Preliminary assessment of Feruloylated arabinoxylans as functional ingredients on physicochemical properties of Frankfurt sausages

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Introduction: The meat industry uses gelling agents in the production of sausages and hams to improve texture, increase viscosity and moisture retention, and reduce costs [1,2]. Feruloylated arabinoxylans (FAX) are non-starch polysaccharides generated as a byproduct during maize flour production [1]. FAX have similar functional and technological properties to analog compounds such as carrageenan and gums which are widely used as food ingredients. Also, FAX have nutraceutical properties that may help to prevent chronic diseases [3]. FAX form covalent gels resistant to changes in pH, temperature, and ionic strength, and have a neutral odor and taste [3]. Therefore, in muscle-based products they could be potentially used to enhance functionality and technological qualities instead of other analogs (xanthan, carrageenan, guar, among others) [1,2]. However, there is not enough information to support that FAX is an alternative for the development of emulsified functional products. For the above reasons, the objective of this research (still in progress) was to gain a better insight into changes of physicochemical characteristics of Frankfurt sausages during chilled storage with as affected by the addition of FAX.

Materials and methods: The carrageenan (CAR) was acquired from a local supplier, whilst FAXs was procured from the Biopolymers Laboratory (CIAD, A.C.). The experiment consisted of the following treatments: control (CN), CAR 1% (T1), FAXs 1% (T2). Two replications of the experiment were conducted at separate times with 25 sausages per replication. All samples were analyzed for proximate chemical composition [4] and stored (4 °C, 9 days). At the end of the storage period the pH was measured using a potentiometer [5]. The water holding capacity (WHC) was determined by weight difference after applying a centrifuge force. Instrumental color was measured based on the CIE (L*, a*, and b*) system [6]. Texture Profile Analysis (TPA) was evaluated with a Texture Analyzer [7]. Analysis of variance and the Tukey-Kramer test were performed to detect differences ($p<0.05$) between treatments using the statistical software NCSSv11.

Results: With respect to the CN, T1 and T2 sausages showed higher values for moisture and ash, as well as lower fat and protein contents ($p<0.05$), with no differences in carbohydrates content ($p>0.05$). In general, pH and WHC values decreased significantly ($p<0.05$) over the storage time, without differences between treatments at day 9 ($p>0.05$). Color was affected by the treatment x storage interaction, and at day 9 T2 showed the lowest ($p<0.05$) values of a*; without differences in L* and b* among treatments ($p>0.05$). TPA indicate that hardness (ca. 1.7 kg) values were not affected by the treatment x storage time ($p>0.05$). Adhesiveness and cohesiveness were affected by treatments. At day 9 T2 exhibited the lowest ($p<0.05$) values for adhesiveness and cohesiveness (-1.4 g.s. and 0.7, respectively). Gumminess and chewiness did not differ among treatments ($p>0.05$); T2 trended to show the lowest values for these textural properties (11.8 and 9.13 kg, respectively). The high moisture and ash content in T2 suggest the presence of a polysaccharide-salt complex. The T2 L* values are similar to those found with the addition of fructo-oligosaccharides [8]; while a* values were relatively lower, and b* values were somewhat higher, as compared to sausages treated with inulin and pectin, respectively [9]. These differences are possibly due to the lower fat content, and the incorporation of dietary fiber. According to the TPA, the inclusion of FAX in emulsified sausages results in a softer product. It is known that electrostatic interactions between proteins and polysaccharides, facilitates the formation of gels with better technological properties [1,8,9].

Conclusions: The present results support the potential usage of FAXs as a functional additive for sausages and other processed meat products.

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