METHODS OF ANALYSES

for

TOMATO PRODUCTS

Determination of Consistency

FOR USE OF USDA PROCESSED FOODS INSPECTORS

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
FRUIT AND VEGETABLE DIVISION
PROCESSED PRODUCTS STANDARDIZATION AND INSPECTION BRANCH

PREFACE

These instructions are designed primarily for Processed Fruit and Vegetable Inspectors of the U. S. Department of Agriculture. They are not intended to be a comprehensive treatise on the subject but give background information and guide-lines to assist in the uniform application and interpretation of USDA grade standards and other similar specifications.

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DETERMINATION OF CONSISTENCY

INTRODUCTION AND BACKGROUND

The consistency of tomato paste and tomato puree can be measured and expressed in any number of ways. Considerable efforts are expended to continually improve the consistency of these and other tomato products -- to make them thicker or more viscous. The consistency is dependent upon many variables, among which are: (1) variety of tomato; (2) type of "break"; (3) particle size; and (4) method of concentrating.

With the advent of the tomato paste "futures" market, a measurement of the consistency of tomato paste scheduled for delivery against exchange contracts must be determined.

Also, more and more packers and buyers are requesting a "consistency determination" for their tomato paste and puree packs and purchases.

PURPOSE AND SCOPE

This procedure sets forth a method -- using, basically, the Bostwick Consistometer -- to determine the consistency of tomato paste and/or tomato puree with a concentration of 12.0% or more of natural tomato soluble solids (N.T.S.S.).

Also, the consistency of tomato puree having a concentration of less than 12.0% N.T.S.S. may be determined; the undiluted puree will be used in these instances.

Unless another method is specifically requested, these instructions shall provide a uniform procedure to use for determining and reporting the consistency of tomato paste or tomato puree.

This procedure may be superseded by another or alternate method which may be requested or specified by an applicant. However, a copy of the methodology requested must be furnished by the applicant to the inspector.

FUTURES

The following method will be used for determination of consistency of tomato paste that is offered in delivery of tomato paste "futures" contracts.

[RESERVED FOR FUTURE DEVELOPMENTS]

EQUIPMENT

(1) Bostwick Consistometer - (Cenco - Bostwick Consistometer, Central Scientific Company No. 24925). The instrument must have a smooth, flat trough, free from buckles or other distortions. There must be no more than a slight leakage under the gate when the gate is closed and sample is allowed to stand in the reservoir for several minutes. Be sure that the gate moves freely and opens completely when tripped.

(2) Spirit Level - Must be of a size to fit into lengthwise trough of consistometer.

(3) Balance - The capacity should be of 800 grams or more with accuracy to ± 0.5 grams.

(4) Abbe' Refractometer - Check adjustment and standardize with distilled water before using. Distilled water at 20° C should have a refractive index of 1.3330.

(5) Stop Watch - or interval timer.

(6) Straight Edge - Used to properly level product in reservoir.

(7) 500 ml. Beaker - For mixing the water with the tomato product.

(8) Spoon - For stirring.

GIVEN OR DETERMINED - The N.T.S.S. of the sample.

PREPARATION OF SAMPLE

(1) Using the nomograph (Inspection Aid No. 93), determine proper amounts of product and distilled water to mix to produce a 12.0 percent concentration.

(2) Tare a 500 ml. beaker.

(3) Weigh indicated amount of water into beaker.

(4) Add 100 grams of product. (Add last portion of product against side of beaker above water level. This will permit accurate weight adjustment of product before it contacts water.)

(5) Thoroughly mix by stirring -- taking care to minimize incorporating of air into mixture.

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PREPARATION OF SAMPLE -- continuation

(6) Check sides of beaker and stir any adhering product into mixture.

(7) Remix and continue stirring until all lumps of product are dissolved.

(8) Check temperature of mixture and adjust to 20° C ± 1° C.

(9) Check concentration of thoroughly mixed sample on refractometer.

(10) Refractive index of properly diluted sample should read 1.3508 to 1.3511, corrected to 20° C. These readings convert to 12.0 ± 0.1% N.T.S.S.

PROCEDURE

(1) Adjust end-to-end level of Bostwick Consistometer by means of a spirit level placed in trough of instrument. Side-to-side level may be adjusted by means of the built-in spirit level.

(2) Mix sample by stirring and pour immediately into reservoir chamber of consistometer.

(3) Slightly overfill reservoir, avoiding incorporation of air bubbles.

(4) Pass straight edge across filled chamber to remove excess product, starting at gate and working toward end of instrument.

(5) Release gate using gradual pressure on release lever. Hold instrument steady as gate is released.

(6) Note time interval and after 30 seconds, measure maximum distance of product flow.

(7) Read flow distance to nearest 0.1 cm.

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PROCEDURE -- continuation

(8) Thoroughly wash and dry consistometer and repeat procedure using a second portion of the same sample. Always remix sample before transferring to instrument.

[Do not wash instrument with hot water if it is to be used immediately for the next determination as this may result in an increase in temperature of the sample. For highest accuracy, the instrument should be maintained at a temperature of 20° C ± 1° C.]

(9) If the first two readings (of the same sample) vary by more than 0.2 cm., repeat a third (or possibly more) procedures until apparent satisfactory agreement is obtained.

