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Fruit and
Vegetable
Division

Processed
Products Branch

Grading Manual for Frozen Strawberries

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This manual is designed for Processed Products Branch Personnel of the U.S. Department of Agriculture. Its purpose is to give background information and guidelines to assist in the uniform application and interpretation of U.S. grade standards, other similar specifications and special procedures.

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I. GENERAL

A. Listing of Needed Instructions. In addition to the U.S. Standards for Grades of Frozen Strawberries and this Grading Manual, you will need to reference:

1. Lot (Stationary or Moving Lot).
 - a. Regulations (109-A-1)
 - b. Sampling Procedures (120-A-1)
 - c. Condition of Container (125-A-1)
2. On-Line
 - a. Regulations (109-A-1)
 - b. In-Plant Inspection (160-A-1)
 - c. Condition of Container (125-A-1)
 - d. Inspection and Certification of Fruits and Vegetables Using Unfrozen Sample Units Drawn During Production (165-A-38)
 - e. Time Sampling Procedures (120-A-4)*
 - f. State of California Strawberry Marketing Order (SF-C-93)
 - g. Below Standard in Quality and Substandard Sample Units (165-A-5a)
3. Non-Quality Factors
 - a. Time Sampling (120-A-5)
 - b. Net Weight (128-A-10)
 - c. Fill of Container (128-A-40)
 - d. Drained Weight (130-A-32)
 - e. Fruit-Sugar ratio (135-A-1)
 - f. Certification of Fruit-Sugar Ratio (135-A-2)
 - g. Brix Measurement (135-A-3)
 - h. Foreign Material (135-A-5)
 - i. Inspection Procedure for Foreign Material (172-A-1)
 - j. The Food Defect Action Levels (172-A-2)
 - k. Mold Count (135-A-8)
 - l. Product and Storage Temperature (130-A-41)
 - m. Thawing (130-A-34)
 - n. Inspection Procedures (130-A-1)

*** Not Applicable for Retail Size Containers of Two Pounds Net Weight or Less Packed Under the State of California Marketing Order.**

B. Drawing The Sample - All Styles

1. Draw a sample unit in accordance with "Regulations Governing Inspection and Certification" (File Code 109-A-1) Section 52.38, Table II. A sample unit may be drawn using the "Time Sampling Plan" (File Code 120-A-4), except for retail size containers of two pounds net weight or less packed under the State of California Marketing Order.
2. Refer to the "U.S. Standards for Grades of Frozen Strawberries," §52.1991 under "Procedure to obtain sample unit size for product grading."
3. To grade the product (unfrozen) on-line for quality and non-quality factors when packed in container sizes up to 10 pounds, draw the sample unit immediately upon its leaving the filling machine. If the sample unit container is less than 16 ounces, draw sufficient containers to collect a 16-ounce aliquot. When bulk container sizes are being packed, a sub-sample unit is drawn. Draw this sample from the point in the process at which the product will not undergo any further changes before and during final packaging.
4. For Lot Grading container sizes up to 10 pounds, the entire container should be used for the sample unit.
5. For Lot Grading container sizes over 10 pounds including bulk containers draw an approximate 3 pound sample unit.
6. The amount of product to be used for quality analysis is stated below:

SLICED STYLE: If the sample unit container is less than 16 ounces, use two or more containers to collect a 16 ounce aliquot. If the sample unit container is of a size exceeding 16 ounces use a representative 16 ounce aliquot.

WHOLE STYLE: If the sample unit container is less than 16 ounces, use two or more containers to collect a 16-ounce aliquot. If the sample unit container exceeds 16-ounces up to 32-ounces use the entire sample unit.

C. Net Weight

The net weight of frozen strawberries means the weight of the strawberries and packing medium, exclusive of the container and wrapper. Net weights should always be taken on retail containers, as well as containers for school lunch and government contracts. Net weights are taken on institutional size containers when requested or when it is suspected that containers may not meet the stated label weight.

D. Drained Weight

Drained weight is not taken routinely on frozen strawberries. However, it may be determined upon request of the applicant and some states require it (California). It should be taken when there is evidence of excessive ice contained in the product.

Procedures for determining drained weights of unfrozen and frozen strawberries are outlined in File Code 130-A-32. Follow this procedure in all cases except as stated below.

