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# Grading Manual for Chili Sauce

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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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## Table of Contents

|                                                                                  | Page No. |
|----------------------------------------------------------------------------------|----------|
| I. Description of Product .....                                                  | 1        |
| II. History and Development of the Product .....                                 | 1        |
| III. Ingredients .....                                                           | 1        |
| A. Tomato Pulp .....                                                             | 2        |
| B. Sugar .....                                                                   | 2        |
| C. Spices, Salt and Acids .....                                                  | 2        |
| D. Other Ingredients .....                                                       | 2        |
| IV. Manufacture .....                                                            | 3        |
| A. Tomato Pulp .....                                                             | 3        |
| B. Adding Other Ingredients .....                                                | 3        |
| C. The Finishing Point .....                                                     | 3        |
| D. Processing .....                                                              | 4        |
| V. Inspection During Processin .....                                             | 4        |
| A. Regularly Observe the Raw Material .....                                      | 4        |
| B. Work as Closely as Possible With the Plant Quality Control .....              | 4        |
| C. Draw Samples of the Tomato Pulp .....                                         | 4        |
| VI. Inspection of the Product .....                                              | 5        |
| A. Sampling .....                                                                | 5        |
| B. Inspection Equipment .....                                                    | 5        |
| C. Setting up the Score Sheet .....                                              | 5        |
| D. Fill of Container .....                                                       | 6        |
| E. Net Weights .....                                                             | 6        |
| F. Vacuum Readings .....                                                         | 6        |
| G. Ascertaining the Grade .....                                                  | 6        |
| 1. Color .....                                                                   | 7        |
| 2. Consistency .....                                                             | 7        |
| 3. Character .....                                                               | 7        |
| 4. Absence of Defects .....                                                      | 8        |
| 5. Flavor .....                                                                  | 9        |
| 6. Limiting Rules for Scoring Factors .....                                      | 9        |
| H. Examination for Filth and Extraneous Material .....                           | 9        |
| VII. Certification .....                                                         | 10       |
| A. Tolerances for Concentration .....                                            | 10       |
| B. Examples of Proper Information to Appear in the Body of the Certificate ..... | 10       |
| <b>I. Description of Product.</b>                                                |          |

The product covered by these standards is somewhat similar in looks and in popular usage to tomato catsup. The principal differences being that chili sauce contains at least a portion of the tomato seeds and it usually contains small bits of the chopped vegetable for the flavoring ingredients; whereas in tomato catsup the ingredients are all macerated into relatively small particles. The Food and Drug Administration has not established standards of identity for this product. Regardless of what the product is

called, these standards apply only to the product described in the standards, one which is primarily made of tomatoes. The standards should not be applied to a product which contains larger portions of pickle relish or other chopped vegetable.

## **II. History and Development of the Product.**

Chili sauce originated by home cooks and resembled a light tomato preserve, that is, the **body** of the product was produced mostly by the larger chunks of broken tomatoes. The tomatoes were hand peeled and cooked in kettles with the other ingredients. They were stirred lightly so that the tomatoes were somewhat broken up.

Produced commercially by similar methods this product has had a good reception for some time; however, because of the amount of hand work it remained in the luxury class. With increased costs for labor, efforts have been made to short cut the hand peeling of the tomatoes by using strained tomato pulp for all or a part of the tomato ingredient. Tomato pulp which more or less closely approaches the appearance of hand peeled tomatoes which have been broken up by stirring and cooking is produced by machines.

Chili sauce now is largely made by machinery; however, regardless of the method of manufacture, efforts are made to approach the appearance of the old-fashioned chili sauce with respect to the tomato ingredient. This is done to a remarkable degree in some of the better chili sauces.

## **III. Ingredients.**

The ingredients used in chili sauce are very similar to those used in tomato catsup. The methods of preparation and the amount of the ingredients used may vary considerably.

**A. Tomato Pulp.**

The primary ingredient in chili sauce is red tomatoes. The tomatoes may be hand peeled and broken up by stirring or the tomatoes may be prepared by any one of a number of machines especially designed for the purpose, or there may be a combination of whole peeled tomatoes and more or less macerated tomatoes from which the peelings have been removed by screening out. These machines are usually similar to the tomato pulper or finisher except that the holes through which the tomato material is forced are usually quite large and they are not nearly as efficient as the usual finishing machine at removing the peeling and defects from the tomatoes. For economic reasons some manufacturers have resorted to using a large amount of cyclone pulp and a small amount of hand peeled or mechanically peeled tomatoes or tomatoes which have been forced through small openings. In general the more of the larger pieces of tomato material present the better the pulp is for chili sauce.

