Grading Problems & Worksheet- Sample Problem Set 2021-2025

<p>Sample #1</p> <p>White Corn 5.0%</p> <p>Yellow Corn 96.0%</p> <p>White Popcorn 2.0%</p> <p>Test Weight (lbs./bu.) 55.0</p> <p>Moisture 11.2%</p> <p>Insect Damage 2.0%</p> <p>Mold Damage 1.1%</p> <p>Broken Corn thru sieve 2.6%</p> <p>Live weevils per 1000g 3</p> <p>Natural Odor</p>	<p>Test wt. _____ Moisture _____</p> <p>Heat Damage _____ DKT _____</p> <p>BCFM/FM _____ Split/Defect _____</p> <p>S/WOOC _____ Shru &amp; Brkn _____</p> <p>CC _____ SGF _____</p> <p>_____</p>
<p>Sample #2</p> <p>Yellow Flint Corn 95.0%</p> <p>White Dent Corn 5.0%</p> <p>Test Weight (lbs./bu.) 57.9</p> <p>Moisture 16.0%</p> <p>Broken Corn thru sieve 8.0%</p> <p>Heat Damage (Severe) 2.9%</p> <p>Slight Damage by heat 0.3%</p> <p>Sour Odor</p>	<p>Test wt. _____ Moisture _____</p> <p>Heat Damage _____ DKT _____</p> <p>BCFM/FM _____ Split/Defect _____</p> <p>S/WOOC _____ Shru &amp; Brkn _____</p> <p>CC _____ SGF _____</p> <p>_____</p>
<p>Sample #3</p> <p>Yellow Soybeans 100.0%</p> <p>Immature Soybeans 10.0%</p> <p>Corn 3.0%</p> <p>Foreign Material thru sieve 2.1%</p> <p>Damaged by heat (Slight) 2.0%</p> <p>Heat Damage (Severe) 1.9%</p> <p>Green Garlic Bulbs in 1000g 6</p> <p>Test Weight (lb/bu.) 48.0</p> <p>Moisture 21.3%</p> <p>Natural Odor</p>	<p>Test wt. _____ Moisture _____</p> <p>Heat Damage _____ DKT _____</p> <p>BCFM/FM _____ Split/Defect _____</p> <p>S/WOOC _____ Shru &amp; Brkn _____</p> <p>CC _____ SGF _____</p> <p>_____</p>

## Grain Grading Problems & Worksheet- Sample Problem Set 2016-2020

<p>Sample #4</p> <p>Yellow Soybeans 89.0%</p> <p>Bi-colored Soybeans 11.0%</p> <p>Sprout Damage 1.3%</p> <p>Frost Damage 0.7%</p> <p>Damaged by heat 4.0%</p> <p>Foreign Material 3.0%</p> <p>Test Weight (lb/bu.) 56.0</p> <p>Moisture 13.0%</p> <p>Dry Garlic Bulblets per 1000g 3</p> <p>Natural Odor</p>	<p>Test wt. _____ Moisture _____</p> <p>Heat Damage _____ DKT _____</p> <p>BCFM/FM _____ Split/Defect _____</p> <p>S/WOOC _____ Shru &amp; Brkn _____</p> <p>CC _____ SGF _____</p> <p>_____</p>
<p>Sample #5</p> <p>Soft red winter wheat 96.5%</p> <p>Hard red winter wheat 2.0%</p> <p>Durum wheat 1.5%</p> <p>Dockage (g/1000g) 26</p> <p>Moisture 13.5%</p> <p>Test Weight (lb/bu.) 60.3</p> <p>Damaged Kernels (Total) 1.0%</p> <p>Foreign Material 0.5%</p> <p>Natural Odor</p>	<p>Test wt. _____ Moisture _____</p> <p>Heat Damage _____ DKT _____</p> <p>BCFM/FM _____ Split/Defect _____</p> <p>S/WOOC _____ Shru &amp; Brkn _____</p> <p>CC _____ SGF _____</p> <p>_____</p>
<p>Sample #6</p> <p>Soft red winter wheat</p> <p>Dockage (g/1000g) 10</p> <p>Moisture 14.8%</p> <p>Test Weight (lb/bu.) 62.0</p> <p>Heat Damage 0.6%</p> <p>Sprout Damage Oats 2.0%</p> <p>Insect Damage 1.4%</p> <p>Damage by heat 3.0%</p> <p>Foreign Material 0.6%</p> <p>Shrunken and Broken Kernels 0.5%</p> <p>Natural Odor</p>	<p>Test wt. _____ Moisture _____</p> <p>Heat Damage _____ DKT _____</p> <p>BCFM/FM _____ Split/Defect _____</p> <p>S/WOOC _____ Shru &amp; Brkn _____</p> <p>CC _____ SGF _____</p> <p>_____</p>

