



BSI Standards Publication

Fermented meat products — Specification

National foreword

This British Standard is the UK implementation of [ISO 23854:2021](#).

The UK participation in its preparation was entrusted to Technical Committee AW/6, Chemical analysis of meat and meat products.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2021

ISBN 978 0 539 05874 1

ICS 67.120.10

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2021.

Amendments/corrigenda issued since publication

Date	Text affected
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INTERNATIONAL
STANDARD

ISO
23854

First edition
2021-09-07

Fermented meat products —
Specification

Produits fermentés à base de viande — Spécifications



Reference number
ISO 23854:2021(E)



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This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 6, *Meat, poultry, fish, eggs and their products*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Fermented meat products — Specification

1 Scope

This document specifies the production and sanitary requirements for fermented meat products and establishes a series of test methods to control the quality of fermented meat products. It also specifies the requirements of transport, storage, packaging and labelling.

This document is applicable to fermented meat products (ready-to-eat type), including fermented sausage, fermented dry-cured ham and other fermented meat products. It is also applicable to fermented meat production and trade links.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[ISO 937:1978](#), *Meat and meat products — Determination of nitrogen content (Reference method)*

[ISO 1442:1997](#), *Meat and meat products — Determination of moisture content (Reference method)*

CAC/GL 50:2004, *General Guidelines on Sampling*

CAC/GL 61:2007, *Guidelines on the Application of General Principles of Food Hygiene to the Control of *Listeria monocytogenes* in Foods*

CAC/MISC 6:2005, *List of Codex Specifications for Food Additives*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

3.1

ready-to-eat fermented meat product

ready-to-eat livestock meat or poultry meat product produced by microbial fermentation and enzymatic action under suitable processing conditions

EXAMPLE Fermented sausage, fermented dry-cured ham, other fermented meat products.

3.2

ready-to-eat fermented sausage

sausage comprised of fresh or frozen livestock and poultry meats as the main raw material, together with other ingredients, which has undergone mixing, seasoning, dicing, stranding (or chopping), filling, curing (or not), microbiological fermentation, drying, ripening, molding (or not), smoking (or not), slicing (or not), packaging and other processing technologies, and is which processed into ready-to-eat meat products

- b) the outer appearance, appearance of the cut, smell, taste, consistency and texture are characteristic of the type of meat and the ripened product;
- c) the colour of the fleshy parts on the cross-section is characteristic and stable.

4.3 Raw material

The meat from which the product is prepared shall be of a quality suitable for human consumption and free from objectionable odours and off-flavours.

The raw material should conform to the requirements of CAC/GL 52:2003.

4.4 Food additives

The use of food additives shall conform to the requirements of CAC/MISC 6:2005.

4.5 Final products

4.5.1 Ready-to-eat fermented sausage

The final product shall have the smell and taste expected of fermented sausages. The final product shall be substantially free from staining and contamination from the container. Physical and chemical characteristics shall conform to the requirements given in [Table 1](#).

Table 1 — Physical and chemical indexes of fermented sausage

Item	Fermented sausages	Test method
Moisture to protein content ratio <	3,1:1	ISO 1442:1997/ISO 937:1978

4.5.2 Ready-to-eat fermented dry-cured ham

The final product shall have the smell and taste expected of fermented meat products. Physical and chemical characteristics shall conform to the requirements given in [Table 2](#).

Table 2 — Physical and chemical indexes of fermented dry-cured ham

Item	Fermented dry-cured ham	Test method
Moisture content % <	63,5 %	ISO 1442:1997
Moisture to protein content ratio <	2,5:1	ISO 1442:1997/ISO 937:1978
Proteolysis index ≥	20	Annex B

4.5.3 Hygiene

The products should conform to any microbiological criteria established in accordance with the principles for the establishment and application of microbiological criteria for foods (see CAC/GL 21:1997). Pathogenic bacterium and indicator of contamination limit shall conform to the requirements given in [Table 3](#). The relevant International Standards for microbiological analysis shall be used as reference methods, refer to the documents of ISO/TC 34/SC 9. Other methods that provide equivalent sensitivity, reproducibility and reliability can be employed if they have been appropriately validated in accordance with [ISO 16140-2:2016](#) or other internationally accepted similar protocols.