NOTE: UNDER THE CALIFORNIA MARKETING ORDER FOR PROCESSING STRAWBERRIES THE DRAINED WEIGHTS FOR RETAIL SIZE CONTAINERS (2 LBS NET WEIGHT OR LESS) SHALL BE TAKEN BEFORE FREEZING, AND REQUIRES THE USE OF A U.S. NO. 4 (4 MESH) SIEVE FOR DRAINED WEIGHT DETERMINATION. THE MARKETING ORDER DOES NOT APPLY TO RETAIL CONTAINERS OVER TWO POUNDS.

E. Thawing the Product for Grading

Retail size packages are placed on trays to thaw in unopened containers. When the product is sufficiently free from ice crystals and readily separable, the sample unit is ready for grading. Thawing can be expedited by placing the sealed containers in a bath of running warm water not to exceed 86 degrees Fahrenheit.

Sub-samples that are drawn from bulk containers should be thawed using the same method as retail size packages. No. 10 enamel lined cans with plastic bags should be used as the sampling containers. If it is necessary to thaw the entire container, allow it to thaw unopened in a warm water bath not to exceed 86 degrees Fahrenheit. Directing a flow of warm air from an electric fan on the unopened containers will hasten the thawing process if a water bath is not available.

The use of a microwave oven to expedite thawing of frozen strawberries does not comply with Branch procedures.

Extreme care should be used to prevent damaging the character of the fruit when transferring it to the grading tray from the container. If frozen strawberries show any material increase in oxidation after thawing in the above described manner, such oxidation should be scored against the product.

NOTE: IT IS VERY IMPORTANT THAT THE GRADE OF FROZEN STRAWBERRIES IS DETERMINED IMMEDIATELY AFTER THAWING TO PREVENT OXIDATION. EVALUATION OF QUALITY SHOULD BEGIN AS SOON AS THE UNITS ARE SUFFICIENTLY THAWED (UNITS MAY BE SEPARATED EASILY, AND ARE FREE FROM ICE CRYSTALS).

F. Determining Fruit Sugar Ratio

NOTE: REFERENCE BRANCH FILE CODES 135-A-I, AND 135-A-2.

1. Dry Sugar Mix

- a. Dry sugar is normally mixed with the fruit as the fruit is moved through the process to the filler.

2. Liquid Packing Medium

- a. With liquid packing medium, sirup is introduced into the container of fruit during the packing operation. The sirup acts as a diluent and displaces a proportionate amount of space otherwise taken up by fruit. Therefore, limitations are made for the amount of sirup that may be added to any container. The amount of sirup added should not exceed the amount indicated by the fruit-sugar ratio.
- b. Most of the time, the liquid packing medium is added to the containers instead of being mixed into the bulk strawberries ahead of time. Consequently, to check the amount of sirup actually being added to the filled containers by weight or volume should be rather easy.
- c. Make random checks using a refractometer to confirm the actual Brix of the in-going sirup.

G. Mold Counting Procedures

1. Obtaining The Sample Unit

- a. Retail size containers - Use the entire contents.
- b. Institutional and bulk size containers - Use a 2 pound aliquot.

NOTE: DO NOT DRAIN BEFORE PULPING.

- c. Under on-line conditions mold counts should be determined on some frozen sample units in case of an improper freezing process.

2. Preparing The Sample Unit

- a. The thawed sample is pulped through a cyclone pulper with .027 inchsize screen. Dismantle the cyclone and scrape any material adhering to the outside of the screen, adding the material to the sample unit to be examined for the presence of mold. The cyclone should be dismantled and washed after each use.
- b. Transfer approximately 100 grams of the well mixed pulped material to a beaker. Add about 15 drops (1/2 mL) of caprylic alcohol, stirring the mixture very carefully to dissipate air bubbles. The slide for microscopic examination should be prepared using the instructions from Branch File Code 135-A-8.

NOTE: THE OUTLET TUBE SHOULD BE POINTING UPWARDS AND PLUGGED WITH A RUBBER STOPPER.

3. Checking for Mold

- a. See File Code 135-A-8 Section III for mold counting procedures.
- b. See File Code 172-A-2 for Food Defect Action Levels.
- c. For Lot Inspection, record all positive and negative mold count fields on form FV-140 (Mold Count Record) and attach to score sheet.
- d. For On-Line Inspection, record all positive and negative mold count fields on form FV-140-1 (Tally Sheet For Mold Counts).

