

INSPECTION OF HULLESS OATS

1. PURPOSE

This directive establishes uniform procedures for the factor analysis of Hulless oats (*Avena nuda* L.) as "Not Standardized Grain" under the U.S. Grain Standards Act (USGSA).

2. REPLACEMENT HIGHLIGHTS

This directive supersedes FGIS Program Directive 9180.63, Inspection of Hulless oats, dated 9/17/01. This directive is updated to reflect minor editorial changes.

3. GENERAL INFORMATION

- a. Inspection of Hulless oats is upon request and on a factor only basis.
- b. All quantities referenced in this directive are approximate unless otherwise specified.
- c. There are no classes, subclasses, or numerical grades for Hulless oats.
- d. In addition to the factor analysis described in this directive, an applicant may request other quality information (e.g., an exact count on stones in addition to the percentage by weight, a percentage for a specific type of damage, etc.).
- e. Use an approved divider to obtain subportions of a sample for analysis unless otherwise specified.
- f. If an approved mechanical sizer is unavailable, inspectors may handsieve the sample.
- g. Official inspection personnel shall document inspection information during sampling and inspection.
- h. Under USGSA regulations there are four inspection levels: original inspection, re-inspection, appeal inspection, and board appeal inspection.

4. DEFINITION OF HULLESS OATS

Hulless oats, as described in this directive, is grain that before the removal of foreign material and other grains consists of 95 percent or more of whole kernels of Hulless oats and not more than 5 percent of other grains.

Hulless oats are recognized by a non-adhering hull that is normally removed in the threshing process or can be removed easily by hand. Visually examine the sample to determine if it meets the definition of Hulless oats. If an analysis is necessary, make the determination on a 25-gram representative portion before the removal of foreign material and other grains.

- a. Whole kernels are kernels with three-fourths or more of the kernel present.
- b. Other grains for which standards have been established are barley, canola, corn, flaxseed, oats, rye, sorghum, soybeans, sunflower seed, triticale, and wheat.

5. BASIS OF DETERMINATION

- a. The determination of distinctly low quality, heating, infestation, or odor is made on the basis of the lot 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.
- b. The determination of rodent pellets, bird droppings, other animal filth, broken glass, castor beans, cockleburs, crotalaria seeds, foreign material and other grains, 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.
- c. All other determinations are made after the removal of foreign material.

6. QUALITY FACTORS DETERMINATION

- a. Purity.

Upon request, determine purity on a 25-gram representative portion of the original sample before the removal of foreign material and other grains. Determine the percent of purity by the weight of kernels and parts of kernels that meet the definition of Hulless oats. Record the percentage of Hulless oats on the work record and the certificate to the nearest tenth percent.

b. Heating.

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

Determine heating on evidence obtained at the time of sampling or on the sample either before or after the removal of foreign material and other grains. When applicable, record the word "Heating" on the work record and the certificate.

c. Moisture.

Water content in Hulless oats is determined by the air oven method or by using the Dickey-john GAC-2100 instrument utilizing the calibrations listed below for Oat Groats (841022), with a moisture range of 5 to 13 percent.

K1: 0334	K6: 1547
K2: 0076	K7: 1305
K3: 1076	K8: 1831
K4: 0000	K9: 1074
K5: 2320	

Determine moisture on a representative portion of approximately 350 grams before the removal of dockage. Record the percentage of moisture on the work record and certificate to the nearest tenth percent.

d. Odor.

Odor Classification Examples

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

- (1) Commercially Objectionable Foreign Odors (COFO) are odors, except smut and garlic that are foreign to grain and render it unfit for normal commercial usage.
- (2) Determine odor on evidence obtained at the time of sampling or on the sample either before or after the removal of foreign material.

Fumigant or insecticide odors are considered commercially objectionable foreign odors if they linger and do not dissipate. When a sample of Hulless 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.

Designate Hulless oats containing a "**DISTINCT ODOR**" as musty, sour, or COFO as such and record in the "Remarks" section of the certificate.

e. Infestation.

Infested Hulless oats are oats 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. Determine infestation on the lot as a whole and/or the sample as a whole. The following table shows insect tolerances.