## Grain Grading Problems & Worksheet- Sample Problem Set 2016-2020 Answers

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<p><b><u>Sample #1</u></b></p> <p>White Corn 5.0% <b>NO EFFECT</b>            Yellow Corn 95.0% <b>YELLOW</b>            White popcorn 2.0% <b>BCFM</b>            Test weight (lb/bu) 55.0            Moisture 11.2%            Insect damage 2.0% <b>DKT</b>            Mold damage 1.1% <b>DKT</b>            Broken corn through sieve 2.6% <b>BCFM</b>            Live weevils per 1000g 3 <b>INFESTED</b>            Natural odor</p>	<p><b>U.S. No. 2</b> <span style="float: right;"><b>No effect</b></span>            Test wt. <u>55.0</u> Moisture <u>11.2</u>  <span style="float: right;"><b>U.S. No. 2</b></span>            Heat Damage <u>    </u> DKT <u>3.1</u>  <span style="float: right;"><b>U.S. No. 4</b></span>            BCFM/FM <u>4.6</u> Split/Defect <u>    </u>            S/WOOC <u>    </u> Shru &amp; Brkn <u>    </u>            CC <u>    </u> SGF <u>    </u>  <u>U.S. No. 4 YELLOW CORN INFESTED</u></p>
<p><b><u>Sample #2</u></b></p> <p>Yellow Flint Corn 95.0% <b>FLINT</b>            White Dent Corn 5.0% <b>NO EFFECT</b>            Test weight (lb/bu) 57.9            Moisture 16.0%            Broken corn through sieve 8.0% <b>BCFM</b>            Heat damage (severe) 2.9% <b>DKT, HD</b>            Slight damage by heat 0.3% <b>DKT</b>            Sour odor <b>SAMPLE GRADE</b></p>	<p><b>U.S. No. 1</b> <span style="float: right;"><b>No effect</b></span>            Test wt. <u>57.9</u> Moisture <u>16.0</u>  <span style="float: right;"><b>U.S. No. 5</b> <span style="float: right;"><b>U.S. No. 2</b></span></span>            Heat Damage <u>2.9</u> DKT <u>3.2</u>  <span style="float: right;"><b>U.S. Sample Grade</b></span>            BCFM/FM <u>8.0</u> Split/Defect <u>    </u>            S/WOOC <u>    </u> Shru &amp; Brkn <u>    </u>            CC <u>    </u> SGF <u>SOUR</u>  <u>U.S. Sample Grade YELLOW CORN FLINT</u></p>
<p><b><u>Sample #3</u></b></p> <p>Yellow soybeans 100.0% <b>Yellow</b>            Immature soybeans 10.0% <b>DKT</b>            Corn 3.0% <b>FM</b>            Foreign material through sieve 2.1% <b>FM</b>            Damage by heat (slight) 2.0% <b>DKT</b>            Heat damage (severe) 1.9% <b>DKT, HD</b>            Green garlic bulbs in 1000g 6 <b>GARLICKY</b>            Test weight (lb/bu) 48.0            Moisture 21.3%            Natural odor</p>	<p><b>No Effect</b> <span style="float: right;"><b>No effect</b></span>            Test wt. <u>48.0</u> Moisture <u>21.3</u>  <span style="float: right;"><b>U.S. No. 4</b> <span style="float: right;"><b>U.S. Sample Grade</b></span></span>            Heat Damage <u>1.9</u> DKT <u>13.9</u>  <span style="float: right;"><b>U.S. Sample Grade</b></span>            BCFM/FM <u>5.1</u> Split/Defect <u>    </u>            S/WOOC <u>    </u> Shru &amp; Brkn <u>    </u>            CC <u>    </u> SGF <u>    </u>  <u>U.S. Sample Grade YELLOW SOYBEANS</u>  <u>GARLICKY</u></p>

## Grain Grading Problems & Worksheet- Sample Problem Set 2016-2020 Answers

<p><b><u>Sample #4</u></b></p> <p>Yellow soybeans 89.0%            Bi-colored soybeans 11.0% <b>MIXED</b>            Sprout damage 1.3% <b>DKT</b>            Frost damage 0.7% <b>DKT</b>            Damage by heat (slight) 4.0% <b>DKT</b>            Foreign material 3.0% <b>FM</b>            Test weight 56.0            Moisture 16.0%            Dry garlic bublets per 1000g 3 <b>NO EFFECT</b>            Natural odor</p>	<p><b>No effect</b> Test wt. <u>56.0</u> <b>No effect</b> Moisture <u>16.0</u>  <b>U.S. No. 4</b>            Heat Damage <u>      </u> <b>DKT</b> <u>6.0</u>  <b>U.S. No. 3</b>            BCFM/FM <u>3.0</u> Split/Defect <u>      </u>            S/WOOC <u>      </u> Shru &amp; Brkn <u>      </u>            CC <u>      </u> SGF <u>      </u>  <u>U.S. No. 4 MIXED SOYBEANS</u>            Yellow Soybeans 89.0% Bi-colored Soybeans 11.0%</p>
<p><b><u>Sample #5</u></b></p> <p>Soft red winter wheat 96.5% <b>SRWW</b>            Hard red winter wheat 2.0% <b>WOC</b>            Durum wheat 1.5% <b>CC, WOC</b>            Dockage (grams per 1000 grams) 26 <b>2.6%</b>            Moisture 13.5%            Test weight (lb/bu) 60.3            Damaged kernels (total) 1.0% <b>DKT</b>            Foreign material 0.5% <b>FM</b>            Natural odor</p>	<p><b>U.S. No. 1</b> Test wt. <u>60.3</u> <b>No effect</b> Moisture <u>13.5</u>  <b>U.S. No. 1</b>            Heat Damage <u>      </u> <b>DKT</b> <u>1.0</u>  <b>U.S. No. 2</b> <b>U.S.No. 1</b>            BCFM/FM <u>0.5</u> Split/Defect <u>1.5</u>  <b>U.S. No. 2</b>            S/WOOC <u>3.5</u> Shru &amp; Brkn <u>      </u>  <b>U.S. No. 2</b>            CC <u>1.5</u> SGF <u>      </u>  <u>U.S. No. 2 SOFT RED WINTER WHEAT,</u>  <u>DOCKAGE 2.6%</u></p>
<p><b><u>Sample #6</u></b></p> <p>Soft red winter wheat 100.0% <b>SRWW</b>            Dockage (grams per 1000 grams) 10 <b>1.0%</b>            Moisture 14.8%            Test weight (lb/bu) 62.0            Heat damage 0.6% <b>HD, DKT</b>            Sprout damaged oats 2.0% <b>DKT, FM</b>            Insect damage 1.4% <b>DKT</b>            Damage by heat (slight) 3.0% <b>DKT</b>            Foreign material 0.6% <b>FM</b>            Shrunken and broken kernels 0.5% <b>SBK</b>            Natural odor</p>	<p><b>U.S. No. 1</b> Test wt. <u>62.0</u> <b>No effect</b> Moisture <u>14.8</u>  <b>U.S. No. 4</b> <b>U.S. No. 3</b>            Heat Damage <u>0.6</u> <b>DKT</b> <u>7.0</u>  <b>U.S. No. 4</b> <b>U.S. No. 4</b>            BCFM/FM <u>2.6</u> Split/Defect <u>10.1</u>  <b>U.S. No. 1</b>            S/WOOC <u>      </u> Shru &amp; Brkn <u>0.5</u>            CC <u>      </u> SGF <u>      </u>  <u>U.S. No. 4 SOFT RED WINTER WHEAT,</u>  <u>DOCKAGE 1.0%</u></p>

## Grain Grading Electronic Answer Worksheet 2021-2025 Key

Place three-digit coded answers on this sheet to use as a guide when completing the electronic answers. Answers are to be transcribed to a separate scan answer sheet, #105482, using the corresponding number indicated in the answer number column.

