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SENSORY AND COMPOSITIONAL STUDY ON SAUSAGE PRODUCTS OBTAINED IN THE TRADITIONAL AND INDUSTRIAL SYSTEM

STUDIU SENZORIAL ȘI COMPOZIȚIONAL ASUPRA PRODUSELOR DE TIP CÂRNAT, OBȚINUTE ÎN SISTEM TRADIȚIONAL ȘI INDUSTRIAL

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ABSTRACT | REZUMAT

The intensive consumption of animal products requires particular attention paid to their quality by both the consumer and the producer. A major role in the achievement of this objective is played by the great manufacturers in this field, as well as by food safety authorities. Food industry currently uses advanced technology, a variety of additives and preservatives, and consumers may choose products from an extremely diverse range. Today, a multitude of methods for the analysis of animal products, in terms of both hygiene and composition, are available. In addition to standardized analysis methods, organoleptic examination continues to have a major role in the consumer's decision to buy and use these products. For this purpose, ten samples of sausage were studied: five samples of homemade sausage obtained in the industrial system and five samples of homemade sausage certified as a traditional product, in order to test the consumers' preference for one of the two products. This study shows the direct connection between the organoleptic examination of food products and the decision to consume and buy these products. The working method used was a food preference questionnaire for consumers. The questionnaire was developed by us and included items regarding: general data on the consumer, specific data related to the analyzed products, and data about the organoleptic evaluation of the studied products. This questionnaire was administered to 35 respondents. For assessing the compositional quality of the studied products, an analysis was conducted to identify the total number of germs (TNG) using the counting technique at 30°C (SR ISO 4833/2003). To establish hygiene norms, hygiene swabs were taken from worktop surfaces, protection equipment, devices, instruments and packages with which the product came into contact. The compositional parameters of the analyzed products were determined with the FoodScan analyzer. In order to esta-

Consumul intensiv de produse de origine animală impune acordarea unei atenții deosebite asupra calității acestora, atât din partea consumatorului, cât și din partea producătorului. Un rol major în îndeplinirea acestui deziderat revine marilor producători din domeniu, precum și autorităților din domeniul siguranței alimentare. La ora actuală industria alimentară dispune de o tehnologie avansată, de o varietate de aditivi și conservanți, iar consumatorul poate alege produse dintr-o gamă foarte variată. Astăzi se cunosc o multitudine de metode de analiză a produselor de origine animală, atât din punct de vedere igienic, cât și compozițional. Pe lângă metodele de analiză standardizate, în decizia consumatorului de a cumpăra și a consuma aceste produse, un rol major îl are în continuare examenul organoleptic. În acest scop au fost luate în studiu zece probe de cârnat, cinci probe cârnat de casă obținut în sistem industrial și cinci probe de cârnat de casă, atestat ca fiind produs tradițional pentru a testa preferința consumatorilor pentru unul din cele două produse. Studiul de față arată legătura directă dintre examenul organoleptic al produselor alimentare și decizia de consum și cumpărare a acestor produse. Ca metodă de lucru s-a utilizat un chestionar de preferințe alimentare pentru consumatori. Chestionarul a fost elaborat de noi și cuprinde itemi cu privire la: date generale despre consumator, date specifice cu privire la produsele analizate și date despre modul de apreciere din punct de vedere organoleptic al produselor studiate. Acest chestionar a fost completat de 35 de respondenți. Pentru evaluarea calității compoziționale ale produselor studiate s-a efectuat o analiză de identificare a numărului total de germeni (NTG) cu ajutorul tehnicii de numărare la 30°C (SR ISO 4833/2003). Pentru stabilirea normelor de igienă s-au prelevat tampoane de sanitație de pe suprafețele de lucru, echipamentele de protecție, utilaje, instrumente și ambalajele cu care vine în contact produsul. Determinarea parametrilor compoziționali al produselor analizate s-a făcut cu ajutorul aparatului FoodScan. Pentru stabilirea conținutului de sare din produse s-a utilizat metoda cu azotat de argint. S-a observat că analiza compozițională a produsului cârnat obținut în sistem

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blish the salt content of the products, the silver nitrate method was used. It was observed that the compositional analysis of the sausage product obtained in the industrial system confirmed the presence of preservatives and flavoring agents, compounds that have the role to enhance the organoleptic properties of the product, and the organoleptic analysis of the two samples qualified the product obtained in the industrial system as being more pleasant than the traditional one.

