APPENDIX C
Grain Grading

Scoring

Scoring of each sample will be as follows:

Grade Designation (30 points)
- Crop name omitted, deduct 15 points
- Wrong class or class omitted, deduct 5 points
- Special grade wrong or omitted, deduct 3 points each (not more than 6 points)
- One grade off, deduct 5 points
- Two grades off, deduct 10 points
- Three or more grades off, deduct 15 points
    - Correct grade wrongly written, deduct 1 point for each of the following (up to 4 points):
    - Wrong abbreviation for "U.S. No."
    - Wrong term used
    - Words not listed alphabetically
    - Incorrect punctuation
    - Words misspelled
    - All words not capitalized.

Grade Factors (20 points)
- One factor required: Wrong, deduct 16 points
- Two factors required: One wrong, deduct 8 points; Both wrong, deduct 16 points
- Three factors required: One wrong, deduct 5 points; Two wrong, deduct 10 points; Three wrong, deduct 16 points
- Four factors required: One wrong, deduct 4 points; Two wrong, deduct 8 points; Three wrong, deduct 12 points; Four wrong, deduct 16 points
- If more factors are listed than required, value of each wrong extra factor will be 16 divided by the total number of factors listed (dropping any fraction). For example, if two are required by four are listed, deduct $16/4 = 4$ points for each wrong factor.
- Grade determining factors, wrongly written, deduct 1 point for each of the following errors (up to 4 points):
    - Wrong percent given
    - Wrong term used (Abbreviations of factors are acceptable and not considered wrong if the proper abbreviation is used-Find correct abbreviations after the EXAMPLE section)
    - All words not capitalized
    - Factors not listed alphabetically
    - Words misspelled
    - "()", "%" omitted.

Explanations

Grain is graded for marketing purposes according to a set of requirements, established by the U.S. Department of Agriculture's Federal Grain Inspection Service (FGIS), called the Official U.S. Standards for Grain. The purpose of grading grain is to assign a label to it, known as the grade designation, which indicates its quality and determines its market value. Following is an explanation of the grading standards for wheat, sorghum, corn, and soybeans in a simplified form, taken from the U.S. Grain Standards for these crops.

Grades: Samples of grain are placed in numerical grades, ranging from U.S. No. 1 to U.S. No.

5, or Sample Grade, depending on quality. Certain factors or quality characteristics must be measured for each sample of grain, and the degree of quality of each factor is compared to the values listed in the grade requirements chart. The numerical grade for each factor on the table must be properly recorded.

Numerical Grading Factors: The numerical grading factors are the quality characteristics that determine the grade number assigned to a sample of grain. They are the column headings on the grade requirement charts, and most of them apply to all of the grains to be graded, although the limits may differ from one grain to another. The grade assigned to a sample is always based on the most serious factor or factors.

Test Weight Per Bushel: Test weight is the weight in pounds of an exact bushel volume of grain. Usually a one quart container is filled and weighed, with the weight converted to pounds per bushel. A bushel of dry, clean, plump grain will weigh more than an equal quantity of grain which is shriveled, hollowed out by insects, or high in moisture. Thus, a high test weight indicates good quality and a high numerical grade, while low test weight places the sample in a lower grade.

Damaged Kernels: Damaged kernels are those which for some reason may be considered unfit for food or feed purposes. There are many types of grain damage, but we will be concerned primarily with those included in the identification list (heat, sprout, mold, and insect damage). Of these, **<u>Heat-damaged Kernels</u>** are considered especially serious, and are handled as a separate factor in each of the grade requirements charts. The other kinds of damage are grouped together, and along with heat damage, are classified as total damage. Therefore, heat damage must be considered by itself, then added to any other kind of damage present, and considered as part of the numerical grading factor for **Damaged Kernels (Total)**. Other colors or market classes of the grain being graded which are damaged must also be included in Damaged Kernels (Total). In grading of corn, only damaged kernels of corn, and in soybeans, only damaged kernels of soybeans, are included as damaged kernels. However, in grading of wheat or sorghum, any of the kinds of damaged kernels of other grains on the identification list are included as part of the numerical factor for either Heat-damaged Kernels or Damaged Kernels (Total). For example, in grading corn, sprout-damaged wheat in the sample does not count as damaged kernels, but in grading sorghum, sprout-damaged wheat is included as damaged kernels, either by itself or added to any damaged sorghum present. (The wheat is also considered as foreign material in either case). Heat-damaged Kernels are those which are distinctly black or brown due to high temperatures which build up in "hot spots" in damp grain stored for long periods. Sprout-damaged kernels are those which germinate on the plant during very wet conditions which delay harvest and which dry out later killing the germ. Kernels on which mold or other diseases have been growing are also considered as damaged kernels. Kernels are considered insect-damaged if the insect has eaten a tunnel, hold, or cavity which is not fully exposed.

