

H y g i e n i c a l   a n d   m i c r o b i o l o g i c a l  
q u a l i f i c a t i o n   m e t h o d   o f   i n c a -  
s i n g s   s t u f f e d   s a u s a g e s .

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It is about 10 years, that the meatindustry has been developed into mass-production in Hungary. This process was based on the development of manufacturing-technological prescriptions and standardization.

But in connection of the sausages the qualities described in the standards do not contain all their basic characteristics. Beside other characteristics it is essential to take into consideration the microbiological condition too.

The qualification begins with the organoleptic examination carried out with the points-method. Every quality will be scored /appearance, colour, smell, flavour, texture, the cleanness of raw material and production/. The highest possible score is 100.

On course of a proper qualification one should take into consideration the composition /eventually also histologically examined/, the technology, the guaranteed time and the prescribed storing temperature of sausages, because the requirements have to be adequately modified.

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The Hungarian Standards enlist the following stuffed sausages: finely chopped sausages, coarse-cut, cured, smoked and cooked sausages, sausages /made of chitterlings/, liver sausages, headcheese-sorts and at least sausages processed by a combination of curing, cold smoking and drying. The storing temperature is not prescribed for coarse-cut, the cured, smoked and cooked sausages, and sausages processed by a combination of curing, cold smoking and drying. The other sausages should be stored and sold on 3 - 10 C<sup>o</sup> temperature. The guaranteed time differs in summer and winter and varies from 1 to 8 days, in case of dried sausages between 60 - 90 days respectively. The diameter of the casing varies with the type of the product and it may be 18 - 100 mm. The diameter of the casing /hog stomach/ of the headcheese may be larger, but at most of 3 kg capacity. The temperature of the smoking varies between 70 - 100 C<sup>o</sup> and last for 25 - 120 minutes, and the temperature of cooking between 74 - 80 C<sup>o</sup> and lasts for 20 minutes, but it may last for some hours depending on the type of sausages.

For ensuring the adequate quality, many factors have to take part. The smoking and cooking does not form only the external characteristics typical to the appearance of sausages, but also the flavour, the colour and last but not

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least its steadfastness, which is essential for the non-perishableness throughout the guaranteed time of sausages made with heattreatment adequate to pasteurization.

The microbiological examination has to determine the microbes belonging to the coli-aerogenes group and the total number of the living microbes in 1 g material. The requirement is, that from stuffed sausages processed by curing smoking and cooking or only with cooking, no microbes belonging to the coli-aerogenes group could be cultivated, because the possibility of cultivation shows, that the heattreatment was not sufficient and in this case it also may show as signalling flora, that some hidden pathogenic microbes /salmonellae, tuberculosis-bacillae, etc./ or parasitae did not perish on course of the heat-treatment. Within the total number of microbes we determine also the number of the proteolytic germs on base of their gelatine-liquefying capacity. We standardized in our laboratories the media to ensure approximately uniform results. For Koch's plate-count method we use as medium <sup>extract?</sup> meatcream/dextrose/yeast/peptone/gelatine/agar. The plates are incubated for 2 days on 32 C<sup>o</sup> to be able to count the colonies of the aerobic and facultative anaerobic mezophil and psychrophil microbes.

The quality of the sausage is from the point of view of bacteriology adequate, if it is wholesome and does not cause injury of health of microbiological origin. The requirement is, that

1/ the sample should not contain pathogenic or toxinogenic microorganisms;

2/ in the sample no microflora signalling intestinal contamination could be determined;

3/ the number of the living aerobic and anaerobic microbes should not be more than 100,000 in 1 g material.

The data collected over a period of 11 years were summarized in a table.

T a b l e .

As one can see from the table in 75 - 94 % of all sausage groups standardized, heat-treated on a pasteurization temperature, the number of the aerobic and facultative anaerobic microbes, determined with Koch's plate-count method, remains under 50,000/1 g material. If the bacterial counts of the sample is less than 5000, so at the qualitative bacteriological examination only aerobic saprophytes sporebearers were traceable. If the bacterial counts is between 5000-50,000, than beside the before mentioned microbes also heat-resistant, but never sporebearing organisms, belonging to the Micrococcaceae or Lacto-

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bacteriaceae family were traceable in minor quantity.

If the bacterial counts referring to 1 g material is more than 50,000, especially if it is over 100,000, examined just after the production, then also streptococcus species /Enterococcus group/ are traceable or such germs, which in case of proper technology perish and do not over-live the temperature of pasteurization. In this case the presence of Gram-negative rods shows above all the insufficient heat-treatment.

In the adequately processed cured, smoked and cooked sausages on course of the heat-treatment all the non-spore-forming microbes perish and the number of the non-sporeforming, but more heatresisting germs is also insignificant. The ferments influencing the keeping quality and the character of the sausages get denatured also.