Key words: consumer, organoleptic examination, sausage, additives, preservatives

industrial a confirmat prezenţa unor conservanți și aromatizanți, compuși care au rolul de a accentua calitățile organoleptice ale produsului, iar analiza organoleptică a celor două probe a calificat produsul obținut în sistem industrial ca fiind mai plăcut, decât cel tradițional.

Cuvinte cheie: consumator, examen organoleptic, cârnat, aditivi, conservanți

In a globalized world, in a world where food industry has boomed in terms of techniques, methods, food preparation components, at a time when diet has become a real cult for mankind, to highlight the importance of organoleptic examination for the consumer's decision, in correlation with qualitative compositional examination is an objective of food industry (1, 5, 7, 14). The question arises to what extent food industry based on extensive food processing, with chemical substance addition, alters or not the natural senses that humans have possessed since their beginnings on Earth and influences their consumption choices (1, 3, 9). Sensory or organoleptic examination is the method that has remained for hundreds of years the unique method for the investigation of food quality, in the absence of other more sensitive and accurate investigation methods (1). For the sensory analysis of food product quality, the measurement instrument is represented by human sense organs with their physical and mental specificity and variability. Knowing the organoleptic properties of animal products is particularly important for the assessment of their qualities and defects. The aim of this study is to see whether consumers can differentiate between the homemade sausage produced in the industrial system and the homemade sausage produced in the traditional system based on organoleptic examination.

MATERIALS AND METHODS

Two different products from the viewpoint of the taste concept were studied, namely a sausage product obtained in the industrial system and a sausage product certified as a traditional product.

The materials used in this study were represented by 2 types of sausage having the same commercial name of "homemade sausage", one of the products obtained in the industrial system, and the other one certified as a traditional product.

Products were studied in order to see to what extent sensory examination subsequently correlated with the result of the qualitative compositional examination influences the consumer's choice regarding the purchase and consumption of these products. At the same time, the study aimed to identify the extent to which the purchase of one of the two studied products was correlated with the qualitative compositional result of the same product, and to what extent humans are capable through sensory examination to distinguish and choose the natural product.

The working methods used were a food preference questionnaire and the known methods for hygienic-compositional determinations of the products (12). The food preference questionnaire was administered to 35 persons, termed respondents, chosen at random from students or passers-by in the USAMV campus in Cluj. This was developed according to the model of other food preference questionnaires (2), and comprised three parts. The first part included general data about the respondent, such as: age, sex and environment of origin. The second part contained data regarding the respondents' food preferences: whether they were meat consumers, and in the case of an affirmative answer, these mentioned the preferred type of meat and the preferred type of sausage, either bought from the store or bought from traditional producers. The third part was allocated to the organoleptic assessment of the products, with the monitoring of the most important parameters: appearance, color, odor and taste (1). After this evaluation, each respondent provided a qualificative for each analyzed parameter.

To determine the total number of germs (TNG), the horizontal method for the enumeration of microorganisms was used. This method consists of seeding in a defined culture medium a determined amount from the successive decimal dilutions of the sample to analyze, and incubation at a temperature of 30°C, for 48-72 hours, after which formed colonies are counted and

the result is interpreted, expressed in colony forming units (CFU/ml or gram product) (4). This technique is used to establish the number of microorganisms in the products intended for human consumption and animal feeding (14). It can be performed on hygiene swabs taken from worktop surfaces, devices, instruments, protection equipment, packaging material that come into contact with food products, microaeroflora, by counting the colonies obtained in solid medium after thermostating in aerobiosis at 30°C (10).