Foreign Material/Broken Corn and Foreign Material/Broken Kernels and Foreign Material: Foreign material includes all matter in the sample except the kind of grain which is being graded. Fine material, dirt, small pieces of broken grain, pieces of stems, hulls, weed seeds, and any other grains are all considered foreign material. Some of these may be separated by mechanical screening or sieving. Each crop differs slightly in the way foreign material and broken kernels are separated and defined. In **soybeans**, the factor **Foreign Material** consists of fine material screened out which is given as a card factor plus any visual foreign material (other crops,

weed seed, etc.) shown on the grading card. In **wheat**, the factor **Foreign Material** consists only of visual factors, since the fine material is removed as dockage. In **corn**, the factor **Broken Corn and Foreign Material** consists of broken corn and fine foreign material screened out which will be given as card factors plus any visual foreign material shown on the card. In **sorghum**, there are two factors of concern. The factor **Foreign Material** includes coarse foreign material screened out which will be given as a card factor plus any visual foreign material shown on the card. The factor **Broken Kernels and Foreign Material** also includes a fine broken kernels portion screened out which will also be given as a card factor. In wheat and sorghum, visual demonstrations of other grains which are damaged are counted both as Foreign Material and Damaged Kernels (Total).

Shrunken and Broken Kernels in wheat is used as a numerical factor. This is determined by sieving, and is given as a card factor on every sample of wheat.

Defects (Total), as a numerical factor in wheat, is the sum of the Damaged Kernels (Total), Foreign Material, and Shrunken and Broken Kernels added together. It should be noted that the limits for Defects (Total) in the grade requirements for wheat are the same as for Shrunken and Broken Kernels. Thus, if the percent of Shrunken and Broken Kernels alone determines the numerical grade, Defects (Total) must also be listed as a determining factor. Heat-damaged kernels are a part of Defects (Total), but do not need to be added again since they should already have been included as a part of the Damaged Kernels (Total).

Contrasting Classes in wheat refers to the presence of Durum Wheat or Hard White Wheat or Soft WhiteWheat in Hard Red Winter Wheat, which would reduce the quality of a sample of Hard Red Winter Wheat for bread making. A sample cannot be graded lower than U.S. No. 4 because of Contrasting Classes. If it contains more than 10% Contrasting Classes, the sample is classified as Mixed Wheat, and then it is regarded with the factor Contrasting Classes disregarded.

Splits in soybeans are broken pieces of soybeans in the sample that are not otherwise damaged (i.e. mold, insect, etc.) They are considered objectionable and lower the grade of the sample because the oil in the broken pieces is oxidized, reducing the quality of the soybean oil when extracted. They will be shown as one of the visual factors. If split kernels are, in fact, also damaged in some other way, they must be considered as Damaged Kernels (Total) instead of Splits.

Soybeans of Other Colors refers to Brown or Black Soybeans in a sample of Yellow Soybeans. This factor will be demonstrated as a visual factor or may be given as a card factor for Black or Brown Soybeans. A sample cannot be graded lower than U.S. No. 4 because of Soybeans of Other Colors. If it contains more than 10% Soybeans of Other Colors, the sample is classified as Mixed Soybeans, and it is then regarded with the factor Soybeans of Other Colors disregarded. (Note: brown soybeans and black soybeans are not on the identification list, but may still appear in the grain grading section.)

SAMPLE GRADE FACTORS

Whenever any of the numerical grading factors on the grade requirements chart exceeds the limits of the lowest grade, except Contrasting Classes in wheat or Soybeans of Other Colors in soybeans, the sample must be placed in Sample Grade. Other factors which would cause a sample to be Sample Grade are discussed below. The descriptions and limitations for sample grade factors are given the paragraph immediately below the

numerical chart in the standards for each crop. Since most of these determinations are made on large portions of the grain or in the elevator, boxcar or barge (i.e. odors, heating, etc.) when the sample is first collected, they will all be given as card factors for the contest. Grain which is Sample Grade is generally considered to be unfit for human food or commercial use. If these non-numerical factors are grade-determining, they must be recorded in the remarks section.

