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Durum wheat semolina and alimentary pasta — Estimation of cooking quality of alimentary pasta by sensory analysis —

Part 1: Reference method

Semoule de blé dur et pâtes alimentaires — Appréciation de la qualité culinaire des pâtes par analyse sensorielle —

Partie 1: Méthode de référence

Reference number
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 34, *Food products*, Subcommittee SC 4, *Cereals and pulses*.

This first edition of ISO 7304-1 cancels and replaces ISO 7304:1985, which has been technically revised.

ISO 7304 consists of the following parts, under the general title *Durum wheat semolina and alimentary pasta — Estimation of cooking quality of alimentary pasta by sensory analysis*:

— *Part 1: Reference method*

— *Part 2: Routine method*

Durum wheat semolina and alimentary pasta — Estimation of cooking quality of alimentary pasta by sensory analysis —

Part 1: Reference method

1 Scope

This part of ISO 7304 sets out a method for estimation by sensory analysis of the cooking quality of alimentary pasta. Estimation takes place through the evaluation of the following:

— firmness, by chewing;

— liveliness, by manual handling;

— starch release, by manual handling.

The method does not express a preference and only gives an estimate relating to the evaluation of the cooking of the pasta; it does not apply to small pasta shapes usually consumed in soups.

NOTE This method can be applied to all forms of alimentary pasta produced from durum wheat and to products made from common wheat or a mixture of common wheat and durum wheat as long as the appropriate national regulations allow these raw materials to be used in alimentary pasta.

This part of ISO 7304 has been specifically designed to establish the reference method with a view to the development, approval or monitoring of instrumental or practical methods of sensory analysis.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4120, *Sensory analysis — Methodology — Triangle test*

ISO 5492, *Sensory analysis — Vocabulary*

ISO 8586, *Sensory analysis — General guidelines for the selection, training and monitoring of selected assessors and expert sensory assessors*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5492 and the following apply.

3.1
firmness
resistance to cutting between the teeth

3.2
liveliness
ability of one strand of pasta to slide smoothly over another, which depends on the degree of adhesion

Note 1 to entry: This property can be evaluated manually by assessing the ability of the cooked pasta strands to stick to each other or to the fingers after handling (between thumb, major, and index).

3.3
starch release
state of surface breakdown of the cooked pasta accompanied by the release of starch

Note 1 to entry: This state can be evaluated visually by assessing the quantity of starch remaining on the fingers after handling (between thumb, major, and index).

3.4
optimum cooking time
OCT
t
time after which the continuous white line visible at the centre of a strand of pasta during cooking disappears

Note 1 to entry: Optimum cooking time is determined by crushing using a crushing plate (6.10) in the case of long pasta or by cutting the strand at right angles with a blade (6.11) in the case of short pasta.

Note 2 to entry: By convention, the white line is considered to have disappeared when it is visible only as a row of dots.

3.5
overcooking
cooking time longer than the *optimum cooking time* (3.4) resulting from a deliberate desire to place the pasta in a critical situation in order to measure the impact on *firmness* (3.1), *liveliness* (3.2), and *starch release* (3.3)

Note 1 to entry: Such overcooking may correspond to 50 % or 100 % over the optimum cooking time (or any other factor).

4 Principle

Estimation of the three parameters mentioned in the scope by chewing and manual handling of pasta after cooking (for the optimum cooking time or until overcooked).

Sensory analysis of at most six samples presented to a panel of at least 10 qualified assessors, one after the other in random order.

5 Reagents

5.1 **Water**.

If tap water is used, validate the hardness thereof. If the hardness is other than French hardness 15 °f ± 1, bring it to the target value using an appropriate water softener.

If bottled water is used, obtain water with a total mineral salt content of approximately 300 mg/l.

5.2 **Sodium chloride**, of analytical grade.

6 Apparatus

6.1 **Balance**, capable of weighing to the nearest 0,01 g.

6.2 **Steel containers (pan)**, thick-bottomed, diameter approximately 17 cm, capacity 2,5 l.

6.3 **Electric hotplates**, diameter approximately 19 cm, power output about 1 500 W.

