

Meat products - definition, main groups and quality requirements: a review

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Abstract

The EU legislation gives an extremely general definition of the term “meat products”. The national legislation of the individual member states specifies meat product groups and requirements for the raw materials used and the final products in more detail. In Central Europe, such regulatory system is particularly well defined in Austria. Meat products in Austria are classified into three basic quality classes, each containing specific products, basic raw material compositions and selected physical-chemical requirements of the final products. The German system is not as detailed, though it does formulate requirements for meat and smoked meat products better than the current Czech Decree no 326/2001.

Decree no 326/2001, food law requirements, meat product groups, The Austrian Food Code, The German Food Code

Introduction

According to the Article 7.1 of Annex I to Regulation (EC) no 853/2004 of the European Parliament and Council, the term “meat products” means processed products resulting from the processing of meat or from the further processing of such processed products, so that the cut surface shows that the product has no longer the characteristics of fresh meat. These criteria differentiate meat products from “meat preparations” (according to point 1.15 of the same regulation). Those are defined as fresh meat, including meat that has been reduced to fragments, which has had foodstuffs, seasoning or additives added to it or which has undergone processes insufficient to modify the internal muscle fibre structure of the meat and thus to eliminate the characteristics of fresh meat. For the sake of completeness, “fresh meat” means meat that has not undergone any preserving process other than chilling, freezing or quick-freezing, including meat that is vacuum-wrapped or wrapped in a controlled atmosphere. In this way, the EU legislation differentiates meat products, in which the character of the meat, i.e. the input raw material, has been altered by a technological process, from products in the meat preparations category of which fresh meat has also been used, though in which the character (texture, structure) of raw meat has been preserved. There are, of course, limitations to all forms of categorisation and classification, and this is true of the differentiation of meat products from meat preparations. Good examples of this are course-grained German raw spreadable sausages (Mettwurst). These are classed as meat products according to point no 7.1 (853/2004), though these products have clearly not lost the characteristics of fresh meat. What is the differentiation according to food law good for? The temperature range at which products can be stored or transported is, for example, precisely demarcated for meat preparations, there are differences in relation to certain additives, etc.

Meat products in the Czech Republic

The situation in food law in the Czech Republic was simpler before the country's entry into the EU – the rules were made in the Czech Republic. Up until 1990, meat products

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in the meat industry of that time had a Czech Standard – CSN 57 6099 “Meat products – common provisions”. This standard existed in two versions, one dated 21st June 1961 and the other 1st January 1977. It was abolished as of 1st January 2002. According to that CSN 57 6099, meat products were prepared from meat and other edible parts of animals for slaughter, additives and various seasonings, designed for direct consumption or for further cooking before consumption (heating, boiling, frying, etc.). According to this definition, it was not possible to differentiate between meat products in the current sense of the term (the loss of the characteristics of fresh meat when cut) from meat preparations or minced meat. In other words, what are now referred to as meat preparations and minced meat were classed as meat products according to the CSN 57 6099.

Meat products were classified in the following main groups:

- 1. Frankfurters
- 2. Cooked sausages
- 3. Dry meat products
- 4. Special meat products
- 5. Meat products from precooked meat
- 6. Cooked whole-muscle meat products

The standard CSN 57 6099 also classified canned meats as meat products.

The CSN 57 6099 also considered basic ingredients and preparations, salting mixes, additives and packaging. Heat treatment (cooking) was defined in Chapter IV – “Production regulations”. The description given is in accordance with the requirements of the current legislation (The Decree 2001) and is understood as the heating of a meat product sufficient that a minimum temperature of 70 °C is attained at the point of slowest penetration of heat (at the centre of the product, in the fatty parts of the product, in the widest part of the product, etc.) for at least 10 minutes (unless the technological process stipulates otherwise). The issue of the CSN 57 6099 from 1979 stipulated maximum limits for nitrites (100 mg.kg⁻¹) and nitrates (200 mg.kg⁻¹) in meat products.

Table 1. Meat products divided into individual groups (The Decree 2001)

| Type | Group |
|--------------|---------------------------|
| Meat Product | Cooked |
| | Raw |
| | Dry Hot Smoked (Cooked) |
| | Dry Fermented |
| | Meat Preparation |
| | Culinary Meat Preparation |
| | Canned Products |

The Czech Decree no 326/2001 has applied since 2001, being later twice amended in 2003 and 2009 (The Decree 2001). The decree does not specify the term meat products, using the definition of meat products as given in Regulation (EC) no 853/2004. Meat products are divided into individual groups in table 1 in Supplement 4.

