GRAIN INSPECTION HANDBOOK

BOOK II, CHAPTER 7

OATS

CHAPTER 7

OATS

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7.1 GENERAL INFORMATION

a. All quantities referenced in this chapter are approximate unless otherwise specified.

b. Use an approved divider to obtain subportions of a sample for analysis unless otherwise specified.

c. If an approved mechanical shaker is unavailable, inspectors may handsieve the sample. When handsieving, hold the sieve level in both hands with elbows close to the sides. In a steady motion, move the sieve from left to right approximately 10 inches and then return from right to left. Repeat this motion 30 times.

d. For specific Visual Reference Images, see O-1.0 – O-5.0.

e. Official inspection personnel shall document inspection information during sampling and grading. See book IV, chapter 2.

The inspection process provides various factor information used to determine grade and to provide further information on the condition or quality of oats. Each section of this chapter provides details on recording factor information. If requested by the applicant for inspection, additional information may be provided (e.g., an exact count on stones in addition to the percentage by weight, a percentage for a specific type of damage, etc.).

7.2 GRADES AND GRADE REQUIREMENTS

There are no classes or subclasses in oats. Oats are divided into four numerical grades and U.S. Sample Grade. Special grades are provided to emphasize special qualities or conditions affecting the value of the oats and are added to and made a part of the grade designation. Special grades do not affect the numerical or sample grade designation.

TABLE NO. 1 - GRADES AND GRADE REQUIREMENTS - OATS

Grade	Minimum Limits of -		Maximum Limits of -		
	Test weight per bushel (pounds)	Sound Oats (percent)	Heat-Damaged kernels (percent)	Foreign material (percent)	Wild oats (percent)
U.S. No. 1	36.0	97.0	0.1	2.0	2.0
U.S. No. 2	33.0	94.0	0.3	3.0	3.0
U.S. No. 3 **1**/	30.0	90.0	1.0	4.0	5.0
U.S. No. 4 **2**/	27.0	80.0	3.0	5.0	10.0

U.S. Sample Grade:

U.S. Sample Grade are oats that:

(a) Does not meet the requirements for grades U.S. No.1, 2, 3, or 4; or

(b) Contains 8 or more stones which have an aggregate weight in excess of 0.2 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (Crotalaria spp.), 2 or more castor beans (Ricinus communis L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cockleburs (Xanthium spp.) or similar seeds singly or in combination, 10 or more rodent pellets, bird droppings, or an equivalent quantity of other animal filth per 1 1/8 to 1 ¼ quarts of oats; or

(c) Have a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor) ; or

(d) Are heating or otherwise of distinctly low quality.

1/ Oats that are slightly weathered shall be graded not higher than U.S. No. 3.

2/ Oats that are badly stained or materially weathered shall be graded not higher than U.S. No. 4.

7.3 GRADE DESIGNATIONS

After completing the analysis, compare the results with the limits for each grade factor specified in table 1. Use the following guidelines when assigning grades.

a. The letters "U.S.";

b. The abbreviation "No." and the number of the grade or the words "Sample Grade";

c. The words "or better" when applicable;

d. The applicable special grade(s) in alphabetical order;

e. The word "Oats"; and

f. The applicable special grade(s) in alphabetical order.

7.4 SPECIAL GRADES

Special grades identify unusual conditions in grain and are part of the grade designation. The oats standards include nine special grades:

a. Bleached Oats. Oats that in whole or in part, have been treated with sulfurous acid or any other bleaching agent.

Example: U.S. No. 2 Oats, Bleached

b. Bright Oats. Oats, except bleached oats, that are of good natural color.

Example: U.S. No. 1 Bright Oats

c. Ergoty Oats. Oats that contain more than 0.10 percent ergot.

Example: U.S. No. 3 Oats, Ergoty

d. Extra-Heavy Oats. Oats that have a test weight per bushel of 40 pounds or more.

Example: U.S. No. 1 Extra-Heavy Oats

e. Garlicky Oats. Oats that contain 4 or more green garlic bulblets or an equivalent quantity of dry or partly dry bulblets (12) in 500 grams of oats.

Example: U.S. No. 2 Oats, Garlicky

f. Heavy Oats. Oats that have a test weight per bushel of 38 pounds or more but less than 40 pounds.

Example: U.S. No. 2 Heavy Oats

g. Infested Oats. Oats that are infested with live weevils or other insects injurious to stored grain.

Example: U.S. No. 2 Oats, Infested

h. Smutty Oats. Oats that have kernels covered with smut spores to give a smutty appearance in mass or that contain more than 0.2 percent of smut balls.

Example: U.S. No. 2 Oats, Smutty

i. Thin Oats. Oats that contain more than 20.0 percent of oats and other matter, except fine seeds, that pass through a 0.064 x 3/8 oblong-hole sieve but remain on top of a 5/64 triangular-hole sieve after sieving according to procedures prescribed in FGIS instructions.

Example: U.S. No. 3 Oats, Thin

7.5 OPTIONAL GRADE DESIGNATION

The Official U.S. Standards for Grain provide for an optional grade designation, commonly referred to as "or better." Upon the request of an applicant, oats may be certificated as U.S. No. 2 or better, U.S. No. 3 or better, etc. An "or better" grade designation cannot be applied to a U.S. No. 1 grade designation.

Example: U.S. No. 2 or better Oats
U.S. Sample Grade or better Oats

7.6 BASIS OF DETERMINATION

Distinctly Low Quality. The determination of distinctly low quality is made on the basis of the lot as a whole at the time of sampling when a condition exists that may or may not appear in the representative sample and/or the sample as a whole.