**B. Sugar.**

In the absence of any Standard of Identity the use of any of the nutritive sweetening ingredients is permitted in this product. The usual sweetener is sugar (sucrose). The solids of chili sauce are usually brought up higher by the use of sugar and lowered by concentrating the tomatoes than is usual with catsup. Some manufacturers use as much as 1/2 more sugar than they do with catsup yet finish at about the same point with respect to soluble solids.

**C. Spices, Salt and Acids.**

About the same spices are used as in the manufacture of catsup, except that garlic is seldom used in chili sauce. The proportions of the various spice ingredients are not standardized between manufacturers. Salt and vinegar are used in about the same proportions as with catsup.

**D. Other Ingredients.**

The other ingredients, such as onion, bell peppers, celery, and sweet pickle relish, contribute to the flavor of the product and also provide **body** to the finished product; that is, they provide part of the consistency and most of the chewiness of the finished chili sauce. The ingredients used and the proportions of the ingredients used vary widely from packer to packer, therefore, quite a variety of flavors can be expected in chili sauces. The onion ingredient is often dehydrated onion flakes. Red or green diced dehydrated peppers are often used.

#### **IV. Manufacture.**

Most important in the manufacture of chili sauce is the preparation of the tomato pulp.

##### **A. Tomato Pulp.**

Where peeled tomatoes are used for a part or all of the tomato pulp they are usually taken from the regular canning lines after at least a partial preparation by mechanical or hand peeling, trimming and coring. There is usually some selection of the raw tomatoes which are to be run through chili sauce preparation machines. Some packers divert very ripe tomatoes which need no trimming to the chili sauce lines while others box-sort or load-sort the tomatoes and trim them on the conveyer belts. This trimming removes defective parts and stems which would become defects in the sauce. The trimmers may or may not remove most of the green portions of the tomatoes depending on the machinery used and the manufacturer's desires with respect to the appearance of chili sauce. If green pepper, pickle relish, or green tomatoes are added green shouldered tomatoes are not usually trimmed.

Manufacture consists of combining the ingredients in a manner so that the finished chili sauce will have the desired qualities of color, consistency, finish, absence of defects, and flavor. The tomato pulp, whether from broken peeled tomatoes or from special chili sauce machines, or cyclone juice to which some tomato material containing tomato seed is added, is run to kettles, usually steam jacketed, and reduced by boiling to about one-half the original volume. Concentration in vacuum pans is particularly satisfactory for this operation.

##### **B. Adding Other Ingredients.**

Onion is often added at the beginning of the boil. The other ingredients may be added at any time but the sugar is usually added late to prevent caramelization. Spices, if in the form of oils or cream of spice, are usually added late to prevent evaporation of the flavor ingredients.

##### **C. The Finishing Point.**

Because of the nature of the ingredients there is no accurate means of determining a correct finishing point which will apply to all formulae. The first batches when starting, or after any major change in formula, are dropped when they appear to be about correct. As with tomato catsup the consistency of the hot sauce may be measured by any suitable device, such as the Bostwick consistometer and the refractive index may be taken. Succeeding batches can then be adjusted by these instruments by increasing or decreasing the boiling or by adjusting the amounts of pulp and sugar to the desired result.

##### **D. Processing.**

Chili sauce is usually closed at about 180 degrees, at which temperature further processing is usually not necessary. Foaming may occur at higher temperatures and an additional process is usually given if the sauce is closed at lower temperatures.

#### **V. Inspection During Processing.**

The basic principles of in-plant inspection outlined in pertinent instructions on this subject apply in general to inspection during the manufacture of chili sauce. The following inspection procedures are suggested. It may be necessary to vary these procedures somewhat depending on the particular operation.

**A. Regularly Observe the Raw Materials** going into this product to see that they are suitable for the purpose. The criteria suggested in connection with decomposed material in tomato catsup may be useful in connection with chili sauce. If unsuitable raw material is going into the product (1) immediately call the attention of the management to the situation, and (2) do not certify the product for any grade or specification without first consulting your supervisor for guidance.

**B. Work as Closely as Possible With the Plant Quality Control** setup, if there is one.

**CAUTION:** Plant quality control records are useful only if there is full cooperation with control people and the plant management and if there are sufficient independent checks by the inspection force to verify the findings made by the plant personnel. Plant quality control checks are particularly useful where the information developed is always subject to recheck and correction by the inspection force.