Sample 1 (corn)

	YOUR ANSWER	ANSWER NUMBER	POINTS
Grade	404	A1	5 pts
Class	407	A2	2.5 pts
Special Grades	411	A3	2.5 pts
Test Weight	550	A4	2.5 pts
Moisture	112	A5	2.5 pts
Broken Corn and Foreign Material	046	A6	2.5 pts
Heat Damage	000	A7	2.5 pts
Total Damage	031	A8	2.5 pts
Sample Grade Factors	415	A9	2.5 pts

Sample 2 (corn)

Grade	406	A10	5 pts
Class	407	A11	2.5 pts
Special Grades	413	A12	2.5 pts
Test Weight	579	A13	2.5 pts
Moisture	160	A14	2.5 pts
Broken Corn and Foreign Material	080	A15	2.5 pts
Heat Damage	029	A16	2.5 pts
Total Damage	032	A17	2.5 pts
Sample Grade Factors	417	A18	2.5 pts

Leave A19-A36 blank and do NOT fill-in bubbles.

Sample 3 (soybeans)

Grade	505	A37	5 pts
Class	506	A38	2 pts
Special Grades	510	A39	2 pts
Test Weight	480	A40	2 pts
Moisture	213	A41	2 pts
Foreign Material	051	A42	2 pts
Heat Damage	019	A43	2 pts
Total Damage	139	A44	2 pts
Splits	000	A45	2 pts
Soybeans other Colors	000	A46	2 pts
Sample Grade Factors	512	A47	2 pts

Sample 4 (soybeans)

Grade	504	B1	5 pts
Class	507	B2	2 pts
Special Grades	508	B3	2 pts
Test Weight	560	B4	2 pts
Moisture	160	B5	2 pts
Foreign Material	030	B6	2 pts
Heat Damage	000	B7	2 pts
Total Damage	060	B8	2 pts
Splits	000	B9	2 pts
Soybeans other Colors	000	B10	2 pts
Sample Grade Factors	512	B11	2 pts

Sample 5 (wheat)

Grade	602	B12	2.5 pts
Class or Subclass	607	B13	0.5 pts
Special Grade	608	B14	2 pts
Dockage	026	B15	2 pts
Test Weight	603	B16	1 pts
Moisture	135	B17	1 pts
Heat Damage	000	B18	2 pts
Total Damage	010	B19	2 pts
Foreign Material	005	B20	2 pts
Shrunken Broken Kernels	000	B21	2 pts
Total Defects	015	B22	2 pts
Wheat other Classes	035	B23	2 pts
Contrasting Classes	015	B24	2 pts
Sample Grade Factors	615	B25	2 pts

Sample 6 (wheat)

Grade	604	B26	2.5 pts
Class or Subclass	607	B27	0.5 pts
Special Grade	608	B28	2 pts
Dockage	010	B29	2 pts
Test Weight	620	B30	1 pts
Moisture	148	B31	1 pts
Heat Damage	006	B32	2 pts
Total Damage	070	B33	2 pts
Foreign Material	026	B34	2 pts
Shrunken Broken Kernels	005	B35	2 pts
Total Defects	101	B36	2 pts
Wheat other Classes	000	B37	2 pts
Contrasting Classes	000	B38	2 pts
Sample Grade Factors	615	B39	2 pts





# **Junior Participant 2021-2025 Grain Grading Handbook**

**This book is for Junior participants *only* during a  
4-H/FFA Crops Evaluation Contest.**

# 2021-2025 Grain Grading Book

## Corn Grading

### What is corn?

Corn is defined as any grain which consists of 50 percent or more of whole kernels of shelled dent corn and/or flint corn. It may not contain more than 10 percent of other grains for which grading standards have been established. If it does not meet these standards, the lot is considered mixed grain. However, in this event there will be no mixed grain so any grain other than dent or flint corn is foreign material. ***Popcorn, sweet corn, and blue corn in corn grading are foreign material.***

Class and damaged kernels are determined **after** the removal of foreign material. All percentages shall be determined on the grain as a whole.

### Corn Grain Class

There are three possible classes of corn, Yellow Corn, White Corn and Mixed Corn. Percentage of corn classes should be rounded to the nearest tenth.

**Yellow Corn** - Yellow-kernelled corn that does not contain **more than 5 percent** corn of other colors. In other words, 95.0% or more Yellow Corn. Yellow kernels with red streaks **covering less than 50.0%** of the kernel are considered yellow corn.

**White Corn** - White-kernelled corn that does not contain **more than 2 percent** corn of other colors. In other words, 98.0% or more White Corn. White corn with a slight tinge of pink is white corn.

**Mixed Corn** - Corn that does not meet the color requirements of white or yellow corn. If more than 50.0% of the kernel is red streaked, then the corn is considered Red Corn. Red Corn is not considered Yellow or White Corn.

### Moisture

Moisture is not a grading factor in commercial grain; nevertheless, a loss of quality in stored corn hinges largely on the amount of moisture present in the grain. Moisture is an important factor in most discount schedules.

Moisture is recorded to the nearest tenth of a percent.

- Example: **16.27% is recorded as 16.3% or 163 on scantron scorecard**

### Test Weight

Test weight is the amount of weight the grain must have to make up a bushel. Good quality corn of low moisture content can be expected to have a good test weight.

Test weight is recorded to the nearest tenth.

- Example: **52.34 lbs/bu is recorded as 52.3 lbs/bu or 523 on scantron scorecard**

## Broken Corn and Foreign Material

Broken corn and foreign material is normally determined by the use of a sieve; broken corn and all matter other than corn that pass through a sieve having round openings  $\frac{12}{64}$ th of an inch in diameter, and all matter other than corn that remain on the sieve after screening are included in this factor.