H. Styles

- 1. Frozen whole strawberries are measured from the largest diameter of the strawberry at right angles to a straight line running from the stem to the apex. This can be achieved with the use of Inspection Aid No. 68, which is designed with holes of the appropriate size specifications.
 - a. Small means whole frozen strawberries that measure less than 5/8 inch in diameter.
 - b. Medium means whole frozen strawberries that measure 5/8 inch in diameter to and including 1-1/4 inches in diameter.
 - c. Large means whole frozen strawberries that measure more than 1-1/4 inches in diameter.

NOTE: THE THAWED BERRIES ARE MEASURED BY LETTING THEM "FREE-FALL" THROUGH THE SMALLEST POSSIBLE HOLE IN AID No. 68.

- 2. There are no particular style requirements for sliced strawberries other than each strawberry must show evidence of coming in contact with the slicing knife. Strawberries may be considered as sliced if they are halves or sliced into two or more pieces. An occasional unsliced (whole strawberry) may be found in the sample unit. Do not take exception to this, unless the overall appearance of the product is not representative of "sliced" style.

II. FACTORS OF QUALITY WHICH ARE PREREQUISITE TO THE GRADE

Some factors are not scoreable quality factors, but are equally important in considering the overall quality of the product. These quality factors are graded independently from the scoreable quality factors. Assign the appropriate letter grade if it is required.

A. Flavor and Odor

Good flavor and odor means that the product has a pronounced strawberry flavor and is free from any kind of objectionable off flavor or off odor. A musty flavor or odor is usually due to the presence of mold or decay. Letter grades A (Good), C (Fairly Good), or Substandard can be assigned to the factor of flavor and odor.

B. Similar Varietal Characteristics

Strawberries used for freezing usually have similar varietal characteristics. In the event the strawberries are distinctly different in varietal characteristics they should be classified as Substandard. Grade A is assigned if the strawberries are similar in varietal characteristics. Substandard is assigned if the strawberries are not of similar varietal characteristics.

C. Size of Whole Strawberries

1. Whole style strawberries which have more than five percent by count of strawberries less than five eighths ($5/8$) inch in diameter cannot be graded above Grade B. U.S. Grades B and C do not have a size limitation. Only assign Grade A or B to the size quality factor of whole strawberries. It is not necessary to grade this quality factor below Grade B.
2. Size is determined only on whole style strawberries. Accuracy of the determination will depend on the requirements of the applicant and labeling requirements. If no special size certification is requested or indicated by labeling use the following methods:
 - a. Select one or more strawberries that are minimum size for medium ($5/8$ inch) and maximum for medium ($1-1/4$ inch).

- b. Visually segregate the strawberries that are smaller than 5/8 inch and larger than 1-1/4 inch and record the percentages. If a sample unit contains 90% or more of one size, and not more than 5% of a larger and/or smaller size, record the size as represented.
- c. Record the general size classification. Example: medium, or medium and large (mostly medium), etc.

III. FACTORS OF QUALITY WHICH ARE SCORED

Place the thawed sample unit on a flat grading tray, and raise one end to drain the packing medium to the other end of the tray. Use a table fork to separate those units which fall into scoreable categories described in the grade standards (Color, Defects, and Character). Weigh the separated units and remove the remaining strawberry material (exclusive of packing medium) from the tray and weigh. The sum of the weights obtained is the total weight of the strawberry ingredients.

NOTE: CALCULATE THE PERCENT, BY WEIGHT, OF THE SEPARATED SCOREABLE MATERIAL BY DIVIDING THE WEIGHT OF SUCH MATERIAL BY THE TOTAL WEIGHT OF STRAWBERRY INGREDIENTS.

A. Color

Strawberries oxidize quite readily and should be examined for color when the strawberries are "JUST" free from ice crystals. With IQF strawberries, wetting the strawberry surfaces to remove frost may be preferred over completely thawing the product. However, some varieties have a very thin pigmentation layer which in some cases will slough off when water is used. This could permanently alter the sample unit for accurate color determination. These varieties should be air-thawed.

Color models of strawberries showing representative interpretations of the color requirements for individual units are available for review in USDA field offices. These wax strawberries models should be used frequently when grading the quality factor of color.

NOTE: WHEN APPLYING THE MODELS FOR COLOR ANALYSIS, INSPECTORS MUST KEEP IN MIND EVEN IF THE STRAWBERRIES MEET MINIMUM REQUIREMENTS INDIVIDUALLY AS ILLUSTRATED BY THE MODELS, THE STRAWBERRIES AS A MASS MUST ALSO MEET THE OVERALL UNIFORMITY OF COLOR REQUIREMENTS FOR EACH RESPECTIVE GRADE.

