



## PROXIMATE COMPOSITION, MICROBIOLOGICAL QUALITY AND SENSORY CHARACTERISTICS IN DIFFERENT TYPES OF PATES

Darko Andronikov<sup>1\*</sup>, Kiro Mojsov<sup>1</sup>, Aco Janevski<sup>1</sup>, Aco Kuzelov<sup>2</sup>, Elenica Sofijanova<sup>3</sup>, Dijana Indzhelieva<sup>4</sup>

<sup>1</sup> Department of Food Technology, Technological Faculty, University „Goce Delčev“, Štip, Republic of Macedonia

<sup>2</sup> Faculty of Agriculture, University „Goce Delčev“, Štip, Republic of Macedonia

<sup>3</sup> Faculty of Economics, University „Goce Delčev“, Štip, Republic of Macedonia

<sup>4</sup> University “Prof. dr. A. Zlatarov”, College of Tourism, Prof. Yakimov, Burgas, Republic of Bulgaria

**\*Corresponding author:** Ass. Prof. Darko Andronikov, DSc; Department of Food Technology, Technological Faculty, University „Goce Delčev“, Krste Misirkov 10-A, 2000 Štip, Republic of Macedonia, tel.: ++389 32 550 111; mobile: ++389 70 879 970; fax: ++389 32 550 900; E-mail: [darko.andronikov@ugd.edu.mk](mailto:darko.andronikov@ugd.edu.mk)

### Abstract

The aim of our research was to examine the chemical and microbiological composition, sensory properties in different types of pates. The test used three groups of five test samples of pork and beef pates and pates with vegetables and are separately measured after heat treatment. The results of chemical composition showed the contents of protein, fat and minerals are the smallest in pig pate. In finished products not found bacteria of the following types: *Clostridium*, *Staphylococcus*, *Proteus*, *Escherichia*. The largest total number of bacteria (bacillus) was found in beef pate (4.16 log CFU/g) and lowest in the pork pates (3.79 log CFU/g). Lowest sensory grades were given on pork pates and highest samples on pates with vegetables.

**Key words:** types of pates, chemical composition, microorganisms, sensory properties



## Introduction

Historically until 1984 in R. Macedonia is not producing pates of meat and from internal organs of cattle for slaughter. Until then the market in R. Macedonia has been supplied with this product from meat industries from other Yugoslav republics. Today, in the market we can find different pork, beef and chicken pates, pate with vegetables produced in R. Macedonia.

Pate as meat product according to the rulebook on the requirements regarding the quality of minced meat, meat preparations and meat products belongs to the group of cooked sausages if the filling is filled into natural or artificial casings and canned meat if the filling is filled into cans (Official Gazette of R. Macedonia No. 63/2013). According to the same rules pates are produced by black liver and meat of I, II, III, or IV category, internal organs, fatty tissue, fat and broth. The finished product should not contain more than 45% fat. The filling for the production of foie intersection should be a uniform color, characteristic lubricants but non-sticky consistency.

Pates with black liver are products, which are demanded in the European and world market because they have good taste and other sensory qualities (Santos et al. 2003; Estevez et al., 2005; Echarte et al. 2004; Vossen et al. 2012).

Because here in R. Macedonia is almost no research on quantitative and qualitative characteristics of pates purpose of our research was to examine the chemical and microbiological composition, and sensory properties of different types of pates produced in R. Macedonia.

## Material and methods

### Materials

As a material for our tests we used beef and pork pate (pate of black liver) and pate with vegetables.

### Technological procedure for beef pate.

Producing beef pate following raw materials were used: beef second category, beef meat from beef heads, beef fat, beef black liver, broth, salt, nitrite, sodium caseinate, onion, coriander and spicy mixture of beef pate.

The meat is fine and brines in the dry process for 24 to 48 hours. First take black liver and grind the cutter while adding salt until the liver is not bold in the form of paste. Brined beef meat, beef tallow and meat from beef heads are blanched in duplexing thus adds dried onion and beef tallow. After blanched table mass are placed in the cutter and gradually minor and add liver and other spices and additives. After

completion of cattering mass is removed from cutter and filled and sealed in cans of 150 grams. After filling and closing cans are sterilized.

For the production of pork pate were used the following materials: pork meat second category, meat from pig heads, hard fat, pork black liver, broth. Technological procedure for production of pork pate and pate with vegetables is the same as the procedure for production of beef pate and were used the same raw materials as well as beef pate plus tomato paste. The other ingredients are the same as the pork and beef pate. After sterilization randomly take samples for chemical, microbiological and sensory analysis.

### Chemical analysis

Total nitrogen (TN) was determined according to the Kjeldahl method. Moisture content was determined by drying at  $103 \pm 2$  °C to constant mass. The intramuscular fat content was determined according to AOAC International method, with petroleum ether as solvent. Ash was determined by burning and combustion (4 – 5 h) at 525 – 550°C [Ash of Meat, 1997].