Stones: The presence of 8 or more stones in a 1000-gram sample of any of the grains (4 or more for wheat) places it in Sample Grade. Weight limits also apply for some crops, but will be ignored for the contest. The number of stones per 1000 gram sample will be given as a card factor. Since most grain sold by grade is ground up for food or feed, the presence of stones would be damaging to the processing machinery, and objectionable when found in food products.

Castorbeans, Cockleburs, Crotalaria, Broken Glass, Animal Filth: The presence of any of these materials in a sample of grain is undesirable for either human food or animal feed. Castorbeans and crotalaria are poisonous seeds, broken glass is dangerous, and animal filth is highly objectionable. They are listed specifically as Sample Grade factors in the grading standards charts with appropriate limits per 1000 gram sample. For the contest, they will always be given as card factors with amounts per 1000 grams indicated.

Harmful or Toxic Foreign Substance: This refers mainly to poison-treated seed grain. The chemical mixture applied to seeds for planting to prevent seedling diseases is usually colored a bright pink, purple or green. Its presence causes grains to be graded as Sample Grade because of distinctly low quality. Farmers must be extremely careful to prevent mixing of any left-over treated seed with grain that they feed, and particularly with the grain they sell. If any poison-treated kernels are found, the entire lot (truckload, railroad car or bin full) may be seized by the Federal Food and Drug Administration, and condemned for any feed or food use.

Musty, Sour, or Heating: Each of these terms, which will be given as a card factor, indicates that the grain is in the process of spoiling, and is not in good condition. If present, they should be listed as determining factors for Sample Grade on the right-handed side of the grain grading answer sheet.

Commercially Objectionable Foreign Odors: This term includes any strong odor which the grain may pick up, which stays in it throughout processing, and which remains in the finished product, such as flour or cornmeal, baked goods or soybean oil. The kind of odors which we will include in our grading, all of which will be given as card factors, are smoke odor, skunk odor, oil, gasoline, diesel, or kerosene odor, and dead animal odor (due to tankage, meat scraps, raw hides or dead rodents in the grain). Many of these odors are picked up by storing grain in the sample buildings with these odor-producing materials, or in bins, trucks, or box cars contaminated with them. It should be noted that odors of smut or garlic are not considered to be commercially objectionable.

SPECIAL GRADE FACTORS

Special grades are quality determinations made after the numerical grade has been determined. They indicate some quality feature of the grain which is not included in the grading chart (i.e. Infested, Garlicky, Smutty). When a special grade applies, the proper term for each grain is added to the grade designation, following the class and kind of

grain on the left-handed side of the answer sheet. The quantities or reasons which cause the use of a special grade are never listed as a grading factor on the right-hand side of the answer form (factors included on the right are only those determining the numerical grade). All factors for determining special grades will be stated as card factors, and any evidence which might be found in the master sample must be ignored. Special grades need not be recorded in the remarks section, but must appear with the lot designation.

MARKET CLASSES OF GRAIN

When sold for commercial purposes, each kind of grain is divided into market classes, which indicate the kind of use each sample is best suited for. Classes of corn, sorghum and soybeans are based on color. In wheat, classes are based on differences in texture (hardness) and protein content as well as color. The texture of wheat is determined mainly by the weather and varieties grown, which vary a great deal in different parts of the United States. The cool climate and high rainfall of the Pacific Northwest and of the Northeastern states is best suited to growing Soft White Wheat, which is very low in protein, and is used for crackers, pastries, noodles and breakfast cereals. In Oklahoma and the surrounding states in the Southern Great Plains, we grow Hard Red Winter Wheat, which usually has enough protein for good bread-making. Newly developed Hard White Wheat varieties suitable for bread making are being grown in California and in the Great Plains and may become as popular as Hard Red Winter Wheat. Hard Red Spring Wheat is grown in the Northern Great Plains (the Dakotas and Canada) where the dry summers cause the wheat to be high in protein, and ideal for bread-making. Durum Wheat is also grown in the Northern Great Plains and is very hard which makes very good macaroni, spaghetti and noodles. Its protein content is very high, but it is not of suitable quality for making bread. The Eastern states, which have plenty of rainfall, produce Soft Red Winter Wheat, which has low protein content, and is best suited for cookies and cakes. We will grade only samples of Oklahoma-grown Hard Red Winter Wheat, and need to consider only hard White Wheat, Soft White Wheat and Durum Wheat for the grading factor "Contrasting Classes" and the possibility that it may be classified as Mixed Wheat. Although Soft Red Winter and Hard Red Spring mixtures in the Hard Red Winter Wheat may also affect the grade and class, they are difficult to distinguish from one another and will not be used in the grading portion of our contest. Market class need not be recorded in remarks section, but must appear as part of the lot designation.

