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Processed Products Branch

Grading Manual for Pineapple Juice

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PREFACE

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 specification and special procedures.

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GRADING MANUAL
for
PINEAPPLE JUICE

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III. HEADSPACE AND FILL OF CONTAINER

Generally, the headspace of containers of pineapple juice need not be checked as long as the declared net contents for the particular container size is met. The quality control department of some plants may prefer to have the headspace recorded for all containers opened for grading. The headspace should be recorded for all cans which appear to have lower than normal fill before determining net contents. Headspace is generally reported in units of 1/32 inch. Headspace measurement is not applicable to other container types such as plastic bottles or aseptic brik pack.

The standard of fill of container for pineapple juice, except when the food is frozen, is not less than 90 percent of the total capacity of the container, as determined by the general method for fill of container prescribed in 21 CFR 130.12 (b). The net contents may be determined either by direct measurement in a volumetric cylinder graduated in fluid ounces or by net weight and conversion to fluid ounces. Refer to File Code 130-A-1 for this procedure.

The net contents statement for pineapple juice must be declared in liquid measure in the largest whole units (quarts, quarts and pints, or pints, as appropriate) with any remainder in terms of fluid ounces or common or decimal fractions of the pint or quart.

III. HEADSPACE AND FILL OF CONTAINER (continuation)

Example:

(1) A declaration of 1 quart liquid measure shall be expressed as “Net 32 fl oz (1 qt).”

(2) A declaration of 1-3/4 quart liquid measure shall be expressed as, Net contents 56 fluid ounces (1 quart 1-1/2 pints)” or as “Net 56 fluid oz (1 qt 1 pt 8 oz),” but not in terms of quart and ounce such as “Net 56 fluid oz (1 quart 24 ounces).”

(3) A declaration of 2-1/2 gallons liquid measure shall be expressed as “Net contents 2-1/2 gallons,” “Net contents 2.5 gallons,” or “Net contents 2 gallons 2 quarts” and not as “2 gallons 4 pints.”

When the contents are less than one pint only the fluid ounces must be declared.

IV. VOLUME MEASUREMENT

A. Measuring Flask Method

Glass flasks are available that are accurately calibrated for measuring volume of liquids. There are two important things to remember when using this method. The flask is calibrated for volume of a liquid at a standard temperature, usually 20 degrees C. The legend is etched on each flask. The juice must be at this temperature for accuracy. Also, it is important not to incorporate air into the liquid when filling the flask to permit any occluded air to escape.

B. Net Weight to Fluid Ounces Conversion Method

Take the net weight of the juice. Convert this weight to volume measurement by the following formula:

$$\text{Net contents} = \frac{\text{Net weight (avoir. oz.)} \times 0.9614}{\text{Specific gravity at 20 degrees C}}$$

Example:

Pineapple juice No. 3 cylinder
Net weight – 49.2 ounces
Refractive Index (20 degrees C) – 1.3414
(See File Code 135-A-50 for Specific Gravity.)
Specific gravity – 1.02289

$$\text{Net contents} = \frac{(49.2)\,(0{,}9614)}{1.02289} = \frac{47.3}{1.02289} = 46.2 \text{ fl oz.}$$

V. STYLES

1. Unsweetened - no sweetener added.

2. Sweetened - any safe and suitable dry nutritive carbohydrate sweetener approved by FDA may be added.

VI. PASTEURIZATION

The juice is pumped to a heat exchanger or pasteurizer where it is brought up to a temperature of 190 degrees F just prior to filling.

VII. MIXED LOT OF UNSWEETENED AND SWEETENED JUICE

Under normal packing practice unsweetened style juice would not be mixed with sweetened style. However, if a lot is inadvertently mixed style, the packer may wish to segregate the lot before offering for grading. In the event the packer declines the segregation, grade the lot according to the style that it is offered for, either unsweetened style or sweetened style.

VIII. METHODS OF ANALYSES

A. Brix Measurement

Procedures for taking Brix measurements are outlined in File Code 135-A-3 (Technical Inspection Procedures - Brix Measurement).

B. Acid Determination

Transfer 10 mL of well-mixed juice to 250 mL Erlenmeyer flask. Rinse inside of flask down with approximately 25 mL distilled water. Add 3 or 4 drops of phenolphthalein indicator or other suitable indicator. Titrate this solution with approximately 0.1N sodium hydroxide (NaOH) to the first signs of a permanent end point

(Acid Determination Continued)

according to the indicator used (pink in the case of phenolphthalein.