THESE MODELS DO NOT REPRESENT EVERY COLOR VARIATION, HOWEVER, THEY DO REPRESENT REASONABLE GUIDELINES FOR INTERPRETING THE STANDARDS AND SHOULD BE USED IN ACCORDANCE WITH THESE INSTRUCTIONS.

1. Model No. 1 illustrates the bottom limit in lightness for "good characteristic pink color." The light colored area on this model represents the approximate area which may be lighter than "good characteristic pink" to comply with the requirement of "over practically the entire surface." The white area which frequently occurs at the stem end as a result of having been covered by the cap should be disregarded in applying the models.
2. Model No. 2 illustrates the maximum darkness permitted for "good characteristic red color."

Neither Model No. 1 nor Model No. 2 illustrates the "four-fifths surface area" referred to in Grades A and B. However, 15 percent in A or 25 percent in B of the strawberries may have less pink to red color than illustrated by Model No. 1 and be darker than Model No. 2.

This is on condition that not more than 5 percent in Grade A or 10 percent in Grade B may have less than four-fifths of the surface area of good pink to red color; or be as dark as or darker than Model No. 5; or have a combination of the above- mentioned conditions.

Strawberries are considered as "reasonably uniform" as required for Grade A if they meet any one of the following conditions:

- a. No strawberries are present that are lighter than Model No. 1 and darker than Model No. 2; or
 - b. Strawberries may be present that are lighter than Model No. 1 within the allowances for Grade A: provided, that none are darker than Model No. 2; or
 - c. Strawberries may be present that are darker than Model No. 2 within the allowances for Grade A: provided, that none are lighter than Model No. 1.
3. Model No. 3 and Model No. 4 represent strawberries which have less than four-fifths of the surface area of pink or red color. Strawberries similar to these models are classed as Substandard.

The actual area of pigmentation represents approximately three-fourths of the surface area of these two models. Strawberries that are slightly better than Models No. 3 and No. 4 (slightly more area of pigmentation) should be considered as possessing four-fifths of the surface area that is "good characteristic pink to red color; or characteristic pink to red color." One hundred percent of such strawberries would be permitted in Grade C, but included in the 5 percent allowance in Grade A and 10 percent allowance in Grade B.

4. Model No. 4 which has a slightly dull (washed- out) appearance represents the typical Grade C color hue.
5. Model No. 5 illustrates "materially darkened color" and is classified as Substandard color.
6. Summary of Color Definitions:
 - a. "Over practically the entire surface" means at least 90 percent of the outer surface. This does not include cut surfaces in sliced style nor small areas at the stem end of the whole strawberry which may be white to light pink in color.
 - b. "Materially darkened" means units that are dark chocolate (brownish-red) in appearance and indicative of over-ripened strawberries.
 - c. "Dull gray" strawberries have a washed-out (bleached) appearance and may possess a pale pink to yellow cast indicative of under-ripened strawberries.

B. Defects

1. Damaged berries include those damaged by slugs or bird pecks and may have a large portion of the flesh eaten away. Also included as damaged berries are:
 - a. Deformed berries (monkey faced) which usually have small seedy deposits on the end of the berries. These must be firm or

hard to be scored. This is generally caused by frost, or injury received before full growth.

- b. Hail damage and scald appear as discolored spots or scabs on the surface of the berry.
 - c. Decay usually found in the form of "brown rot" sometimes falls out of the strawberry as a core. Score rot damaged material and the affected strawberry as one unit. Strawberries affected with "rubber rot" are grayish pink in color and very firm, often with a strong creosote odor. Decay is a good indication that mold may also be present. Follow Branch File Code 135-A-8 and the manual section on Mold Counting Procedures.
2. Harmless Extraneous Material (HEM) refers to caps, sepal like bracts, leaves, etc. For HEM that is measurable by area, determine the total measurable area by placing the material as closely together as possible on Branch Inspection Aid Number 30 (Area Measurement Aid). Separate allowances are provided in the grade standards for HEM that is not measurable by area.

3. Short stems under 1/8 inch may be non scoreable. If the stem stub is sharp or tough, it should be counted. However, if the stub end of the short stem is tender and not otherwise objectionable, it should not be counted as a short stem.
4. Free from grit, sand or silt means the product should not contain any of this material that is readily visible or discernable upon chewing.

