

## SECTION II – GRAIN GRADING

### What is grain grading?

- Participants will be given 6 written scenarios of possible grain samples to be graded according to USDA standards. These descriptions will give grain type, weight, moisture, damages, foreign material, and other important information that is normally considered for the grain grading procedure.

### What do participants need to provide?

- Participants will need the following tools for this portion of the contest:
  - Clipboard
  - Pencil(s)
  - A non-scientific calculator

### What are participants provided with by contest officials?

- Grain grading problems
- Corn, Soybean and Wheat Charts (page 70-71)
- Official grain grading Code Sheets
- Official grain Grading Electronic Worksheets
- **Junior participants:** Grain grading handbook (pages 49-64)

### Rules for this portion of the contest

- This portion of the contest will have the following 6 grain samples:
  - 2 corn samples
  - 2 soybean samples
  - 2 wheat samples
- Participants will have 60 minutes to complete all 6 samples.
- Each sample is worth 25 points.
- Participants will grade samples based on the official grain grading handbook. This book will be provided to junior participants to use during this portion of the contest. Senior participants are not permitted a copy of the book during the contest at any time. (pages 49-64).

### How to prepare students for this portion of the contest

- Students should know all rules pertaining to grain grading found in the grain grading handbook. (pages 15-32).

For statistical information and other useful information regarding grain grading, see page 41.

## How do you fill out the Grain Grading answer sheet?

- Grade
  - Required for all samples
  - Number is determined by charts after heat damage, damage kernels (total), special factors, etc. is calculated (charts on page 70-72)
  - Participant will select the code off of the code sheet corresponding to the Grade they have determined for the sample and write it on the electronic answer worksheet.
  
- Grain Class
  - Required for all samples
  - Corn can be Yellow, White or Mixed and soybeans can be Yellow or Mixed. Wheat will **always** be Soft Red Winter Wheat.
  - Participant will select the code off of the code sheet corresponding to the Class they have determined for the sample and write it on the electronic answer worksheet.
  
- Test Weight and Moisture
  - Required for all samples, no matter the grade designation
  - Both numbers will be given in the sample
  - These numbers should be rounded to the nearest tenth for all samples and will need extra zero added before the number if less than ten.
  
- Grade Factors
  - Each of the grade factors will need to be answered with the percentage totaled from all of the items that qualify as that factor. The total shall be rounded to the nearest tenth and have a zero added to the front of a number less than ten.
  - Each Electronic Answer Sheet will have the entire list of all grade factors that will need to be filled in for that sample.
  - A 000 will be filled in for samples without any of that factor in the sample.
  
- Special grade factors
  - Varies for corn, soybeans, and wheat
  - Only one will be included in each sample.
  - These factors normally do not affect the grade
  - Corn, Soybeans, and Wheat will have a different list of Special Factors and codes for each.
  - In wheat, when dockage is present, it will always be answered as a percentage rounded to the tenth with a zero added to the front of numbers less than ten.
  
- ) Sample Grade Factors
  - Only one sample grade factor can be found in each sample.
  - Participant will select the code off of the code sheet corresponding to the Sample Grade Factor they have determined for the sample and write it on the electronic answer worksheet
  - If there are no sample grade factors, it will be coded as 000 “No Sample Grade Factor”

## How to use grain charts

### Minimum test weight per bushel

- Test weight listed for grades is the **minimum** amount a grain can weigh
- Example: Corn that is U.S. No. 1 can weigh 56 lbs. or more, but it cannot weigh less.
- Example: Corn that weighs 55.9 lbs. it is U.S. No. 2.
- **Note**
  - All wheat samples will be Soft Red Winter Wheat, therefore, participants will NEVER use the test weight category of “Hard Red Spring Wheat or White Club Wheat”
  - Soybean test weight is no longer a factor in determining grades

### Other categories

- Maximum limits are given for all other factors. This means a sample cannot contain more than a given maximum percentage of a given factor.
- Example: Corn that is U.S. No. 1 cannot have more than 2.0% Broken Corn and Foreign Material
- Example: Corn that has 2.1% Broken Corn and Foreign Material must be U.S. No. 2.

## What is the final grade of your grain?

The factor resulting in the lowest grade determines the grade for the lot of grain.

**Samples that are U.S. No. 1 do not require factors listed except the test weight, moisture, and special factors that do not contribute to the grade designation.**

Example: yellow soybean sample

Test Weight (lbs/bu)	51.0	<b>No effect</b>
Foreign Material	0.8 %	<b>U.S. No. 1</b>
Moisture	13.2%	<b>No effect</b>
Splits	18.7%	<b>U.S. No. 2</b>
Green Garlic bulbs	6	<b>Garlicky</b>

This sample would be U.S. No. 2 and will be recorded as follows:

If, for any reason, the sample fails to make any of the numerical grades, the sample is graded “U.S. Sample Grade.” Factors for which any sample is automatically graded as Sample Grade are listed in the manual and below each chart.

