# GRAIN INSPECTION HANDBOOK

## BOOK II, CHAPTER 5

## FLAXSEED

# CHAPTER 5

# FLAXSEED

## 5.1 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 grain Visual Reference Images, see F-1.0 – F-3.0.

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 flaxseed. 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.).

## 5.2 GRADES AND GRADE REQUIREMENTS

There are no classes, subclasses, or special grades in flaxseed. Flaxseed is divided into two numerical grades and U.S. Sample Grade.

**TABLE NO. 1 - GRADES AND GRADE REQUIREMENTS - FLAXSEED**

| Grade | Minimum Limits of - | Maximum Limits of - | |
|---|---|---|---|
| | Test weight per bushel (pounds) | Heat-Damaged kernels (percent) | Damaged kernels total (percent) |
| U.S. No. 1 | 49.0 | 0.2 | 10.0 |
| U.S. No. 2 | 47.0 | 0.5 | 15.0 |

U.S. Sample Grade:

U.S. Sample Grade is flaxseed that:

(a) Does not meet the requirements for grades U.S. No. 1, or 2; 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), 10 or more rodent pellets, bird droppings, or equivalent quantity of other animal filth per 1 1/8 to 1 ¼ quarts of flaxseed, or

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

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

## 5.3 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 word "Flaxseed" shall be shown next, and

e. The word "Dockage" (when applicable) and the percentage thereof.

## 5.4 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, flaxseed may be certificated as U.S. No. 2 or better, U.S. Sample Grade 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 Flaxseed, Dockage 1.0%

## 5.5 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 when free from dockage, except the determination of odor is made on either the basis of the grain as a whole or the grain when free from dockage.*

**TABLE NO. 2**

| BASIS OF DETERMINATION | | |
|---|---|---|
| Lot as a Whole | Factors Determined Before the Removal of Dockage | Factors Determined After the Removal of Mechanically Separated Dockage |
| Distinctly low quality<br>Heating<br>Odor | Distinctly low quality<br>Heating<br>Kind of Grain<br>Moisture<br>Odor<br>U.S. Sample Grade factors | Damaged kernels<br>Handpicked dockage<br>Heat-damaged kernels<br>Odor<br>Stones<br>Test weight |

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

## 5.6 DEFINITION OF FLAXSEED

Flaxseed is defined as:

*Grain, that before the removal of dockage, consists of 50 percent or more of common flaxseed (Linum usitatissimum L.) and not more than 20 percent of other grains for which standards have been established under the United States Grain Standards Act and which, after the removal of dockage, contains 50 percent or more of whole flaxseed.*

Whole kernels are kernels with three-fourths or more of the kernel present. Other grains for which standards have been established are barley, canola, corn, oats, 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 for flaxseed. However, if an analysis is necessary, make the determination before the removal of dockage on a representative portion of 25 grams.

If the sample does not meet the definition of flaxseed, 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.

## 5.7 HEATING

Flaxseed developing high temperature from excessive respiration is considered heating. Heating flaxseed, in its final stages, will usually have a sour or musty odor. Care should be taken not to confuse flaxseed that is heating with flaxseed that is 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 flaxseed U.S. Sample Grade and record the word "Heating" in the "Remarks" section of the certificate.

## 5.8 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 dockage.

**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 |
| Smoke **1/** | | Insecticide |
| | | Oil products |
| | | Skunk |
| | | Smoke |
| | | Strong weed |

**1/** Smoke odors are considered sour only in canola, flaxseed, soybeans, and sunflower seed.

Odors from Heat-Damaged Flaxseed. When heat-damaged kernels are present, flaxseed gives off an odor very similar to smoke. Flaxseed containing a "smoke" odor is considered as having a "sour" odor unless evidence of a fire-burnt material is present in the lot or the original sample. If evidence of a fire-burnt material is present in the lot or the sample, the smoke odor is considered a commercially objectionable foreign odor.

**Commercially Objectionable Foreign Odors**. Commercially objectionable foreign odors are 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 flaxseed contains a fumigant or insecticide odor that prevents a 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 Determination**. 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 flaxseed 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.