Check each sample (whole and sliced styles) carefully for the presence of grit, by tasting repeated spoonfuls of strawberries and liquid medium. In addition, by tilting the grading tray (after removing the strawberries) grit or sand particles will be seen on the bottom of the tray. When strawberries are not washed properly grit may be noted in the bottom end of 30-pound tins. Grit tends to settle to the bottom of the container before freezing or after thawing.

NOTE: BE ALERT FOR PARTICLES OF SAND, SILT OR GRIT ON IQF STRAWBERRIES. PARTICLES OF DIRT MAY BECOME TRAPPED AROUND THE SEEDS AND MAY NOT BE REMOVED BY NORMAL WASHING.

C. Character

1. The character of frozen strawberries should be ascertained immediately after thawing and the product is free from ice crystals. This can be done immediately after scoring the color, while determining defects. If frozen strawberries are allowed to stand for any length of time after thawing, whole strawberries become soft and flatten out and sliced strawberries become very soft.
2. Mushy strawberries (whole and sliced styles) are a pulpy mass, badly frayed or badly disintegrated and cannot readily be picked up with the tines of a table fork.
3. A partial strawberry is a berry in whole style that is less than three-fourths of a whole strawberry.
4. Seediness in strawberries pertains to the amount, size, or condition of the seeds which may affect the appearance and edibility of the strawberry unit. Closely-spaced seeds covering 1/3 or more of the surface area of the unit, or darkened and protruding seeds should be considered under this factor.
5. Firmness is considered in whole and sliced styles. In whole style considerable flattening can be expected on the thawed strawberries. The overall requirement for Grade A is reasonably firm for whole and sliced styles. Strawberries must be fairly firm to meet Grade B and Grade C.

IV. SPECIAL SAMPLING SITUATIONS

A. Frozen Verification Sample Units

1. To meet minimum sampling rates, the total number of sample units examined each shift must be equal to or exceed the minimum number required in the single sampling plan or time sampling plan for each lot size of one grade, style, container size, etc.
2. The required number of sample units may consist of unfrozen sample units from the processing line and frozen sample units from the cold storage area. The minimum number of frozen verification sample units is as follows:
 - a. One frozen sample unit must be examined from approximately each 1,000 cases of product packed in 10 ounce to 10 pound containers and for approximately each 1,000-30 pound cans and/or for each 100 barrels. A minimum of one frozen sample unit per shift from each lot of a single grade, style and container size must be examined regardless of lot size.
 - b. Suspected or known abnormal handling or freezing conditions is reason for an increased sampling rate for frozen samples. If the product is frozen at more than one location or by more than one method at one location, verification sample units must be examined from each.
3. In selecting the necessary frozen verification sample units, an occasional unfrozen line check sample unit should be drawn in duplicate. These verification sample units are used to check correlation with line check grading; particularly for the factors of color and character. The duplicate should be marked or banded to identify it with the line check sample unit. On bulk containers, mark the container from which the duplicate sample unit was drawn. If the results don't correlate, additional frozen samples should be checked. Verification sample units may be included in the minimum number of sample units required for examination of the lot.

NOTE: SEE BRANCH FILE CODE 165-A-38 IF FROZEN SAMPLES ARE NOT CHECKED.

B. Borderline Situations

When a borderline grade situation exists, it may be desirable to increase the sampling rate. Check Branch File Code 120-A-4 for optional time sampling rates for quality factors and 120-A-5 for time sampling of the non-quality factors. Do not use lateral samples.

C. Lateral Samples

When a processor desires lateral sample units to be drawn and checked, these sample units are to be treated as unofficial samples. Lateral sample units are to be used as quality control information only and should not be included on the score sheet. Use the following guidelines when lateral sample units are taken:

1. Each lateral sample unit must be comprised of a recommended sample unit size.

2. All prerequisite and scoreable quality factors are to be checked on each sample unit.
3. Grade acceptance is based on the U.S. Standards for Grades of Frozen Strawberries and other Branch regulations.
4. Each lateral sample unit stands on its own.

D. Marketing Order Grading

Marketing Order Agreements involving frozen strawberries exist for some states. The state of California has a Marketing Order which contains instructions for the inspection of frozen strawberries on retail pack containers of two pounds or less. These instructions are issued by the Processing Strawberry Advisory Board located in Watsonville, California.

Under the rules and regulations issued under the California Processed Strawberry Marketing Order, "No processor shall process retail packed frozen strawberries with a drained weight of strawberry ingredients less than 60 percent of the actual net weight."

