

# QUALITY OF RAW SAUSAGES PRODUCED WITH THE USE OF MICROBIOLOGICAL MODIFIED PORCINE BLOOD PLASMA

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## SUMMARY

The aim of this work was to modify the use of starter culture by production of some raw sausages to improve their quality. The sausages ("Polish Salami") were manufactured using significant amount of blood plasma proteins as substitute of meat protein (up to 20%). Preliminary condensed porcine blood plasma (with protein content of ca 20%) which contained 2% of NaCl, 2% of lactose and 1% of glucose was incubated with 5% addition of culture of microbial mixture (*Lb.brevis*, *Lb.casei*, *Str.lactis*, *St.cremoris*, *Candida kefir*) at 28° C for 24 hours.

The initial microbiological modification of blood plasma allowed better to distribute high active microorganisms in whole mass of raw material and in consequence to improve sensoric properties of the sausages. The higher content of volatile low fatty acids (30 - 60% depending on level of blood plasma addition) as result of more intensive fermentation process was observed. No changes of sausages consistency measured by INSTRON apparatus were found. Very high improvement (statistically significant) was observed for the flavour of the sausages. This parameter for sausages with 10% addition of modified plasma reached level up of 4.5 points in 5 - hedonic scale. The time of the sausage ripening can be lowered from to ca 10 days keeping the desirable sensoric properties.

## 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. By manufacturing of fermented sausages, the use of microbial starter cultures still offers interesting possibilities for such modification (Velic et al. 1988). The increase of animal blood plasma (one of the best slaughterhouse by-products) should be also taken into consideration during these modifications. The preliminary growth of starter microbial mixture in a meat like suspension prepared from fresh blood plasma makes its utilization more effective (Uchman, Pyrcz, 1986)

## Materials and methods

Experimental fermented sausages ("Polish salami" type) were produced from lean pork (40%) and lean beef (30%) and pork backfat (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%) and lactose (2%) and glucose (1%). The obtained mixture was incubated with 5% addition of culture of microbial mixture (*Lb.brevis*, *Lb.casei*, *Str.lactis*, *Str.cremoris*, *Candida kefir*) at 28° C for 24 hours. Finally, the modified blood plasma was used as meat protein substitute at 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, 30 days after stuffing and analysed for: content of lactic acid (by Dische-Laszlo method - Homolka, 1971), total amount of volatile low fatty acids expressed as acetic acid (Halvarson, 1973) and pH-value. Both the consistency of sausages (by INSTRON 1140) and as their

sensoric acceptance (using 5 point hedonic scale) (Barylko-Pikielna, 1975) were also evaluated. The experiment was repeated 3 times using another batch of meat and newly prepared blood plasma.

## Results and Discussion

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

It was found that the sausages manufactured with the modified blood plasma demonstrate significantly higher content of acid products of fermentation in comparison to control batch (Fig. 1 and 2). The more intensive fermentation process results in high accumulation of lactic acid and volatile low fatty acids in sausages B, C and D (due to amount of modified blood plasma added), in 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 affects also the sensory characteristics of the sausages. Follow the time of ripening, the overall acceptability of the sausages manufactured with blood plasma (despite of level of addition) were scored higher (0.2 - 0.5 point) as the control batch (Fig 3). In particularly, the aroma and the taste of experimental sausages were found better and differed from the control one. Experimental sausages made with the modified blood plasma (at levels 10 to 12 %) reached equal or even better sensoric quality than control samples already after 10 days of the ripening. It indicates that time of ripening can be significantly lowered (up to 10 to 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 microorganisms producing lactic acid used as ingredient of meat formula affected the quality of the fermented sausages.
2. With increasing of amount of blood plasma modified by the use of such microbial culture more intensive fermentation process is observed. Total content both of lactic acid and as 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 scored higher (up to 0.5 point) in comparison to the control sausages.
4. The most desirable changes in the aroma and the taste of sausages were observed. No difference in the consistency of sausages was found.
5. The use of microbial modified blood plasma in manufacturing of fermented sausages offers a possibility for the lowering of the ripening time keeping the desirable sensoric properties of final product.

## References

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Figure 1 Changes of lactic acid content in the experimental sausages

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

Figure 3 Overall sensoric acceptability of the experimental sausages