The sausage is bacteriologically fully cooked, if no coccus shaped bacteria could be cultivated from it. In this case in the core of the product there should be a temperature of 74 C<sup>o</sup> for at least 15 - 20 minutes. This treatment is only necessary if it is not obligatory to store the product on 3 - 10 C<sup>o</sup> also during the sale, but it can be stored also on shop-temperature and it must remain stabil exposed to temperature variations.

The cured and dried sausages answer the microbiological requirements, if they do not contain any pathogenic or toxinogenic microorganisms and no Gram-negative rods belonging to the coli-aerogenes group can be cultivated. In the riped sausages the number of the proteolytic microbes lessens considerably, because the metabolism-products of the Lactobacillae together with the shaping of biochemical circumstances prevent their multiplication and harmful activity. The chemical characteristics of the finished ripening process are: pH 5,8 - 6,0; salt/water ratio 13 - 16 %; latter correspond to 25 - 28 % watercontent and 3,5 % saltcontent.

Beside the mentioned microbiological requirements the product must contain the prescribed protein-, fat- and moisture-content, the ingredients giving the flavour and colour. All these together give the essential characteristics, which are essential considering the quality. From point of view of alimentation-physiology the product should contain the food value, which the consumer shall get from the product.

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## S u m m a r y .

The qualification of the stuffed sausages is a combined process. Beside the composition and the organoleptic examination the examination of the microbiological conditions from the viewpoint of human consumption or the tracing of these conditions by other methods is very important. The systematical examination of the sausages begins with the organoleptic examination, carried out with the points-method, should be completed with chemical analyses too. The veterinarian control completed with chemical analyses represent in Hungary the basic examinations for the qualification, the development of which in accordance with the practice will improve the qualification of the meat-product, which process is otherwise not easy to effectuate.

The groups of stuffed sausages in accordance with the Hungarian Standards	Quantity of samples	Total number of living microbes in 1 g material x/				
		- 5000 %+	5000-50000 %+	50000-500000 %+	above 500000 %+	
Finely chopped sausages	2226	54 94 <sup>++</sup>	40	5	1	
Coarse-cut	3702	28 76 <sup>++</sup>	48	16	8	
Cured, smoked and cooked sausages	1911	27 89 <sup>++</sup>	62	7	4	
Sausages /made of chitterlings/	839	38 82 <sup>++</sup>	44	12	6	
Liver sausages	474	21 75 <sup>++</sup>	54	19	6	
Headcheese sorts	762	45 82 <sup>++</sup>	37	11	7	
Sausages processed by curing cold smoking and drying	775	10	26	34	30	

Legends: x/ = number of colonies of aerobic and facultative anaerobic mezophil and facultative psychrophil microbes after incubating for 2 days at 32 C°

%+ = average values

++ = average percent of bacterial counts for the first two categories.



Zusammenfassung

Die Qualifizierung der Wurstwaren ist ein komplexer Prozess, in welcher neben der Zusammensetzung und den organoleptisch bestimmten Eigenschaften auch die mikrobiologischen Untersuchungen hinsichtlich der Konsumierbarkeit oder das Feststellen dieses Zustandes mittels anderer Methoden von grösster Bedeutung sind. Die systematische Untersuchung und Qualifizierung der Fleischwaren /Wurstwaren/ beginnt mit der organoleptischen Punktwertung, welche mit mikrobiologischen und chemischen Untersuchungen zu ergänzen ist. Die tierärztliche Kontrolle, ergänzt mit chemischen Untersuchungen, umfasst in Ungarn die Qualifizierung bestimmenden Grunduntersuchungen, deren Weiterentwicklung, gemäss der Praxis, die übrigens schwierige Qualifizierung der Fleischwaren /Wurstwaren/ vervollkommen wird.

Résumé.

La qualification des saucisses est un procès complexe, dans lequel, en outre de la composition et des propriétés constatées par examen sensoriel, l'examen de l'état micro-biologique, ou bien les conclusions déduites par autres méthodes sur cette dernière propriété ont une importance extraordinaire au point de vue de la consommation.

L'examen systématique et la qualification des saucisses commencent par un jugement sensoriel à pointage, lequel doit être complété par des examens de laboratoire chimiques et microbiologiques. En Hongrie, le contrôle vétérinaire, complété par les examens chimiques renferme les examens fondamentaux de qualification, dont le développement progressif, en conformité avec la pratique, perfectionnera la qualification des produits de boucherie, d'ailleurs difficilement exécutable.

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Квалификация колбасных изделий представляет собой комплексный процесс, в котором наряду с составом и органолептическим обследованием играют существенную роль и исследования по микробиологическому состоянию изделий с точки зрения общественного потребления, или же обнаружение упомянутых свойств по иным методам. Систематическая проверка и квалификация колбасных изделий начинается с органолептической оценкой по баллам, дополняемой микробиологическими и химическими лабораторными исследованиями. Ветеринарный контроль, дополненный химическими исследованиями, охватывает в Венгрии основные исследования, представляющие собой квалификацию. Дальнейшее развитие способов этих исследований в соответствии с практикой усовершенствует труднопроизводимую квалификацию колбасных изделий.