The acid content is expressed in grams anhydrous citric acid per 100 mL of juice according to the following formula:

mL NaOH x N of NaOH x 0.64 = gm anhydrous citric acid/100 mL of juice.

IX. SUGGESTED ORDER OF GRADING A SAMPLE UNIT

1. Draw 500 mL (250 mL for containers 12 fl. oz. or less) of well-mixed pineapple juice. This could be a portion of the contents of a container, the entire contents of a container, or a composite of more than 1 container from a particular code.

2. Evaluate the color by pouring the suggested amount (250 mL or 500 mL) into a clean glass cylinder approximately two inches in diameter and twelve inches tall and viewing the juice through the cylinder under good lighting conditions.

   Grade A – the color should be very good, bright and typical as described in the standards. Pineapple juice that falls into this classification may be assigned a score of 17 to 20 points.

   Grade B – the color should be good and may be slightly dull but not off-color. Pineapple juice that falls into this classification may be assigned a score of 14 to 16 points and should not be graded above U.S. Grade B regardless of the total score for the product.

   The more prevalent color of pineapple juice in the marketplace is light yellowish beige. Another variety from the Caribbean (Puerto Rico) yields a golden amber or golden pinkish cast. This range in color is normal as long as it is typical of the variety. However, watch for “abused” juice such as: oxidized, caramelized, scorched, stack burn, etc.

   Reasonable allowance should be made for pineapple juice made from concentrate, as long as it is typical of the color of the processed product. Any juice, which has been improperly prepared or processed, is subject to impaired color - - generally because of excessive or prolonged heating.

3. Evaluate the juice for absence of defects. In addition to the subjective evaluation for dark specks and seed or shell particles, the juice should be evaluated for the amount of "finely divided insoluble solids." The quantity of "finely divided insoluble solids" as described in the standards is determined as follows:

   Measure 50 mL of thoroughly stirred pineapple juice into a cone-shaped graduated tube of the long-cone type, measuring approximately 4-3/16 inches from tip to top calibration and having a capacity of 50 mL.

   Place the tube in a suitable centrifuge, the approximate speed of which is related to diameter of swing in accordance with the table below. The word "diameter" means the overall distance between the tips of opposing centrifuge tubes in operating position.

   The milliliter reading at the top of the layer of "insoluble solids," after centrifuging 3 minutes, is multiplied by two to obtain the percentage of "insoluble solids."

Diameter	Approximate revolutions per minute
10 inches	1,609
10-1/2 inches	1,570
11 inches	1,534
11-1/2 inches	1,500
12 inches	1,468
12-1/2 inches	1,438
13 inches	1,410
13-1/2 inches	1,384
14 inches	1,359
14-1/2 inches	1,336
15 inches	1,313
15-1/2 inches	1,292
16 inches	1,271
16-1/2 inches	1,252
17 inches	1,234
17-1/2 inches	1,216
18 inches	1,199
18-1/2 inches	1,182
19 inches	1,167
19-1/2 inches	1,152
20 inches	1,137

Compare the results obtained against the allowances in the standards.

Grade A – may contain slight amounts of defects (specks, pieces of shell, seeds) that do not more than slightly affect the appearance or palatability of the juice. Pineapple juice that falls into this classification may be assigned a score of 34 to 40 points.

Grade B – may contain moderate amounts of defects (specks, pieces of shell, seeds) that do not more than materially affect the appearance or palatability of the juice. Pineapple juice that falls into this classification may be assigned a score of 28 to 33 points and should not be graded above U.S. Grade B regardless of the total score for the product.

Dark specks, seed or shell particles, or other defects are evaluated by pouring 250 mL portions of the sample onto a flat white grading tray (approx. 17" x 12") and observing the defects present. Also evaluate for the allowable amount of "finely divided insoluble solids" as previously discussed. Allow 5-26 percent by volume of "finely divided insoluble solids" in Grade A and 5-30 percent by volume in Grade B. The intent of these tolerances is to allow a little bit more pulp in Grade B than in Grade A.

4. Evaluate flavor. A proper combination of various pineapple characteristics is essential to a high quality pineapple juice flavor. Specifically, these are:

   (1) A good sugar-acid balance; and

   (2) Pineapple essences which provide the "fruity flavor," bouquet and aroma.

   Minimum requirements are provided for sugar, expressed as "Degrees Brix," in grade A and B. Maximum requirements for acid are provided in these grades.