Classes of corn:
- **Yellow Corn:** Kernels yellow or yellow with reddish areas, containing not more than five percent of white, red, or other-colored kernels.

- **White Corn:** Kernels white or white with pink or yellow tinges with not more than two percent of yellow or other colors.

- **Mixed Corn:** Any sample that does not meet the requirements for the classes Yellow Corn or White Corn.

Classes of sorghum:
- **Sorghum:** Sorghum with white subcoats and yellow, yellow-red, orange-red, salmon-pink, reddish or white pericarps, or white pericarps with black or reddish spots, with not more than three percent of tannin sorghum. White kernels are allowed in any amount in yellow sorghum and do not cause mixed sorghum.

- **Tannin Sorghum:** Sorghum with brown subcoats caused by the presence of tannin with not more than ten percent of sorghum of other colors. Tannin sorghums are identified by the presence of brown subcoats beneath the pericarps and may have pericarps of other colors. However, tannin sorghum used in the contest will have only brown or tan pericarps so they can be distinguished from non-tannin sorghum with reddish pericarps.

- **White Sorghum:** Sorghum with white pericarps with not more than two percent of sorghum of other colors. White sorghum with more than two percent sorghum (yellow, red, orange or salmon pericarps) and less than three percent tannin sorghum is classified as "Sorghum". White kernels may have black, brown, or reddish spots which cover not more than 25% of the kernel.

- **Mixed Sorghum:** Sorghum and/or white sorghum with more than three percent tannin sorghum or tannin sorghum with more than ten percent of other colors.

Classes of soybeans:
- **Yellow Soybeans:** Soybeans with yellow or greenish seed coats with not more than ten percent soybeans of other colors (black and/or brown soybeans).

- **Mixed Soybeans:** Soybeans with more than ten percent soybeans of other colors (black and/or brown soybeans). (Note: Brown Soybeans and Black Soybeans have been removed from the identification list, but may still appear in the grain grading section.)

Classes of wheat:
- **Durum Wheat is divided into three subclasses**:
  - Hard Amber Durum Wheat is durum wheat with 75 percent or more of hard and vitreous kernels of amber color (will be in given factors)
  - Durum Wheat is durum wheat with less than 60 percent of hard and vitreous kernels of amber color

- **Soft Red Winter Wheat**: All varieties of Soft Red Winter Wheat. There are no subclasses in this class.

- **Hard White Wheat**: All hard endosperm white wheat varieties. There are no subclasses in this class.

- **Hard Red Winter Wheat:** Hard Red Winter Wheat with not more than ten percent wheat of Contrasting Classes (Durum and/or Hard or Soft White Wheat).

- **Mixed Wheat:** Any variety of wheat which is consists of less than 90% of one class and more than 10 percent of one other class, or a combination of classes which meet the definition of wheat. (Ex. 85% HRWW, 10% Durum, 5% Soft Red Winter).

Determination of mixtures of classes: The classes (colors) of corn, soybeans and sorghum not matching the master sample, and of Contrasting Classes (Hard and Soft White Wheat and Durum Wheat) in Hard Red Winter Wheat, may be shown as visual factors on the grading cards. Representative market classes for corn, soybeans, sorghum and wheat are included on the ID list. Other classes may also be given as a card factor. Visual class factors such as heat-damaged or mold-damaged kernels in which the color or class is not

distinct and easily determined should be considered as the same class as the master sample, and not included as mixed. Definitions of market classes will be provided to contestants with the grade requirement tables.

