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THE INFLUENCE OF MICROBIOLOGICAL MODIFIED BLOOD PLASMA ON QUALITY OF THE "POLISH SALAMI" TYPE RAW SAUSAGES

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ABSTRACT

The principal aim of this study was to modify the method of using starter culture in the production of some raw sausages to improve their quality. The sausages ("Polish Salami") were manufactured using significant amount of blood plasma proteins as a substitute for meat protein (up to 20%). Preliminary condensed porcine blood plasma (with protein content of ca 20%), containing 2% of NaCl, 2% of lactose and 1% of glucose was incubated with 5% addition of microbial cultures mixture (Lb.brevis, Lb.casei, Str.lactis, St.cremoris, Candide kefyr) at 28(C for 24 hours. The initial microbiological modification of blood plasma resulted in a better

distribution of high active micro-organisms in whole mass of raw material and, as a result, in improving the sensoric properties of final products. A higher content of volatile low fatty acids (30-60%, depending on the level of blood plasma addition) as result of more intensive fermentation process was observed. No changes of sausages consistency as measured by INSTRON apparatus were found. A very high improvement (statistically significant) was observed in the flavour of sausages. This parameter for sausages with 10% addition of modified plasma reached level above 4.5 in the 5-point hedonic scale. The time of the sausage ripening can be lowered to about 10 days, keeping the desirable sensoric properties of the final product.

Key words: raw sausage, blood plasma, consumer quality

INTRODUCTION

The principal aim of any modification of sausage processing is usually to increase its shelf-life and/or to improve its final consumer quality. Microbial starter cultures are widely used in the process of production of fermented sausages to obtain products demonstrating specific sensoric properties [3, 6]. The preliminary growth of starter microbial mixture in a suspension prepared from fresh blood plasma (one of the important slaughterhouse by-products) makes its utilisation more effective [5].

MATERIALS AND METHODS

Experimental fermented sausages ("Polish salami" type) were produced from lean pork (40%), lean beef (30%), and pork back fat (30%). The addition of modified porcine blood plasma was the source of technological variation. The plasma was preliminary condensed (up to 20% of protein content) and next mixed with NaCl (2%), lactose (2%), and glucose (1%). The obtained mixture was incubated with 5% addition of mixture of microbial cultures (*Lb.brevis*, *Lb.casei*, *Str.lactis*, *Str.cremoris*, *Candide kefyri*) at 28°C for 24 hours. Finally, the modified blood plasma was used as a meat protein substitute at the following levels: 8% (sausage B), 10% (sausage C) and 12% (sausage D). A sausage manufactured without modified blood plasma addition was used as reference one (sausage A).

The samples were collected at 0, 5, 10, 20 and 30 days after stuffing, and analysed for: content of lactic acid by the Dische-Laszlo [4], the total amount of volatile low fatty acids expressed as acetic acid (Halvarson, 1973) and pH-value. Both the consistency of sausages (determined by INSTRON 1140 equipment) and their sensoric acceptance (using 5-point hedonic scale) [1] were also evaluated. The experiment was repeated 3 times using another batch of meat and newly prepared blood plasma.

RESULTS

In general, the use of microbiologically modified blood plasma at the levels between 8 and 12% of addition has no influence on the character of changes of biochemical processes occurring in the examined fermented sausages. However, both the amount of modified plasma added and the time of ripening affected quantitative changes of analysed characteristics.

It was found that the sausages manufactured with the modified blood plasma demonstrated significantly higher content of acid products of fermentation in comparison to the control batch ([Fig.1](#) and [2](#)).