Certain Quality Determinations. Each determination of rodent pellets, bird droppings, other animal filth, broken glass, castor beans, cockleburs, crotalaria seeds, dockage, garlic, live insect infestation, large stones, moisture, temperature, and unknown foreign substance(s), and a commonly recognized harmful or toxic substance(s) is made on the basis of the sample as a whole. When a condition exists that may not appear in the representative sample, the determination may be made on the basis of the lot as a whole at the time of sampling according to procedures prescribed in FGIS instructions.

All Other Determinations. Other determinations not specifically provided for under the General Provisions are made on the basis of the grain as a whole.

TABLE NO. 2

BASIS OF DETERMINATION		
Lot as a Whole	Factors Determined Before the Removal of Coarse Foreign Material and Other Grains	Factors Determined After the Removal of Coarse Foreign Material and Other Grains
Distinctly low quality Heating Infested Odor	Bleached oats Distinctly low quality Ergot Garlicky General appearance Heating Infested Kind of Grain Moisture Odor Smut Stones Test Weight Thin oats U.S. Sample Grade factors	Heat-damaged kernels Odor Other damaged kernels Other grains Sound oats Wild oats

The following sections are arranged in a logical sequence typically followed in the inspection and grading of oats.

7.7 DEFINITION OF OATS

Oats are defined as:

Grain that consists of 50 percent or more of oats (Avena sativa L. and A. Byzantina C. Koch) and may contain, singly or in combination, not more than 25 percent of wild oats and other grains for which standards have been established under the United States Grain Standards Act.

Other grains for which standards have been established are barley, canola, corn, flaxseed, rye, sorghum, soybeans, sunflower seed, triticale, and wheat.

Basis of Determination. Normally, a visual appraisal of the sample is sufficient to determine if the sample meets the definition of oats. However, if an analysis is necessary, make the determination on a portion of 30 grams.

If the sample does not meet the definition of oats, examine it further to determine if it is:

a. Another grain for which standards have been established or

b. Not standardized grain. No further analysis is necessary on a sample designated as not standardized grain unless a specific factor test is requested.

7.8 HEATING

Oats developing a high temperature from excessive respiration is considered heating. Heating oats, in its final stages, will usually have a sour or musty odor. Care should be taken not to confuse oats that are heating with oats that are warm and moist because of storage in bins, railcars, or other containers during hot weather.

Basis of Determination. Determine heating on evidence obtained at the time of sampling or on the basis of the sample as a whole.

Certification. Grade heating oats as U.S. Sample Grade and record the word "Heating" in the "Remarks" section of the certificate.

7.9 ODOR

Basis of Determination. Determine odor on evidence obtained at the time of sampling or on the sample either before or after the removal of foreign material.

TABLE NO. 3

ODOR CLASSIFICATION EXAMPLES		
Sour	Musty	Commercially Objectionable Foreign Odors
Boot	Ground	Animal hides
Fermenting	Insect	Decaying animal and vegetable matter
Insect (acrid)	Moldy	Fertilizer
Pigpen		Fumigant
		Insecticide
		Oil products
		Skunk
		Smoke
		Strong weed

Commercially Objectionable Foreign Odors. Commercially objectionable foreign odors are odors, except smut and garlic odors, foreign to grain that render it unfit for normal commercial usage.

Fumigant or insecticide odors are considered commercially objectionable foreign odors if they linger and do not dissipate. When a sample of oats contains a fumigant or insecticide odor that prevents the determination as to whether any other odor(s) exists, apply the following guidelines:

a. Original Inspections. Allow the work portion to aerate in an open container for 4 hours, or less, if the odor dissipates in less time.

b. Reinspections, Appeal, and Board Appeal Inspections. Allow unworked file samples and new samples to aerate in an open container for 4 hours, or less, if the odor dissipates in less time. The 4-hour aeration requirement does not apply when the original work portion was aerated and retained as the final file.

Consider the sample as having a commercially objectionable foreign odor if the fumigant or insecticide odor persists based on the above criteria.

Final Determinations. The inspector(s) is responsible for making the final determination for all odors. A consensus of experienced inspectors is used, whenever possible, on samples containing marginal odors. The consensus approach is not required if no odor or a distinct odor is detected.

Certification. Grade oats containing a "distinct" musty, sour, or commercially objectionable foreign odor as U.S. Sample Grade. Record the words "Musty," "Sour," or "Commercially Objectionable Foreign Odor" in the "Remarks" section of the certificate.

7.10 MOISTURE

Water content in grain as determined by an approved device according to procedures prescribed in FGIS instructions.

Basis of Determination. Determine moisture before the removal of dockage on a portion of approximately 225 grams.

The procedures for performing a moisture determination using the DICKEY-john Grain Analysis Computer GAC 2100 moisture meter are described in book II, chapter 1, section 1.10.

Certification. Record the percent of moisture on the work record and the certificate to the nearest tenth percent.

7.11 GENERAL APPEARANCE

General appearance factors are defined as:

Bright Oats. *Oats, except bleached oats, that are of good natural color.*

Slightly Weathered Oats. Oats that are slightly weathered shall be graded not higher than U.S. No. 3.

Badly Stained or Materially Weathered Oats. Oats that are badly stained or materially weathered shall be graded not higher than U.S. No. 4.

Basis of Determination. Determine general appearance on the sample as a whole.

Characteristics of Bright Oats. Bright oats are oats which have been ripened and harvested under favorable weather conditions and have a good natural color. Oats which do not have a good natural color usually appear dull and lifeless, or are stained, or green from immaturity. Do not consider a mixture of bright oats with any appreciable quantity of poorly colored oats as bright, but bright oats which contain smut masses or a light trace of smut spores on the kernels are considered bright.