Compliance with the drained weight requirements shall be based on the average drained weight and average net weight of all sample units of the same container size and quality level covering not more than one shift's production. The drained weight is determined by draining the sample unit for two minutes on a U.S. No. 4 (4 Mesh) sieve.

To comply with the California Frozen Strawberry Marketing Order quality requirements, each individual sample unit shall have a total score of not less than 85 points, as defined in the U.S. Standards for Grades of Frozen Strawberries; provided, that no sample unit shall score less than 34 points for the grade factor of Color; provided, that no sample unit shall score less than 34 points for the grade factor of Defects; and provided, that no sample unit shall score less than 17 points for the grade factor of Character.

The USDA lot acceptance criteria shall apply provided no sample unit from the lot has a total score of less than 80 points; provided that no sample unit scores less than 28 points for color, 28 points for defects, and 14 points for character; and further provided that the average score for all sample units (including deviants) from the lot shall not be less than 85 points.

The California Processing Strawberry Advisory Board requests that USDA supply them with data on the drained weights and net weights obtained in determining compliance with the marketing order. This data is entered daily on the Summary Sheet, Form PSAB-78. This information should be submitted at the end of each month to the Processing Strawberry Advisory Board. All lots that meet the drained weight and quality requirements should be reported to the Processing Strawberry Advisory Board the end of each week on Form PSAB-78 (Report of Meeting Lots).

Additional information and forms may be obtained from the California Processing Strawberry Advisory Board at the following address. Consult your supervisor first.

Manager
Processing Strawberry Advisory Board of California
P.O. Box 929
Watsonville, California 95077
Telephone (408) 724-5454

E. Special Size Designation

Many requests from importers and some domestic producers presently require that numerical sizes not adequately described by the U.S. grade standards be stated on the grade certificate. If a request for a grade certificate requires size designation, state the numerical size requested followed by the size designation from the U.S. grade standards.

a. Example:

Packer requests size certification with a specification of 5/8" to 7/8" and a tolerance of over-sized and under-sized strawberries.

Certification statement if product meets specification:

"Size: 5/8 inch to 7/8 inch (Medium)"

Certification statement if product fails specification:

"Size: _____ Sample Units 5/8 inch to 7/8 inch (Medium)
_____ Sample Units _____ inch to _____ inch [indicate each size designation]"

Certification statement for GRADE if product fails specification:

"Grade: Fails 5/8 inch to 7/8 inch (Medium) [indicate company
_____ and Specification No. _____] for size, Because [state
reasons _____]"

F. Unofficial Samples

Branch "Regulations" provide for grading of samples submitted by an applicant. Unofficial Samples do not represent a lot.

1. Each "Unofficial Sample" must stand on its own.
2. Each "Unofficial Sample" must contain one (1) recommended sample unit size (see Regulations Governing Inspection and Certification of Processed Fruits and Vegetables and Related Products).
3. Grade the sample in accordance with the U.S. grade standards and as outlined in this manual.

V. SUGGESTED ORDER OF GRADING A SAMPLE

All quality factors, scoreable and non-scoreable, stand on their own and are graded independently. Generally, the scoreable quality factors are analyzed for grade first. However, it is often convenient to analyze scoreable and non-scoreable factors simultaneously.

A. Drawing the Sample

Draw a sample unit in accordance with "Regulations Governing Inspection and Certification" (File Code 109-A-1) Section 52.38, Table II, or a sample unit may be drawn using the "Time Sampling Plan" (File Code 120-A-4), except for retail size containers of two pounds net weight or less packed under the State of California Marketing Order.

Refer to the "U.S. Standards for Grades of Frozen Strawberries", §52.1991 under "Procedure to obtain sample unit size for product grading."

B. Net Weight

The net weight of frozen strawberries means the weight of the strawberries and packing medium, exclusive of the container and wrapper.

C. Thawing the Product

It is very important that the grade of frozen strawberries is determined immediately after thawing as soon as the product is free of ice crystals and is readily separable.

NOTE: DETERMINING THE GRADE AS SOON AS POSSIBLE AFTER THAWING MINIMIZES THE RISK OF OXIDATION.

D. Drained Weight

Procedures for determining drained weights of unfrozen and frozen strawberries are outlined in File Code 130-A-32.

