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Stručni rad

ANALYSIS OF CHANGES IN THE PARAMETERS OF THE MATURATION OF SREMSKI SAUSAGE WITH PREVIOSLY GIVEN TEHNICAL CHARACTERISTICS OF THE CHAMBER

Vangelica Jovanovska[1], Aco Kuzelov[2]
vangelicaj@yahoo.com

[1]*University St. Kliment Ohridski Bitola, Faculty of Biotehnical Science, 7000 Bitola, Macedonia*
[2]*University Goce Delcev Shtip, Faculty of Agriculture, 2000 Shtip, Macedonia*

Abstract

Srem sausage belongs to the group of durable delicatessen products whose production is known since a long time ago. It is produced by selected recipe at precisely determined tehnical characteristics of the maturation chamber. The change of relative humidity, air temperature during the maturation and changes of pH values in the stuffing mass has been analyzed Also the difference in the mass of the Srem sausage has been determined at the begining and the end of maturation. The bacteriological state and organoleptic characteristics are examined.The processed data of changes are given in a tabular display.

Key words: *Chamber of maturing, Srem sausage, pH.*

INTRODUCTION

The poduction of durable meat products dates back since a long time ago. It can be assumed that these findings occurred by human efforts to conserve and thus to preserve those pieces of meat which could not be consumed immediately and which were not suitable for conservation in another way. The written data shows that the ancient Greeks knew several kinds of durable meat (raw) products among which are the salami. It is assumed that salami come from the city Salamis, which was located on the east coast of Cyprus, but it was destroyed 449 year B.C. [1]. From this it can be assumed that durable meat products, especially durable sausages originate from Greece. Today, they are consumed in all European countries and North America. In Italy the production of durable raw products, especially the sausages began approximately 250 years ago. The Italian masters transferred this skill around 150 years ago to Hungary [2].

In the mountainous parts of the Balkans and in our country especially in areas where the Muslim population lives, durable meat products from beef meat is produced,and especially the beef sausage (Sudzhuk in Turkish-sucuk) – a sausage from walnuts and thick red wine is produced even today. In the beginning the production of durable meat products was performed in an extensive way. For the development of their production technology, an important influence had the customs, climatic factors etc. The chambers where the smoking of these products was performed were built from hollow bricks, or wooden material. Otherwise, their production was seasonal (through the winter period) ands not much care was paid for the hygienic standard during the production. Their sustainability is based on the reduction of moisture in the product (drying). With the development of the meat industry, the production of these products was done in supervised conditions (special chambers for drying, smoking and maturing of the product) where the temperature, humidity and air circulation in the chambers is controlled [3].

Previously the raw sausages were produced from meat, fat tissue and spices. The production and application of new additives in the production of raw sausages which experienced their expansion in the higly industrialized countries reached us, too.

So 18 years ago, also in our country started the application of various preparations with more or less success such as: glukono delta lacton, Tari C-77 and starter cultures in combination with low temperatures drying the process lead to shortening of the process of maturation of the raw sausages [4]. Considering the fact that in our literature there are no data or they are very poor, a goal was set to investigate the maturation of Srem sausage[1] in controlled conditions and the quality of the ready product by checking temperature, relative humidity,the movement in the air mass in the chamber, pH of stuffing mass. A chemical, microbiological and sensory analysis of the ready product was performed.

MATERIAL AND METHOD OF OPERATION

To carry out the examination a durable srem sausage was used. The recipe by which the sausage is made is given in table 1.

Table 1. Recipe for produce of Srem sausage

Name of raw matirials	*kg.*
Beef second category	33
Pork meat second category	35
Stingily fat tissue	32
Spice for Srem sausage	0,400
Nitric salt	1,2
Sugar	0,4
Tari C-77	1,0

Beef meat, pork meat and hard fatty tissue are prior frozen,specialy the meat of -4ºC, and hard fatty tissue of -8ºC. In such a way frozen meat (beef and pork) it is cut in the machine for cutting frozen meat. The cutting up of is done in cutter machine and mixing is done in a vacuum mixer. After the mixing follows weighing of the mixture in order to determine its mass and then with the stuffing mass the natural pork intestines with diameter of Ø22 are filled. After the stuffing, the sausages are left to dry (to drain out 12-15 hours). The smoking of the sausage is done at a temperature 18-19ºC, 7-8 hours. The drying (maturation) of sausage is done in controlled conditions: temperature, relative humidity and air movement.The PH-value is measured with pocket pH meter. The loss of mass during the maturation is calculated on the basis of difference of the sausage before the stuffing and at the end of the maturation. An organoleptic, chemical and microbiological testing is done on the ready product [8-11].

Tehnical characteristics of the chamber for maturation

The chambers where the maturation (drying) of the durable meat products is done are built by experts of the factory on the basis of the expertise that they have. They are not chambers from the well known world companies like Shreter and Travelini but there are unique because they are built by the exsperts of the factory. They are 3m high, the surface area 18m^2 and volume 54m^3. The capacity of chamber is 3tons (final product). The power consumption for one batch is 5kW/h. The chambers are constructed from panel. The regulation of temperature and humidity is done automatically by microprocessor (by a program) controller. The work of this controller is with working intervals and breaks. The movement of air in the chambers (ventilation) is regulated by valves. The circulation sistem ensures equal thermal processing and smoking in all parts of the chamber. The humidity is created with direct injection of water vapor. The smoke is created by a generator for smoke with wooden sawdust. The heaters are with power of 10kW. The engine power that provides ventilation i.e. that performs air circulation is 1-1,5 kW. The velocity of air circulation in the chambers is 2-4 m/s. The massive door is secured with a safety system for closure. The assurance of quality sealing of the working space is done with a sealed door with a termo resistand silicone. The smoking chamber is shown on the following picture:

Figure 1. Smoking chamber

RESULTS AND DISCUSSION

Next will follow a tabular display of the processed data from the tests and the relevant comments:

Table 2. Changes of temperature and relative humidity during the maturation of Srem sausage

Phases	*Days*	*Relative humidity %*	*Temperature °C*	*Intensity of light lux*
Stuffing and draining	*1*	*90*	*18,0*	*Darkness*
Smoking	*2*	*89*	*18,0*	*Darkness*
	3	*89*	*18,0*	*Darkness*
	4	*88*	*18,0*	*Darkness*
	5	*87*	*17,5*	*Darkness*
	6	*86*	*17,5*	*Darkness*
	7	*85*	*17,0*	*Darkness*
	8	*84*	*17,0*	*Darkness*
	9	*83*	*16,5*	*Darkness*
	10	*83*	*16,5*	*Darkness*
	11	*82*	*16,0*	*Darkness*
	12	*82*	*16,0*	*Darkness*
	13	*81*	*16,0*	*Darkness*
	14	*80*	*15,5*	*Darkness*
	15	*79*	*15,5*	*Darkness*
	16	*78*	*15,5*	*Darkness*
	17	*77*	*15,5*	*Darkness*
	18	*76*	*15,5*	*Darkness*
	19	*75*	*15,0*	*Darkness*
Work of climate chamber -15 minutes , break-15 minutes *Speed of air circulation 2-4 m/s*				

As it can be seen from table 2 the temperature in the chamber during and smoking (maturation) of Srem sausage gradually falls, so that the beginning it is 18ºC and at the end it is 15ºC. The relative humidity of the air is the highest at the beginning and the lowest at the end of maturation. The fall of the relative humidity has a proper course.

Table 3. Changes of pH in the stuffing mass of the Srem sausage during the drying and smoking

Time	*2 hours*	*6 days*	*12 days*	*19 days*
pH	*5,57*	*5,07*	*5,15*	*5,20*

The changes of the pH of the stuffing (table 3.) are a result of the addition of Tari C -77 that contains GDL, which in the stuffing of the Srem sausage turns into Glucon acid which is manifested by rapid fall of the pH after a few hours from the addition of GDL . The Glucono Delta Lakton combined with nitrit salt leads to rapid creation of the color of sausage and its consistency wich is explained with the rapid decomposition of the nitrite because of the declined pH.

Table 4. Difference in the mass of Srem sausage at the beginning and the end of maturation (drying)

Mass of the Srem sausage per stuffing / kg	*Mass of Srem sausage at the end of maturation (drying) / kg*	*loss of weight in kg*	*loss of weight in %*
103	*69,50*	*33,5*	*32,53*

As a result of maturation (drying) of Srem sausage there is loss of its mass (loss of weight). The total loss of the product weight is given in table 4. During the maturation the Srem sausage there is decrease of the activity of water. In the initial phase that happens in the peripheral layers of sausage. In the course of the drying process this is much slower i.e. the loss of mass is smaller.
Our data are in line with the data of . Belica [5,6]. he determined that the mass losses depend of the relative humidity of the chamber during maturation, i.e. bigger relative humidity, less loss of weight and vice versa. Liepe [7]. determined that the raw sausages that have pH over isoelectric point have smaller loss of mass.

Table 5. Bacteriological image of Srem sausage

Total number of bacteria	*Esherihia*	*Staphilococus*	*Proteus*	*Clostridii*
350	*/*	*/*	*/*	*/*

As it can be seen from table 5. the bacteriological image of the sausage is good. This is certification of the high hygiene during the manufacturing process.
In terms of organoleptic characteristics (color, taste, smell, consistency, succulence) the Srem sausage satisfies all these organoleptic qualities.

CONCLUSIONS

The following conclusions can be drawn from the above analysis:

- The automated control of the obtained parameters and conditions for testing processes of maturing and smoking of Srem sausage in smoking chamber, enabled accurate information and their proper analysis;
- During the process, which lasted 19 days with reduction of the temperarures in the chamber gradually from 18 to 15^{o}C occurs gradual reduction of the relative humidity from 90 to 75%;
- Quick decline of the pH in the stuffing, after several hours, due to the addition of Tari C-77 which contains GDL;
- For the given conditions in the chamber, and taking into consideration the initial mass of the Srem sausage, appears loss of mass, i.e. 32,53% of loss of weight;
- A high hygienic manufacturing process with good bacteriological image of sausage;
- Positive organoleptic characteristics;

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ANALIZA PROMENA U PARAMETARA SAZREVANJA KOD SREMSKE KOBASICE ZA PRETHODNO ZADATE TEHNIČKE KARAKTERISTIKE KOMORE

Vangelica Jovanovska[1], Aco Kuzelov[2]
vangelicaj@yahoo.com

[1]*Univerzitet Sv. Kliment Ohridski Bitola, Fakultet biotehničkih nauka, 7000 Bitola, Makedonija*
[2]*Univerzitet Goce Delčev Štip, Poljoprivredni fakultet, 2000 Štip, Makedonija*

Izvod

Sremska kobasica pripada grupi suhomesnih proizvoda čija proizvodnja je davno pre poznata. Napravljena je po receptu za odabrane tehničke karakteristike komore sazrevanja. Analizirana je promena relativne vlažnosti vazduha, temperatura vazduha tokom sazrevanja i promene pH vrednosti u polneznoj masi. Tako odredjena je razlika masa sremske kobasice na početku i na kraju zrenja. Istraživana je situacija bakteriloške slike i organoleptičke osobine. Obrađeni podaci promene dati su tabelarnim prikazom.

Ključne reči: *komore za zrenje, sremske kobasice, pH.*