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Influence of carbohydrate additives on 5-hydroxymethylfurfural (HMF) content in pork tenderloin

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Abstract

Heat-processed foodstuffs are a rich source of Maillard reaction products (MRPs) in the daily human diet. Although MRPs favourably affect the colour and flavour of heat-processed foods, they also have an impact on nutritional value and safety. Some MRPs (e.g. 5-hydroxymethylfurfural) may be toxic, mutagenic or carcinogenic and their presence in food has been studied extensively due to possible negative health effects^(1,2). There is a general scarcity of published information on 5-hydroxymethylfurfural (HMF) concentrations in meat products.

This study analysed whether there are differences in the concentrations of HMF between smoked pork tenderloins previously cured with the addition of glucose, saccharose or maltodextrin at concentrations of 0.5, 1.0 or 1.5% (including the control trial without sugar). Material for the tenderloin production consisted of *longissimus dorsi* muscles collected from 20 porcine carcasses. Colour parameters of the external surface (CIE L*a*b* system) and the content of water and 5-hydroxymethylfurfural were determined. The HMF content was analysed with reversed-phase high-performance liquid chromatography (RP-HPLC).

The type of sugar used for curing had a significant impact on the amount of HMF formed in the product. The highest HMF content was found in the tenderloins cured with saccharose (it was about three-fold higher than the control trial and trials with glucose or maltodextrin). The formation of HMF was influenced not only by the type but also by the concentration of carbohydrates. Higher concentrations of glucose and maltodextrin resulted in a slight increase in the HMF content in the product ($P > 0.05$), while a higher concentration of saccharose produced a very pronounced HMF content increase ($P < 0.05$). Furthermore, tenderloins cured with a 2% carbohydrate addition were characterized by a lower water content ($P < 0.01$) and a darker surface colour ($P < 0.01$) compared to tenderloins with a lower carbohydrate addition. The results indicate the clear impact of technological additives on the HMF content of tenderloins. Conducting studies on the HMF in meat products is fully justified due to the relatively high HMF contents observed in the experiment (approximately 20–23 mg/kg), which were comparable to products such as bread or fruit jams.

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Conflict of Interest

there is no conflict of interest

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