Method for property - analysis of meat products

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Introduction

As with other foods, also in case of meat products palatibility plays a decisive role in quality in addition to other factors. The organoleptic properties characterising palatibility have to be defined property and controlled by competent methods. On purpose to quality food products in Hungary sensory - systems of hedonic and descriptive will be applied. For judging of meat products the descriptive sensory analysis is wide-spread. The basis of the analysis is the property - list. This list contains the characteristic properties required from the product and the undesirable (mostly likewise characteristic) properties (arising at the manufacturing or storing of the product), intensity - scale included. The proposed new system works well only if
- panelists are able to recognize the given property with its intensity uniformly,
- it contains all the characteristics important for consumers.

In this paper a method will be presented by the help of which it succeeded to shape up product - property - lists working successfully.

Experimental

- Sensory method: descriptive analysis using questionnaire - the questionnaire prepared in advance contains properties together with their intensity grades.
- Panel: consists of panelists trained for meat products.
- Tasting Area: odourless, properly illuminated room used only for this purpose.
- Sample preparation: the panelists investigated in a definite sequence samples ("Bologna" sausages) of good differing properties descending from various enterprises, at first the properties of the whole sausage then that of the cut-surface being parallel to the longitudinal axis of the sausage and finally the properties of a ($\sim$3 mm thick) slice. The panel test was carried out at room temperature (22°C). The panelists got the samples with neutral signs. Row of samples: all samples given at one testing technique.
- Statistical methods: Contingency-test (G-test)

Results and discussion:

The steps of drawing up of property-list is shown in Fig.1.

1.) The collection of the positive and negative properties being characteristic of the product can be performed on the basis of exchange of experience among experts having proper knowledge of product but also earlier descriptions of products could serve as a good starting basis.

2.) We order intensity - scale to the properties keeping in view the abilities of an average panelists. The intensity scales are compiled in form of a querionnaire.

3.) Products were obtained from different enterprises. The testing of samples is carried out by the filling in of questionnaires in such a way that the panelists has to judge in a given time only one property. In the course of judging properties may occur which have not been contained by the questionnaire, new questionnaire must be completed with this.

4.) The results obtained for certain samples are summarized in contingency-tables according to the properties. These tables contain the frequency - values belonging to the certain property - grades.

5.) In the next step homogenity-investigation of frequency distributions were carried out computing the "G_B value" for samples

$$G_B = 2\sum_{1}^{i} Z_i \, (\ln Z_i - \ln Z) \qquad \text{where}$$

Z_i = empirical frequency

Z = frequency to be expected in case of homogenous distribution

i = number of grades (k). number of samples (m)

The determination of significance of the values we have read off from the table χ^2 (upon levels P = 5%, 1%, and 0,1%) at a degree of freedom DF = (m-1) . (k-1).

On the basis of the test properties investigated can be divided into two groups: properties judged consistently and properties judged inconsistently.

Reasons and steps to be done if properties were indistinguishable are as follows:

- description of properties is wrong, description shall be corrected in the questionnaire,
- the panelists are unskilled in the estimation of a given property consequently they must be trained property before next test,
- the environment for the judgement is not suitable (e.g. disturbing odour, wrong illumination), disturbing effects shall be eliminated.

6.) In case of consistently judged properties "G value" is computed which shows whether the consistent judgement of differences among the samples by the panelists are to be expected on the basis of the distribution of empirical frequencies, i.e. whether one can differentiate the grades in the given row of samples. This "G value" has then a maximum when judges of panelists are entirely consistent and when the samples are filling up all the grades (therefore the number of samples investigated shall be equal or higher than the number of grades). This maximum of "G value" decreases if:

- judgements are inconsequent
- small differences are among the samples

$$G = 2\left[\sum_{1}^{i} Z_i \cdot \ln Z_i - \sum_{1}^{m} o_m \cdot \ln o_m - \sum_{1}^{k} s_k \ln s_k + n \ln n\right] - u \qquad \text{where}$$

o = sum of frequencies belonging to one sample

s = sum of frequencies belonging to one grade

n = total sum of frequencies

u = sum of the number of zeroes

(The significance - test will be carried out according to G_B).

On the basis of "G value" the properties judged consistently are either distinguishable or not. The reasons that could not distinguish the properties and the tasks to be done in this case are as follows:

- no property - deviation is to be found at the samples, the description of property is unnecessary it must be deleted from the questionnaire,
- although with the samples investigated no deviation was to be found but sometimes differences can occur in the property (e.g. foreign substances) in this case it is advisable to control the properness of property - description by the acquisition of suitable samples,
- the marking out of the grades is incorrect and so the panelist is unable to judge the property the description shall be corrected in the questionnaire.

7.) With those properties which were distinguished in the row of samples "r-value" (value of performance, contingence - coefficient) in relation to the maximum distinction will be computed.

This latter is regarded as the figure of merit belonging to the given product. The more the index-value of the performance approaches 1, the more sensitive is the sensoric property investigated, i.e. the more reliable is the judgement. On the basis of the "r value" properties can be divided into two groups: clearly and poorly distinguished properties. Our questionnaire will contain in an ideal case after due exercising only clearly distinguishable properties on condition that the panel shall not be changed in her composition.

TABLE I. shows the possible grouping of properties on the basis of the applied statistical tests.

On the basis of the viewpoints described above we have carried out the property-analysis of more meat products.

Table II. shows the results obtained for "Bologna" sausage.

The questionnaires compiled on the basis of the performed method are facilitating the work of the panelists, consequently the reliability of the judgement increases.

Literature

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Table I.

Groups of properties on the base of statistical tests

G_B \\ G	significant		not significant
	$r \geq 0,75$	$r < 0,75$	
significant	CLEARLY DISTINGUISHABLE	POORLY DISTINGUISHABLE	INDISTINGUISHABLE
not significant			INCONSISTENT (judgement)

Table II.

Description and evaluation of properties of "Bologna" sausage

WHOLE SAUSAGE			CUT SURFACE and SLICE		
Property	Number of grades	Performance-value	Property	Number of grades	Performance-value
Appearance			Odour		
Shape	2	0,77x	Smoke	3	0,80x
Shrinkage of sausage end	2	0,60	Cooked emulsion	2	-
Diameter	2	F	Pepper	3	0,75x
Binding-end	2	0,89x	Foreign	2	-
Locking head	2	0,80x			
Wrinkliness	2	0,68	Appearance		
Cleanness	2	0,75x	Shade of colour	3	0,77x
Shade of colour	3	0,70	Uniformity of colour	2	0,93x
Uniformity of colour	3	0,80x	Groundness	2	0,79x
Brightness of colour	2	0,74x	Air-holes	4	0,65
			Tendon, membrane	4	0,70
Consistency					
Separation at the endings	3	0,67	Sliceability	2	0,80x
Separation under the casing	4	1,00x			
Elasticity	2	-	Flavour		
Hardness	4	-	Salt	3	0,60
			Smoke	3	-
			Cooked emulsion	2	0,58
			Pepper	3	0,88x
			Foreign	2	0,73x
			Consistency		
			Hardness	3	0,73x
			Toughness	5	0,75x
			Chewing residue	2	0,80x

x = clearly distinguishable
F = unnecessary property
- = no differing samples available

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fig.1. Scheme of property-analysis

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