Fig. 1. Changes of lactic acid content in the experimental sausages

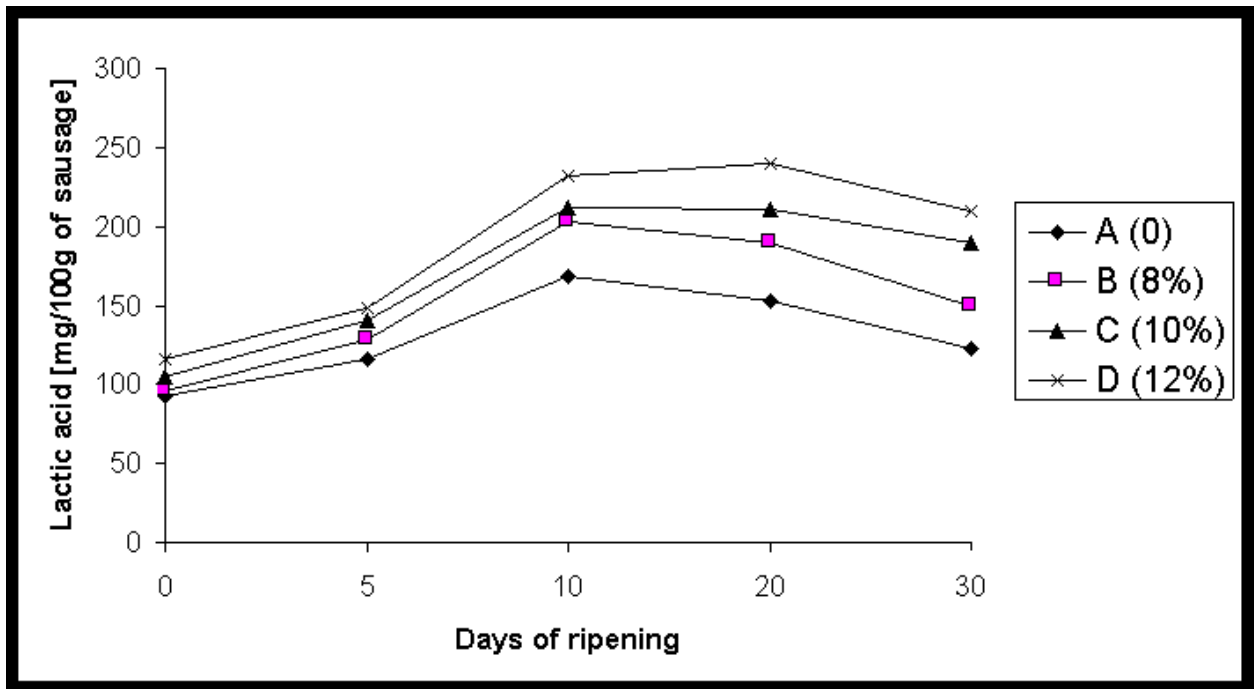
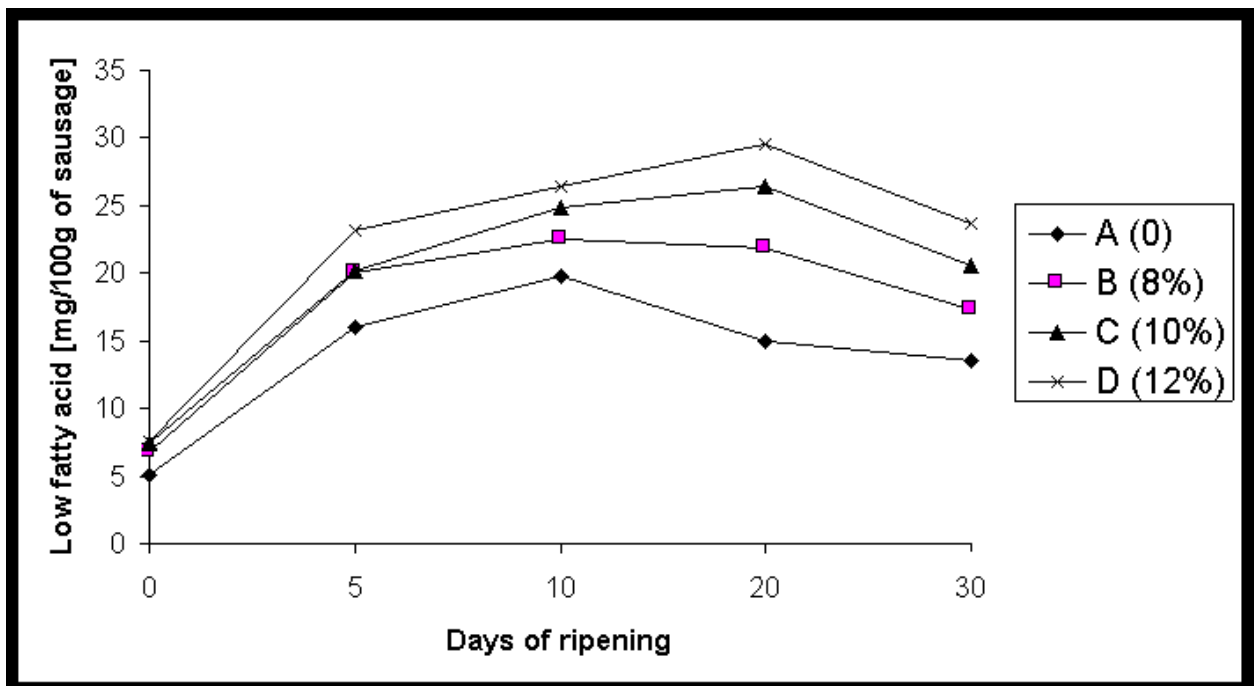