Compositional parameters: water, fat, collagen and protein were determined with the FoodScan analyzer, which is a dedicated instrument for the control of production and for the control of a wide range of products in the food industry. This is used to analyze raw materials and end products, with a minimal preparation of the sample (9). This method is based on near infrared transmittance (NIT) spectroscopy, which can be used for the simultaneous and accurate determination of a number of parameters: humidity, protein, fat, etc. Sample processing is easy and consists of very good homogenization, performed by grinding with an electrical grinder or an Ultraturax device (15). The homogenized sample is placed on the tray of the device, and the analysis is carried out. The results of the analysis are displayed on the monitor screen and consist of the following parameters: water %, fat %, collagen %, protein %. These values, along with the number of the sample and its type, the date and hour of the determination are memorized by the computer. The working time is about 2 minutes.

To determine the preservative compounds and the amount of salt, the silver nitrate method was used. The principle of the method is the following: silver nitrate in contact with chlorine ions produces silver chloride; potassium chromate is used as an indicator. When chlorine is completely precipitated in the form of silver chloride, excess silver nitrate reacts with potassium chromate, resulting in silver chromate of brick red color. To establish the nitrite content, the Griess method was used.

The principle of this method is the following: nitrites combine in acid medium with a primary aromatic amine, forming a diazonium salt that is condensed or coupled with another primary aromatic amine, forming a colored complex.

The intensity of the resulting color is compared to that of a standard solution which contains a known amount of nitrites (8). The chemical analyses were repeated three times in order to obtain results as accurate as possible.

RESULTS AND DISCUSSIONS

The analysis of the first part of the questionnaire evidenced the following results: of the 35 respondents who participated in this study, 37.14% were females and 62.85% were males. Regarding the environment where they spent most of their time (at least 7 months per year), 20% spent most of their time in the rural environment, and 80% in the urban environment.

In the second part of the questionnaire, all subjects were asked if they ate meat and answered affirmatively. Next, they were asked what kind of meat they preferred (a question with possible multiple answers) (Fig. 1), the reason why they preferred that type of meat (a question with possible multiple answers), and if they ate pork sausage at least once per month.

It was observed that preference was given in the first place by taste (29 respondents), followed by the concern about a healthy diet (because it is considered more healthy – 11 respondents, and contains less fat – 9 respondents). None of the subjects answered that the reason for their preference was the doctor's recommendation, which can be largely explained by the fact that at the age of 21-33 years, this type of diet is not necessary. There 65.71% (23/35) of the subjects consumed pork sausage at least once per month and 88.57% (31/35) preferred the traditional sausage.

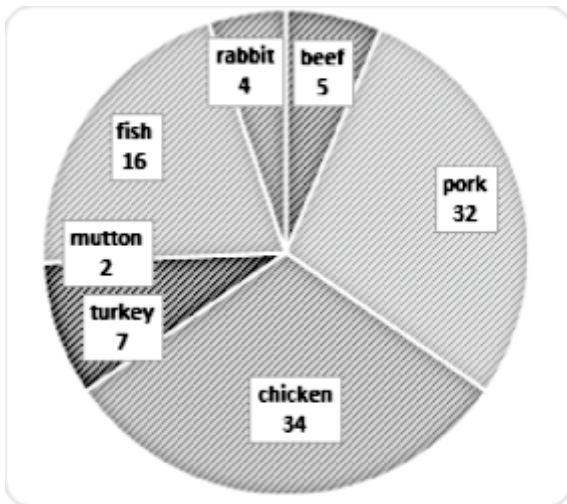

Fig. 1. The preference for various types of meat in surveyed group (absolute values)

The three reasons for the subjects' preference for the traditional sausage (a question with possible multiple answers) are illustrated in Fig. 2. This diagram also shows the concern about a natural diet, which is the first reason for the choice of this type of meat, exceeding by 1 the taste reason.

