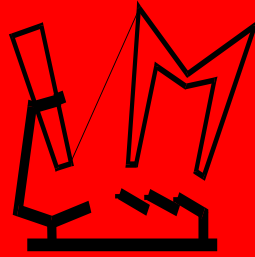


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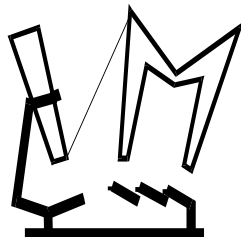
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**MEAT AND MEAT PRODUCTS – PERSPECTIVES OF
SUSTAINABLE PRODUCTION**

Belgrade, June 10th-12th, 2013

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CHEMICAL PARAMETERS OF THE QUALITY OF *PÂTÉS* FROM DIFFERENT MANUFACTURERS FROM NOVI SAD MARKET

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Abstract – *Pâté* is a cooked sausage prepared predominantly of cooked or poached muscle tissue according to the manufacturing specification. Each manufacturer can develop his unique manufacturing specification for the *pâté*, which results in significant variations in product composition between the manufacturers. The aim of this study was to perform comparative analysis of chemical parameters of the quality of *pâtés* from different manufacturers, to identify potential differences between average levels of investigated chemical parameters of quality of frankfurter sausages and to compare the obtained results with those of other authors. The following chemical parameters were investigated: moisture content, total fat content, total protein content, chloride and ash content. The samples were obtained from four manufacturers, i.e. six *pâté* packages of the same manufacturing date from each manufacturer. Moisture content in the examined *pâté* samples ranged from $56.70 \pm 1.02\%$ to $62.41 \pm 0.14\%$, which is significantly higher compared to the levels reported in the available literature. Total fat content was within a range between $24.06 \pm 0.44\%$ and $30.11 \pm 0.29\%$ that corresponds with the data of other authors. Total protein content in the *pâtés* ranged from $8.75 \pm 0.05\%$ to $10.03 \pm 0.02\%$, which is significantly lower as compared to the levels reported by other authors. Only in one manufacturer, the total protein content was below the minimum values established by the Regulation on total protein content. Chloride content in the examined *pâtés* ranged from $1.66 \pm 0.03\%$ to $2.12 \pm 0.06\%$. The levels of sodium chloride in cooked sausage reported by other authors are highly variable. The ash content determined in the investigated *pâté* samples was within a range $1.12 \pm 0.05\%$ - $2.98 \pm 0.08\%$, which is in accordance with the results reported by other authors.

Key words – *pâtés*, moisture, total protein, total fat, sodium chloride, ash.

I. INTRODUCTION

The diet of modern man highly relies on meat products. Busy lifestyle increasingly poses requirements for healthy food and diet, and thus consumers' expectations concerning quality of food products are expanding. In terms of production volume, cooked sausages have an important place in meat processing industry. Their attractive organoleptic characteristics (softness, mellowness, mild smell and taste) makes them acceptable for all age categories of consumers.

Pâtés are the most common product produced both by large industrial food producers and small manufacturers [5]. *Pâté* is a cooked sausage prepared predominantly of cooked or poached muscle tissue, liver and other internal organs, skin and blood. *Pâtés* are preserved by pasteurization, cooking or sterilization. *Pâtés* are produced according to the manufacturing specification. Each manufacturer can develop his unique manufacturing specification, which results in significant variations in product composition between the manufacturers. According to the Regulation on the quality of minced meat, meat preparations and meat products ("Off. Gazette of RS" No. 31/2012), the *pâtés* that are put on the market must meet the quality requirements pertaining to minimum total protein content (9%) and maximum relative protein content of connective tissue (25%). With respect to sensory characteristics, such products must meet requirements established for all types of cooked sausages.

The aim of this study was to perform comparative analysis of chemical parameters of the quality of pâtés from different manufacturers, to identify potential differences between average levels of investigated chemical parameters of quality of frankfurter sausages and to compare the obtained results with those of other authors.