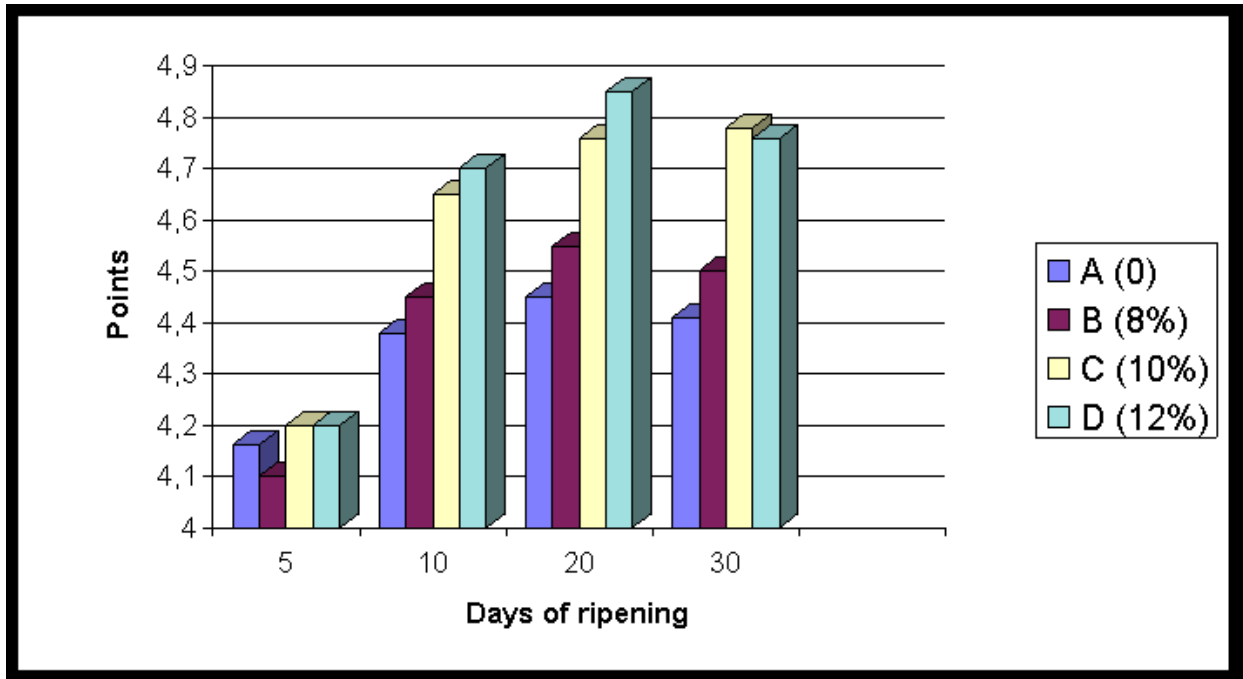
Fig. 2. Changes of volatile low fatty acids content in the experimental sausages



The more intensive fermentation process results in a high accumulation of lactic acid and volatile low fatty acids in sausages B, C and D (due to the amount of modified blood plasma added), particularly, after 10 and 20 days of ripening. However, probably because of the strong buffering effect of the sausage formula, no significant difference in pH development and final pH-value between examined sausages was observed.

The use of microbiologically modified blood plasma also affects the sensory characteristics of the sausages. Following the time of ripening, the overall acceptability of the sausages manufactured with blood plasma (despite of the level of addition) was higher (0.2-0.5 point) than the control batch ([Fig 3](#)).

Fig. 3. Overall sensoric acceptability of the experimental sausages



In particular, the aroma and the taste of experimental sausages were found better and differed from the control ones. Experimental sausages made with the modified blood plasma (at levels 10 to 12%) reached equal or even better sensoric quality than the control samples already after 10 days of ripening. It indicates that time of ripening can be significantly lowered (up to 10-20 days).

On the other hand, no significant difference in the consistency of examined sausages (measured by INSTRON) was determined.

CONCLUSIONS

1. The mixture of different micro-organisms producing lactic acid used as an ingredient of meat formula affected the quality of the fermented sausages.
2. With increasing the amount of blood plasma modified by the use of such microbial culture, more intensive fermentation process is observed. The total content of both lactic acid and volatile low fatty acids in experimental sausages is significantly higher in comparison to the control batch.
3. The overall organoleptic acceptability of fermented sausages manufactured with modified blood plasma addition was higher (up to 0.5 point) in comparison to the control sausages.

4. The most desirable changes in the aroma and taste of sausages were observed. No difference in the consistency of sausages was found.

5. The use of microbial modified blood plasma in the manufacturing fermented sausages offers a possibility for the lowering of the ripening time keeping the desirable sensoric properties of final product.

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