Characteristics of Weathered Oats. The factors "Slightly Weathered," "Badly Stained," and "Materially Weathered" denote a discolored condition caused by adverse weather conditions.

a. Slightly-Weathered. In order for a sample of oats to be designated slightly weathered, (1) each individual kernel must have a slightly dusty, gray appearance on the brush end in sufficient amounts to give the entire sample a slightly weathered appearance or (2) the sample may contain severely weathered kernels in a sufficient number to give it a slightly weathered appearance. In either case, the oats are slightly weathered. (Reference: Interpretive Line Print - O-Slightly Weathered).

b. Badly Stained or Materially Weathered. When kernel discoloration due to weather has progressed to a point where many of the kernels are badly discolored and weathered, the oats are badly stained or materially weathered. (Reference: Interpretive Line Print -O-Materially Weathered).

In order to assure a more uniform application of the general appearance factors in oats, it is recommended that the following procedures be followed:

a. Cut 350 grams from the original sample.

b. Place the 350-gram portion into an empty plastic box approximately the same size as the interpretive line print.

c. Compare the sample with the interpretive line print.

d. Consider the oats slightly weathered, badly stained, or materially weathered when the sample is equal to or worse than the oats in the interpretive line print.

Certification. Record the words "Slightly Weathered," "Badly Stained," or "Materially Weathered" in the "Remarks" section of the certificate.

7.12 BLEACHED OATS

Oats that in whole or in part have been treated with sulfurous acid or any other bleaching agent.

Basis of Determination. Determine bleached on the general appearance and odor of the sample as a whole.

The odor of sulfur or any other bleaching agent is associated with bleached oats. When the odor or general appearance indicate that oats have been artificially bleached, either in whole or in part, the oats are "bleached."

Certification. When applicable, grade the oats in accordance with Section 7.4, Special Grades.

7.13 TEST WEIGHT

The weight per Winchester bushel (2,150.42 cubic inches) as determined using an approved device according to procedures prescribed in FGIS instructions.

Basis of Determination. Determine test weight on a portion of sufficient quantity to overflow the kettle.

The procedures for performing the test weight determination and available services are described in book II, chapter 1, section 1.11.

There are two special grades in oats that are based on test weight. They are:

Extra-Heavy Oats. *Oats that have a test weight per bushel of 40 pounds or more*.

Heavy Oats. *Oats that have a test weight per bushel of 38 pounds or more but less than 40 pounds*.

Certification. Record test weight results on the work record as displayed on the electronic scale or in whole and half pounds. Disregard fractions of a half pound. Record the test weight on the certificate in whole and half pounds. If requested, convert the pounds per bushel (lbs./bu) result to kilograms per hectoliter (kg/hl) using the following formula: lbs./bu x 1.287 = kg/hl and record in the "Remarks" section in whole and tenths.

When applicable, make the special grades "Extra Heavy" or "Heavy" a part of the grade designation and record on the certificate in accordance with Section 7.4, Special Grades.

7.14 INFESTED OATS

Infested oats are oats that are infested with live weevils or other live insects injurious to stored grain.

The presence of any live weevil or other live insects injurious to stored grain indicates the probability of infestation and warns that the oats must be carefully examined to determine if they are infested. In such cases, examine the work sample and the file sample before reaching a final conclusion. Do not examine the file sample if the work portion is insect free.

Live weevils shall include rice weevils, granary weevils, cowpea weevils, maize weevils, and lesser grain borers. Other live insects injurious to stored grain shall include grain beetles, grain moths, and larvae. (See Chapter 1, Section 1.2, Visual Grading Aids.)

Basis of Determination. Determine infestation on the lot as a whole and/or the sample as a whole. For insect tolerances, see table No. 4.

TABLE NO. 4

INSECT INFESTATION		
Samples meeting or exceeding any one of these tolerances are infested: ***2 lw, or 1 lw + 5 oli, or 10 oli***		
1,000-gram representative sample **1/** (+ file sample if needed)	Lot as a Whole (Stationary)	Online Sample (In-Motion) **2/**
Submitted samples Probed lots D/T sampled land carriers	Probed lots (at time of sampling)	Railcars under the Cu-sum Subsamples for Sacked Grain lots Components for Bargelots **3/** Components for Shiplots **3/**

1/ Examine work portion and file sample if necessary. Do not examine file sample if work portion is insect free.

2/ Minimum sampling rate is 500 grams per 2,000 bushels.

3/ Minimum component size is 10,000 bushels.

Key: lw = live weevil, oli = other live insects injurious to stored grain

Certification. When applicable, grade the oats "Infested" in accordance with Section 7.4, Special Grades.

7.15 DISTINCTLY LOW QUALITY

Consider oats distinctly low quality when they are obviously of inferior quality and the existing grade factors or guidelines do not accurately reflect the inferior condition.

Basis of Determination. Use all available information to determine whether the oats are of distinctly low quality. This includes a general examination of the oats during sampling and an analysis of the obtained sample(s).

Large Debris. Oats containing two or more stones, pieces of glass, pieces of concrete, or other pieces of wreckage or debris which are visible to the sampler but too large to enter the sampling device are considered distinctly low quality.

Other Unusual Conditions. Oats that are obviously affected by other unusual conditions which adversely affect the quality of the oats and cannot be properly graded by use of the grading factors specified or defined in the standards are considered distinctly low quality.