6.4 Colander, for pasta, made of stainless steel, diameter approximately 25 cm to 30 cm, with holes approximately 2 mm in diameter.

6.5 Timer.

6.6 Flat white plates, identical and in sufficient number for the performance of the tests.

6.7 Fork or spatula.

6.8 Graduated cylinder, capacity 1 l.

6.9 Water softener.

6.10 Transparent plastic crushing plate.

6.11 Cutter, with a sharp blade.

6.12 30 mm taper-ended micrometre, suitable for measuring all short strands of pasta after cutting into pieces.

6.13 30 mm flat-ended micrometre, suitable for measuring all long strands of pasta.

6.14 Container, volume approximately 200 ml.

7 Sampling

It is important that the laboratory receives a sample which is truly representative and has not been damaged or changed during transport or storage.

Sampling is not part of the method specified in this part of ISO 7304. A recommended sampling method is given in ISO 24333.

8 Cooking procedure

8.1 Optimum cooking time (OCT), *t*

The optimum cooking time should be determined before the actual test using the same cooking conditions as in 8.2.

Two minutes before the estimated cooking time, usually written on the package by the manufacturer or, if this is not the case, on the basis of experience with pasta of similar diameter or thickness:

— remove a long strand and crush it using the crushing plate (6.10) or

— remove a short strand of pasta and cut it using the cutter (6.11).

Repeat this operation every 30 s until the continuous white line, visible at the centre of the crushed strand or the cut section, disappears. The time required for the line to disappear is the optimum cooking time for this type of pasta (see illustration in Annex A).

8.2 Sample preparation

— Weigh out (6.1) 100 g of pasta.

— Place the 2,5 l steel container (pan) (6.2), containing 1 500 ml of tap water (5.1) measured using the graduated cylinder (6.8), on an electric hotplate (6.3).

— Add 10,5 g of sodium chloride (5.2) to the water (i.e. 7 g per litre of water).

— Turn on the hotplate (6.3) and bring the water to a boil.

— Keep the water close to boiling point so that it can be brought back to the boiling point as soon as the pasta is added.

— Add the 100 g test sample of pasta to the steel container (pan) and start the timer (6.5) at the same time. Adjust the hotplate so that the water simmers, use a fork or spatula (6.7) to ensure that all of the pasta is submerged, and for long strands, twist after softening so that they are submerged without breaking.

— Cook the pasta for the time, *t*, determined in 8.1 (or the desired overcooking time).

— While the pasta is cooking, mix it with a fork or spatula (6.7) three times for 10 s. Do this at one-quarter, one-half, and three-quarters of the cooking time.

— When the desired cooking time has elapsed, quickly empty the steel container (pan) into the colander (6.4) and drain the cooked pasta immediately, gently hitting the colander three times within the first 5 s.

— Put the whole cooked test sample onto a plate (6.6).

— Chewing to establish firmness shall take place 5 min after draining.

— Manual handling to establish liveliness and starch release shall take place after 5 min rest after draining.

9 Sensory analysis

A reference sample (see 9.1.8) is systematically presented for analysis in order to provide a comparison with the test samples.

9.1 General test conditions

9.1.1 The tests shall be carried out in a room specially designed for sensory analyses.

9.1.2 The panel shall consist of at least 10 qualified assessors, selected by means of a triangle test in accordance with ISO 4120, adapted for the estimation of cooked pasta.

9.1.3 Previous training on the estimation of the firmness of cooked pasta shall be given to the assessors using reference samples which have been cooked at various cooking times, that is at OCT or longer, in order to cover a wider firmness range as possible.

9.1.4 The assessors shall be trained in accordance with ISO 8586.

9.1.5 The samples shall be presented one after another, starting with the reference sample. No assessor shall ever have more than one plate plus the reference sample in front of him/her (see 9.1.8). At the most, six pastas may be evaluated (including the reference sample) at one time.

9.1.6 Cooked and overcooked products shall never be presented in the same series.

9.1.7 Tasting shall be carried out in red or yellow artificial light and presentations of a single series shall progress regularly without interruption.