## 5.9 DISTINCTLY LOW QUALITY

Consider flaxseed distinctly low quality when it is obviously of inferior quality and the existing grading factors or guidelines do not properly reflect the inferior condition.

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

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

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

Flaxseed suspected of containing diatomaceous earth is 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 flaxseed contains diatomaceous earth, then the flaxseed is 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 flaxseed for diatomaceous earth.

**Certification**. Grade distinctly low quality flaxseed as U.S. Sample Grade. Record the words "Distinctly Low Quality" and the reason(s) why in the "Remarks" section of the certificate.

## 5.10 U.S. SAMPLE GRADE CRITERIA

**Basis of Determination**. Determine additional U.S. Sample Grade criteria, except for stones, before the removal of dockage based on a work portion of 1,000 - 1,050 grams. Table No. 4 shows the criteria and corresponding Visual Reference Images, tolerance limits, and the appropriate basis of determination. Determine stones on a dockage-free portion. Consider identifiable pieces of grain, processed grain products (e.g., soybean meal, sorghum grits, corn meal, bulgur, etc.), or feed pellets in grain as dockage. Unidentifiable materials or material unrelated to grain shall function as "unknown foreign substance."

**TABLE NO. 4**

**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. 2 | N/A |
| Animal filth | OF-Animal Filth | 10 or more | N/A |
| Castor Beans | OF-Castor-Bean | 2 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 5.9

**Certification**. Grade flaxseed "U.S. Sample Grade" when one or more of the limits in table 4 are exceeded. Record the reason(s) why in the "Remarks" section of the certificate. Record count factors to the nearest whole number.

## 5.11 DOCKAGE

*All matter other than flaxseed that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. Also, underdeveloped, shriveled, and small pieces of flaxseed kernels removed in properly separating the material other than flaxseed and that cannot be recovered by properly rescreening or recleaning.*

**Basis of Determination**. Determine dockage on a portion of 1,000 - 1,050 grams.

# CHART 1 - PROCEDURE FOR DETERMINING DOCKAGE

**STEP 1. Carter Dockage Tester.**

a. Set air control on 3.5 and the feed control on 4.

b. Insert No. 000 riddle in the riddle carriage.

c. Insert No. 4 sieve in the top sieve carriage.

d. Insert No. 2 sieve in the middle sieve carriage.

e. Insert No. 7 sieve in the bottom sieve carriage.