Oats suspected of containing diatomaceous earth are considered distinctly low quality unless the applicant specifically requests an examination to verify the presence of diatomaceous earth. If the laboratory examination verifies that the oats contain diatomaceous earth, then the oats are not considered distinctly low quality due to diatomaceous earth. Refer to Program Directive 9180.49, Grading and Certification of Grain Containing Diatomaceous Earth and Silica Gel, for additional information regarding the testing of oats for diatomaceous earth.

Certification. Grade distinctly low quality oats as U.S. Sample Grade. Record the reason(s) why the oats were distinctly low quality on the certificate.

7.16 U.S. SAMPLE GRADE CRITERIA

Basis of Determination. Determine U.S. Sample Grade criteria before the removal of coarse foreign material and other grains based on a work portion of 700 - 800 grams. Table No. 5 shows the criteria and corresponding interpretive line slides, tolerance limits, and the appropriate basis of determination. Consider identifiable pieces of grain, processed grain products (e.g., soybean meal, sorghum grits, corn meal, bulgur, etc.), or feed pellets in grain as foreign material. Unidentifiable materials or material unrelated to grain shall function as "unknown foreign substance."

TABLE NO. 5

U.S. SAMPLE GRADE CRITERIA			
Criteria	*Visual Reference Image*	Number/Weight **1**/	
		Sample Basis	Lot Basis **2**/
Any numerical grading factor		Excess of limit for U.S. No. 4	N/A
Animal filth	OF-Animal Filth	10 or more	N/A
Castor Beans	OF-Castor-Bean	2 or more	N/A
Cockleburs	OF-Cocklebur	8 or more	N/A
Crotalaria seeds	OF-Crotalaria	3 or more	N/A
Glass		2 or more	N/A
Odor		Presence	N/A
Stones		8 or more and in excess of 0.2% by weight	N/A
Unknown foreign substances **3**/	OF-Fertilizer	4 or more	N/A
Heating		Presence	Presence
Large Debris *		N/A	2 or more
Other unusual conditions *		Presence	Presence

1/ Record count factors to the nearest whole number.

2/ The entire sample of a submitted sample is considered as the lot.

3/ Consider feed pellets and processed grain products as foreign material, not unknown foreign substance.

***** For Distinctly Low Quality, see section 7.15

Certification. Grade oats U.S. Sample Grade when one or more of the limits in table 5 are observed. Record the reason(s) why in the "Remarks" section of the certificate. Record count factors to the nearest whole number.

7.17 THIN OATS

Thin Oats. *Oats that contain more than 20.0 percent of oats and other matter, except fine seeds, that pass through a 0.064 by 3/8 oblong-hole sieve but remain on top of a 5/64 triangular-hole sieve after sieving according to procedures prescribed in FGIS instructions.*

Fine Seeds. *All matter that passes through a 5/64 triangular-hole sieve after sieving according to procedures prescribed in FGIS instructions.*

Basis of Determination. Determine thin on a portion of 250 grams of the original sample. Separate the thin oats from the sample using one of the following methods:

a. Mechanical Sieving Method:

(1) Mount a 0.064 x 3/8 inch (1.626 x 9.525 millimeters (mm)) oblong-hole sieve and a bottom pan on the mechanical sieve shaker.

(2) Set the stroke counter for 30 strokes.

(3) Follow the procedure described in Book II, Chapter 1, Section 1.13, Mechanical Sieve Shaker.

(4) Place one-third of the sample in the center of the sieve and start the machine. After the sieve shaker has stopped, remove and clean the sieve and empty the bottom pan. Return the material lodged in the perforations to the oats on top of the sieve.

(5) Repeat this operation on the remaining portions until entire sample has been sieved.

b. Hand Sieving Method:

(1) Mount a 0.064 x 3/8 inch oblong-hole sieve on a bottom pan.

(2) Place one-third of the sample in the center of the sieve.

(3) Hold the sieve level in both hands with elbows close to the sides and the sieve perforations parallel to the direction of movement.

(4) In a steady motion, move the sieve from left to right approximately 10 inches and then return from right to left.

(5) Repeat this operation 30 times.

(6) Clean the sieve and empty the bottom pan. Return the material lodged in the perforations to the oats on top of the sieve.

(7) Repeat this operation on the remaining portions until entire sample has been sieved.

Sieve the material which passed through the 0.064 x 3/8 inch oblong-hole sieve over a 5/64 (1.984 mm) triangular-hole hand sieve (small buckwheat) to remove the fine seeds which may be present. Place the material that passed through the 0.064 x 3/8 inch oblong-hole sieve on the upper edge of the small buckwheat sieve. Hold the sieve at a 10 to 20-degree angle and work the material down over the sieve with a gentle side-to-side motion. The fine seeds and other material passing through the small buckwheat sieve are considered fine seeds.

The oats and other material that pass through the 0.064 x 3/8 inch oblong-hole sieve but remain on top of the 5/64 inch triangular-hole sieve are thin oats.

Certification. When applicable, grade the oats "Thin" and record the percentage to the nearest tenth percent on the certificate in accordance with Section 7.4, Special Grades.

7.18 PROCESSING THE WORK SAMPLE

At this point, determinations have been made for heating, odor, moisture, general appearance, bleached, test weight, infestation, distinctly low quality, sample grade factors, and thin. Now divide the work sample into fractional portions for determining smutty, garlicky, ergoty, sound, foreign material and other grains, heat-damaged kernels, damaged, and wild oats. The following chart and table No. 6 illustrate how the sample is divided into fractional parts using the Boerner divider.