Examples of foreign material

- Sweet corn
- Popcorn
- Blue corn
- Soybeans not passing through the sieve
- Grains or weeds dropping through the sieve
- Rodent excreta and stones (cinders are stones)
  - *Note:* If the total weight of stones in a 1-1/4 quarts (1,000 gm.) sample **exceeds** 1.1 percent of the sample weight the sample must be graded "U.S. Sample Grade".

Broken corn and foreign material is recorded to nearest tenth of a percent.

## Heat Damaged Kernels

Heat damaged corn is **severely** discolored (brown to black) either from external heating, such as improper drying, or from heating as a result of excessive moisture in storage and spoilage. Kernels in this category will be included in heat damage **AND** damaged kernels (total).

Slightly damaged corn shows some discoloration (light to dark tan) and therefore is not as severely damaged. The two are **not** added together to determine heat damaged kernels. Slight damaged corn will only be included in damaged kernels (total).

Record to the nearest tenth of a percent.

## Damaged Kernels (Total)

Damaged kernels (total) includes **all** types of damage found in corn. Darkening of the germ is one of the first indicators of corn declining in quality or that the amount of damage is increasing.

Examples of damaged kernels

- mold damage
- heat damage
- sprout damage
- frost damage
- badly ground-damaged
- badly weather-damaged
- insect damage (not chewed)
- kernels that have become slightly discolored from heat

Note that the percent of heat damage is added to other types of damage to obtain the percent of Damaged Kernels (Total).

Record to the nearest tenth of a percent.

## **Musty, Sour, or Heating**

A sample in any of these conditions is "U.S. Sample Grade."

Musty- Musty, ground, or moldy odor

Sour- Sour, fermenting, or pigpen odor

Heating- Corn developing a high temperature from excessive respiration. Corn will usually have a musty or sour odor. For this contest, samples that are affected by heating will state "corn affected by high temperature" OR "heating."

## **Commercially Objectionable Foreign Odor**

If the corn carries an odor which does not normally occur in grain and which, for this reason, would render the corn unfit for its normal commercial use, then it is graded "U.S. Sample Grade."

This includes animal hides, decaying animal or vegetable parts, fertilizer, skunk, smoke, strong weed, oil, etc.

## **Distinctly Low Quality**

The Federal Grain Inspection Service reserves the use of this term to describe corn when it is obviously of inferior quality and the existing grading factors or guidelines do not accurately reflect the inferior condition.

When a sampler is collecting corn from a rail car, he/she can notice whether the grain also includes two or more large stones, pieces of glass, pieces of concrete, sticks of lumber, or scrap metal or debris which are visible to the sampler but are too large to enter the sampling device, such as a grain probe.

This grading factor **should not** be confused with the other conditions which can also cause corn to be "Sample Grade," such as animal filth, cocklebur, crotalaria seed, etc.

## **Sample Grade Factors**

There is a list of factors that does not meet U.S. number standards and make the sample "Sample Grade" listed on the bottom of the grading chart. These include animal filth, cocklebur, crotalaria seed. If any of these are reported in the sample, participants should grade the sample "Sample Grade"

Here is a list of those Factors:

- Stones
- Glass
- Crotalaria
- Castor Beans
- Unknown Foreign Substance
- Commonly Recognized Harmful or Toxic Substance
- Cocklebur
- Animal Filth (Includes bird droppings and rodent pellets)
- Heating
- Distinctly Low Quality (Reason)

## **Special Factors, Special Grade Requirements, Special Grade Designations**

Special grades are conditions which should be noted but **do not** affect the numerical grade.

### **Flint**

Corn of any class which consists of **95 percent or more** of flint corn; flint corn is graded and designated according to the grade requirements of the standards applicable to such corn if it were not flint.

Flint corn is a different subspecies of corn with hard starch rather than soft starch as in dent corn.

### **Flint and Dent**

Corn of any class which consists of a mixture of flint and dent corn containing **more than 5 percent but less than 95 percent of flint corn**.

### **Infested**

Any corn sample 1-1/4 quarts or 1000 g that contains one of the following:

- 2 or more live weevils
- 1 live weevil and 5 or more other live insects injurious to stored grain
- 10 or more other live insects injurious to stored grain

Infested is the condition of live weevils or grain-damaging insects in the grain.

Infested corn is graded and designated according to the grade requirements of the standards applicable to such corn if it was not infested.

### **Waxy Corn**

Corn that consists of **95% or more waxy corn**.

## Soybean Grading

### What are soybeans?

Soybeans are any grain that consists of 50 percent or more of whole or broken soybeans which will not pass readily through an 8/64 sieve and not more than 10 percent of other grains for which grading standards have been established.

Class, splits, and damaged kernels are determined after foreign material is removed.

### Soybean Grain Class

There are two possible classes of soybeans, Yellow Soybeans or Mixed Soybeans.

**Yellow Soybeans** - Soybeans that have a yellow seed coat and are yellow in cross-section. Sample does not contain more than 10 percent of other colors.

**Mixed Soybeans** - Any mixture of soybeans that does not meet the requirements of yellow soybeans (See Soybeans of Other Colors).

**Soybeans of Other Colors**- These colors serve as a **grading factor** in yellow soybeans. When soybeans of other colors (black, brown, and bi-colored) **occur in quantities of 10 percent or less**, the percentage is a factor in determining the grade of yellow soybeans. **When other colors exceed 10 percent, the sample is then classified as Mixed Soybeans** (see above).

Example

Yellow Soybeans	85.0%	Mixed Soybeans
Bi-color Soybeans	15.0%	
Yellow Soybeans	95.0%	Yellow Soybeans
Bi-color Soybeans	5.0%	Soybeans Of Other Colors

### Test Weight

Test weight is the amount of weight the grain must have to make up a bushel. Good quality seed of low moisture content can be expected to have a good test weight. **Test weight has no effect on the grade of soybean samples.**

Record test weight rounded to the nearest tenth.

### Moisture

The moisture content of soybean seed is extremely important but it is no longer used as a grading factor. Loss of quality of stored seed hinges largely on the amount of moisture present in the sample. Moisture is an important factor in most discount schedules.

Record moisture to the nearest tenth of a percent.

## Splits

Any soybean having **more than** 1/4 of the seed missing is considered a split. Splits are determined on a portion of approximately 125 grams after the removal of all foreign material.

