The effect of dry tomato and lingonberry on the color of pork meat formulations

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Introduction: Traditionally, sodium nitrite is used in meat manufacturing to obtain safe products, having typical color, taste, and smell, which are characteristic for cured meats. Safety issues connected with using nitrites are being raised. Visual perception is the first quality trait judged at the moment of purchase and color is considered one of the most important factors of product quality. For that reason, producers concentrate mainly on color, using natural ingredients to keep the product microbiologically safe. However, obtaining the safe, acceptable, and stable color of a meat product using natural ingredients may be challenging. Tomato and lingonberries (Vaccinium vitis-idaea) are red fruits, which can positively influence color of meat products. Lingonberry is a wild fruit containing high amounts of biologically active substances and proved to work as an antimicrobial agent (Klavins et al., 2021). Tomato pomace as a natural source of lycopene has been already effectively used in beef frankfurters and hams (Savadkoohi et al., 2014), however, it has been mentioned, that their redness tended to be more orange than red. There is no information on using lingonberry in meat formulations. This is a preliminary study aiming to compare the effect of tomato and lingonberry powders (separately or combined) on the color of pork meat formulations and color stability during 14-day storage compared to nitrite-cured meat samples.

Materials and methods: The pork meat was obtained from a local retailer and ground using a grinder (3 mm plate; Mado Primus, Germany), dry tomatoes, and dry lingonberries (Vaccinium vitis-idaea) were powdered in a coffee grinder (Bosch). Seven variants were prepared: O - with 1.5 % of NaCl; SP - with 1.5 % of curing salt (99.5 % NaCl; 0.5 % NaNO2); 1P – with 1.5 % of NaCl and 1 % tomato powder; 2P – with 1.5 % of NaCl and 2% tomato powder; 1B – with 1.5 % of NaCl and 1 % lingonberry powder; 2B – with 1.5 % of NaCl and 2 % lingonberry powder; PB – with 1.5 % of NaCl and 1 % tomato powder and 1 % lingonberry powder. The meat was homogenized with all the other ingredients for 3 minutes using Robot Coupe (France). The pH of the batters was measured (Elmetron, Poland). The homogenate was placed in 50 ml plastic tubes and cooked in a water bath (95 °C/30 minutes). The color was measured after cooling the samples to room temperature and then after 7 and 14 days of storage at 4 °C using Konica Minolta 3500 spectrophotometer (Japan). Redness (a*/b*) ratio and saturation [((a*)2+(b*)2)0,5] were calculated.

Results: The addition of tomato or lingonberry decreased the pH of meat batters. The Lightness of cooked meat samples decreased with the addition of both plants. Parameter a* values were the highest in the samples with tomato (P), followed by samples with curing salt (SP). Parameter b* and saturation values were the highest in all the samples with tomato and the lowest in SP. The "redness" calculated as a*/b* ratio was comparable in SP, P, and PB samples. It was higher compared to the other variants. However, the color of samples with tomato was visually orange as noticed by Savadkoohi et al., (2014). "Redness" and a* values decreased during storage in all the samples except for SP, 1P, and 2P, which shows that tomato would be a better additive in terms of maintaining the initial color of meat samples.

Conclusions: Based on the obtained results it can be concluded that lingonberry does not allow to create appropriate redness of meat samples. Meat with tomato was comparable and equally stable as the meat with curing salt. Other than 1:1 proportions of tomato and lingonberry could be used in meat formulations to use the antimicrobial potential of lingonberry and obtain the acceptable color of meat products. Further studies will be conducted in this area.

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References:

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