CHART 1 - DIVIDING THE WORK SAMPLE

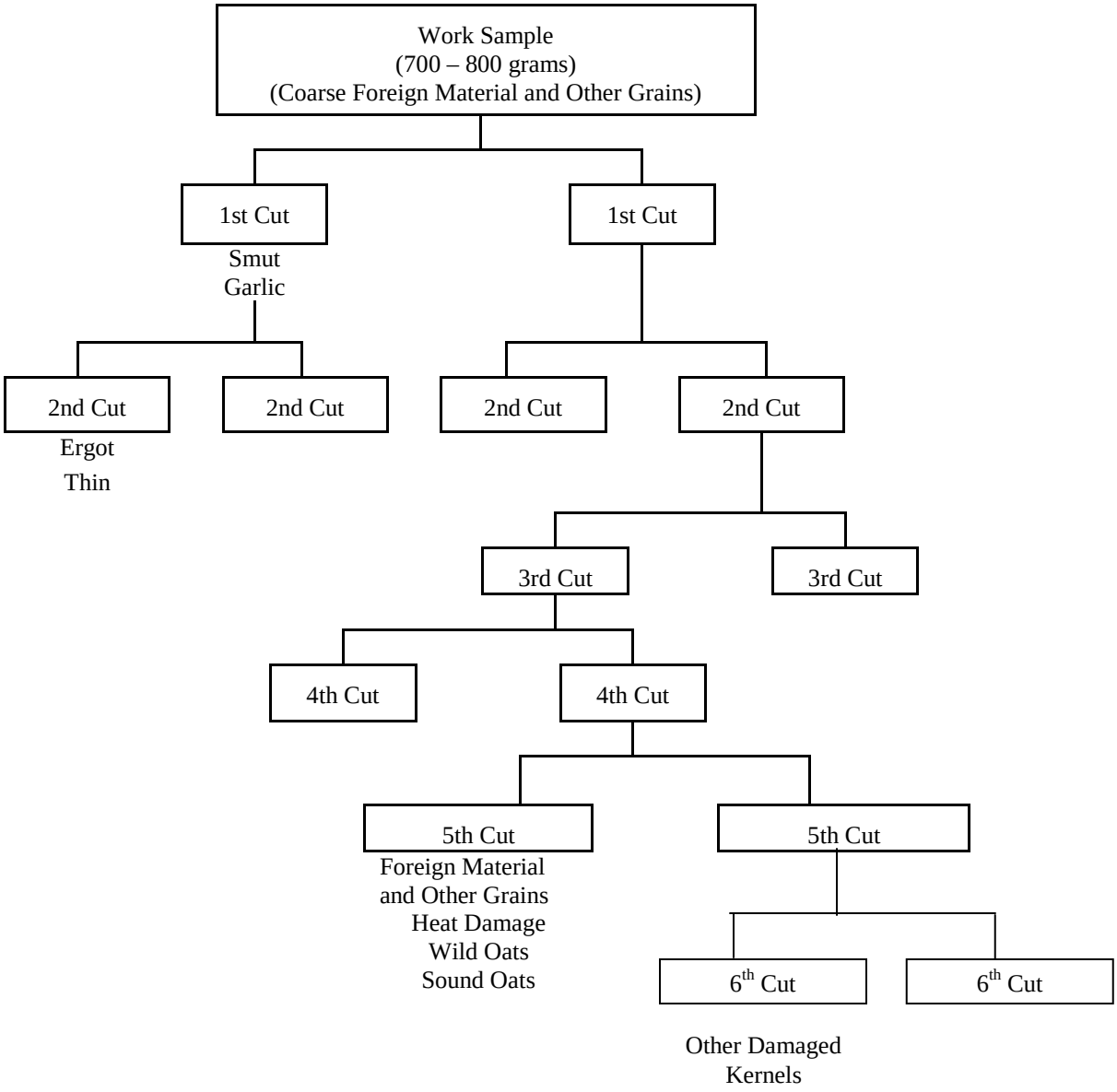


TABLE NO. 6

APPROXIMATE ANALYTICAL PORTION SIZES	
Factors	*Grams*
Smut	500
Garlic	500
Ergot	250
Foreign material and other grains	30
Heat-damaged kernels	30
Wild oats	30
Other damaged kernels	15
Sound oats	30

7.19 SMUTTY OATS

Oats that have kernels covered with smut spores to give a smutty appearance in mass or that contain more than 0.2 percent of smut balls.

Basis of Determination. Determine smutty on a portion of 500 grams of the original sample.

Smut Spores. When smut spores are in a sufficient quantity to give the entire sample a smutty appearance, grade the oats smutty. In such cases, there is often a sufficient quantity of smut balls (excess 0.2 percent) which would cause the sample to grade smutty. Smut balls apply in the determination of the special grade "Smutty" but also function as foreign material.

Certification. When applicable, grade the oats "Smutty" in accordance with Section 7.4, Special Grades.

7.20 GARLICKY OATS

Oats that contain four or more green garlic bulblets or an equivalent quantity of dry or partly dry bulblets in 500 grams of oats.

Basis of Determination. Determine garlicky on a portion of 500 grams of the original sample. (Reference: Visual Reference Images Nos. OF-Garlic Bulbs and OF-Dry Garlic Bulbs)

Characteristics of Bulblets.

a. Green garlic bulblets are bulblets which have retained all of their husks intact.

b. Dry or partly dry garlic bulblets are bulblets which have lost all or part of their husks. Consider bulblets with cracked husks as dry.

NOTE: Wild onion, sometimes referred to as "crow garlic", is considered as garlic.

Three dry or partly dry garlic bulblets are equal to one green bulblet.