This factor includes only **sound splits** - those free from damage.

Damaged splits are **only** recorded in Damaged Kernels (Total).

Splits are recorded to the nearest tenth of a percent.

## Heat Damage

Heat damaged soybeans are **severely** discolored (black or dark brown) either from external heating, such as improper drying, or from heating as a result of excess moisture and spoiling. Almost all heat damage is the result of storing grain too wet. Soybeans in this category will be included in heat damage **AND** Damaged Kernels (Total).

Slightly damaged soybeans show some discoloration (light to dark tan) and therefore are not as severely damaged. The two are **not** added together to determine heat damaged kernels. Slight damaged soybeans will only be included in Damaged Kernels (Total).

Record heat-damaged kernels to the nearest tenth of a percent.

## Damaged Kernels (Total)

This factor includes **all** types of damage found in whole and pieces of soybeans.

### Examples of Damaged Kernels

- heat damage
- sprout damage
- frost damage
- immature seed
- ground-damage
- mold damage
- insect damage (not chewed)
- kernels that have become slightly discolored from heat
- heat damage
- stink bug stung kernels\*\*

\*\*Stink bug stung kernels are considered damaged kernels at the rate of 1/4 of actual total percentage of stung kernels

Example: 12 grams is considered as 3 grams of damage

Record Damage Kernels (Total) to the nearest tenth of a percent.

## Foreign Material

Foreign material is normally determined by the use of a sieve and separated into coarse and fine foreign material.

Coarse foreign material includes material that does not pass through an 8/64 inch sieve and made on 1000 grams.

Fine foreign material includes material that passes through an 8/64 inch sieve and material and pieces of soybean that remains on top of the sieve after sieving. This test is made on 125 grams.

Examples of foreign material

- corn
- cockleburrs
- sticks
- stalks
- rodent excreta
- stones
- other grains

Record to the nearest tenth of a percent.

## Distinctly Low Quality

The Federal Grain Inspection Service reserves the use of this term to describe soybeans when it is obviously of inferior quality and the existing grading factors or guidelines do not accurately reflect the inferior condition.

When a sampler is collecting soybeans from a rail car, he/she can notice whether the grain also includes two or more large stones, pieces of glass, pieces of concrete, sticks of lumber, or scrap metal or debris which are visible to the sampler but are too large to enter the sampling device, such as a grain probe.

This grading factor **should not** be confused with the other conditions which can also cause soybeans to be "Sample Grade", such as animal filth, cockleburrs, crotalaria seed, etc.

*(See corn for example of how to record).*

## Musty, Sour or Heating

A sample in any of these conditions is "U.S. Sample Grade".

Musty- Musty, ground, or moldy odor

Sour- Sour, fermenting, or pigpen odor

Heating- Soybeans developing a high temperature from excessive respiration. Soybeans will usually have a musty or sour odor. For this contest, samples that are affected by heating will state "Soybeans affected by high temperature" OR "heating."

*(See corn for example of how to record)*



## Commercially Objectionable Foreign Odor

If the soybeans carry an odor which does not normally occur in grain and which, for this reason, would render the soybeans unfit for its normal commercial use, then it is graded "U.S. Sample Grade."

This includes animal hides, decaying animal or vegetable parts, fertilizer, skunk, smoke, strong weed, oil, etc.

*(See corn for example of how to record)*

## Sample Grade Factors

There is a list of factors that automatically make the sample "Sample Grade" listed on the bottom of the grading chart. These include animal filth, cocklebur, crotalaria seed. If any of these are reported in the sample, participants should grade the sample "Sample Grade"

Here is a list of the Sample Grade Factors

- Stones
- Glass
- Crotalaria
- Castor Beans
- Unknown Foreign Substance
- Commonly Recognized Harmful or Toxic Substance
- Cocklebur
- Animal Filth (Includes bird droppings and rodent pellets)
- Heating
- Distinctly Low Quality (Reason))

## Cumulative Total

If a cumulative total of 11 or more sample grade factors are found, the sample is graded "U.S. Sample Grade."

These factors include any combination of animal filth, castor beans, crotalaria seeds, glass, stones, and any unknown foreign substance.

## Special Factors, Special Grade Requirements, Special Grade Designations

Special grades are conditions which should be noted but **do not** affect the numerical grade.

### Garlicky

Specific types of garlic bulbs found in the sample may be considered a special factor.

Green bulbs- husk is still intact, contains **three or more** green bulblets in 1000 grams

Dry bulbs- husk is dry or missing, **3 dry bulbs= 1 green bulb**

A garlic odor is not a basis for "Garlicky."

**Infested**

Any soybean sample that contains one of the following:

- two or more live weevils
- one live weevil and 5 or more other live insects injurious to stored grain
- 10 or more other live insects injurious to stored grain

Infested is the condition of live weevils or grain-damaging insects in the grain.

Infested soybeans are graded and designated according to the grade requirements of the standards applicable to such soybeans if it was not infested.

**Purple Mottled or Stained**

Soybeans that are discolored with pink or purple seed coats, dirt or dirt-like substance, or pokeberry stains, as determined on a portion of 400 grams with the use of an FGIS Interpretive Line Print. The Interpretive Line Prints are help tools for inspectors to judge whether or not a kernel is damage or not.

Samples with this condition will state "Purple Mottled or Stained" as the description.

## Wheat Grading

### What is Wheat?

Wheat is any grain of common wheat, club wheat, and durum wheat, which before the removal of dockage, consists of 50 percent or more of these wheats and not more than 10 percent of other grains for which standards have been established and which, after the removal of dockage, contains 50 percent or more of whole kernels of one or more of these wheats.

Wheat is divided into the following seven classes: Hard Red Spring Wheat, Durum Wheat, Soft Red Winter Wheat, Hard Red Winter Wheat, Hard White Wheat, Soft White Wheat, Unclassed Wheat, and Mixed Wheat.

**Soft Red Winter Wheat is the only wheat class that will be graded in this event**, and the following discussion will pertain **only** to Soft Red Winter Wheat. The class Soft Red Winter Wheat includes all varieties of Soft Red Winter Wheat. There are no subclasses in this class.