Requirements for the quality and composition of selected meat products are specified in Tables 3 to

13 in Supplement 4 (The Decree 2001). The decree defines universal quality requirements for meat products:

The following must not occur during the slicing of meat products:

- 1. the release of water or fat,
- 2. the insides of meat products falling out of the slice,
- 3. the slice containing extraneous parts that are not part of the composition of the meat product; imprints of stamps,
- 4. the slice containing unprocessed parts, tough skin and collagen parts, conglomerations of seasonings or other constituents unless these are a characteristic feature of the given product.

The surface of meat products must not be slimy, sticky, and unusually wrinkly or covered with mould, unless these are deliberately cultivated types of mould characteristic of the given product, or blemished in any other way.

The taste of a meat product must be typical of the given product; it must not display a strange off-flavours or the taste of spoiled ingredients.

Meat products are, in principle, divided into two large groups (according to the type of meat used and their subsequent processing) – comminuted products and whole-muscle products (Maddock 2012). German-speaking countries differentiate between “Würste” and “Pökelwaren”.

The Codex Alimentarius Austriacus (Austrian food law) and meat products

The Codex Alimentarius Austriacus defines “Würste” (“Wurst” in the singular) as a meat product prepared from comminuted meat originating from skeletal muscle and fat tissue (pork fat), with the addition of sodium chloride and seasonings, and for certain types with the use of offal, blood, skin, emulsion (of fat or connective tissue), ice and other additives. Meat batter is filled in natural or artificial casings or filled in moulds or dishes and subjected to the customary treatment in the form of heating, preserving, marinating or drying, also in combination with smoking or ripening.

In Austria, mechanically separated meat is not used for products in the category “Würste”. Raw material (meat) for the preparation of comminuted products is dividing into the following categories:

Beef:

1. Class I: 8% fat
2. Class II: 17% fat
3. Class III: 25% fat

Pork:

1. Class I: 10% fat
2. Class II: 20% fat
3. Class III: 30% fat

More detailed characteristics of the individual classes (proportions of water, fat, minerals, proteins, collagen and pure muscle protein, water/protein ratio, proportion of collagen to total proteins) are given in paragraphs no G.1.1.1 and G.1.1.2 of the Codex Alimentarius Austriacus, Chapter B 14: Meat and meat products.

Veal and horse meat are classified similarly as beef. Pork fat exists in 2 classes – with 90% fat (back fat, without skin) and 80% fat (fat except back fat, without skin). Poultry meat may also be used.

“Wurst” (sausage) is an extremely general term. In Austria, comminuted products of this type are further differentiated into:

1. Brühwurst (cooked sausages and frankfurters)
2. Kochwurst (sausages from pre-cooked meat)
3. Rohwurst (fermented sausages)

Three quality classes (categories) of meat products are differentiated. These are referred to as Sorte 1, Sorte 2 and Sorte 3, with each having further subclasses (e.g. 1a, 1b, etc.).

The term “Brühwurst” cannot be easily translated in one or two words. In general terms, this group is comprised of products which the Czech legislation classifies as cooked meat products of a comminuted nature with the exception of products from pre-cooked meat (i.e. including dry cooked sausages – dry, hot smoked).

The Brühwurst group is further differentiated into the subgroup “Brätwurst” – finely comminuted products (corresponding in the Czech Republic to cooked sausages and

frankfurters) – and “Fleischwurst” – products made from more coarsely comminuted meat and pork fat with the addition of the base emulsion (“Brät”). The base emulsion is an intermediate product formed by the intensive comminution of meat with the addition of water (ice) and a nitrite curing salt or sodium chloride (NaCl) and nitrate (“red Brät”) or with the addition of NaCl alone (“white Brät”).

Three types of the base emulsion are differentiated:

Brät 30: 77% beef and/or pork, 23% water

Brät 40: 71% beef and/or pork, 29% water

Brät 50: 67% beef and/or pork, 33% water

In addition to the main raw material (meat), vegetable starches can also be used for the “Brühwurst” group, and, for quality class 3, fat or collagen emulsions and heart from among the offal meats.

The subgroup “Brätwurst” comes in quality classes 1a, 1b, 2, 3a and 3b. The Codex Alimentarius Austriacus lists individual types of products with their classification to the pertinent quality class and an enumeration of the raw material used. For example, for Parisian sausage (Pariser) in class 1a the use of the following is permitted:

- 50 parts of beef I or pork I
- 20 parts of pork fat II
- 30 parts of drinking water

This sausage (with the pertinent labelling) may also be prepared in category 1b, with the use of 47 parts of meat of the same quality class as for 1a, 20 parts of fat and 33 parts of water. In addition, 1 part of potato starch may be added for 100 parts of sausage batter. Knackwurst, Leberkäse and Fleischkäse are, for example, included in category 2. The constituent ingredients are 49 parts of class II meat, 18 parts of pork fat II and 33 parts of water. Two parts of potato starch may be added to 100 parts of sausage batter.