Example: Mixed Corn (Yellow Corn 80.0%, White Corn 20.0%)

Test Weight (lbs/bu)	55.0	<b>U.S. No. 2</b>
Foreign Material	5.1 %	<b>U.S. Sample</b>
Moisture	13.2%	<b>No effect</b>
Damaged Kernels (Total)	1.0%	<b>U.S. No. 1</b>

This sample would be U.S. Sample Grade and will be recorded as follows:

### How is the answer sheet scored?

- *The Official Grain Standards of the United States*, published by the U.S. Department of Agriculture, Federal Grain Inspection Service, will be the official manual for completing the answer sheet which resembles an official grain grading certificate. If, however, the rules of the grading change during the five year coverage of this document, the rules spelled out within will have presidency.
- Incorrectly written percentages will result in an incorrect answer.
  - Numbers less than 1 should be written to include two zeros before the decimal
    - Ex. .8% should be recorded at 008
    - Contestant will lose all points if incorrect
- The sample will be scored on the basis of grade line, grading factors line, and remarks section for a total of 25 points per sample (150 points total).

### How to score corn problems

Grade	5 pts	Broken Corn and Foreign Material	2.5 pts
Class	2.5 pts	Heat Damage	2.5 pts
Special Grades	2.5 pts	Damaged Kernels (Total)	2.5 pts
Test Weight	2.5 pts	Sample Grade Factors	2.5 pts
Moisture	2.5 pts		

### **How to score soybean problems**

Grade	5 pts	Heat Damage	2 pts
Class	2 pts	Damaged Kernels (Total)	2 pts
Special Grades	2 pts	Splits	2 pts
Test Weight	2 pts	Soybeans of other Colors	2 pts
Moisture	2 pts	Sample Grade Factors	2 pts
Foreign Material	2 pts		

### **How to score wheat problems**

Grade	2.5 pts	Damaged Kernels (Total)	2 pts
Class or Subclass	0.5 pts	Foreign Material	2 pts
Special Grade	2 pts	Shrunken Broken Kernels	2 pts
Dockage	2 pts	Defects (Total)	2 pts
Test Weight	1 pts	Wheat of other Classes	2 pts
Moisture	1 pts	Contrasting Classes	2 pts
Heat Damage	2 pts	Sample Grade Factors	2 pts

### **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 and is not considered Yellow or White.

### **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 scoresheet**

### **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 scoresheet**

### **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 12/64th 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** 0.1 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

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• mold damage</li> <li>• heat damage</li> <li>• sprout damage</li> <li>• frost damage</li> <li>• badly ground-damaged</li> </ul> | <ul style="list-style-type: none"> <li>• badly weather-damaged</li> <li>• insect damage (not chewed)</li> <li>• kernels that have become slightly discolored from heat</li> </ul> |
|---|---|

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, cockleburs, 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, cockleburs, crotalaria seed. If any of these are reported in the sample, participants should grade the sample "Sample Grade" .

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



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

Special grades are conditions which should be noted but **do not** affect the numerical grade. They should be listed in alphabetical order with commas in between.

### **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.

### **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. Percentage of soybean classes should be rounded to the **nearest tenth**.

**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.

## 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."

### **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.

Record the words "Commercially Objectionable Foreign Odor" in the "Remarks" section of the certificate.

*(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 are a list of 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. They should be listed in alphabetical order with commas in between.

### **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 re-cleaning 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. **Participants will need to convert the number to a percentage if it is reported in grams.**

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**

Contrasting classes in soft red winter wheat are durum wheat and unclassified 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."

### **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.

### **Other Grains**

Other grains as used in this discussion are:

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

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, cockleburs, 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, cocklebur, crotalaria seed. If any of these are reported in the sample, participants should grade the sample "Sample Grade"

Here is a list of Sample Grade Factors

- Stones
- Glass
- Crotalaria
- Castor Beans
- Unknown Foreign Substance
- Commonly Recognized Harmful or Toxic Substance
- Cockleburs
- Animal Filth (includes bird droppings and rodent pellets)
- 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. All special grades should be listed in alphabetical order with commas in between.

### **Ergoty**

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

The word "Ergoty" is added to and made part of the grade designation.

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
- Washed
- Limed
- Sulphured

**See page 43 for an example of the grain grading problem set.**

**Past grain grading problems from invitational contests, area, and state can be found on the agronomy website (see reference page for information).**