### Basis of Determination

Each determination of dockage, moisture, temperature, odor, garlic, live weevils or other insects injurious to stored grain, and distinctly low quality completed on the grain as received when taken from an incoming truck, rail car, etc. All other "tests" are conducted after dockage has been removed.

### Test Weight

Test weight is the amount of weight the grain must have to make up a bushel. Good quality wheat of low moisture content can be expected to have a good test weight.

Record test weight rounded to the nearest tenth of a percent.

### Moisture

The moisture content of wheat seed is extremely important but it is no longer used as a grading factor. Loss of quality of stored seed hinges largely on the amount of moisture present in the sample. Moisture is an important factor in most discount schedules.

Moisture is recorded to the nearest tenth of a percent.

### Dockage

The word "dockage" means weed seed, weed stems, chaff, straw, grain other than wheat, sand, soil, and any other material other than wheat, that can be removed readily from the wheat by the use of appropriate sieves and cleaning devices. Also, the underdeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the material other than wheat plus that which cannot be recovered by properly rescreening or recleaning is also a part of dockage.

Determination of dockage is made in the initial sieving. Shrunken and broken kernels and foreign material are determined after the dockage has been removed. Dockage is determined from a 1,000 gram sample.

The percent dockage is rounded and reported to the nearest tenth percent.

## Foreign Material

Foreign material refers to all matter other than wheat, including stones, that is not separated from the wheat in the proper removal of dockage.

Examples of foreign material

- corn
- cockleburrs
- sticks
- stalks
- rodent excreta
- stones
- other grains
- ergoty wheat

Record to the nearest tenth of a percent.

## Contrasting Classes

A contrasting class in soft red winter wheat is durum wheat.

Soft red winter wheat flour is especially suited for cake mixes while flour from durum wheat is required for pasta production. Thus, there is a "contrast" in use. Each wheat has its own "Contrasting Classes."

"Contrasting Classes" is recorded to the nearest tenth of a percent.

## Wheat of Other Classes (Total)

This factor spotlights the presence of other wheats in a sample. Some mixtures may be of minor importance. For example, if a soft red winter wheat contained 8.0% hard red winter wheat, the flour from such a mixture might be acceptable, but not the most desirable for cake mixes when compared to flour from 100.0% soft red winter wheat.

Wheat of Other Classes (Total) also includes percent of Contrasting Classes.

"Wheat of Other Classes (Total)" is recorded rounded to the nearest tenth of a percent.

## Other Grains

Other grains as used in this discussion are:

- rye
- oats
- corn
- grain sorghum
- barley
- flax
- emmer
- spelt
- einkorn
- polish wheat
- poulard wheat
- cultivated buckwheat
- soybeans

These grains are also considered foreign material, even when damaged.

## Heat Damage

Heat damage in wheat is **severely** discolored (black or dark brown) kernels and pieces of kernels of **wheat and other grains** caused either from external heating, such as improper drying, or from heating as a result of excess moisture and spoiling. Almost all heat damage is the result of storing grain too wet. All grains listed in Other Grains above that are severely heat damaged **in Wheat** will be included in heat damage, damaged kernels (total), **and** Foreign Material.

Slightly damaged wheat and other grains show some discoloration (light to dark tan) and therefore are not as severely damaged. The two are **not** added together to determine heat damaged kernels. Slight damaged wheat and other grains will only be included in damaged kernels (total).

Record heat-damaged kernels to the nearest tenth of a percent.

## Insect Damaged Wheat Kernels

Wheat is determined to be "U.S. Sample Grade" when 32 or more insect damaged kernels per 100 grams are found. This is up to a 3 stage process. For simplicity in this event, the number of kernels per 100 gram will be given.

Do not confuse insect chewed with insect damage. Insect damage includes drill holes, pin holes, bored, tunneling and webbing in description.

## Damaged Kernels (Total)

This factor includes all types of damage found in wheat. It is very inclusive in that kernels and pieces of kernels of **wheat plus other grains (Ex. Sprout-damaged Oats)** are also included.

Examples of Damaged Kernels

- heat-damage
- sprout damage
- frost damage
- badly ground-damage
- badly weather-damage
- mold damage
- insect damage (not chewed)
- disease or otherwise materially damaged

Damaged Kernels (Total) is recorded to the nearest tenth of a percent.

## Shrunken and Broken Kernels

These are kernels and pieces of kernels of wheat and other matter that will pass readily through a .064 x 3/8 inch oblong hole sieve after the dockage has been removed.

Record to the nearest tenth of a percent.

## Defects (Total)

This factor is determined by adding the percentages of Damaged Kernels (Total), Foreign Material, and Shrunken and Broken Kernels.

### **Distinctly Low Quality**

The Federal Grain Inspection Service reserves the use of this term to describe wheat when it is obviously of inferior quality and the existing grading factors or guidelines do not accurately reflect the inferior condition.

When a sampler is collecting wheat from a rail car, he/she can notice whether the grain also includes two or more large stones, pieces of glass, pieces of concrete, sticks of lumber, or scrap metal or debris which are visible to the sampler but are too large to enter the sampling device, such as a grain probe.

This grading factor **should not** be confused with the other conditions which can also cause wheat to be "Sample Grade," such as animal filth, cocklebur, crotalaria seed, etc.

### **Musty, Sour or Heating**

A sample in any of these conditions is "U.S. Sample Grade."

Musty- Musty, ground, or moldy odor

Sour- Sour, fermenting, or pigpen odor

Heating- Wheat developing a high temperature from excessive respiration. Wheat will usually have a musty or sour odor. For this contest, samples that are affected by heating will state "Wheat affected by high temperature" OR "heating."

### **Commercially Objectionable Foreign Odor**

If the wheat carries an odor which does not normally occur in grain and which, for this reason, would render the wheat unfit for its normal commercial use, then it is graded "U.S. Sample Grade."

This includes animal hides, decaying animal or vegetable parts, fertilizer, skunk, smoke, strong weed, oil, etc. **This does not include smutty or garlicky odor.**

## Sample Grade Factors

There is a list of factors that automatically make the sample "Sample Grade" listed on the bottom of the grading chart. These include animal filth, cockleburs, crotalaria seed. If any of these are reported in the sample, participants should grade the sample "Sample Grade."