II. MATERIALS AND METHODS

Pâtés were manufactured according to manufacturing specification of four manufacturers from the territory of Novi Sad market. Six pâté packages of the same manufacturing date were obtained from each manufacturer. Moisture and total fat contents were determined according to methods SRPS ISO 1442/1998 [14] and SRPS ISO 1443/1992 [11], respectively. Total protein content was determined by the method SRPS ISO 937/1992 [15] (*Kjeldahl Method*), using an automatic *Kjel-Fos* apparatus. Chloride and ash contents were determined by the methods SRPS ISO 1841-1/1999 [12] and SRPS ISO 936/1999 [13], respectively.

III. RESULTS AND DISCUSSION

Results on contents of moisture, total protein, total fat, chloride and ash in pâtés from four manufacturers from Novi Sad market are displayed in Table 1.

Investigated parameter (%)	Manufact. A	Manufact. B	Manufact. C	Manufact. D
Moisture content	58.20 ± 0.37	60.36 ± 0.08	62.41 ± 0.18	56.70 ± 0.58
Total protein content	10.03 ± 0.02	9.46 ± 0.12	8.75 ± 0.05	9.06 ± 0.12
Total fat content	27.45 ± 0.10	25.43 ± 0.13	24.06 ± 0.02	30.11 ± 0.29
Chloride content	1.66 ± 0.03	1.96 ± 0.04	2.12 ± 0.06	1.80 ± 0.10
Ash content	2.35 ± 0.05	2.98 ± 0.08	1.86 ± 0.15	1.12 ± 0.05

Moisture content in pâtés of four manufacturers from Novi Sad market ranged

from $56.70 \pm 0.58 \%$ to $62.41 \pm 0.18 \%$. This parameter demonstrated extremely high variability between the investigated pâté samples from different manufacturers as well as between results on moisture content in cooked sausages reported by other authors.

According to the results of Estévez and Cava [2], moisture content in pâtés made of meat of Iberian and white pigs ranged from $48.42 \pm 1.37\%$ to $50.51 \pm 0.62\%$, which is significantly lower content than that established in our pâtés. Dalmása et al. [1] reported moisture contents in goat-meat pâtés manufactured according to three different recipes, being: 54.93 ± 0.51 , 53.57 ± 0.12 and $54.82 \pm 0.38\%$. This is lower moisture content than that established in our products, and somewhat higher as compared to the results of Estévez and Cava [2]. Pinho et al. [3] analyzed the Portuguese pâté brands, reporting significantly lower moisture content (53.4%) in their products in comparison to the results of our research.

Our research revealed the total fat content in the investigated pâté samples in a range from $24.06 \pm 0.02 \%$ to $30.11 \pm 0.29 \%$. In their pâté samples, Estévez and Cava [2] established a total fat contents of $31.82 \pm 0.57\%$ to $33.37 \pm 1.81\%$, which is higher content than that determined in our research. Dalmása et al. [1] reported total fat values in three different pâtés being $22.67 \pm 0.07\%$, $24.33 \pm 0.00\%$ and $23.68 \pm 0.11\%$. The findings of these authors revealed lower values than those obtained in our investigation. Pinho et al. [2] reported a total fat content of 29.4% in pâtés from Portuguese market, which corresponds with our findings.

Proteins are the most important component of meat products. According to the relevant Regulation, minimum values for the total protein content are prescribed for majority of meat products. The minimum total protein content in pâtés is 9%. Results of our study revealed that total protein content in pâté samples from manufacturers from Novi Sad market ranged from $8.75 \pm 0.05\%$ to $10.03 \pm 0.02\%$. Estévez and Cava [2] reported that total protein content in pâtés made of meat of Iberian and white pigs was quite unified, ranging from $10.04 \pm 0.7\%$ to $10.34 \pm 0.24\%$. This result is higher as compared to our results.