WRITING THE GRADE DESIGNATION and DETERMINING FACTORS

In order to get full credit, the grade designation must be correctly written. It consists of two parts: the grade designation itself and the determining factors. See the examples written on an official answer form, which go with the practice problems at the end of this section.

The Grade Designation is written as follows on the left-handed side:

1. The numerical grade preceded by the abbreviations "U.S. No." or "U.S. Sample Grade" -- whichever applies.
2. The name of the class and kind of grain (such as "Hard Red Winter Wheat", "White Sorghum" or "Mixed Corn").
3. The Special Grade terms which apply (such as "Infested" or "Smutty"), following a comma after the name of the kind of grain.

The Determining Factor or Factors written on the right-handed side are:

1. The column headings in the grade requirement charts such as "Test Weight Per Bushel", "Damaged Kernels (Total)", or "Defects (Total)" which cause the sample to be placed in the numerical (or sample) grade listed on the left.
2. Factors causing the grain to be graded Sample Grade if appropriate, such as "Musty", "Heating", "Animal Filth", or "Commercially Objectionable Foreign Odor".

All factors which determine the grade chosen should be listed. No factors are given for a sample grading U.S. No. 1. The maximum number of determining factors will be four. Percentages (or lbs for Test Weight Per Bushel) should be stated for each factor in parentheses immediately following. For examples of correctly written grade designations, see the completed official grain grading form on page 22 which follows the examples.

Commercial Grain Grading Answer Sheet

Contestant No.   Total Score

Contestant Name

Sample No .	Complete Grade Designation	Factor or Factors
1		
2		
3		
4		
5		
6		

GRADE REQUIREMENTS FOR **CORN**				
		Maximum Limits of …		
Grade	Minimum Test Weight Per Bushel	Heat-damaged Kernels	Damaged Kernels (Total)	Broken Corn and Foreign Material
	Lbs.	%	%	%
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0

U.S. Sample Grade shall be designated for corn that:

a) Exceeds the limitations of U.S. No. 5 for any of the above factors; or
b) Contains, in a 1000 gram sample: 8 or more stones; 2 or more castorbeans; 8 or more cockleburs; 2 or more pieces of glass; 3 or more crotalaria seeds; 10 or more rodent pellets, bird droppings, or other pieces of animal filth; or
c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or
d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

SPECIAL GRADES
Infested - Infested by live weevils or other live insects injurious to stored grain.

MARKET CLASSES
Yellow Corn - Kernels yellow or yellow with reddish areas, containing not more than <u>five</u> percent of white, red, or other colored kernels.
White Corn - Kernels white or white with pink or yellow tinges with not more than <u>two</u> percent of yellow or other colored kernels.
Mixed Corn - Any sample that does not meet the requirements for the classes Yellow Corn or White Corn.

DEFINITIONS
Heat-damaged Kernels - Heat-damaged kernels of corn only.
Damaged Kernels (Total) - Kernels of corn only which are damaged by insects, mold, sprouting, disease, or other factors, <u>including heat-damaged kernels</u>.
Broken Corn and Foreign Material - All broken corn and foreign material screened from the sample, plus all matter other than corn which remains in the sample.

GRADE REQUIREMENTS FOR **SOYBEANS**						
		Maximum Limits of …				
Grade	Minimum Test Weight Per Bushel	Heat-damaged Kernels	Damaged Kernels (Total)	Foreign Material	Splits	Soybeans of Other Colors
	Lbs.	%	%	%	%	%
U.S. No. 1	56.0	0.2	2.0	1.0	10	1.0
U.S. No. 2	54.0	0.5	3.0	2.0	20	2.0
U.S. No. 3	52.0	1.0	5.0	3.0	30	5.0
U.S. No. 4	49.0	3.0	8.0	5.0	40	10.0**

U.S. Sample Grade shall be designated for soybeans that:

a) Exceeds the limitations of U.S. No. 5 for any of the above factors; or
b) Contains, in a 1000 gram sample: 8 or more stones; 2 or more castorbeans; 8 or more cockleburs; 2 or more pieces of glass; 3 or more crotalaria seeds; 10 or more rodent pellets, bird droppings, or other pieces of animal filth; or
c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or
d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

SPECIAL GRADES
Infested - Infested by live weevils or other live insects injurious to stored grain.
Garlicky - Five or more garlic bulblets in 1000 grams.