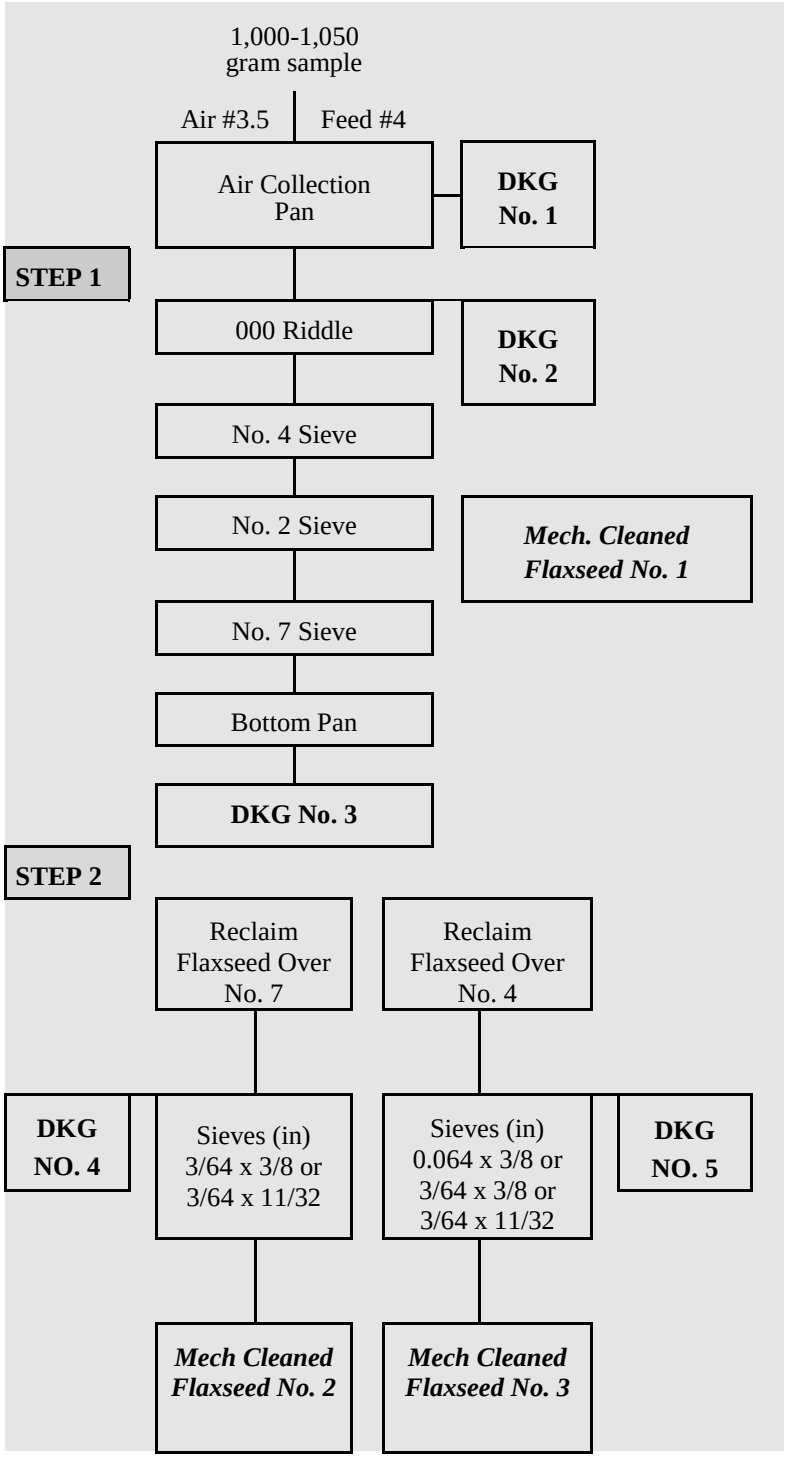
f. Start carter Dockage Tester and pour sample into feed hopper.

g. If matted lumps of flaxseed clog or kick over the riddle, remove the riddle and the No. 4 sieve and proceed with the dockage determination.

h. If the material that passes over the No. 4 sieve contains lumps of flaxseed that cannot be reclaimed, add this portion to the mechanically cleaned flaxseed.

**STEP 2. Reclaim Seed**

Using an approved hand sieve, reclaim the flaxseed passing over the No. 4 sieve. When the material contains large-sized flaxseed, sieve (30 strokes) with a 0.064 x 3/8 inch (1.626 x 9.525 millimeters (mm)) sieve. When the material contains small-sized flaxseed, sieve (30 strokes) with a 3/64 x 3/8 inch (2.241 x 9.525 mm) or a 3/64 x 11/32 inch (2.241 x 8.732 mm) sieve. Using an approved hand sieve, reclaim the flaxseed passing over the No. 7 sieve. Sieve (30 strokes) with a 3/64 x 3/8 inch (2.241 x 9.525 mm) or a 3/64 x 11/32 inch (2.241 x 8.732 mm) sieve.