How to record in the "Remarks" box (see chart for details)

- Stones
- Glass
- Crotalaria
- Castor Beans
- Unknown Foreign Substance
- Commonly Recognized Harmful or Toxic Substance
- Cockleburs
- Animal Filth (includes rodent pellets and bird droppings)
- Heating
- Distinctly Low Quality (Reason)

## Cumulative Total

If a cumulative total of 5 or more sample grade factors (e.g. 3 stones + 1 animal filth + 1 unknown = 5 or more sample grade factors) are found, the sample is graded "U.S. Sample Grade."

## Special Factors, Special Grade Requirements, Special Grade Designations

Special grades are conditions which should be noted but **do not** affect the numerical grade.

### Ergoty

Wheat that contains **more than 0.05 percent** per 1000 grams ergot is considered Ergoty.

Note that **ergot also fits the definition of foreign material** in wheat and must be included as such.

### Garlicky

Specific types of garlic bulbs found in the sample may be considered a special factor.

Green bulbs- husk is still intact, contains **three or more** green bulblets in 1000 grams

Dry bulbs- husk is dry or missing, **3 dry bulbs= 1 green bulb**

A garlic odor is not a basis for "Garlicky."

**Infested**

Any wheat sample that contains one of the following:

- two or more live weevils
- one live weevil and 1 or more other live insects injurious to stored grain
- 2 or more other live insects injurious to stored grain

Infested is the condition of live weevils or grain-damaging insects in the grain.

Infested wheat is graded and designated according to the grade requirements of the standards applicable to such wheat if it was not infested.

**Smutty**

There are two special grades of smutty wheat -- Light Smutty and Smutty.

- Light Smutty - Applies to wheat with a smutty odor, or when wheat contains 6-30 smut balls in 250 grams of grain.
- Smutty - Applies to wheat that contains 31 or more smut balls per 250 gram sample.

**Treated Wheat**

Treatments of wheat include:

- Scoured
- Limed
- Washed
- Sulphured



# 4-H/FFA Crops Evaluation CDE

## Seeds List (125 points)

Contestant Number: \_\_\_\_\_

Score: \_\_\_\_\_/125

Contestant Name: \_\_\_\_\_

Contestant School: \_\_\_\_\_

**Directions:** Write in the correct number of the plant that correlates to the correct seed example. Each specimen is worth 10 points.

- |          |           |           |
|----------|-----------|-----------|
| 1. _____ | 10. _____ | 19. _____ |
| 2. _____ | 11. _____ | 20. _____ |
| 3. _____ | 12. _____ | 21. _____ |
| 4. _____ | 13. _____ | 22. _____ |
| 5. _____ | 14. _____ | 23. _____ |
| 6. _____ | 15. _____ | 24. _____ |
| 7. _____ | 16. _____ | 25. _____ |
| 8. _____ | 17. _____ |           |
| 9. _____ | 18. _____ |           |

- |                               |                             |                            |
|-------------------------------|-----------------------------|----------------------------|
| 101. Alfalfa                  | 124. Field pennycress       | 147. Redroot pigweed       |
| 102. Alsike clover            | 125. Flax                   | 148. Reed canarygrass      |
| 103. Barley                   | 126. Foxtail                | 149. Rice                  |
| 104. Barnyardgrass            | 127. Grain sorghum          | 150. Rye                   |
| 105. Bindweed                 | 128. Giant ragweed          | 151. Ryegrass              |
| 106. Birdsfoot trefoil        | 129. Hairy vetch            | 152. Shepherdspurse        |
| 107. Bitter wintercress       | 130. Hard red winter wheat  | 153. Smooth bromegrass     |
| 108. Buckhorn plantain        | 131. Horsenettle            | 154. Soft red winter wheat |
| 109. Burcucumber              | 132. Jimsonweed             | 155. Soybean               |
| 110. Canada thistle           | 133. Johnsongrass           | 156. Sudangrass            |
| 111. Canola                   | 134. Kentucky bluegrass     | 157. Sweetcorn             |
| 112. Common cocklebur         | 135. Korean lespedeza       | 158. Sweetclover           |
| 113. Common lambsquarters     | 136. Large crabgrass        | 159. Tall fescue           |
| 114. Common milkweed          | 137. Marestalk              | 160. Timothy               |
| 115. Common ragweed           | 138. Morningglory           | 161. Triticale             |
| 116. Crownvetch               | 139. Oat                    | 162. Trumpet creeper       |
| 117. Curly dock               | 140. Orchardgrass           | 163. Velvetleaf            |
| 118. Dandelion                | 141. Oxeye daisy            | 164. White wheat           |
| 119. Dent corn                | 142. Pennsylvania smartweed | 165. White clover          |
| 120. Downy brome              | 143. Perennial sowthistle   | 166. Wild buckwheat        |
| 121. Durum wheat              | 144. Popcorn                | 167. Wild carrot           |
| 122. Eastern black nightshade | 145. Quackgrass             | 168. Wild garlic           |
| 123. Fall panicum             | 146. Red clover             | 169. Wild mustard          |

# 4-H/FFA Crops Evaluation CDE

## Plants List (125 points)

Contestant Number: \_\_\_\_\_

Score: \_\_\_\_\_/125

Contestant Name: \_\_\_\_\_ Contestant School: \_\_\_\_\_

**Directions:** Write in the correct number of the plant that correlates to the correct plant mount.

- |          |           |           |
|----------|-----------|-----------|
| 1. _____ | 10. _____ | 19. _____ |
| 2. _____ | 11. _____ | 20. _____ |
| 3. _____ | 12. _____ | 21. _____ |
| 4. _____ | 13. _____ | 22. _____ |
| 5. _____ | 14. _____ | 23. _____ |
| 6. _____ | 15. _____ | 24. _____ |
| 7. _____ | 16. _____ | 25. _____ |
| 8. _____ | 17. _____ |           |
| 9. _____ | 18. _____ |           |