MARKET CLASSES
Yellow Soybeans - Soybeans with yellow or greenish seed coats with not more than 10% soybeans of other colors (black or brown).
Mixed Soybeans - Soybeans with more than 10% soybeans of other colors.

DEFINITIONS
Heat-damaged Kernels - Heat-damaged soybeans only.
Damaged Kernels (Total) - Kernels of soybeans only which are damaged by insects, mold, sprouting, disease, or other factors, including heat-damaged kernels.
Foreign Material - All foreign material screened from the sample, plus all matter other than soybeans which remains in the sample.
Splits - Broken pieces of soybeans that are not otherwise damaged.
Soybeans of Other Colors - Soybeans with black or brown seed coats.

GRADE REQUIREMENTS FOR **SORGHUM**					
		Maximum Limits of …			
Grade	Minimum Test Weight Per Bushel	Heat-damaged Kernels	Damaged Kernels (Total)	Foreign Material	Broken Kernels and Foreign Material
	Lbs.	%	%	%	%
U.S. No. 1	57.0	0.2	2.0	1.5	4.0
U.S. No. 2	55.0	0.5	5.0	2.5	7.0
U.S. No. 3	53.0	1.0	10.0	3.5	10.0
U.S. No. 4	51.0	3.0	15.0	4.5	13.0

U.S. Sample Grade shall be designated for sorghum that:

a) Exceeds the limitations of U.S. No. 4 for any of the above factors; or
b) Contains, in a 1000 gram sample: 8 or more stones; 2 or more castorbeans; 8 or more cockleburs; 2 or more pieces of glass; 3 or more crotalaria seeds; 10 or more rodent pellets, bird droppings, or other pieces of animal filth; or
c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or
d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

0SPECIAL GRADES
Infested - Infested by live weevils or other live insects injurious to stored grain.
Smutty - Covered with smut spores, **or** contains 20 or more smut masses in 100 grams.

MARKET CLASSES
Sorghum - Sorghum with white subcoats and yellow, yellow-red, orange-red, salmon-pink, reddish or white pericarps, or white pericarps with black or reddish spots, with not more than three percent of tannin sorghum.
Tannin Sorghum - Sorghum with brown subcoats (tannin sorghum used in the contest will have only brown pericarps also) with not more than ten percent of sorghum of other colors.
White Sorghum - Sorghum with white pericarps with not more than two percent of sorghum of other colors. White sorghum with more than two percent sorghum (yellow, red, orange or salmon pericarps) and less than three percent tannin sorghum is classified as "Sorghum".
Mixed Sorghum - Sorghum and/or white sorghum with more than three percent tannin sorghum or tannin sorghum with more than ten percent of other colors.

DEFINITIONS
Heat-damaged Kernels - Heat-damaged kernels of sorghum and other grains.
Damaged Kernels (Total) - Kernels of sorghum and other grains which are damaged by insects, mold, sprouting, disease, or other factors, including heat-damaged kernels.
Foreign Material - All foreign material screened from the sample, plus all matter other than sorghum which remains in the sample.
Broken Kernels and Foreign Material - All broken kernels screened from the sample plus all foreign material as defined above.

			Maximum Limits of …				
Grade	Minimum Test Weight Per Bushel	Heat-damaged Kernels	Damaged Kernels (Total)	Foreign Material	Shrunken and Broken Kernels	Defects (Total)	Contrasting Classes
	Lbs.	%	%	%	%	%	%
U.S. No. 1	60.0	0.2	2.0	0.4	3.0	3.0	1.0
U.S. No. 2	58.0	0.2	4.0	0.7	5.0	5.0	2.0
U.S. No. 3	56.0	0.5	7.0	1.3	8.0	8.0	3.0
U.S. No. 4	54.0	1.0	10.0	3.0	12.0	12.0	10.0**
U.S. No. 5	51.0	3.0	15.0	5.0	20.0	20.0	-----

*Title: GRADE REQUIREMENTS FOR **WHEAT***

U.S. Sample Grade shall be designated for wheat that:

a) Exceeds the limitations of U.S. No. 5 for any of the above factors; or

b) Contains, in a 1000 gram sample: 4 or more stones; 2 or more castorbeans; 8 or more cockleburs; 1 or more pieces of glass; 3 or more crotalaria seeds; 2 or more rodent pellets, bird droppings, or other pieces of animal filth; or

c) Has a musty, sour, or commercially objectionable foreign odor (does not include smut or garlic odor); or

d) Is heating, contains any commonly recognized harmful or toxic foreign substance, or is otherwise of distinctly low quality.