Certification. Record the word "Garlicky" on the certificate in accordance with Section 7.4, Special Grades. Upon request, provide the number of garlic bulblets in whole and/or in decimals to the hundredths position (e.g., 1/3 = 0.33, 2/3 = 0.67).

7.21 ERGOTY OATS

Oats that contain more than 0.10 percent ergot.

Ergot is a hard, reddish-brown or black grain like mass of certain parasitic fungi that replaces oat kernels. (Reference: Visual Reference Image No. OF-Ergot)

Basis of Determination. Determine ergoty on a portion of 250 grams of the original sample.

Certification. Record the word "Ergoty" on the certificate in accordance with Section 7.4, Special Grades. Upon request, record the percentage of ergot to the nearest hundredth percent.

7.22 SOUND OATS

Kernels and pieces of oat kernels (except wild oats) that are not badly ground- damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat- damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

Basis of Determination. To determine the percentage of sound oats, separate all damaged oats and all matter other than cultivated oats from the work portion. The practical application of this determination involves:

a. Separation of coarse foreign material and whole kernels of corn and soybeans from the work sample (700 - 800 grams) (refer to section 7.23);

b. The separation of foreign material, other grains, heat-damaged kernels, and wild oats from a work portion of 30 grams; and

c. The separation of other damaged kernels from a work portion of 15 grams.

The sum of the percentages of foreign material, other grains, heat-damaged kernels, other damaged kernels, and wild oats subtracted from 100 percent, equals the percentage of sound oats.

Certification. Record the percentage of sound oats on the certificate to the nearest tenth percent.

7.23 FOREIGN MATERIAL AND OTHER GRAINS

Foreign Material. *All matter other than oats, wild oats, and other grains.*

Consider oat clippings and detached oat hulls and pieces of detached hulls as foreign material.

Other Grains. *Barley, canola, corn, cultivated buckwheat, einkorn, emmer, flaxseed, guar, hull-less barley, nongrain sorghum, Polish wheat, popcorn, poulard wheat, rice, rye, safflower, sorghum, soybeans, spelt, sunflower seed, sweet corn, triticale, and wheat.*

a. Coarse Foreign Material and Other Grains.

Basis of Determination. Determine coarse foreign material and coarse other grains on a work portion of 1-1/8 to 1-1/4 quarts. Coarse foreign material and coarse other grains consists of the following:

(1) Coarse Foreign Material.

(a) Cockleburs.

(b) Sticks if the following criteria are met:

1 Approximately 2.5 cm (1 inch) or more in length.

2 Approximately 1.3 cm (1/2 inch) or more with a thickness of .4 cm (5/32 inch).

(c) Soybean pods (one-half pod or more).

(d) Other coarse foreign material may include but is not limited to corn cobs, large feed pellets, pieces of dirt, and edible beans.

(2) Coarse Other Grains.

(a) Whole kernels of corn and sweet corn. Whole kernels of corn and sweet corn are kernels with one-fourth or less of the kernel removed.

(b) Whole soybeans. Whole soybeans are soybeans with one-fourth or less of the soybean removed.

(c) Sunflower seeds. Sunflower seeds with the hulls intact.

Maintain individual separations for coarse foreign material and for coarse other grains.

b. Fine Foreign Material and Other Grains. Fine foreign material and fine other grains consist of the following:

Basis of Determination. Determine fine foreign material and fine other grains after the removal of coarse foreign material and coarse other grains on a work portion of 30 grams.

(1) Fine Foreign Material.

(a) Star thistles, star burs, sandburs, morning glory, and kinghead seeds.

(b) Sticks not meeting the criteria for coarse foreign material.

(c) Soybean pods less than one-half the total pod.

(d) Any other material too small to function as coarse foreign material and other grains.

(2) Fine Other Grains.

(a) Broken kernels of corn and sweet corn with more than one-fourth of the kernel removed.

(b) Broken soybeans with more than one-fourth of the soybean removed.

(c) Dehulled sunflower seeds.

(d) Other grains as defined in this section.

CHART 2 - PROCEDURE FOR DETERMINING FOREIGN MATERIAL AND OTHER GRAINS

STEP 1. Coarse Foreign Material and Coarse Other Grains

a. Handpick the 700 – 800 gram work portion for coarse foreign material and coarse other grains.

b. Refer to the above definition for materials which constitute coarse foreign material and coarse other grains.

STEP 2. Fine Foreign Material and Fine Other Grains

a. Cut down the cleaned sample to a portion of 30 grams.

b. Either:

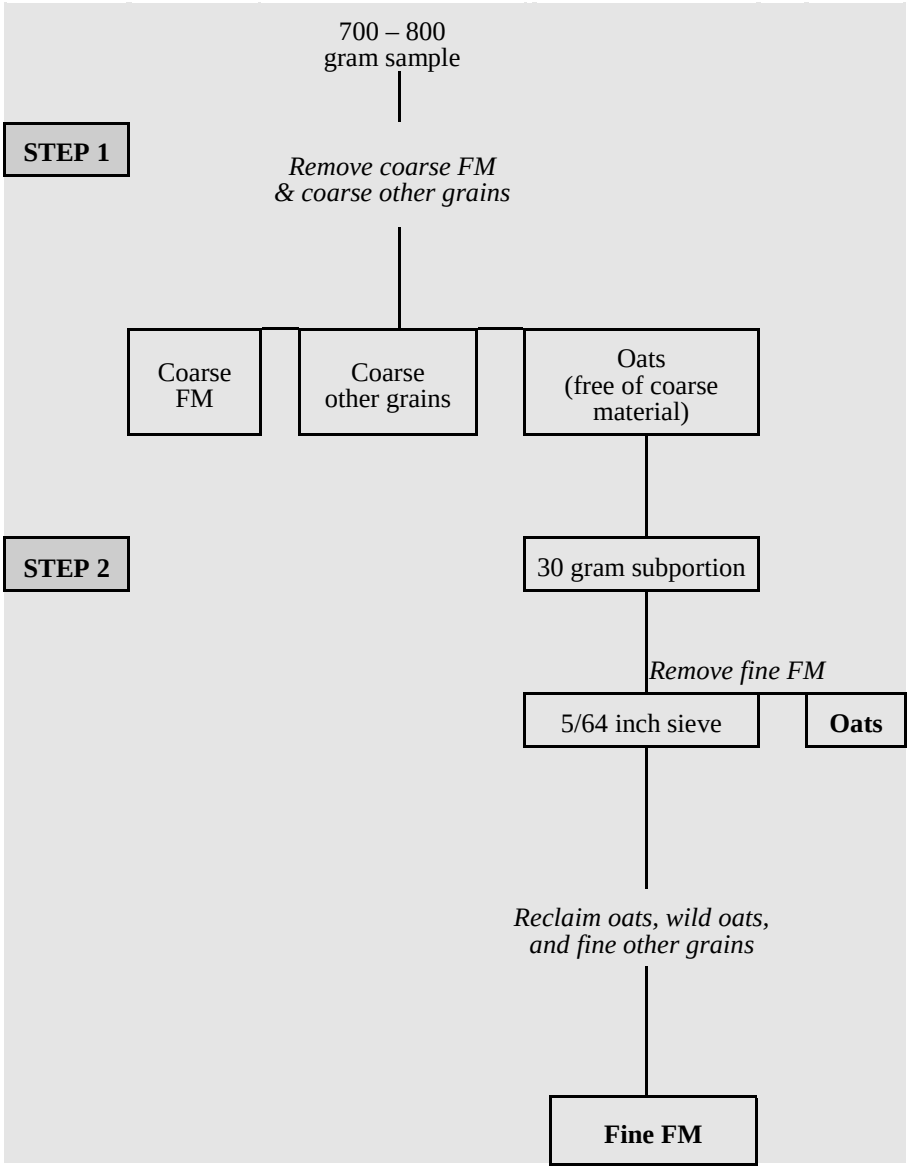
(1) handpick the 30-gram portion for fine foreign material and fine other grains; or

(2) use, as an aid, a 5/64 inch (1.984 mm) triangular-hole sieve to remove the fine foreign material and fine other grains.

c. When using the sieve, gently slide the sample across the sieve then separate the oats, wild oats, and fine other grains from the material that passed through the sieve.

d. Remove all fine foreign material from the material remaining on top of the sieve.

e. Refer to the above definition for the materials which constitute fine foreign material and fine other grains.



Computing Foreign Material. Compute foreign material in oats by adding the percentage of coarse foreign material to the percentage of fine foreign material in hundredths (disregard thousandths) and round the sum to the nearest tenth percent.

Example

Weight of representative sample	700 grams
Weight of coarse foreign material	5.00 grams
Percentage of coarse foreign material (5.00 ÷ 700) x 100	0.71 percent
Weight of portion to be sieved	30.00 grams
Weight of fine foreign material	0.50 grams
Percentage of fine foreign material (0.50 ÷ 30.00) x 100	1.66 percent
Percentage of foreign material (0.71 + 1.66)	2.37 percent
rounded to:	2.4 percent

Computing Other Grains. Compute other grains in oats by adding the percentage of coarse other grains to the percentage of fine other grains (procedure similar to that given in the above example).

Certification. Record the percent of foreign material (includes coarse and fine) on the certificate to the nearest tenth percent. Record the percent of other grains (includes coarse and fine) on the work record to the nearest tenth percent.

7.24 HEAT-DAMAGED KERNELS

Kernels and pieces of oat kernels, other grains, and wild oats that are materially discolored and damaged by heat.

a. Whole Corn and Soybeans.

Basis of Determination. Determine heat-damaged whole corn and soybeans on a work portion of 700 - 800 grams.

Whole corn and soybeans that show evidence of distinct discoloration and damage by heat are examined to determine if they are heat damaged. (Reference: Visual Reference Image Nos. C-5.0 Heat Damage (Drier), C-5.1 Heat Damage (White), C-5.2 Heat Damage (Yellow), SB-5.0 Heat Damage (Mat. Damage/Heating))

b. Oats, Wild Oats, and Other Grains.

Basis of Determination. Determine heat-damaged kernels after the removal of coarse foreign material and coarse other grains on a work portion of 30 grams.

Kernels of oats and wild oats that show evidence of distinct discoloration and damage by heat are hulled to determine if they are heat damaged. When the hulled kernels show a reddish discoloration extending out of the germ, the kernels are heat damaged. (Reference: Visual Reference Image No. O-3.0 Heat Damage)

Groats showing moldy, mold-like substance, sprouted, or dead germs but no reddish cast or discoloration function against sound cultivated oats but not as heat-damaged kernels.

Other grains that show evidence of distinct discoloration and damage by heat are examined to determine if they are heat-damaged.

Computing Heat-Damaged Kernels. Compute the percentage of heat-damaged kernels by adding the percentage of heat-damaged whole corn and soybeans to the percentage of heat-damaged oats, wild oats, and other grains in hundredths (disregard thousandths) and round the sum to the nearest tenth percent.