The subclass “Fleischwurst” includes dry hot smoked sausages (Dauerwürste) and raw “Bratwürste” (rohe Bratwürste) designed for cooking (roasting, grilling). Pork or veal meat and pork fat can be used for the preparation of raw “Bratwürste”; these products are designed to be cooked before eating. The food law also defines the shelf life of raw grilling sausages – they can be sold by the evening on the day on which they are made at the latest. The sale of frozen products is an exception to this – in this case the shelf life is, understandably, longer.

The subgroup Fleischwürste can be prepared in quality categories 1a, 1b, 2a, 2b, 2c, 3a and 3b. Category 1a Krakow sausage, for example, can be made only from 85 parts of pork meat I and 15 parts of Brät 30. One part of potato starch may be added to 100 parts of batter. The Polish sausage Special is a class 2a product. Twenty-five parts of fat I and 25 parts of Brät 30 are added to 50 parts of pork meat I (a proportion may be replaced with beef I).

Products from pre-cooked meat (Kochwürste) include pâtés, spreadable products (quality categories 1, 2 and 3), sliceable products (jellied meat and white pudding in categories 1a, 1b, 2 and 3), blood sausages and andouille, and aspics.

Fermented products (Rohwürste – Chapter B.4.5) are divided into sliceable (dry) and spreadable, such as Teewurst and Mettwurst (classified as raw meat products in the Czech Republic).

Chapter B.5 deals with whole-muscle products (“Pökelfwaren”). These are divided into cooked (“Kochpökelfwaren”) and cured air-dried meat products (“Rohpökelfwaren”). Other groups of meat products are listed by the Austrian Food Code in Chapter B.6 – poultry meat products, B.7 – ready foods, and B.8 – canned meat.

The German Food Code and meat products

Germany also has its own Food Code – the Deutsches Lebensmittelbuch. It is issued by the Federal Ministry for Food, Agriculture and Consumer Protection.

This Food Code contains guidelines on individual foodstuffs. Meat is covered by its “Leitsätze für Fleisch und Fleischerzeugnisse” (Guidelines for Meat and Meat Products). According to the German Food Code, meat products are products that are exclusively or predominantly composed of meat. The term “Wurstwaren” corresponds to the above word “Würste” with the description: sliceable or spreadable products prepared from comminuted meat (in part also offal) with the addition of additives. They are filled into casings and may be smoked or unsmoked, or are filled in containers, or put on the market as unpacked products. This large group is further divided, similarly as in Austria, into products of the following types:

1. Rohwürste (from the German roh = raw): products generally prepared with the addition of nitrite/nitrate, shelf stable at temperatures $> 10^{\circ}\text{C}$, designed for consumption without prior cooking. Made as either spreadable (e.g. Teewurst and Mettwurst) or sliceable (as the result of drying and ripening). Sugar is added at a maximum amount of 2%.
2. Brühwürste (from the German brühen = boil, scald) are heat treated comminuted products prepared with the addition of sodium chloride or other salt required for technological purposes, and drinking water (ice). The meat protein coagulates during cooking, so the product remains sliceable after repeated heating.
3. Kochwürste (products from pre-cooked meat) are prepared from precooked meat; only blood, offal and pork fat are added in a raw state. These products are sliceable only at low temperatures as a result of the use of precooked meat.

Similarly to the Codex Alimentarius Austriacus, the German Code also defines requirements for the quality of meat products (and meat itself). When comparing the two sources, it can be said that the given specification is far more thorough in Austria. The so-called Grenzwerte, i.e. limits with physical-chemical attributes or proportional indicators based on physical-chemical characteristics, are defined for individual groups of products and quality classes. Paragraph G.1.1.2, for example, states average parameters for pork meat and lard for the production of comminuted meat products (Table 2).

Table 2. The average values of selected indicators for pork meat and pork lard (The Codex Alimentarius Austriacus 2012)

| Parameter | Pork I | Pork II | Pork III | Lard I | Lard II |
|--------------------------|--------|---------|----------|--------|---------|
| Water (%) | 69.8 | 62.3 | 54.1 | 7.9 | 15.8 |
| Fat (%) | 10 | 20 | 30 | 90 | 80 |
| Minerals (%) | 1.0 | 0.9 | 0.7 | 0.1 | 0.2 |
| Proteins (%) | 19.2 | 16.8 | 15.2 | 2.0 | 4.0 |
| Collagen (%) | 1.6 | 1.5 | 1.8 | 1.6 | 2.0 |
| Water/proteins | 3.6 | 3.7 | 3.6 | 4.0 | 4.0 |
| Pure muscle protein (%) | 17.6 | 15.3 | 13.4 | 0.4 | 2.0 |
| Collagen of proteins (%) | 8 | 9 | 12 | 80 | 50 |

Chapter G.1.2 of the Codex Alimentarius Austriacus states limit values for groups of meat products and the given quality classes. Section G.1.2.1 deals with Brätwürste (part of this paragraph is shown in table 3), Section G.1.2.2 with Fleischwürste, Section G.1.2.5 with Kochwürste, etc.