**A sample with more than ten percent Contrasting Classes shall be classified Mixed Wheat and shall be graded with the factor Contrasting Classes disregarded.

SPECIAL GRADES
Light smutty - Strong odor of smut **or** 5 to 30 smut ball in 250 grams.
Smutty - More than 30 smut balls in 250 grams.
Garlicky - More than 2 garlic bulblets in 1000 grams.
Infested - Infested by live weevils or other live insects injurious to stored grain.

MARKET CLASSES
Hard Red Winter Wheat - Hard Red Winter Wheat with not more than ten percent of wheat of contrasting classes (Durum Wheat and/or Soft White Wheat).
Hard Amber Durum Wheat – durum with 75% or more of hard and vitreous kernels of vitreous kernels (CCL – All other non-durum wheat varieties.)
Durum Wheat – durum wheat with less than 60% of hard and vitreous kernels of amber color (CCL – All other non-durum wheat varieties.)
Soft Red Winter Wheat – all varieties of Soft Red Winter Wheat (CCL – Durum)
Hard White Wheat – all hard endosperm white wheat varieties (CCL – Durum, Soft Red Winter)
Mixed Wheat - Hard Red Winter Wheat with more than ten percent of wheat of contrasting classes.

DEFINITIONS
Heat-damaged Kernels - Heat-damaged kernels of wheat and other grains.
Damaged Kernels (Total) - Kernels of wheat and other grains which are damaged by insects, mold, sprouting, disease, or other factors, including heat-damaged kernels.
Foreign Material - All foreign material other than wheat which remains in the sample after removal of Shrunken and Broken Kernels.
Defects (Total) - The sum of Damaged Kernels (Total), Foreign Material, and Shrunken and Broken Kernels.
Contrasting Classes - Durum Wheat and/or Soft White Wheat in Hard Red Winter Wheat (others listed above)

EXAMPLES

Note: The correctly written grade designations and determining factors for these examples are given on the following page.

1. *Sample of Hard Red Winter Wheat.*

Card Factors		**Visual Factors**	
Test Weight Per Bushel	62.5 lbs.	Heat-damaged HRW wheat	1.0%
3 garlic bulblets in 1000 grams		Sprout-damaged HRW wheat	1.5%
3 stones in 1000 grams		Mold-damaged soybeans	1.2%
Shrunken and Broken Kernels	6.0%	Undamaged Durum Wheat	5.0%
Odor of Smut			

Note: Four or more stones are required for Sample Grade; Damaged Kernels (Total) (including other grains), Foreign Material, and Shrunken and Broken Kernels must be added together to obtain Defects (Total); Mold-damaged soybeans must be added to Sprout-damaged and Heat-damaged wheat to obtain Damaged Kernels (Total), and added again as Foreign Material; 3 garlic bulblets causes special grade "Garlicky"; odor of smut causes special grade "Light Smutty."

2. *Sample of Yellow Corn.*

Card Factors	**Visual Factors**		
Test Weight Per Bushel	52.5lbs.	Insect-damaged corn	14.0%
Kerosene odor		Heat-damaged corn	2.5%
Broken Corn and Foreign Material sieved out 3.5%		Undamaged white corn	5.5%
8 cockleburs in 1000 grams			
3 live weevils			

Note: Insect damage and heat damage must be added together to obtain Damaged Kernels (Total) which is off table for Sample Grade; presence of live weevils causes special grade "Infested"; 5.5% white corn in yellow corn causes class "Mixed"; Kerosene odor is Commercially Objectionable; 8 cockleburs exceeds the limit for Sample Grade.

3. *Sample of Sorghum.*

Card Factors		**Visual Factors**	
Test Weight Per Bushel	55 lbs	Insect-damaged sorghum	7.0%
Dead insect bodies		Sprout-damaged wheat	1.5%
Kernels covered with smut spores		Giant ragweed seed	1.0%
Foreign Material sieved out	1.0%	Undamaged white sorghum	11.0%
Broken Kernels sieved out	4.5%	Undamaged tannin sorghum	2.5%

Note: Damaged wheat must be added to damaged sorghum for Damaged Kernels (Total); wheat and giant ragweed must be added to foreign material sieved out to get Foreign Material, which is then added to broken kernels sieved out to get Broken Kernels and Foreign Material; presence of smut spores causes special grade "Smutty"; 2.5% tannin sorghum in sorghum is not enough to cause class Mixed; any amount of white kernels are allowed in sorghum, thus class remains "Sorghum"; insects must be live to cause Infested special grade.