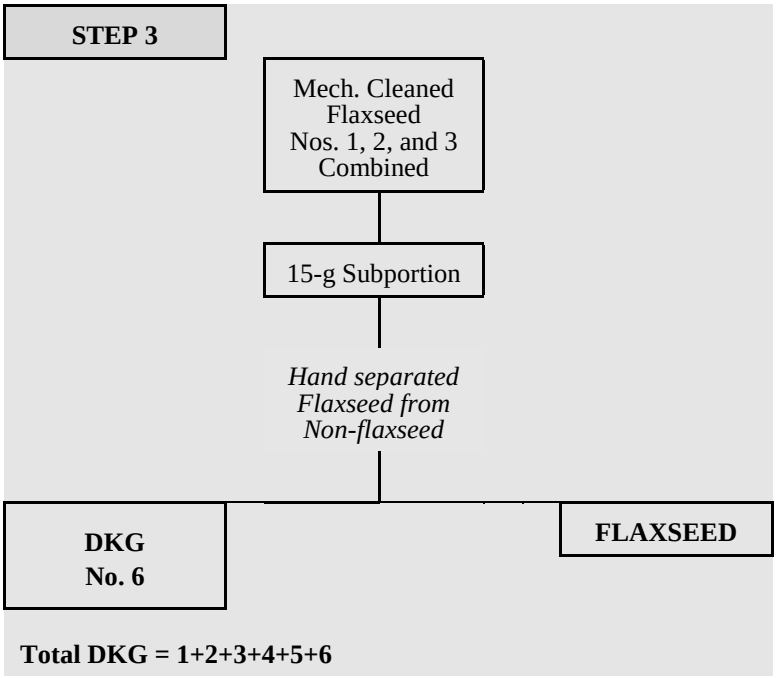
**STEP 3**

a. Combine the three mechanically cleaned portions.

b. Cut down the cleaned sample to a portion of 15 grams.

c. Handpick the 15-gram portion for material other than flaxseed

**NOTE: Matted kernels of flaxseed are considered flaxseed even though portions of flax bolls adhere to the matted kernels. The test weight determination should be made (see section 5.14) before determining handpicked dockage.**




Computing Dockage. Compute the percentage of dockage by adding the percentage of mechanically separated dockage to the percentage of handpicked dockage in hundredths (disregard thousandths).

**STEP 1**. (weight of mechanically separated dockage ÷ original sample weight) x 100 = percent of mechanically separated dockage

**STEP 2**. (100 percent - percent of mechanically separated dockage) ÷ 100 = change of base factor

**STEP 3**. (weight of handpicked dockage ÷ weight of handpicked portion) x 100 = percent of handpicked dockage

**STEP 4**. Percent of handpicked dockage x change of base factor = adjusted percentage of handpicked dockage

**STEP 5**. Percent of mechanically separated dockage + adjusted percentage of handpicked dockage = percent of dockage

Example

| | |
|---|---|
| Original sample weight | 1,000 grams |
| Weight of mechanically separated dockage | 68.0 grams |
| Weight of handpicked portion | 15.30 grams |
| Weight of handpicked dockage | 0.55 grams |

**STEP 1**. (68.00 ÷ 1,000) x 100 = 6.80% mechanical dockage

**STEP 2**. (100% - 6.80%) ÷ 100 = 0.93 change of base factor

**STEP 3**. (0.55 ÷ 15.30) x 100 = 3.59% handpicked dockage

**STEP 4**. 3.59 x .93 = 3.33% adjusted percentage of handpicked dockage

**STEP 5**. 6.80% + 3.33% = 10.13% dockage

**Certification**. Record the word "Dockage" and the percentage on the work record in hundredths. When the sample contains 1 percent or more dockage, record the percentage of dockage on the certificate in whole percent with a fraction of a percent disregarded. For example:

1.00 to 1.99 percent is recorded as 1.0 percent
2.00 to 2.99 percent is recorded as 2.0 percent, etc.

## 5.12 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 650 grams.

The procedures for performing a moisture determination using the GAC2500-UGMA and Perten AM 5200-A moisture meters are described in Moisture Handbook.

**Certification**. Record the percent of moisture on the certificate to the nearest tenth percent.

## 5.13 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 dockage-free 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.

**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.

## 5.14 PROCESSING THE WORK SAMPLE

At this point, all tests required to be performed prior to the removal of dockage have been made and the percentage of dockage has been determined. Also, determinations for moisture and test weight have been performed. Now the work sample is ready to be cut into fractional parts for those determinations required to be performed after the removal of dockage. The following chart and table No. 5 illustrate how the sample is divided into fractional parts using the Boerner divider.