9.1.8 Reference sample (during each test, a sample known to the assessors shall be presented): prepared under the same conditions as the rest of the series, and the firmness, liveliness, and starch release ratings of which are known to the assessors and fall in the middle of the range (between 30 and 70 in a range from 10 to 100); this test sample shall remain available to the assessor throughout the entire test.

9.2 Progress of the test

The test shall always start with the presentation of the reference sample, the firmness, liveliness, and starch release ratings of which are known to the assessors; the coded test samples then follow.

9.2.1 Each assessor is presented with a plate containing a cooked pasta sample.

9.2.2 The assessor shall first assess the pasta for firmness by chewing for 5 min after draining. The assessor shall give a rating, expressed as a whole number, from 10 (very tender) to 100 (very firm). The ratings increase with increasing firmness.

9.2.3 Each assessor shall then, after 5 min have elapsed since draining, assess the pasta for liveliness. During this operation, the assessor stirs the pasta on the plate by hand and assesses the strands' ability to stick to each other or to the fingers.

— Put one hand into a container (6.14) full of water and then wipe dry.

— Pick up a handful of pasta, handle it and drop the pasta back onto the plate.

— Analyse the way in which the strands of the pasta separate from each other and from the fingers.

— Repeat the procedure three times.

— Give a rating, based on the three successive evaluations, expressed as a whole number, from 10 (very sticky) to 100 (not at all sticky). The ratings increase with increasing liveliness.

9.2.4 Each assessor shall then assess the pasta for starch release. During this operation, the assessor manually removes, by rubbing, the starch that covers the surface of the cooked pasta and evaluates the quantity of starch transferred to his/her hand.

— Put one hand into a container (6.14) full of water and then wipe dry.

— Place the hand on the pasta and rub gently with the fingers.

— Repeat the procedure three times.

— Give a rating, based on the three successive evaluations, expressed as a whole number, from 10 (a large quantity of starch) to 100 (no starch). The ratings decrease with decreasing quantities of starch.

10 Expression of results

The results for a given cooking time are expressed as a whole number in relation to a scale defined for the three parameters analysed.

Rate the sample analysed by referring to the rating scale (see Table 2) specified for the three parameters (see Table 1).

Table 1 — Analysis of the parameters

Long strands	Short strands
Firmness	Firmness
Liveliness	Liveliness
Starch release	Starch release

Table 2 — Rating scale

1 – Firmness	2 – Liveliness	3 – Starch release
100 – very high (very firm)	100 – very high (not at all sticky)	100 – very low (no starch)
80 – high	80 – high	80 – low
50 – medium	50 – medium	50 – medium
30 – low	30 – low	30 – high
10 – very low (very tender)	10 – very low (very sticky)	10 – very high (large quantity of starch)

The results shall be given in a table with the ratings given by each assessor for the three criteria assessed and for each pasta tested (as a whole number); see example in Table 3.

Table 3 — Sample response form

Sampling method: ISO 24333					
Test method: ISO 7304-1			Laboratory:		
Test no.:			Date, time:		
Physical conditions:					
Codes of assessors:					
Sample ID	Dimensions (mm)	Cooking time (s)	Ratings given to pasta (10 to 100)		
			Firmness	Liveliness	Starch release
1 (reference)					
2					
3					
4					
5					
6					
7					
8					
9					
10					

The arithmetic means for each pasta tested are calculated for each of the three criteria and expressed as numbers rounded to the nearest whole number.

11 Test report

The test report shall specify the following:

a) the sampling method used, if known;

b) the test method used, with reference to this part of ISO 7304, i.e. ISO 7304-1;

c) all information necessary for the complete identification of the samples (in particular, the dimensions of the uncooked strands of pasta measured using a micrometre (6.12) and (6.13));

d) the number of samples assessed and an indication that the texture (starch release, liveliness, and firmness) was the only criterion examined;

e) the cooking time, indicating if there has been any overcooking time;

f) any other recommendation given during the test;

g) the final results obtained from the test;

h) the date, time, and physical conditions of the test;

i) the test location;

j) the number of assessors and their codes;

k) the details of any operations not specified in this part of ISO 7304 as well as all operations regarded as optional, together with details of any incidents which may have influenced the test result(s).