(10) Calculate and report the average of two or more readings for any one single sample, excluding any that appear to be abnormal.

CERTIFICATION

The results of the method outlined herein will be declared as shown in the following examples:

In the body of the certificate:

Consistency (Bostwick-Consistometer Method) --
at 12.0% Natural Tomato Soluble Solids:
Range ------- 6.1 cm. to 7.3 cm.
Average ----- 6.7 cm.

For tomato puree which contains less than 12.0% N.T.S.S., and on which a consistency determination is made on the undiluted product, certify:

Consistency (Bostwick-Consistometer Method) --
at 10.2% Natural Tomato Soluble Solids:
Range ------- 9.4 cm. to 11.1 cm.
Average ----- 10.2 cm.

Any other requested method of measuring the consistency of tomato puree or paste may be certified; provided, that the results of such measurements are expressed in the terms used in the specified method and a copy of the methodology of the procedure is available upon request.

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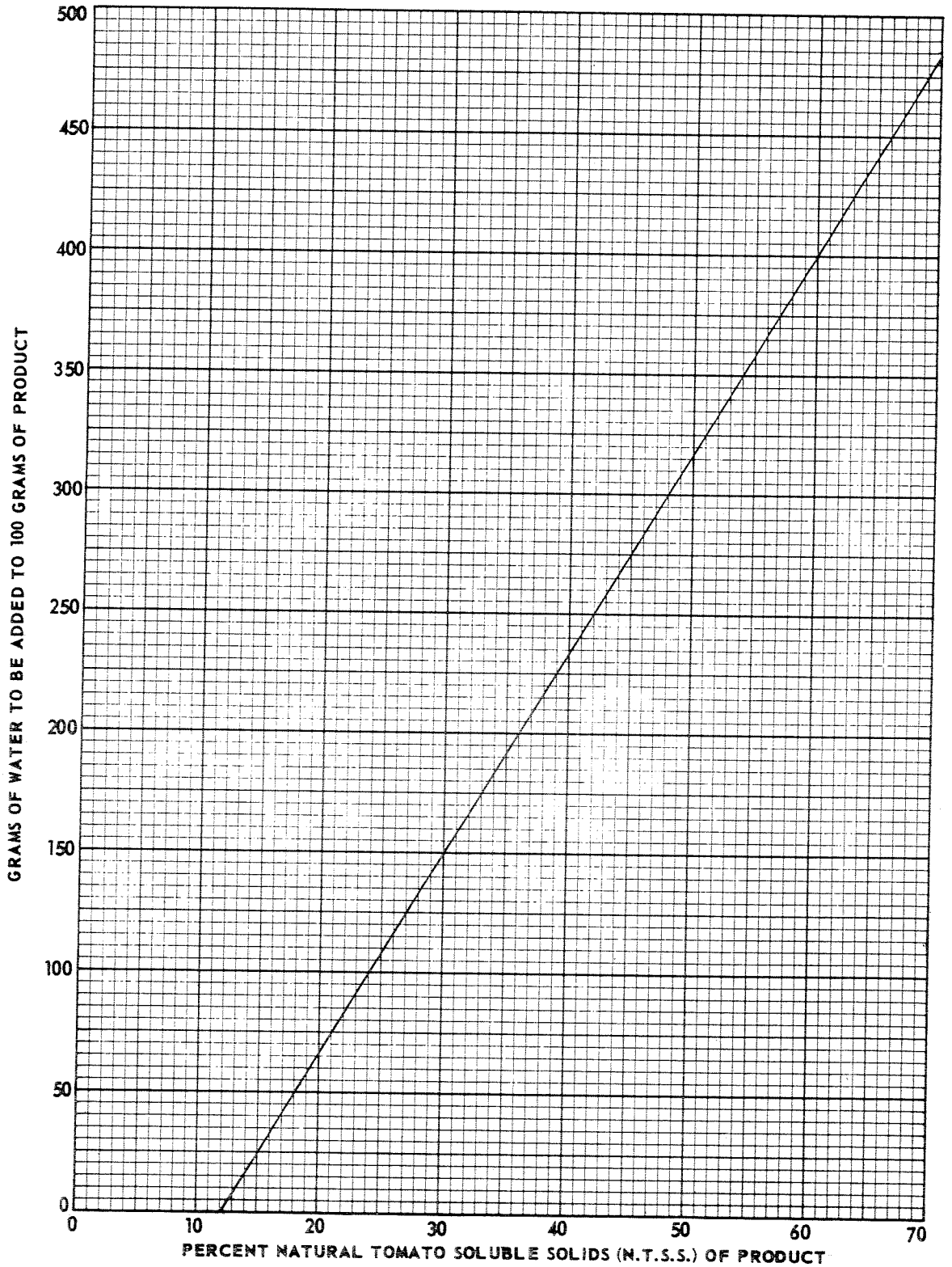
CONCENTRATED TOMATO PRODUCTS

DILUTION CHART – GRAMS OF WATER TO BE ADDED TO 100 GRAMS OF PRODUCT TO OBTAIN 12 PERCENT N.T.S.S. FOR CONSISTENCY DETERMINATION