Total protein contents in *pâtés* manufactured according to three different recipes established by Dalmása et al. [1] were: 14.74 ± 0.07 , 14.94 ± 0.00 and $14.90 \pm 0.11\%$, which is significantly higher total protein content than that obtained for our samples. Pinho et al. [3] reported a total protein content 11.80% in Portuguese *pâtés*, which is also somewhat higher as compared to our results. According to Saicic et al. [9], the meat protein content in cooked sausages ranged between 8.19 and 12.22%, whereas total protein content was within the range from 6.79% to 9.18%. According to the Regulation, these sausages should contain minimum 8% of proteins. Out of the total of 14 examined sausage samples, one half (50%) did not meet the quality requirements, i.e. minimum total protein content, stated by the Regulation. In samples of cooked sausages made of poultry meat, the total protein content ranged from 7.26% to 14.58%. Out of 22 examined products, two (9.09%) did not fulfill the quality requirements of the Regulation, as the total protein content was below the minimum prescribed value.

Ash content in the examined *pâté* samples (Table 1.) ranged between $1.12 \pm 0.05\%$ and $2.98 \pm 0.08\%$. Estévez and Cava [2] reported that ash content in *pâtés* made of meat of Iberian and white pigs was quite unified, ranging from 2.69 ± 0.09 to 2.78 ± 0.21 . Ash contents in *pâtés* manufactured according to three different recipes were 3.13 ± 0.51 , 2.99 ± 0.12 and $3.21 \pm 0.38\%$, as reported by Dalmása et al. [1] Pinho et al. [3] investigated 15 brands of beef *pâté* available on Portuguese market and established an ash content of 2.6%. Based on the determined values, we may conclude that our results on ash content in liver *pâtés* are in accordance with those reported by other authors.

The function of salt in meat products is multiple – it inhibits the microbial growth, increases the water-holding ability of meat products, enhances flavor. The amount of salt in meat products is not defined by the Regulation on the quality of meat products. The amount of salt in meat products is defined in terms of organoleptic traits, i.e. flavor. The Regulation prescribes that meat products must have a stable and characteristic taste. Meat

product with low salt content may be tasteless and dull, whereas too high salt content gives a briny, over-salted or even bitter taste. In such instances, the product is not of a characteristic taste, which is considered a product quality deficiency. Numerous authors addressed the issue of technology and amount of salt added to poached, semi-durable and cooked sausages. The content of salt in *pâté* samples from four manufacturers from Novi Sad market ranged from 1.66 ± 0.03 to 2.12 ± 0.06 (Table 1.). Prica et al. [4] reported sodium chloride content in cooked sausages from Novi Sad market to be averagely $2.95 \pm 1.13\%$, which is somewhat higher than the values determined in our research. Investigation of cooked sausages revealed sodium chloride contents of 1.15% and 1.4% as reported by Vranić et al. [4] and Ruusunen and Puolanne [8], respectively. This result is significantly lower as compared to the results of our current research.

IV. CONCLUSION

Investigation of chemical parameters of *quality of pâtés* of four manufacturers from Novi Sad market demonstrated moisture content ranging from $56.70 \pm 0.58\%$ to $62.41 \pm 0.18\%$. This result revealed that *moisture content in pâtés* from Novi Sad market is significantly higher than that reported by other authors. Total protein content ranged from $8.75 \pm 0.05\%$ to $10.03 \pm 0.02\%$. It was established that only *pâté* produced by manufacturer C did not meet the requirements of the Regulation as the total protein content was below the minimum prescribed value. Total protein content in *pâtés* from other manufacturers was in line with the requirements of the Regulation (9%). Furthermore, total protein content in *pâtés* from our manufacturers is significantly lower as compared to the results reported by other authors. Total fat content in our *pâtés* was within the range $24.06 \pm 0.02\%$ - $30.11 \pm 0.29\%$. Generally, the results on total fat content in *pâtés* varied significantly among the samples. Thus, some results reported by other authors correspond with our findings, whilst some researchers reported higher or lower values as compared to ours. Chloride content in *pâtés* obtained from Novi Sad market was

highly variable, ranging from $1.66 \pm 0.03\%$ to $2.12 \pm 0.06\%$. Also, the results on sodium chloride content in cooked sausages obtained by different authors were significantly diverse. As compared to our research, the sodium chloride levels were either higher or lower than ours. Ash content ranged from $1.12 \pm 0.05\%$ to $2.98 \pm 0.08\%$. Based on the obtained results, we may conclude that our findings on ash content in liver *pâtés* are in accordance with the results of other authors.

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