E. Prerequisite Quality Factors

1. Assign Grade A, C, or Substandard to the prerequisite quality factor, "Flavor and Odor."
2. Assign Grade A or Substandard to the prerequisite quality factor, "Similar Varietal Characteristics."
3. Assign Grade A or B to the prerequisite quality factor, "Size" (Whole Style Only).

F. Scoreable Quality Factors

NOTE: DO NOT USE DECLARED LABEL WEIGHT TO CALCULATE THE TOTAL WEIGHT AS WEIGHT OF STRAWBERRY INGREDIENTS.

1. Evaluate and determine the color score immediately after the strawberries have thawed and are JUST free from ice crystals. Use the USDA approved wax strawberry color models to interpret color requirements for individual units and the requirements for uniformity as applied to the mass. (Refer to A-456).
2. Apply the definitions in the U.S. grade standards for Good Color, Reasonably Good Color, and Fairly Good Color, for the respective grades classification and separate those units that fall into the following categories:
 - a. WHOLE STYLE (percent by count) - Separate those units that do not possess a good characteristic pink to red color over practically the entire surface. Further separate those units that have less than 4/5 of surface area that possess a good characteristic pink or red color, or are materially darkened. Calculate the percentage by count of scoreable color defects found in the sample unit to determine the color score. Refer to the appropriate attached scoring guide for scoring the factor of color for whole style strawberries.
 - b. SLICED STYLE (percent by weight) - Separate those slices that do not possess a good characteristic pink to red color over practically the entire outer surface (not including cut surfaces). Further separate those slices that have less than 1/2 of the outer surface (not including cut surfaces) that possess a good characteristic pink to red color, or are materially darkened. Calculate the percent by weight of scoreable color defects found in the sample unit to determine the color score. Refer to the appropriate attached scoring guide for scoring the quality factor of color for sliced style strawberries.

3. When you are visually scanning the sample unit for color, observe and separate pieces of harmless extraneous material. This refers to caps, sepal-like bracts, leaves, short stems (1/8 inch or less in length), stems (longer than 1/8 inch in length), weeds and grass, etc.
4. Measure the total area of flat extraneous vegetable material by placing the material as closely together as possible, on Branch Inspection Aid No. 30 (Area Measurement Aid).
5. Count and record the number of pieces of HEM, other than flat HEM, such as weeds, grass, short stems and other stems.
6. Separate and record the percentage by weight of damaged strawberries. Damaged strawberries include those damaged by insects or bird damage, deformed strawberries (monkey face), hail damage, sun scald, scars and decay affected units.
7. In grading sliced and whole styles, check each sample unit carefully for the presence of grit, sand or silt material.
8. Separate and record the percentage, by weight, of mushy and seedy units in whole and sliced styles.
9. Separate and record the percentage, by weight, of partial strawberries in whole style.
10. In whole style, check each sample unit carefully for whole strawberries that are small size (less than 5/8 inch in diameter).

V. ASSIGNING THE GRADE OF THE LOT

A. Sample unit grade

1. When all sample unit grading and analyses have been completed for a production shift or a designated production run comprising a lot, all sample unit scores should be totaled and the grade assigned to each individual sample unit.
2. Be certain a grade is assigned to each non-scoreable quality factor and representative score points are assigned to the proper grade classification for each scoreable quality factor of each sample unit. Consideration must be given to all factors with an imposed limiting rule. Note the lowest grade indicated by the score points of all scoreable quality factors when assigning the score points.
3. Total the score points of all the scoreable quality factors for each sample unit. Note the lowest grade indicated by the minimum total score points required for the grade (90 points for grade A, 80 points for grade B, etc.).
4. Assign the appropriate letter grade to each sample unit.

- a. A sample unit cannot be assigned a higher grade than that of the lowest prerequisite quality factor.
- b. A sample unit cannot be assigned a higher grade than that indicated by the score points of any scoreable quality factor or that indicated by the minimum required total score points.

B. Lot Grade

1. Apply the deviant rate to all sample units in the lot as necessary. (Use Branch File Code 120-A-4 for time sampling deviant rates or the deviant rate for the sample size in the Branch regulations, as applicable).
2. Assign the final grade for the lot.

NOTE: OTHER ON-LINE GRADING ACCEPTANCE CRITERIA, SUCH AS DEVIANT RUNS, WORSE THAN DEVIANTS, ETC., MAY APPLY. REFER TO BRANCH FILE CODES AND REGULATIONS AS NECESSARY.