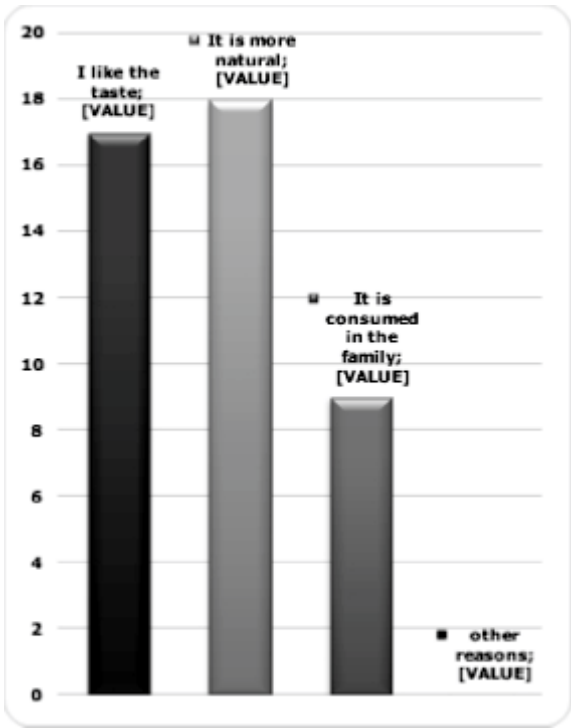

Fig. 2. Reasons for the preference of traditional sausages in surveyed group (absolute values)

Of the 4 persons who did not prefer the sausage produced in the industrial system, 3 said they did not prefer it because they were used to another type of product, and a person answered "I do not like homemade sausage". Also, 77% of the subjects preferred not to buy homemade sausage from the store, which indicates again a preference for the traditional aspect, this was also reported in other studies (5).

Of the 8 respondents who preferred to buy homemade sausage from the store, 6 motivated their choice by the fact that they liked its taste.

Of the 27 respondents who preferred not to buy homemade sausage from the store, 15 motivated this by the fact that they preferred to consume traditional products and 11 by the fact that this type of sausage contains a number of preservatives and flavoring agents despite being homemade.

The analysis of the subjects' answers shows that their great majority (98%) preferred the traditional sausage over the sausage obtained in the industrial system and 77% preferred the sausage which was not bought from the store. The most important reason for this was the concern about a traditional healthy diet, free of preservatives and flavoring agents, which was followed by the preference for the taste of the product, which also played an important role.

In the third part of the questionnaire, the 35 respondents assessed the appearance, color, odor and taste of the two samples of sausage, one produced industrially and the other produced traditionally.

When comparing the answers for the two products, a more positive evaluation of the industrial sausage product was observed, in which the "pleasant" answer was predominant (Fig. 3). For the traditional sausage product, there were more "less pleasant" answers and even 10 "unpleasant" answers.

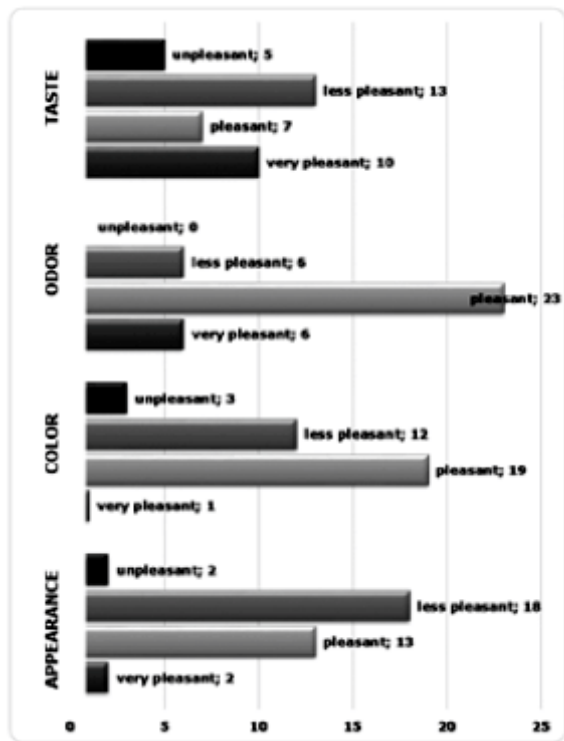

Fig. 3. Evaluation of the traditionally produced sausages (absolute values)

The results obtained for the determination of the total number of germs (TNG) were as follows: in the case of the traditional sausage product, the number of bacteria was very high, $1.9x10^6$ CFU/g, compared to the sausage product obtained in the industrial system, $8.7x10^3$ CFU/g (Fig. 4), which shows a precarious hygiene quality of the product. This situation is explained by the absence of nitrites from the traditional preparation, which have a preservation role, inhibiting microorganisms, and also by the fact that the industrial product is a boiled and smoked product (11).