**C. Draw Samples of the Tomato Pulp as it Enters the Cooking Kettles** and examine for defects, particularly tomato peel. An examination at this point will spot faulty machinery or poor preparation before the batch is complete and will give some time for correction of any fault. It will also serve as an indication of the final score for the product with respect to defects.

## **VI. Inspection of the Product.**

### **A. Sampling.**

Follow applicable sampling instructions meticulously when drawing samples of chili sauce. Chili sauce is made in kettle sized batches and every container from each batch is usually very similar to every other container from that batch. It may be very different from the containers in another batch even though they are offered for inspection as part of the same lot. If it is known that each batch bears a different code every effort should be made to secure a sample from each batch unless the batches are very small. If each batch does not bear a separate code mark it may be that a new code mark represents another day or half day's run or some other period of time. Some knowledge of the coding system will be very helpful in securing samples which will be representative of the lot. Suitable equipment has been developed to code bottle caps. Such coding is more satisfactory than just case coding.

### **B. Inspection Equipment.**

1. Minimum equipment necessary for the inspection of chili sauce.
  - a. Scale- 1/4 ounce gradations.
  - b. Flat, white, grading trays.
  - c. Ruler.
  - d. Refractometer.
2. Additional equipment for microanalytical examination for mold and other filth (listed in more detail in other instructions).
  - a. Mold counting equipment.
  - b. Insect fragment counting equipment.
  - c. Maggot and fly egg counting equipment.

### **C. Setting up the Score Sheet.**

Record all important information concerning the inspection on the score sheet as directed in basic instructions on this subject. This includes such information as net weights, kind of containers, vacuum readings and all significant information taken from the labels.

### **D. Fill of Container.**

Compliance with the fill of container recommendation in the standards (at least 90 percent of the volume of the container) assures that the headspace in most containers will not be excessive. Because the presence of air bubbles in the chili sauce may give the impression of poor color and because there may be a real loss of color because of oxidation, most packers fill containers of chili

sauce as full as is practicable. Slack filled containers should be noted and reported on certificates as directed in basic instructions on this subject.

**E. Net Weights.**

Although chili sauce is a semi-liquid product it is labeled in terms of avoirdupois weight rather than fluid ounces; therefore, weigh the product and record the weights on the score sheets.

**F. Vacuum Readings.**

The red color of tomato products is easily affected by oxidation and certain types of closures require a good vacuum in the container to keep the closure in place. For these reasons the vacuum reading is often very important to the buyer of chili sauce. Vacuum readings can be taken through the lids of bottled chili sauce although it may be difficult to pierce both the lid and the gasket. Every effort should be made to get as accurate vacuum reading as possible on this product.

**G. Ascertaining the Grade.**

There are a number of condiment sauces on the market which contain tomatoes. They may or may not be **chili sauce** within the meaning of these grades. Even though the manufacturer may call the sauce **chili sauce** to be eligible for a grade under these standards the products must meet the definition in the first paragraph of the United States standards. The principal differentiating requirements in this paragraph are:

1. Predominately composed of a tomato ingredient;
2. At least a portion of the tomato seed present, and
3. The refractive index of the filtrate is not less than 1.3784.

All of the requirements of each grade are scoring factors.

**1. Color.**

Because of the addition of various combinations of ingredients other than tomatoes, chili sauce color is not evaluated by comparing it to the color of spinning discs as is done with other tomato products. The evaluation of color, however, should be made only under suitable lighting conditions as described in instructions on the evaluation of color in tomato products. It is believed that the color descriptions in the standards quite accurately describe the requirements of each scoring group. They should be reviewed carefully. It should be kept in mind that the tomato color should predominate but that it need not be as red as is required in Grade A color for catsup, juice, and other tomato products. On the other hand, if the color of the chili sauce is dark and even slightly off color the score should be dropped into the Grade C range or lower. If the color is objectionably dark or off color for any reason the product should be scored in Substandard for this factor.

**2. Consistency.**

No entirely objective method of measuring the consistency of chili sauce has been developed. It is believed that the standards for factor of consistency quite adequately describe the requirements for each scoring group.

**3. Character.**

Character and consistency are quite closely related in that the character has a considerable effect on the consistency of the product. Good character may be imparted to the sauce by the firmness of the larger pieces of tomato material or it may come almost entirely from the added ingredients, such as onion or pickle. It is particularly desirable that most of the character come from the tomato ingredient and such a sauce would receive a higher score than if there was little character to the tomato pulp.

Proper scores for character will be assigned if the standards are followed quite literally.