Table 3 — Pathogenic bacterium/ indicator of contamination limit

Pathogenic bacterium /indicator of contamination	Sampling plan and limit			
	<i>n</i>	<i>c</i>	<i>m</i>	<i>M</i>
<i>Salmonella</i>	5	0	Not detected in 25 g	
<i>Listeria monocytogenes</i> ^a	5	0	Not detected in 25 g	
<i>Listeria monocytogenes</i> ^b	5	0	100 CFU/g	—
<i>Escherichia coli</i> O157:H7 ^c	5	0	Not detected in 25 g	
<i>Escherichia coli</i>	5	2	10 CFU/g	100 CFU/g
Key <i>n</i> = the number of collected samples of the same batch products. <i>c</i> = maximum number of samples allowed to exceed <i>m</i> . <i>m</i> = the acceptable limit value of pathogenic bacteria indicators. <i>M</i> = the highest safety limit value of the pathogenic bacteria indicators. a & b Different types of fermented meat products present different risks from <i>Listeria monocytogenes</i> , hence different microbiological criteria can apply. a These criteria apply to fermented products in which the growth of <i>Listeria monocytogenes</i> can occur. b These criteria apply to fermented meat products in which the growth of <i>Listeria monocytogenes</i> will not occur. They shall conform to the following criteria in accordance with CAC/GL 61:2007: products with pH < 4,4 or aw < 0,92, products with pH < 5,0 and aw < 0,94. Other categories of products can also belong to this category, subject to scientific justification. c Only for beef products.				

5 Sampling

The sampling of the fermented meat products shall use the method specified in [Annex A](#) and CAC/GL 50:2004.

6 Labelling, packaging, transportation and storage

6.1 Labelling

At least the following information shall be marked on each package or on a label:

- a) the name of the product, the ingredients of the product, the trade name or brand name, if any;
- b) the name and address of the producer or packer;
- c) the net weight for those products with hermetic packaging;
- d) the producing date if required;
- e) the shelf life of the product;
- f) the storage mode and instructions;
- g) the batch or code number;
- h) any other information (e.g. nutritional information, health mark) requested by the purchaser.

6.2 Packaging

Packaging material in contact with fermented meat products shall be of food grade.

6.3 Transportation

The products shall be transported in suitable conditions according to the characteristics and hygiene requirements of fermented meat products. If necessary, insulation, refrigeration and fresh-keeping facilities should be provided. The products shall be protected from exposure to sunlight and rain, and shall not be transported with toxic, corrosive material or material that can have a negative effect on the quality.

6.4 Storage

Suitable storage and transportation conditions should be selected according to the characteristics and hygiene requirements of fermented meat products. If necessary, insulation, refrigeration and fresh-keeping facilities should be provided.

The products should be stored in a hygienic and odour-free warehouse.

The products should not be stored with toxic, corrosive material or material that can volatilize.

Products in storage should be protected from direct sunlight, rain, significant changes in temperature, humidity and violent impact, and should also be prevented from being subject to adverse effects.

Store the products away from the walls and the ground. Put the products in order and leave a channel in the middle.

Annex A (normative)

Sampling

A.1 Microorganism

A.1.1 Sampling principle

Sampling should follow the principle of randomness and representativeness.

The sampling process should follow aseptic techniques to prevent any possible external contamination.

A.1.2 Sampling programme

Determine the sampling programme according to the purpose of the inspection, the characteristics of food, the batch, the inspection method and the degree of damage caused by the microorganism.

The sampling programme can be divided into a secondary and a tertiary sampling programme. The secondary sampling programme has n , c and m values, and the tertiary sampling programme has n , c , m and M values.

n = the number of collected samples of the same batch products.

c = maximum number of samples allowed to exceed m .

m = the acceptable limit value of pathogenic bacteria indicators.

M = the highest safety limit value of the pathogenic bacteria indicators.

According to the index setting of secondary sampling programme, it is allowed to have no more than c samples among n samples with the corresponding microbial index value larger than the m value.

According to the index setting of tertiary sampling programme, it is allowed to have all the samples with the corresponding microbiological index value no more than the m value. No more than c samples are allowed to have the corresponding microbial index value between the m value and the M value. No sample is allowed to have the corresponding microbiological indicators larger than the M value.

A.1.3 Sampling method

A.1.3.1 Pre-packaged fermented meat product

Samples should be collected from the same batch of individually packaged products in the appropriate quantities. The amount of each sample should meet the requirements for microbiological index testing.

A package of independently packaged fermented meat products weighing no more than 1 000 g should be collected from the same batch.

For independently packaged fermented meat products weighing more than 1 000 g, an aseptic sampler should be used to take the appropriate amount of samples from different parts of the same package and they are placed into the same sterile sampling container as one sample of fermented meat.

A.1.3.2 Bulk fermented meat products

Samples should be collected from n different parts of the fermented meat product by using a sterile sampling tool and placed in n sterile sampling containers as n samples. The amount of each sample should meet the requirements of the microbiological indicator inspection unit.

A.1.4 Sample labelling

The collected samples should be recorded and marked in a timely and accurate manner, including the sampler, sampling location, time, sample name, source, batch number, quantity and storage conditions.

A.1.5 Storage and transportation of collected samples

Samples should be sent to the laboratory for inspection as soon as possible.

Samples should be kept in completed status during transportation.

Samples should be stored close to the original storage temperature or taking necessary measures to prevent any change of microorganism amount in the sample.