<p><i>Samples meeting or exceeding any one of these tolerances are infested: 2 lw, or 1 lw + 5 oli, or 10 oli</i></p>
<p>I. 1,000-Gram Representative Sample <u>1/</u> (+ file sample if needed)</p> <ul style="list-style-type: none"> - Submitted Samples - Probed Lots - D/T Sampled Landcarriers
<p>II. Lot as a Whole (Stationary)</p> <ul style="list-style-type: none"> - Probed Lots (at time of sampling)
<p>III. Online Sample (In-Motion) <u>2/</u></p> <ul style="list-style-type: none"> - Railcars Under Cu-Sum - Subsamples for Sacked Grain Lots - Components for Bargelots <u>3/</u> - Components for Shiplots <u>3/</u>
<p><u>1/</u> Examine work portion and file sample if necessary. Do not examine file sample if work portion is insect free. <u>2/</u> Minimum sampling rate is 500 grams per 2,000 bushels. <u>3/</u> Minimum component size is 10,000 bushels. Key: lw = live weevil Oli = other live insects injurious to stored grain</p>

When applicable, record the word "Infested" in the "Remarks" section of the certificate.

f. Test Weight.

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

Determine test weight on a portion of sufficient quantity to overflow the kettle. Record test weight results on the work record as displayed on the electronic scale, or in whole and half pounds, disregarding fractions of a half-pound. Record the test weight on the certificate in whole and half pounds disregarding fractions of a half pound.

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.

g. Distinctly Low Quality.

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

- (1) Large Debris. Oats containing two or more stones, pieces of glass, pieces of concrete, or other pieces of wreckage or debris that are visible to the sampler but too large to enter the sampling device are considered distinctly low quality.
- (2) 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.

Hulless 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 FGIS 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.

Designate the grain as distinctly low quality and record the reason(s) why the oats were distinctly low quality on the certificate.

h. Smutty.

Hulless oats that have kernels covered with smut spores so as to give a smutty appearance in mass or that contain more than 0.2 percent of smut balls. 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, or the sample contains smut balls in excess of 0.2 percent, grade the oats smutty.

When applicable, designate the oats “Smutty” and record the percentage to the nearest tenth percent on the work record and certificate.

i. Garlicky.

Hulless oats that contain four or more green garlic bulblets or an equivalent quantity of dry or partly dry bulblets in 500 grams of oats. Determine garlicky on a portion of 500 grams of the original sample. Bulblets are divided into the following types:

- (1) Green garlic bulblets are bulblets that have retained all of their husks intact.
- (2) Dry or partly dry bulblets are bulblets that have lost all or part of their husks.
- (3) Consider bulblets with cracked husks as dry.
- (4) Three dry or partly dry bulblets are equal to one green garlic bulblet.

Record the word "Garlicky" on the certificate. Upon request of the applicant for service, provide the number of garlic bulblets in whole and decimals to the nearest hundredth percent on the certificate. (*i.e.* $1/3=0.33$, $2/3=0.67$)

j. Ergoty.

Hulless oats that contain more than 0.10 percent ergot are considered ergoty. Determine ergoty on a portion of 250 grams of the original sample.

Ergot is a hard, reddish-brown or black grain-like mass of certain parasitic fungi that replaces oat kernels.

Record the word "Ergoty" on the certificate. When requested, the percentage of ergot may be recorded to the nearest hundredth percent on the certificate.

k. Sound.

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

Determine sound as follows:

- (1) Separate coarse foreign material and whole kernels of corn and soybeans from the work sample, and
- (2) Separate foreign material, other grains, heat-damaged kernels, other damaged kernels, and wild oats from a work portion of 30 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.

Record the percentage of sound oats on the work record and certificate to the nearest tenth percent.

1. Fine Foreign Material and Other Grains.

All matter other than Hulless oats, wild oats, and other grains are considered foreign material. Consider oat clippings and detached oat hulls and pieces of detached hulls as foreign material.

Barley, canola, corn, cultivated buckwheat, einkorn, emmer, flaxseed, guar, hulless barley, nongrain sorghum, oats, Polish wheat, popcorn, poulard wheat, rice, rye, safflower, sorghum, soybeans, spelt, sunflower seed, sweet corn, triticale, wild oats, and wheat are considered other grains.

(1) Coarse Foreign Material and Other Grains:

Determine coarse foreign material and coarse other grains on 1-1/8 to 1-1/4 quarts representative portion. Coarse foreign material and coarse other grains are corn, soybeans, cockleburs, sticks, soybean pods, corn cobs, large feed pellets, pieces of dirt, sweet corn, and edible beans.

