Nitrite and nitrate levels in meat products labelled as “preservative- free” compared to conventionally cured counterparts

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Objectives: The trend to avoid “chemical additives” as it is described by consumers has led to the creation of a group of products with clean labels. A concern regarding the safety of products containing nitrites and nitrates has appeared (Asioli et al., 2017; Jo, Lee, Yong, Choi, & Jung, 2020). These substances play an important role in the safety and quality attributes of cold meats, but their elimination is not as simple as one could think. The color, taste, and smell are a part of cured meat quality, which is hard to replace with any other substance. Natural additives such as celery or beetroot leave powder are applied (Sebranek & Bacus, 2007). However, the active substance in those additives is still nitrate. Other substances like plant extracts are also added. Some of them contain nitrites or nitrates. One of the main concerns regarding nitrites is the possibility of obtaining cancerogenic nitrosamines in cured products. Nitrosamines may be created at certain conditions: the presence of secondary amines, high temperature, and the presence of residual nitrite. In this regard, the aim of using substances other than nitrites/nitrates is to eliminate the residual nitrite from the product (Jo et al., 2020). Consumers’ health concerns lead them to purchase those preservative-free products, however, the question arises: are they really safe? Or, are they safer than those conventionally cured meats? Therefore, this study aimed to verify the nitrite and nitrate presence in products labeled by producers as “nitrite-free” or “preservative-free” and compare them to their counterparts traditionally cured.

Materials and Methods: The analysis was performed on 12 products available on the market labeled as preservative-free and 10 conventionally preserved meat products in which nitrite was stated as an additive. Nitrite and nitrate content was analyzed based on the Griess method (Zając et al. 2020). Colour parameters (L, a* b*) were tested (Konica Minolta spectrophotometer CM-3500d, Osaka, Japan).

Results and Discussion: Consumers are willing to purchase meat products with no additives or just natural ones. Those products are generally recognized as safer than conventional ones (Hung, de Kok, & Verbeke, 2016). It is difficult to define consumer exact expectations of the “preservative-free” products. One would suspect that there would be no nitrite in the “preservative-free” product or its amounts would be negligible. The results of our study show that not only are the nitrites and nitrates present but in some cas- es, they may be even higher compared to conventionally cured products. Preservative-free products (7 Vienna sausages and 5 hams) and 10 conventional products (5 Vienna sausages and 5 hams) were analyzed. The nitrite amounts were lower in preserva- tive-free Vienna sausages compared to the conventionally cured products of this kind. It was similar in hams. The results were more variable when compared to the nitrate levels of the preservative-free products - it depended on the producer. In some of the analyzed products, the nitrate amounts were negligible but in others, there were considerable amounts of nitrates found. Although nitrates are not as reactive as nitrites and are generally recognized as safer, their presence proves the “preservative-free” labeling confusing. The results indicate a strong variability among the compounds used in the production of “preservative-free” products. Comparing the color parameters of all the products no significant differences were found. Products of the same kind regardless of the additive used were similar in lightness, redness, and yellowness. It must be underlined that the color of each product depends on many basic factors (raw material and other than nitrite additives).

Conclusions: The amounts of nitrites and nitrates in some products labeled as “nitrite-free” or “preservative-free” were lower (or not detected at all) compared to their conventionally cured counterparts. In this regard those products seem to be safer as reduction of the residual nitrite content is one of the factors decreasing the possibility of nitrosamine formation. However, it was proved that the labeling “preservative-free” may be confusing as some of those products did contain some amounts of nitrites and nitrates. Some other information should be suggested to distinguish between those meat products, which do not contain any of those preservatives, and those in which their considerable amounts can be detected.

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