A.2 Physical and chemical index detection

A.2.1 Sampling principle

Sampling should follow the principle of randomness and representativeness.

A.2.2 Sampling method

The samples should be collected within same batch. The amount of sample should not be less than 2 kg and from no less than three samples.

A.2.3 Sample labelling

The sampling should be recorded and marked timely and accurately, including the operator, location, time, sample name, source, batch number, quantity and storage conditions.

A.2.4 Storage and transportation of samples

Samples should be sent to the laboratory for inspection as soon as possible.

Samples should maintain their original integrity during transportation.

Samples should be stored at an appropriate storage temperature.

Annex B
(normative)

Determination of proteolysis index in fermented meats

B.1 Reagents

B.1.1 Perchloric acid (HClO₄).

B.1.2 Sodium hydroxide solution, carbonate-free, containing approximately 33 g of sodium hydroxide (NaOH) per 100 g of solution.

B.1.3 Perchloric acid solution, 0,6 mol/l.

Dissolve 0,047 ml of concentrated perchloric acid (HClO₄) in water and dilute to 1 000 ml.

B.1.4 Hydrochloric acid, 0,1 mol/l standard volumetric solution, the normality being known to four decimal places.

B.2 Determination of non-protein nitrogen content in fermented dry-cured ham

For sampling, the insoluble surface oxide layer of fermented dry-cured ham (about 5 mm) should be removed, then about 200 g lean meat in the biceps femoris should be taken and stored in a vacuum for later use.

All reagents should be of recognized analytical quality. The water used should be distilled water.

The non-protein nitrogen content (C_{nnpn}) directly reflects the extent of protein degradation in the meat by using the Kjeldahl method.

Weigh 5 g of the test sample (biceps femoris muscle) into a 50 ml centrifugal tube. Add 25 ml 0,6 mol/l HClO₄ and homogenize in a commercial homogenizer for 3 min at maximum speed. Then, centrifuge the mixture for 10 min at 6 000 r/min in a commercial centrifuge, remove the supernatant into a 100 ml beaker and add 25 ml 0,6 mol/l HClO₄ into the residue. Repeatedly homogenize and centrifuge the supernatant and merge into the same beaker as before. Next, neutralize the combined supernatant by adding NaOH solution. Finally, remove the extraction solution into a 100 ml volumetric flask and make up to volume.

Determine the non-protein content by using the Kjeldahl method in accordance with [ISO 937:1978](#).

The non-protein nitrogen content of the sample, expressed as a percentage by mass, is equal to [Formula \(B.1\)](#):

$$C_{\text{nnpn}} = 0,001 \ 4 \times (V_1 - V_0) \times \frac{100 \times 10}{w} \tag{B.1}$$

where

- C_{nnpn} is the non-protein nitrogen content, in g/100 g, of the test portion;
- V_0 is the volume, in millilitres, of the hydrochloric acid solution required for the blank test;
- V_1 is the volume, in millilitres, of the hydrochloric acid solution required for the determination;
- w is the mass, in grams, of the test portion.

Take the arithmetic mean of the result of two determinations as the final result.

Report the result to the nearest 0,01 g of nitrogen per 100 g of sample.

B.3 Determination of total nitrogen content in fermented dry-cured ham

Weigh 2 g to 5 g of the same sample (biceps femoris muscle) as used in the non-protein nitrogen content test (see [B.2](#)). Determine the total nitrogen content (C_{tn}) of the samples by using the Kjeldahl method in accordance with [ISO 937:1978](#).

The total nitrogen content of the sample, expressed as a percentage by mass, is shown by [Formula \(B.2\)](#):

$$C_{\text{tn}} = 0,001 \ 4 \times (V_1' - V_0') \times \frac{100 \times 10}{w} \quad (\text{B.2})$$

where

- C_{tn} is the total nitrogen content, in g/100 g, of the test portion;
- V_0' is the volume, in millilitres, of the hydrochloric acid solution required for the blank test;
- V_1' is the volume, in millilitres, of the hydrochloric acid solution required for the determination;
- w is the mass, in grams, of the test portion.

Take the arithmetic mean of the result of two determinations as the final result.

Report the result to the nearest 0,01 g of nitrogen per 100 g of sample.

B.4 Proteolysis index of fermented dry-cured ham

The proteolysis index (P_i) can be calculated as shown by [Formula \(B.3\)](#):

$$P_i = \frac{C_{\text{npn}} \times 100}{C_{\text{tn}}} \quad (\text{B.3})$$

Bibliography

- [1] [ISO 16140-2:2016](#), *Microbiology of the food chain — Method validation — Part 2: Protocol for the validation of alternative (proprietary) methods against a reference method*
- [2] CAC/GL 21:1997, *Principles for the Establishment and Application of Microbiological Criteria for Foods*
- [3] CAC/GL 52:2003, *General Principles of Meat Hygiene*

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