Annex A
(informative)

Illustrations of strands of cooked pasta (optimum cooking time)

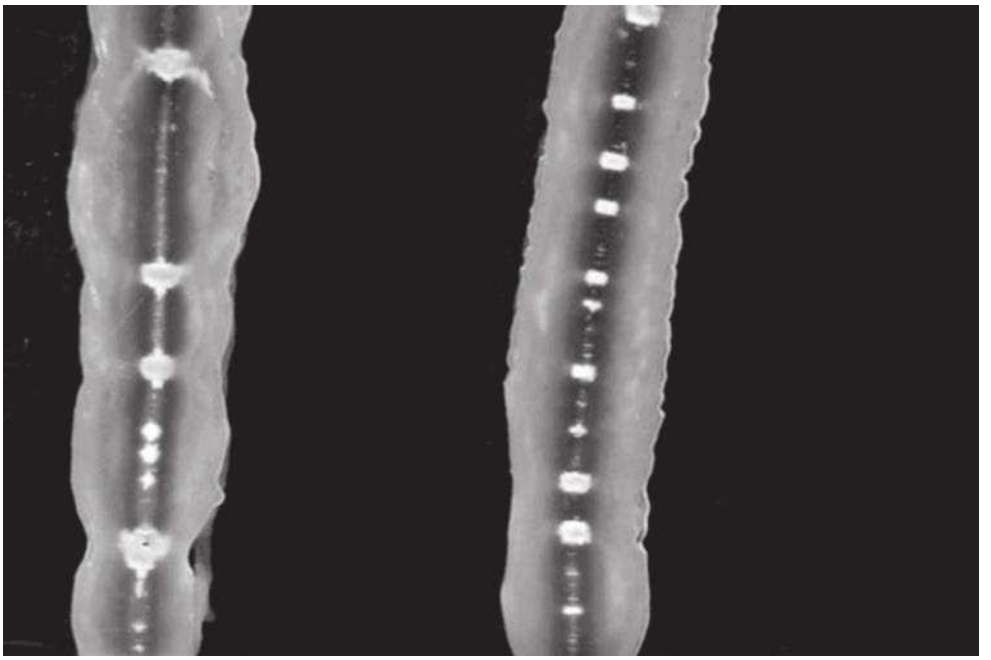

Figure A.1 — Example showing the broken white line visible at the centre of a long strand of pasta (spaghetti) after the optimum cooking time when the strand is crushed using the crushing plate

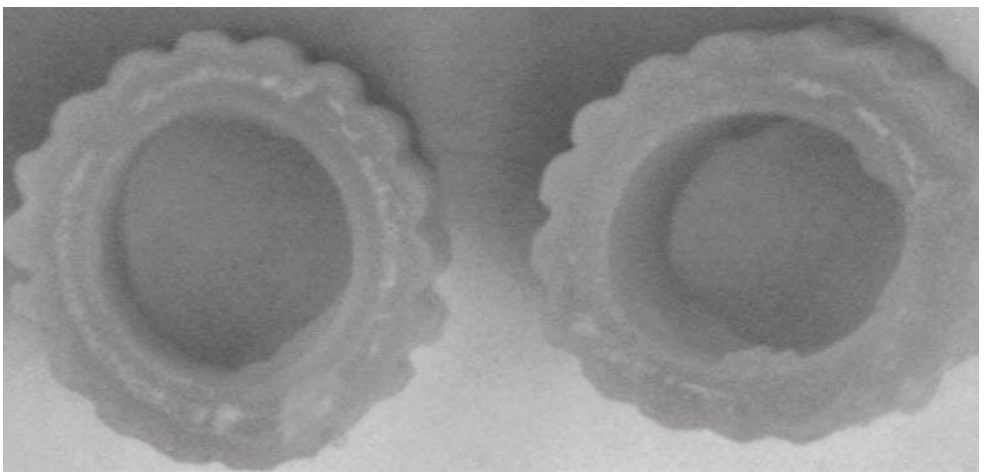

Figure A.2 — Example showing the broken white line in a short strand of pasta after the optimum cooking time when the strand is cut at right angles with the cutter

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[5] ISO 8587, *Sensory analysis — Methodology — Ranking*

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1) Withdrawn.

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