From a compositional point of view (Table 1), it was observed that the traditional sausage sample contained less water (43.07 g) than the homemade sausage sample obtained in the industrial system, a much higher amount of fat, 43.31 g compared to 29.57% for the sausage obtained in the industrial system, and

similar protein and collagen values. Most probably, both products were obtained from the same batch of meat, and fat was added to the traditional sausage during the manufacturing process (13). The higher water content in the homemade sausage sample obtained in the industrial system was most probably due to the preservatives contained in this product, which have the capacity to incorporate and retain water.

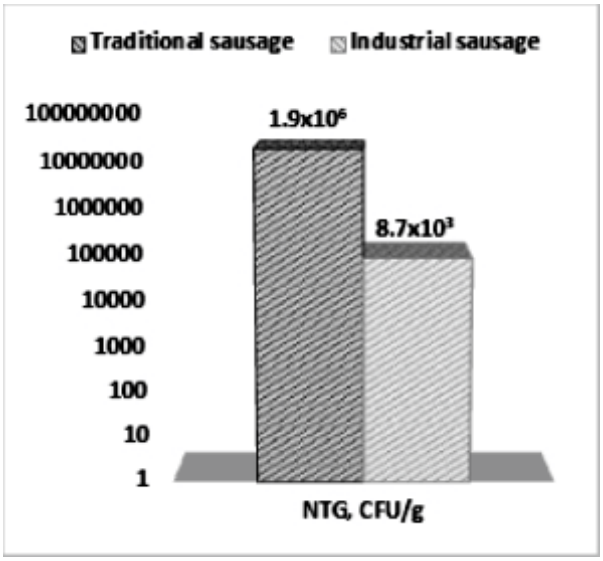

Fig. 4. Total number of germs in two types of sausages

The salt content in the two products was relatively low, while ranging towards the maximum accepted limit of 3g % for the group of sausage preparations treated thermally by cold smoking.

According to the label and laboratory tests of the homemade sausage product obtained in the industrial system, this contains sodium nitrite, while the traditional product does not. Sodium nitrite is currently used in the manufacturing technology of meat preparations, due to its capacity to combine with myoglobin and hemoglobin, forming a red complex that stabilizes through heat (during smoking). This is known as a harmful substance that acts by blocking an equivalent amount of hemoglobin and potentially combines with some amines in meat, leading to the formation of nitrosamines with a carcinogenic effect (6). Legally, the amount of sodium nitrite cannot exceed 10mg % in meat preparations. For the sausage produced in the industrial system, the amount of nitrites ranged within the accepted limits.

The results obtained demonstrated that the respondents could not differentiate the product based on the organoleptic examination alone, although the majority of the questioned subjects had a preference for the traditional sausage. The consumers' final decision relied on certain organoleptic characteristics, ignoring the microbiological and compositional determinations of the studied products.

CONCLUSIONS

The main reason for the respondents' preference for a type of meat was taste, followed by the concern about a healthy diet.

The respondents who preferred the traditional sausage product were concerned about a natural diet, even if the taste of the product did not meet the highest standard, while the respondents who preferred the sausage product obtained in the industrial system mainly focused on the quality of the taste.

The respondents who mentioned in the first part of the questionnaire that they preferred the traditional sausage changed their option following the organoleptic examination.

The compositional analysis of the sausage product obtained in the industrial system confirmed the presence of preservatives and flavoring agents.

Table 1

Compositional parameter values in the analyzed sausages

Name of the product	Water %	Fat %	Protein %	Collagen %	NaCl %	Nitrites mg/kg
Product 1 Industrial sausage	48.92	29.57	18.72	2.3	2.74	10.28
Product 2 Traditional sausage	43.07	43.31	17.44	2.17	2.97	0

The organoleptic analysis of the two products, according to the data expressed by respondents in the questionnaires, qualified the product obtained in the industrial system as more pleasant than the traditional product.

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