#### 4. Absence of Defects.

The scoring for this factor is based on the effect of the defects present on the **appearance and eating quality of the product**. Therefore the examination for defects is made by viewing the actual product (not a diluted sample) on a white tray. Pour eight to twelve ounces about a quarter inch deep on the tray for this evaluation. Because of the wide variation in size, number, kind, type, and color of defects such as dark specks, scale-like particles, discolored seeds, or pieces of abnormally discolored ingredients which might be present, it has not proven feasible to assign score points on a strictly objective basis, that is, on the number of the various defects which are present. The decision as to the degree the defects present affect the appearance and eating quality of the product must necessarily be based on experience with the product and on good judgement. Experience can be gained and judgment be improved by checking samples with supervisors at every opportunity. This will result in a high degree of uniformity in rating the factor of defects throughout the inspection service.

Most common and also the most controversial defects in chili sauce is tomato peel. If hand-peeled tomatoes are used entirely, there is usually very little peel in the sauce. If the tomato pulp is produced, at least in part, by chili sauce machines or slow operating pulpers there may be little or there may be a considerable amount present.

Small bits of rolled up peel are not particularly objectionable unless there is a considerable number of them. Such material may be so numerous as to warrant dropping the score to the Grade C or Substandard range. Larger pieces may be tough and may be quite objectionable, particularly if they are numerous. In most cases the larger scrolls of peeling are the only ones of any consequence. Therefore, the following guide considers only pieces of peel one-half inch or more in the longest dimension. **(Rolled up scrolls are not unrolled for measuring)**.

##### a. Guide for Consideration of Peel Only.

The following allowances are guides for the presence of larger pieces of peel only. In assigning grade and score points the effect of defects of **all types present** on the appearance and eating quality of the product must be considered.

Minimum Grade A - 3 pieces one-half inch in length or longer, of which not more than one piece is  $\frac{3}{4}$  inch or longer, per 2 ounces of chili sauce.

Minimum Grade C - 3 pieces one-half inch in length or longer, of which not more than one piece is  $\frac{3}{4}$  inch in length or longer, per 1 ounce of chili sauce.

**5. Flavor.**

Chili sauce is a formula product and as such the flavor can be adjusted over a wide range by the use of different ingredients, different proportions of ingredients, different spices, and different amounts of sugar and acid. Therefore, all good chili sauces do not taste alike and equally competent persons will prefer very different tasting chili sauces. In order that personal preferences do not affect the scoring unduely keep in mind that the chili sauce is primarily a spiced and flavored sweetened tomato sauce and the scoring is based on the traditionally characteristic flavor associated with this product. With this concept of flavor in mind the standards will be a satisfactory guide for assigning the score points for this factor.

**6. Limiting Rules for Scoring Factors.**

Note that, except for character, scores in the Grade C group limit the grade of the product to Grade C. The factor of **character** is limited only at the Substandard level. Thus, chili sauce which has only a **fairly good character** may be graded A, provided it meets the other requirements of this grade. All scoring factors are limited at the Substandard level.

**H. Examination for Filth and Extraneous Material.**

Before assigning any U.S. Grade to any processed food product every reasonable effort should be made to be sure that the food is clean and not in violation of any regulation of the Food and Drug Administration. In the case of chili sauce at least the following analyses are to be made as directed in Part II of this instruction or other effective interim instructions:

1. Mold counts.

2. Fly egg and maggot determinations.
3. Insect fragment and other light filth analyses.  
(These to be run only if specifically directed or requested or if there is any question about sanitary manufacture or suitable raw materials).

## VII. Certification.

Certification procedure for chili sauce is, in general, exactly as directed in general instructions on this subject.

### A. Tolerances for Concentration.

A refractive index of 1.3784 is a prerequisite to grading a product under these standards. Other merchantable tomato sauces are produced at less than 1.3784. However, these are not considered chili sauce for the purpose of these standards. Chili sauce is difficult to control; therefore, in order not to unduly penalize a batch which has been **dropped** too soon, allow the index of any sample to go to 1.3767 provided the average of all the samples in the lot is 1.3784.

If a product offered for inspection as **chili sauce** exceeds this tolerance the proper grade statement would be similar to:

**No applicable United States Standard for this product-- refractive index does not comply with requirement for grade standard of chili sauce.**

### B. Examples of Proper Information to Appear in the Body of the Certificate.

1. Net weights: 12.0 to 13.4 ounces.  
Vacuum readings: 8 to 13 inches.  
Refractive index: 1.3788 to 1.3792.
2. Net weights: 12.4 to 12.9 ounces.  
Vacuum readings: 8 to 14 inches.  
Refractive index: 1.3770 to 1.3795, average 1.3789.