   Although a sample unit of pineapple juice may meet the requirements for a particular grade for both sugar and acid, a subjective evaluation must be made with respect to sugar-acid balance. For example, if the acidity of the juice approaches the maximum for Grade A, the sugar content should be such that the juice is not too tart for good flavor balance. On the other hand, if the acidity of the juice is quite low, the sugar content should not be

such as to cause the flavor to be too sweet. NOTE: Allow for normal sweet taste in the sweetened style.

Pineapple essences must be present to provide a pronounced "fruity" flavor characteristic of pineapple juice made from properly ripened and properly processed pineapple, in addition to meeting sugar and acid requirements in order for the juice to qualify for Grade A. If the juice does not have a pronounced pineapple flavor, the sample unit must not be classified above Grade B even though sugar and acid requirements for Grade A are met.

Also, be alert to scorched and caramelized flavors particularly when grading pineapple juice from concentrate. Adverse "de-tinned" can flavor should also be watched for.

Grade A (very good flavor) – the juice possesses a distinct varietal flavor that is typical of freshly extracted juice (pineapple juice) or typical reconstituted juice (pineapple juice from concentrate) that is properly processed from mature, well-ripened pineapple. Pineapple juice that falls into this classification may be assigned a score of 34 to 40 points.

Grade B (good flavor) – the pineapple juice possesses a normal varietal flavor that may be slightly caramelized but is not off-flavor. Pineapple juice that falls into this classification may be assigned a score of 28 to33 points.

5. Examine for MOLD (and other foreign material) per File Code 172-A-1.

Prepare the juice for the Howard Mold Counting Procedure as follows:

Without incorporating air into the sample unit, thoroughly mix by pouring back and forth a minimum of 12 times between two containers. After mixing, pour 50 mL of juice into a 50 mL graduated conical centrifuge tubes (Corning No. 8300 or equivalent). Centrifuge according to the following instructions:

Centrifuge the sample for 10 minutes at a Relative Centrifugal Force (RCF) of 1060 g. The reference centrifuge has a radius of 19.6 cm and attains RCF of 1060 g at a speed of 2200 rpm.

Since many of the centrifuges used in plants and offices differ from the AOAC reference, the following equation may be used to calculate the speed at which your centrifuge must run to attain RCF = 1060 g.

$N_1^2 \times r_1 = N_2^2 \times r_2$

Where N_1 = 2200 rpm
r_1 = 19.6 cm
N_2 = speed of centrifuge
r_2 = radius of centrifuge arm

For example, for a centrifuge having a radius of 14.1 cm, determine the speed as follows:

$$N_2^2 = \frac{N_1^2 \quad r_1}{r_2}$$

$$N_2^2 = \frac{(2200)^2 \quad (19.6)}{(14.1)}$$

$N_2^2 = (2594)^2$

N_2 = 2594 rpm

Rounding to the nearest 100 rpm, would result in a speed of 2600 rpm. This is the speed necessary to run the centrifuge to attain the proper relative centrifugal force.

Consult the manufacturer's instructions for the radius of the centrifuge arm. Be certain that the measurement is that taken to the bottom of the horizontal centrifuge tube. When setting the speed of the centrifuge, it is best to use a tachometer that reads by direct contact. Strobe type tachometers are not as accurate. Centrifuge must be balanced properly.

AFTER CENTRIFUGING FOR 10 MINUTES, ALLOW CENTRIFUGE TO COME TO A STOP GRADUALLY. DO NOT USE CENTRIFUGE BRAKE. DO NOT OPEN CENTRIFUGE COVER UNTIL THE CENTRIFUGE HAS COME TO A COMPLETE STOP.

After centrifuging, read and record the volume of sediment in the tube and decant the supernatant liquid without disturbing the sediment. Add 0.5 mL hydrochloric acid to dissolve oxalate crystals. Add distilled water to the tube to bring to the 10 mL mark. Add 5 mL stabilizing solution.

The stabilizing solution may be any one of the following:

1. 0.5 percent Sodium Carboxymethylcellulose

2. 3 to 5 percent Pectin Solution

3. 1 percent Algin Solution

See file code 135-A-6 for preparation of stabilizing solutions.

Thoroughly mix sediment, water, and stabilizing solution and pour into a small beaker. Mix by pouring back and forth a minimum of 6 times between beaker and centrifuge tube. Stir mixture thoroughly in beaker and proceed with mold counting according to instructions in File Codes 135-A-8 and 135-A-9. Record results and apply acceptance criteria from 172-A-2. Lots failing Howard Mold Count cannot be assigned a grade. These lots are Grade Not Certified (GNC) and fail the Federal Food, Drug and Cosmetic Act.