The German Food Code is more concise than the Austrian product specifications. Meat products are, however, also classified into quality classes in Germany. A range of ingredients is listed for each narrow group of products or for individual products.

Table 3. Limit values of selected indicators for certain products in the “Brühwurst” group (The Codex Alimentarius Austriacus 2012)

| Quality class /type | Pure muscle protein (%) | Collagen of protein (%) | Water /proteins | Fat /proteins | (Water + Fat) /proteins | Potato starch (%) |
|--------------------------|----------------------------|----------------------------|--------------------|------------------|----------------------------|----------------------|
| 1a (Frankfurters) | 9.6 | 15 | 5.6 | 2.5 | 7.6 | - |
| 1b (Parisian sausage) | 8.7 | 18 | 6.5 | 2.2 | 8.3 | 2 |

The durable fermented sausage “Cervelatwurst”, for example, has the following designated composition of ingredients:

- beef meat 1.111
- beef meat 1.112
- pork meat 1.122
- pork fat 1.212

Page 2 of the Guidelines for Meat and Meat Products describes standards for enumerated types of meat. In terms of qualitative parameters, a proportion of pure muscle protein (not less than 11.5%; for sausages of a diameter of more than 77 mm not less than 11.0%) and a percentage of pure muscle protein in meat proteins (determined chemically – not less than 80%; determined histometrically – not less than 70% volume) are stipulated for Cervelatwurst.

The Czech Decree no 326/2001, as amended, is rather superficial in many regards in comparison with the German and, in particular, the Austrian definition of meat and meat product standards. The updating of The Decree no 326/2001 is currently under consideration. It is clear from the past that views of the quality and selected quality parameters of meat products have been subject to systematic development. For example, requirements for the group “cooked sausages” were stricter in 1961, when the standard CSN 57 7201 “Cooked sausages, quality standard” was approved, than in 1977 or 2013 (Table 4). In 1977, individual standards (CSNs) were created for individual products and generally amended the limits set in 1961. As can be seen in table 4, these limits were relaxed in many cases. The Decree no 326/2001 represents a continuation of the original

Table 4. The requirements for selected cooked sausages in the Czech Republic in the years 1961 (CSN 57 7201), 1977 (CSN 577234 Kabanos; CSN 577231 Gothajský sausage; CSN 577243 Šunkový sausage) and 2013 (The Decree 2001)

| | | % Water | % Fat | % NaCl | % Starch |
|------|-------------------|--------------|--------|-----------------------------|-----------|
| 1961 | Kabanos | 49 ± 6 | 30 ± 6 | 2.4 ± 0.6 | 2.5 ± 1 |
| | Šunkový sausage | 62 ± 6 | 18 ± 6 | 2.1 ± 0.6 | 1.0 ± 0.5 |
| | Gothajský sausage | 44 ± 6 | 34 ± 6 | 1.8 ± 0.6 | 2.5 ± 1 |
| | | % Water max. | | % Fat max. | % NaCl |
| 1977 | Kabanos | 55 | | 38 | 2.4 ± 0.6 |
| | Šunkový sausage | 70 | | 20 | 2.3 ± 0.6 |
| | Gothajský sausage | 53 | | 42 | 2.0 ± 0.6 |
| | | % Fat max. | | Min. proportion of meat (%) | |
| 2013 | Kabanos | 40 | | 50 | |
| | Šunkový sausage | 20 | | 55 | |
| | Gothajský sausage | 40 | | 40 | |

regulations valid in the Czechoslovak Republic in certain respects. Requirements for the sensory properties of products which are given in the Decree copy the original texts almost to the word (The Decree 2001). Physical-chemical parameters have been amended, and minimum limit values for the content of pure muscle protein have been newly assigned for selected dry meat products and categories of cooked ham. The requirement for the maximum proportion of fat has been retained, while a requirement for the minimum proportion of meat has appeared for selected cooked products.

Conclusions

The EU legislation gives an extremely general definition of meat products and demarcates this broad product group from meat preparations and minced meat. Individual member states legislate the separation of meat products into groups according to certain characteristic features at the national level and specify requirements for the raw material (meat) for production and qualitative features of the final products. Austria has a relatively detailed system in place. Requirements for meat and meat products are set out in the Codex Alimentarius Austriacus issued by the Austrian Ministry of Health. This text contains clear criteria for the preparation of individual groups, subgroups and types of meat products with a view to quality classes. The tables at the end of the Food Code set out limits for selected physical-chemical indicators and proportions between them. A similar system also exists in Germany. In the Czech Republic, the legislation on meat and meat products at the national level is contained in The Decree no 326/2001, as amended. It is not, however, as detailed as the German or, in particular, the Austrian food law.

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