PHEFFECT OF NATURAL ANTIOXIDANTS ON LIPOLYSIS AND PH OF DRY-FERMENTED SAUSAGES "LUKANKA" TYPE

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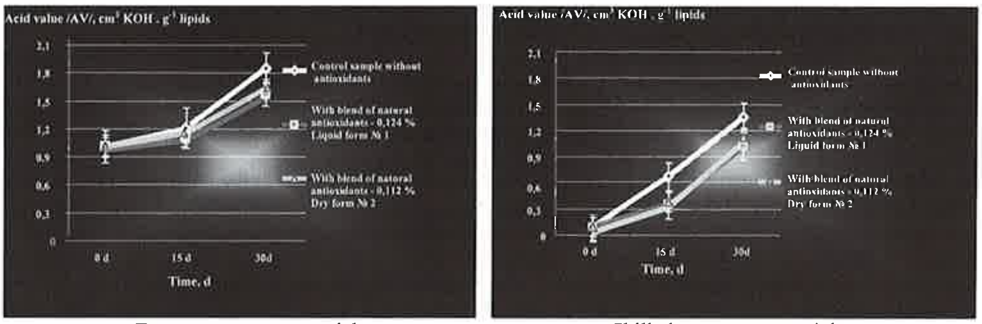
Introduction

Recently, scientists are directing their efforts towards clarification of the questions: which features and taste properties of dry-fermented sausages are formed as a result of the lactic-acid bacteria activity; which are due to the protein and lipids hydrolysis and to what extent are these factors mutually dependent? To a great extent the lipolysis in the dry-fermented sausages is passing during the drying and maturing processes and is a result most of all of the endogen lipases found in muscles and fats (Johansson *et al.,* 2000). In order to produce the desired taste and flavour it is necessary for the free fatty and free amino acids to go through consecutive chemical transformations (Diaz *et al.,* 2005). The aim of this study was to establish the efficiency of a blend of natural antioxidants, on the lipolysis depth and the pH changes in the Bulgarian dry-fermented "lukanka" sausage.

Materials and Methods

The experiments were carried out with "Monastery's lukanka". The model system "lukanka" was prepared from:
a) Product produced from meat raw materials chilled at 0 - 4°C: 1) beef type CL 95 stored 72 h *post mortem* and frozen to -5°C 6 h prior to mincing; 2) pork - sort 50/50, stored for 72h *post mortem* and frozen to -10°C 6h prior to cutting; 3) back bacon stored for 24 h *post mortem* frozen to -10°C, prior to use. Parallel samples were produced: **Control sample** – without antioxidants; **Sample No 1** – with the addition of 1,124 g/kg blend of natural antioxidants (Liquid form No 1), liquid rosemary extract in combination with 35.48% rutine and 16.13% sodium erythrobate. **Sample No 2** – with the addition of 1,112 g/kg blend of natural antioxidants (Dry form No 2), dry rosemary extract in combination with 78.57% dry extract of Japanese acacia (*Sophora japonica*) flower bud (containing 53.33% quercetin – aglicon of the natural glycoside rutine) and 17.85% sodium erythrobate.
b) Product produced from meat raw materials stored three months at minus 18°C: 1) beef type CL 95; 2) pork – sort 50/50 and back bacon. The same three parallel samples were produced.
For the laboratory analysis the following reagents were purchased: chloroform and n-hexane (Sigma Chemical Company Ltd. St. Louis, MO 63178, USA, affiliate Deisenhofen, Germany), silver nitrate (Fluka Chemie AG Buchs CH-9470, Switzerland). The remaining chemicals were AR or GPL quality and were supplied by an affiliate of "Aldrich Chemical" Co. (Gillingham, Dorset SP8 4JL UK in Germany D-89555 Steinheim, Germany). The total lipids from the sausages were extracted by the method of Bligh and Dyer (1959). The degree of lipolysis in the extracted lipids was determined by the acid value (AOAC, 1980), and pH was measured using a pH-meter (Microsyst MS 2004, Microsyst, Plovdiv), equipped with combined pH electrode (Sensorex Combination Recorder 450 CD, pH Electrode Station, CA 90680, USA).

Results and Discussion

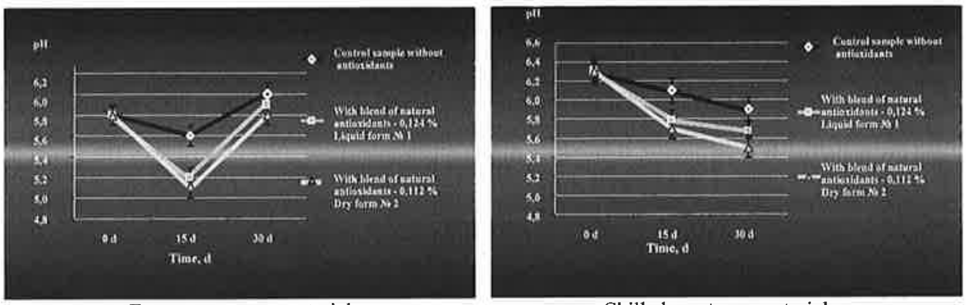


Frozen meat raw materials — Chilled meat raw materials

Figure 1: Acid value of the lipids extracted from "lukanka" with the addition of blend of natural antioxidants.

The application of natural antioxidants blend suppresses the lipolytic processes during the "Monastery's lukanka" production (Figure 1). In the experiments with frozen meat raw materials, the acid value of the test samples was statistically significantly lower (P< 0.05) as late as on day 30 of the experiment, whilst in the tests with chilled meat raw

materials statistically significant differences ($P < 0.05$) were estimated no more than the day 15 of the experiment. According to this indicator, both variances of the composition show similar properties (Figure 1).
Irrespective of the significant reduction in free fatty acids levels, the acid value of the final product "lukanka" produced from frozen meat raw materials is higher than that critical for maximum product quality - 1 cm^3 NaOH/g lipids (Dominguez Fernandez and Zumalacarregui Rodrigez, 1991). In the "lukanka" produced from chilled meat with the addition of antioxidants, similar composition critical values are estimated in the final product on day 30 of the experiment (Motilva *et al.,* 1993).
The addition of blend of natural antioxidants causes certain pH reduction of "Monastery's lukanka" during the drying and maturing processes when the final product is produced from frozen meat raw materials (Fig 2). As the meat is in the process of autolysis (maturing) pH of the filling mass is comparatively high 6.3.



Frozen meat raw materials — Chilled meat raw materials

Figure 2: pH of "lukanka" with the addition of blend of natural antioxidants.

During the drying, pH decreases and in the final product (day 30) it reaches approximately 5.9 in the control sample. The pH of the experimental samples decreases faster and on the day 15 in Sample No 1 (with the addition of antioxidants composition) is approximately 5.8, and 5.7 in sample No 2. This trend goes deeper in the final product (day 30). The addition of natural antioxidant blend causes insignificant pH reduction of the "Monastery's lukanka" during the drying and maturing processes, when the product is produced from chilled meat raw materials (Figure 2). As the meat changes its condition from *rigor mortis* to initial autolysis, pH of the filling mass is higher than the samples produced from frozen meat – 5.8. During the first 15 days of the processing the pH of both experimental samples decreases statistically significantly ($P < 0.05$) and varies around levels of 5.1–5.2; then starts increasing and in the final product the values are near to the levels in the control sample 5.8–5.9. A little lower than the rest are pH values in sample No 2.

Conclusion
The blend of natural antioxidants provides evidence of antilipolytic activity and leads to pH reduction probably due to chemical substances obtained from the plant extracts.

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