Example

Weight of representative sample	700 grams
Weight of heat-damaged corn and soybeans	3.00 grams
Percentage of heat-damaged whole corn and soybeans (3.00 ÷ 700) x 100	0.42 percent
Weight of representative sample	30.00 grams
Weight of heat-damaged oats, wild oats, and other grains	0.30 grams
Percentage of heat-damaged oats, wild oats, and other grains (0.30 ÷ 30.00) x 100	1.00 percent
Percentage of heat-damaged kernels (0.42 + 1.00)	1.42 percent
rounded to:	1.4 percent

Certification. Record the percent of heat-damaged kernels to the nearest tenth percent on the certificate.

7.25 OTHER DAMAGED KERNELS

Other damaged kernels are kernels and pieces of oat kernels, except heat-damaged kernels, that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

Heat-damaged kernels are not considered as part of other damaged kernels (refer to section 7.24).

Basis of Determination. Determine other damaged kernels after the removal of coarse foreign material and coarse other grains on a work portion of 15 grams.

In general, oat kernels are considered damaged for inspection and grading purposes only when the damage is distinctly apparent and of such character as to be recognized as damaged for commercial purposes.

Oat groats; hull-less oats; and green, immature kernels of oats that are not otherwise damaged are considered sound.

Badly-Ground and/or Weather-Damaged Kernels. Kernels which are badly discolored by ground and/or weather conditions. (Reference: Visual Reference Image No. O-1.0 Badly Ground and /or Weather Damage)

Germ-Damaged Kernels (Sick and/or Mold). Kernels in which the germ is discolored or moldy as a result of respiration. The hull must be removed to determine the extent of germ damage. (Reference: Visual Reference Image No. O-2.0 Germ Damage (Sick and/or Mold))

Insect-Bored Kernels. Kernels which have been bored or tunneled by insects are considered damaged and scored against sound. (Reference: Visual Reference Image No. O-4.0 Insect Damage)

Sprout-Damaged Kernels. Kernels which have sprouted or which generally have a crack in the seed coat over the germ area are considered damaged and scored against sound. The hull must be removed to determine if the cracked seed coat indicates sprouting. (Reference: Visual Reference Image No. O-5.0 Sprout Damage)

Computing Other Damaged Kernels. Compute other damaged kernels in oats as shown in the following example:

Example

Weight of representative portion	15.10 grams
Weight of other damaged kernels	0.11 grams
Percentage of other damaged kernels (0.11 ÷ 15.10) x 100	0.72 percent
rounded to:	0.7 percent

Certification. Record the percent of other damaged kernels on the work record to the nearest tenth percent.

7.26 WILD OATS

Seeds of Avena fatua L. and A. sterilis L.

Basis of Determination. Determine wild oats after the removal of coarse foreign material and coarse other grains on a work portion of 30 grams.

Wild oats are usually identified by their characteristic slender kernels with twisted awns (so-called "sucker mouths") and basal hairs or bristles on the germ end of the kernels. Wild oats function against sound oats. (Reference: Visual Reference Image No. OF- Wild Oats)

Certification. Record the percent of wild oats on the certificate to the nearest tenth percent.

7.27 OFFICIAL CRITERIA

Seed sizing is considered "official criteria" and is determined only on request. It does not affect the grade designation. Use the 5/64 x 3/4 slotted-hole sieve to determine the percentage of oats and other materials, except for fine seeds, that pass through the sieve.

Basis of Determination. Determine seed size on a portion of 250 grams of the original sample. Separate the seeds from the sample using one of the following methods:

a. Mechanical Sieving Method.

(1) Mount a 5/64 x 3/4 (1.984 x 19.050 millimeters (mm)) slotted-hole sieve and a bottom pan on the mechanical sieve shaker.

(2) Set the stroke counter for 30 strokes.

(3) Follow the procedure described in Book II, Chapter 1, Section 1.13, Mechanical Sieve Shaker.

(4) Place the sample in the center of the sieve and start the machine. After the sieve shaker has stopped, remove and clean the sieve and empty the bottom pan. Return the material lodged in the perforations to the oats on top of the sieve.

(5) Sieve the material which passed through the 5/64 x 3/4 inch slotted-hole sieve over a 5/64 (1.984 mm) triangular-hole hand sieve (small buckwheat) to remove the fine seeds which may be present. Place the material that passed through the 5/64 x 3/4 inch slotted-hole sieve on the upper edge of the small buckwheat sieve. Hold the sieve at a 10 to 20-degree angle and work the material down over the sieve with a gentle side-to-side motion. The fine seeds and other material passing through the small buckwheat sieve are considered fine seeds.

b. Hand Sieving Method.

(1) Mount a 5/64 x 3/4 inch slotted-hole sieve on a bottom pan.

(2) Place the sample in the center of the sieve.

(3) Hold the sieve level in both hands with elbows close to the sides and the sieve perforations parallel to the direction of movement.

(4) In a steady motion, move the sieve from left to right approximately 10 inches and then return from right to left.

(5) Repeat this operation 30 times.

(6) Clean the sieve and empty the bottom pan. Return the material lodged in the perforations to the oats on top of the sieve.

(7) Sieve the material which passed through the 5/64 x 3/4 inch slotted-hole sieve over a 5/64 (1.984 mm) triangular-hole hand sieve (small buckwheat) to remove the fine seeds which may be present. Place the material that passed through the 5/64 x 3/4 inch slotted-hole sieve on the upper edge of the small buckwheat sieve. Hold the sieve at a 10 to 20-degree angle and work the material down over the sieve with a gentle side-to-side motion. The fine seeds and other material passing through the small buckwheat sieve are considered fine seeds.

Certification. Record the results of the sizing test to the nearest tenth percent in the "Remarks" section of the certificate.