### Microbiological analysis

Following bacteria were determined: Total bacteria (bacillus) number – ISO 4833/2003. Sown on nutrient agar to 37 °C during 24 hours. Staphylococcus ISO 6888-1/1999. Sown on ETGP agar (barit parker agar) after thermostating on 37 °C during 24 hours. Enterobacteriaceae ISO 21528-1/2004; ISO 21528-2/2009. Escherichia coli are sown on lactoza bujon and brilliant green, thermostated on 37°C during 24–48 hours. Clostridium sown on sulfiten agar, thermostated on 37 °C during 24–48 hours. Data were transformed into log<sub>10</sub> CFU/g before comparison of means. The results were statistically processed using mathematical program Microsoft EXEL ANOVA (single factor) 2009 / 2013.

### Sensory examination

The evaluation was performed by a 5 experienced specialists following sensory attributes: external appearance, appearance of cut, color section, smell, taste, consistency and appearance of drain in vacuums samples. Evaluators were served bread and water for rinsing-cleaning the mouth after every test samples. Sensory analysis was obtained with using 9 step scale for testing of sensory properties of meat and meat products established by VNIMP Moscow.



## Results and discussion

Results of chemical composition of the groups of different types of pate were given in Table 1. The content of water in all groups ranges from 55.26 to 57.76 %. The lowest water content found in beef pate and the highest in pork pate. Generally, the content of protein, fat and minerals is smaller in pork pates in relation to the other two types of pates. The highest fat content found in beef pates (26.44 %) while the lowest in pork pates (25.04 %). The content of minerals in all groups of pates ranges from 1.58-1.62 %. Our results for chemical composition were similar to the results obtained by (Santos et al. 2003; Estevez et al. 2005).

The results of microbiological analysis of different types of pates were shown Table 2. The lowest microbial contamination in terms of total number of bacteria (bacillus) in a pork pate 3.79 log CFU/g and has the largest microbiological contamination in beef pate 4.16 log CFU/g. Our results agree with the results of (Estevez et al. 2005; Abu-Salem and Abou Arab 2010).

The results from the sensory analysis of different types of pates were shown in Table 3. Low marks for smell (pork pates) and colour of intersection and sustainability colour (beef pates) make the main difference in the annual average sensory evaluation. Pate with vegetable got higher marks for taste, colour of intersection and sustainability colour than the other two types of pates. Our results for sensory evaluation were similar to the results obtained by (Abu-Salem and Abou Arab 2010; Santos et al. 2003; Abu-Salem and Khalaf 1988).

## Conclusions

According to the above written, we can conclude the following: the content of protein, fat and minerals is smaller in pork pates in relation to the other two types of pates. No bacteria are found from the following types of *Clostridium*, *Staphylococcus*, *Proteus*, *Escherichia*, and the total number of bacteria (*bacillus*) showed a decrease of bacteria in beef pates and lowest in the pork pates. From the results of sensory evaluation can be seen that the differences in terms of sensory properties in groups and between groups of pates are small and statistically insignificant. Probably this is the result of the standardization of the preparations and uniformity of raw material used for the production of pates.

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**Table 1.** The results from the sensory analysis of different types of pates ( $X \pm SD$ )

Groups	Water (%)	Proteins (%)	Fats (%)	Minerals (%)
Pork pates $X \pm Sd$	$57.76 \pm 0.25$	$14.56 \pm 0.72$	$25.04 \pm 0.56$	$1.58 \pm 0.17$
Beef pates $X \pm Sd$	$55.26 \pm 0.34$	$15.09 \pm 0.31$	$26.44 \pm 0.75$	$1.59 \pm 0.14$
Pates with vegetable $X \pm Sd$	$56.84 \pm 0.58$	$15.53 \pm 0.27$	$25.38 \pm 0.32$	$1.62 \pm 0.13$

$X = \text{mean}$ ,  $Sd = \text{standard deviation}$ ; number of pieces ( $n=5$ )

**Table 2.** Microbiological analysis of different types of pates (log CFU/g)

	Pork pates $X \pm Sd$ log CFU/g	Beef pates $X \pm Sd$ log CFU/g	Pates with vegetable $X \pm Sd$ log CFU/g
<i>Staphylococcus</i>	/	/	/
<i>Proteus</i>	/	/	/
<i>Echerichia</i>	/	/	/
<i>Clostridium</i>	/	/	/
Total bacteria number ( <i>Bacillus</i> )	$3.79 \pm 0.34$	$4.16 \pm 0.57$	$3.96 \pm 0.23$

$X = \text{mean}$ ,  $Sd = \text{standard deviation}$ ; number of pieces ( $n=5$ )

**Table 3.** The results from the sensory analysis of different types of pates ( $X \pm Sd$ )

Sensory characteristics	Pork pate	Beef pate	Pate with vegetable
Outside appearance	8	9	8
Cross-section appearance	9	9	9
Colour of intersection	9	7	9
Sustainability colour	8	7	9
Smell	7	9	8
Taste	8	8	9
Consistency	8	9	8
Average sensory evaluation	8.14	8.28	8.57