3. When strawberries are graded as "STRAWBERRIES PREPARED FOR FREEZING", and frozen samples are not examined, a final grade cannot be established for the lot. Refer to Branch File Code 165-A-38 for certification procedures.
4. Branch "Regulations" provide for grading of samples submitted by an applicant. UNOFFICIAL SAMPLES do not represent a lot. No lot grade may be given.

SCORING GUIDE FOR FROZEN SLICED STRAWBERRIES

	U.S. GRADE A					U.S. GRADE B <u>1</u> /				U.S. GRADE C <u>1</u> /				SSTD							
COLOR SCORE	40	39	38	37	36	35	34	33	32	31	30	29	28	0 - 27							
PERCENT BY WEIGHT <u>2</u> / Less than overall pink to red color	REASONABLY UNIFORM					FAIRLY UNIFORM				VARIABLE				FAILS GRADE C							
	3	6	9	12	15	18	20	23	25	NO LIMIT											
PERCENT BY WEIGHT <u>2</u> / Less than 1/2 surface pink to red or materially darkened	0	1	2	3	5	6	8	9	10	11	12	13	15								
DEFECT SCORE	40	39	38	37	36	35	34	33	32	31	30	29	28	0 - 27							
PERCENT BY WEIGHT <u>2</u> / Damage	0		1	2	2.5	3	4	5		5.5		6		FAILS GRADE C							
HEM By Net Weight (Sq. inch/16 oz.)	0	1/16	2/16	3/16	4/16	5/16	6/16	7/16	8/16	9/16	10/16	11/16	12/16								
Short stems < 1/8 inch	0	4	8	12	16	20	24	28	32	NO LIMIT											
Stems > 1/8 inch including:	0		1		2	3		4		5		6									
Stems > 1/2 inch including:	0		1							3	4	5	6								
Stems > 3/4 inch	0																1				
Weeds (Not by area)	0																2				
GRIT, SAND, or SILT	0		None present that affects the eating quality							Trace											
CHARACTER SCORE	20		19		18	17		16		15		14		0 - 13							
PERCENT BY WT. <u>2</u> / Mushy	5		10		20	25		30		40		50		FAILS GRADE C							
Firmness	REASONABLY FIRM					FAIRLY FIRM															
Disintegration or Seediness	Not affected		Not materially affected			Not seriously affected				NO LIMIT											

1/ Limiting rule.

2/ Strawberry ingredient exclusive of surrounding medium.

SCORING GUIDE FOR FROZEN WHOLE STRAWBERRIES

	U.S. GRADE A <u>1</u> /					U.S. GRADE B <u>2</u> /				U.S. GRADE C <u>2</u> /				SSTD	
COLOR SCORE	40	39	38	37	36	35	34	33	32	31	30	29	28	0 - 27	
PERCENT BY COUNT Less than overall pink to red color	REASONABLY UNIFORM					FAIRLY UNIFORM				VARIABLE				FAILS GRADE C	
	3	6	9	12	15	18	20	23	25	NO LIMIT					
PERCENT BY COUNT Less than 4/5 surface pink to red or materially darkened	0	1	2	3	5	6	8	9	10	11	12	13	15		
DEFECT SCORE	40	39	38	37	36	35	34	33	32	31	30	29	28	0 - 27	
PERCENT BY WEIGHT <u>3</u> / Damage	0		1	3	5	6	8	9	10	11		12		FAILS GRADE C	
HEM By Net Weight (Sq. inch/16 oz)	0	1/16	2/16	3/16	4/16	5/16	6/16	7/16	8/16	9/16	10/16	11/16	12/16		
Short stems < 1/8 inch	0	4	8	12	16	20	24	28	32	NO LIMIT					
Stems > 1/8 inch including:	0		1		2	3		4		5		6			
Stems > 1/2 inch including	0		1							3	4	5	6		
Stems > 3/4 inch	0									1					
Weeds (Not by area)	0									2					
GRIT, SAND, or SILT	0		None present that affect the eating quality							Trace					
CHARACTER SCORE	20		19		18	17		16		15		14		0 - 13	
PERCENT BY WT. <u>3</u> / Partial and Mushy	2		5		10	15		20		25		30		FAILS GRADE C	
Firmness	REASONABLY FIRM					FAIRLY FIRM									
Disintegration or Seediness	Not affected		Not materially affected			Not seriously affected				NO LIMIT					

1/ May not contain more than 5%, by count, berries under 5/8 inch in diameter.

2/ Limiting rule.

3/ Strawberry ingredient exclusive of surrounding medium.