(2) Foreign Material and Other Grains:

Determine fine foreign material and fine other grains after the removal of coarse foreign material and coarse other grains on a 30-gram representative portion.

Fine foreign material are Star thistles, star burs, sandburs, morning glory, kinghead seeds, sticks not meeting the criteria for coarse foreign material, soybean pods less than one-half the total pod, and any other material too small to function as coarse foreign material and other grains.

Fine other grains are broken kernels of corn or soybeans with more than one-fourth of the kernel removed, and other grains.

Computing Foreign Material. Compute foreign material 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
Percent 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 gram
Percent of fine foreign material (0.50 / 30.00) X 100	= 1.66 percent
Percent of foreign material (0.71 + 1.66)	= 2.37 percent
Rounded to:	= 2.4 percent

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

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

m. Heat-damaged Kernels.

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

- (1) Whole Corn and Soybeans: 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.

- (2) Oats, Wild Oats, and Other Grains: Determine heat-damaged kernels after the removal of coarse foreign material and coarse other grains on a 30-gram representative portion.

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.

Hulless oats showing moldy, mold-like substance, sprouted, or dead germs, but no reddish cast or discoloration, are not considered sound oats, but function against the percentage of sound oats. Also, these oats are not considered 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 whole corn and soybeans	= 3.00 grams
Percent 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
Percent of heat-damaged oats, wild oats, and other grains (0.30 / 30.00) x 100	= 1.00 percent
Percent of heat-damaged kernels (0.42 + 1.00)	= 1.42 percent
Rounded to:	1.4 percent

Record the percent of heat-damaged kernels to the nearest tenth percent on the work record and certificate.

n. Other Damaged Kernels.

Other damaged kernels are kernels and pieces of Hulless 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. Determine other damaged kernels after the removal of coarse foreign material and coarse other grains on a work portion of 30 grams.

In general, oat kernels are considered damaged for inspection purposes only when the damage is distinctly apparent and of such character as to be recognized as damaged for commercial purposes. Green, immature kernels of Hulless oats that are not otherwise damaged are considered sound.

- (1) Badly Ground and/or Weather-Damaged Kernels. Kernels which are badly discolored by ground and/or weather conditions.
- (2) Germ-Damaged Kernels (Sick and/or Mold). Kernels in which the germ is discolored or moldy as a result of respiration.
- (3) Insect-Bored Kernels. Kernels which have been bored or tunneled by insects are considered damaged and scored against sound.
- (4) 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.
- (5) Computing Other Damaged Kernels. Compute other damaged kernels in Hulless oats as follows:

Example:

Weight of representative portion	= 30.00 grams
Weight of other damaged kernels	= 0.22 grams
Percentage of other damaged kernels: (0.22 / 30.00) x 100	= 0.73 percent
rounded to:	0.7 percent

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

o. Wild Oats.

Wild oats are seeds of Avena fatua L. and A. sterilis L. They 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 are not considered sound oats, but function against the percentage of sound oats.

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

Record the percent of wild oats on the work record and certificate to the nearest tenth percent.

p. Seed Sizing.

Determine seed sizing on a portion of 250 grams of the original sample using the 5/64 x 3/4 slotted-hole sieve to determine the percentage of Hullless oats and other materials, except for fine seeds, that pass through the sieve as follows:

(1) Mechanical Sieving Method:

- (a) 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.
- (b) Set the stroke counter for 30 strokes.
- (c) 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.
- (d) Sieve the material that 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.
- (e) 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.

(2) Hand Sieving Method:

- (a) Mount a 5/64 x 3/4 inch slotted-hole sieve on a bottom pan.
- (b) Place the sample in the center of the sieve.
- (c) Hold the sieve level in both hands with elbows close to the sides and the sieve perforations parallel to the direction of movement.
- (d) In a steady motion, move the sieve from left to right approximately 10 inches and then return from right to left.
- (e) Repeat this operation 30 times.
- (f) Clean the sieve and empty the bottom pan. Return the material lodged in the perforations to the oats on top of the sieve.
- (g) 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.
- (h) 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.

Record the results of the sizing test to the nearest tenth percent on the work record of the certificate.

7. QUESTIONS

Direct any questions concerning this directive to the Policies and Procedures Branch at (202) 720-0224.

/s/ John Giler

John Giler, Director
Field Management Division