- |                               |                             |                        |
|-------------------------------|-----------------------------|------------------------|
| 301. Alfalfa                  | 326. Giant ragweed          | 351. Redroot pigweed   |
| 302. Alsike clover            | 327. Grain sorghum          | 352. Reed canarygrass  |
| 303. Barley                   | 328. Hairy vetch            | 353. Rye               |
| 304. Barnyardgrass            | 329. Hedge bindweed         | 354. Ryegrass          |
| 305. Birdsfoot trefoil        | 330. Hemp dogbane           | 355. Shattercane       |
| 306. Buckhorn plantain        | 331. Hophornbeam copperleaf | 356. Shepherd's purse  |
| 307. Burcucumber              | 332. Horsenettle            | 357. Smooth bromegrass |
| 308. Canada thistle           | 333. Ivyleaf morningglory   | 358. Soybean           |
| 309. Canola                   | 334. Jimsonweed             | 359. Sudangrass        |
| 310. Cantaloupe               | 335. Johnsongrass           | 360. Sweetclover       |
| 311. Common cocklebur         | 336. Kentucky bluegrass     | 361. Tall fescue       |
| 312. Common lambsquarters     | 337. Korean lespedeza       | 362. Tall morningglory |
| 313. Common ragweed           | 338. Large crabgrass        | 363. Tall waterhemp    |
| 314. Corn                     | 339. Maretail               | 364. Timothy           |
| 315. Crownvetch               | 340. Mint                   | 365. Tomato            |
| 316. Curly dock               | 341. Oat                    | 366. Trumpet creeper   |
| 317. Dandelion                | 342. Orchardgrass           | 367. Velvetleaf        |
| 318. Downy brome              | 343. Oxeye daisy            | 368. Wheat             |
| 319. Eastern black nightshade | 344. Palmer amaranth        | 369. White clover      |
| 320. Fall panicum             | 345. Pennsylvania smartweed | 370. Wild buckwheat    |
| 321. Field bindweed           | 346. Perennial sowthistle   | 371. Wild carrot       |
| 322. Field pennycress         | 347. Prickly sida           | 372. Wild garlic       |
| 323. Field sandbur            | 348. Pumpkin                | 373. Wild mustard      |
| 324. Foxtail                  | 349. Quackgrass             | 374. Yellow nutsedge   |
| 325. Garlic mustard           | 350. Red clover             |                        |

# 4-H/FFA Crops Evaluation CDE

## Disease, Damage, and Insect List (100 points)

Contestant Number: \_\_\_\_\_

Score: \_\_\_\_\_/100

Contestant Name: \_\_\_\_\_

Contestant School: \_\_\_\_\_

**Directions:** Write in the correct number of the plant that correlates to the correct plant mount. Each specimen is worth 10 points.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
16. \_\_\_\_\_
17. \_\_\_\_\_
18. \_\_\_\_\_
19. \_\_\_\_\_
20. \_\_\_\_\_

- |                          |                                |                              |
|--------------------------|--------------------------------|------------------------------|
| 201. Aphid               | 219. Green damage              | 237. Sudden death syndrome   |
| 202. Alfalfa weevil      | 220. Heat damage               | 238. Two-spotted spider mite |
| 203. Armyworm            | 221. Insect damage             | 239. Western corn rootworm   |
| 204. Blacktip            | 222. Japanese beetle           | 240. White mold              |
| 205. Black cutworm       | 223. Lady Beetle               | 241. Wireworm                |
| 206. Blue eye mold       | 224. Leafhopper                |                              |
| 207. Brown leaf spot     | 225. Manganese deficiency      |                              |
| 208. Brown stem rot      | 226. Northern corn leaf blight |                              |
| 209. Common rust         | 227. Nitrogen deficiency       |                              |
| 210. Corn flea beetle    | 228. Phosphorus deficiency     |                              |
| 211. Corn smut           | 229. Phytophthora root rot     |                              |
| 212. Downy mildew        | 230. Potassium deficiency      |                              |
| 213. Ear rot             | 231. Purple seed stain         |                              |
| 214. Ergot               | 232. Small grain smut          |                              |
| 215. European corn borer | 233. Sprout damage             |                              |
| 216. Frogeye leaf spot   | 234. Sound grain               |                              |
| 217. Grasshopper         | 235. Southern corn leaf blight |                              |
| 218. Gray leaf spot      | 236. Stinkbug                  |                              |

# 4-H/FFA Crops Evaluation CDE

## Machinery and Equipment Identification (50 points)

Contestant Number: \_\_\_\_\_

Score: \_\_\_\_\_/50

Contestant Name: \_\_\_\_\_

Contestant School: \_\_\_\_\_

**Directions:** Write in the correct number of the plant that correlates to the correct plant mount. Each specimen is worth 10 points.

1. \_\_\_\_\_

6. \_\_\_\_\_

2. \_\_\_\_\_

7. \_\_\_\_\_

3. \_\_\_\_\_

8. \_\_\_\_\_

4. \_\_\_\_\_

9. \_\_\_\_\_

5. \_\_\_\_\_

10. \_\_\_\_\_

- 
- |  |   |
|--|---|
| 401. Anhydrous applicator with tank                        | 417. Hay mower/conditioner (disk, reel/drawn or self-propelled) |
| 402. Articulated tractor                                   | 418. Hay rake (reel or wheel)                                   |
| 403. Bale wagon (kick or flat)                             | 419. Hay tedder   |
| 404. Broadcast fertilizer spreader                         | 420. Hitch pin  |
| 405. Chisel plow   | 421. Hydraulic cylinder/hose                                    |
| 406. Combine (may be displayed w/harvesting head attached) | 422. Moldboard plow   |
| 407. Conveyor/Elevator/Auger                               | 423. PTO shaft  |
| 408. Corn head for combine                                 | 424. Rotary hoe   |
| 409. Disk  | 425. Round baler  |
| 410. Disk chisel   | 426. Row crop cultivator  |
| 411. Drawn planter   | 427. Skid steer   |
| 412. Field cultivator                                      | 428. Sprayer  |
| 413. Grain drill (includes no-till)                        | 429. Square baler (large or small)                              |
| 414. Grain cart  | 430. Vegetable transplanter                                     |
| 415. Grain head for combine                                | 431. V-ripper   |
| 416. Gravity wagon   |   |