4. *Sample Yellow Soybeans*

Card Factors		**Visual Factors**	
Test Weight Per Bushel	51 lbs	Mold-damaged yellow soybeans	2.5%
Odor of garlic		Heat-damaged corn	1.5%
Foreign Material sieved out	2.0%	Undamaged black soybeans	10.9%
9 mouse pellets per 1000 grams			

Note: Damaged corn is not included as damaged kernels in soybeans; the corn is Foreign Material and must

be added to sieved Foreign Material; the black soybeans are Soybeans of Other Colors, but exceed 10% making class "Mixed", thus Soybeans of Other Colors column is disregarded; strong garlic smell does not cause special grade "Garlicky", there must be garlic bulblets; 10 pieces of animal filth are needed to make Sample Grade

Examples of proper abbreviations

Factor	Correct Abbreviation
Total Other Material	**TOM**
Test weight	**TW**
Damaged kernels (total)	**DKT**
Foreign material	**FM**
Heat damage	**HT**
Wheat of other classes	**WOCL**
Contrasting Classes	**CCL**
Broken corn and foreign material	**BCFM**
Commercially Objectionable Foreign Odor	**COFO**
Shrunken and broken kernels	**SHBN**

Example Answers
Commercial Grain Grading

Contestant No.   Total Score

Contestant Name

(NOTE: The following designations and factors are for the examples on the previous page.)

Sample No.	Complete Grade Designation	Factor or Factors
1	U.S. No. 4 Hard Red Winter Wheat, Garlicky, Light Smutty	Heat-damaged Kernels (1.0%) Contrasting Classes (5.0%) Defects (Total) (10.9%)
2	U.S. Sample Grade Mixed Corn, Infested	Commercially Objectionable Foreign Odor Cockleburs Damaged Kernels (Total) (16.5%)
3	U.S. No. 3 Sorghum, Smutty	Damaged Kernels (Total) (8.5%) Foreign Material (3.5) Broken Kernels and Foreign Material (8.0%)
4	U.S. No. 4 Mixed Soybeans	Test Weight Per Bushel (51.0 lbs.) Foreign Material (3.5%)

Grain Grading Worksheet

Wheat		
Factor	**% or Lbs**	**Grade**
Test weight per bushel		
Heat Damaged Kernels		
Damaged Kernels (total)		
Foreign Material		
Shrunken and Broken Kernels		
Defects (Total)		
Contrasting classes		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		

Market class

Hard Red Winter Wheat   Hard White Wheat   Hard Amber Durum Wheat   Durum Wheat

Soft Red Winter Wheat

Special grades

Infested   Light smutty   Smutty   Garlicky

Sorghum		
Factor	**%Lbs`**	**Grade**
Test weight per bushel		
Heat Damaged Kernels		
Damaged Kernels (total)		
Foreign Material		
Broken kernels and Foreign Material		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		
Market class		
Sorghum Tannin sorghum	White sorghum	Mixed sorghum
Special grades		
Infested Smutty		

Soybeans

Factor	%Lbs`	Grade
Test weight per bushe l		
Heat Damaged Kernels		
Damaged Kernels (total)		
Foreign Material		
Splits		
Soybeans of Other Colors		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		

Market class

Yellow soybean   Mixed Soybean

Special grades

Infested

Corn		
Factor	**%Lbs`**	**Grade**
Test weight per bushel		
Heat Damaged Kernels		
Damaged Kernels (total)		
Broken corn and foreign material		
Stones		
Castorbeans		
Cockleburs		
Glass		
Crotalaria Seeds		
Rodent Pellets		
Bird Droppings		
Animal filth		
Musty Odor		
Sour Odor		
Commercially Objectionable Foreign Odor		
Heating		
Harmful or Toxic Substance		
Distinctly low quality		

Market class

Yellow Corn   White Corn   Mixed Corn

Special grades

Infested   Garlicky