## CHART 2 - DIVIDING THE WORK SAMPLE

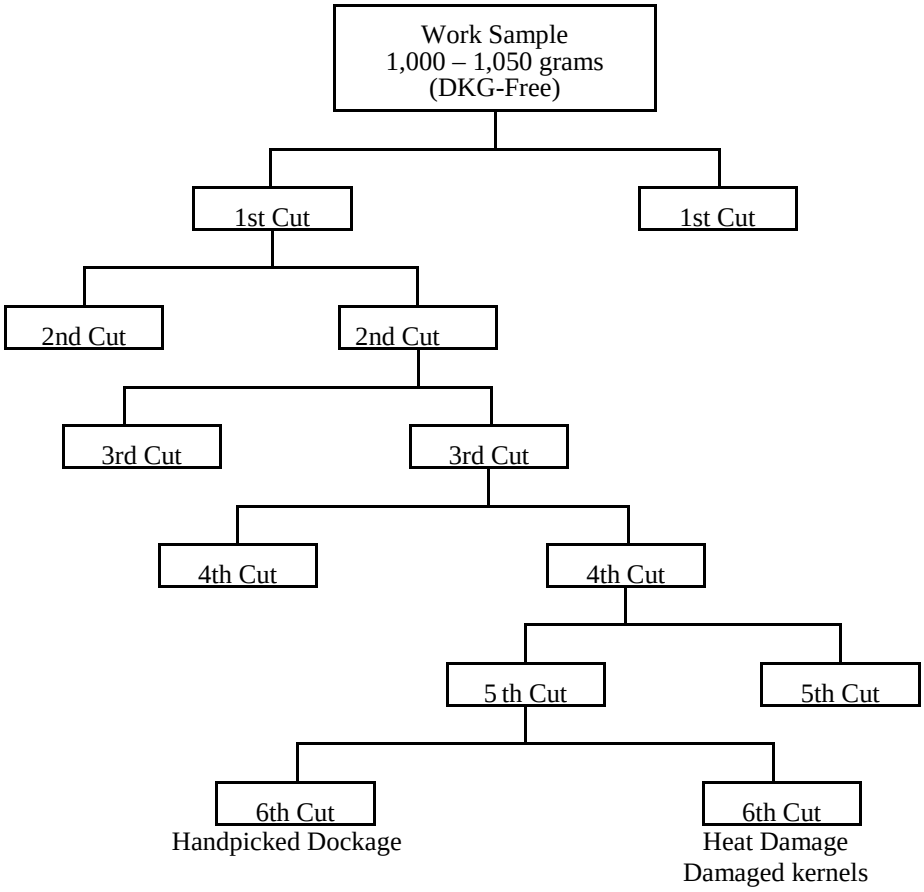


**TABLE NO. 5**

| APPROXIMATE ANALYTICAL PORTION SIZES | |
|---|---|
| *Factors* | *Grams* |
| Damaged kernels | 15 |
| Heat-damaged kernels | 15 |
| Kind of grain | 25 |

## 5.15 DAMAGED KERNELS

*Kernels and pieces of flaxseed kernels that are 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**. Determine damaged kernels on a mechanically cleaned portion of 15 grams.

In general, consider flaxseed to be 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.

TYPES OF FLAXSEED DAMAGE.

Damaged Flaxseed. Damaged flaxseed is usually characterized by a distinct discoloration, such as white, dark brown, or black discolorations caused by disease or by a moldy, scabby, or a dead appearance. Very thin whitish, paper like seeds of flaxseed, commonly known as "fly's wings" or "bee's wings" are considered as damaged. (Reference: Visual Reference Image No. F-1.0 Bee's Wings Damage)

Damaged by Heat Flaxseed. Flaxseed and pieces of flaxseed which are damaged as a result of heat but which are not materially discolored. (Reference: Visual Reference Image No. F-2.0 Damaged by Heat)

Immature Flaxseed. Green kernels of flaxseed which are otherwise sound are not considered damaged.

Mold-like Substance. Whole kernels of flaxseed which are 50 percent or more covered and pieces of kernels which are discolored and covered with a mold-like substance.

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

## 5.16 HEAT-DAMAGED KERNELS

*Kernels and pieces of flaxseed kernels that are materially discolored and damaged by heat*.

**Basis of Determination**. Determine heat-damaged kernels on mechanically cleaned portion of 15 grams. It is necessary, in most cases, to cross-section the kernels to determine if the color is a chocolate color. (Reference: Visual Reference Image No. F-3.0 Damaged by Heat)

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