UTILIZING PORK COLLAGEN PROTEIN IN EMULSIFIED AND WHOLE MUSCLE MEAT PRODUCTS

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Background

Collagen plays a major role in the texture of meat and meat products. The influence of collagen on meat product quality depends on the degree of comminution and extent of gelatinization during cooking (WHITING, 1989). Collagen also contributes to the nutritional value, flavor and succulence of meats. Collagen from various sources has been used as in ingredient to improve water and fat retention in meat products (WEBSTER et al., 1982, JOBLING, 1984). The source of collagen, its physical form and the amount of heat stable cross-links might also influence the amount of collagen that can be used in a comminuted meat product. Although collagen does not dissolve in the meat batter, the collagenous product along with soluble myosin coat the fat particles during comminution resulting in a more viscous and stable emulsion (WHITING, 1989). At low levels, collagen is effective in stabilizing shrinkage and manipulating texture in meat products. Added collagen generally increases the firmness and perhaps the juiciness of frankfurters (JONES, 1984).

Objectives

The objectives of this study were to evaluate the water-binding, purge reducing and sensory properties of pork collagen when used in emulsified and whole muscle meat products.

Methods

Frankfurter manufacture

Eight treatments were formulated as shown in Table 1. The pork 80's along with the pork collagen were chopped in a bowl chopper with salt, sodium nitrite, sodium erythorbate and sodium tripolyphosphate to 4.4C. Then the mechanically deboned chicken, the rest of the pork and the other ingredients were added and chopped until the batter reached 12.7C, stuffed and smoked to an internal temperature of 70C. The frankfurters were chilled, hand-peeled and vacuum-packaged. The experiment was replicated four times.

Ham manufacture

Four treatments were formulated as shown in Table 4. Brines for each treatment were prepared by dissolving phosphate, salt, sodium erythorbate and sodium nitrite and pork collagen in water. The brine was added to the ham in a vacuum tumbler and tumbled continuously for 4 h. After refrigeration overnight, the hams were stuffed into a fibrous casing, thermally processed to an internal temperature of 68C. The cooked product was chilled and sliced into 5-mm-thick slices and vacuum-sealed.

Results and Discussion

Cooked and chilled yields

The cooked and chilled yields for the frankfurters for all treatments are shown in Table 2. There was no significant difference in cooked or chilled yield (P>0.05) between the control and the treatment containing the pork collagen at 0.5%. However, addition of pork collagen at 1% and above caused significantly higher cooked and chilled yields (P<0.05) compared to the control or the treatment containing the 0.5% pork collagen. In the ham, there were no significant differences in cooked or chilled yield (P>0.05) between the control and all the treatments containing the pork collagen (data not shown).

Purge

Use of pork collagen at 1.5% and above significantly (P<0.01) reduced purge in frankfurters compared to the control after 4 weeks of refrigerated storage (Table 3). After 8 weeks of refrigerated storage, a similar trend was seen where the pork collagen used at 1.5% and above, significantly reduced purge (P<0.01). In the ham, purge was significantly lower (P<0.05) after 4 weeks of refrigerated storage for treatments containing 2% and 3% pork collagen treatments compared to the control and 1% pork collagen treatments. After 8 weeks of refrigerated storage, all treatments containing the pork collagen had a significantly (P<0.05) lower purge compared to the control (Table 5).

Instrumental texture analysis

There was no significant difference (P>0.05) in texture measurements for all frankfurter treatments evaluated although there was an increase in Peak Load values as the level of pork collagen increased (data not shown). Similarly, there was no significant difference (P>0.05) in texture measurements of all ham treatments evaluated (data not shown).

Sensory evaluation

In frankfurters, when pork collagen was used at the 3.5% or the 2.5% level and compared to the control in a triangle test, 21 of the 30 panelists were able to pick the odd sample correctly in both cases (P<0.05). However, when pork collagen was used at 2%, and compared to the control in a triangle test only 13 of the 30 panelists were able to pick the odd sample (P>0.05). In the sensory evaluation of the ham, only 11 of the 30 panelists were able to pick the odd sample correctly (P>0.05) at the 1% usage level of pork collagen and only 15 of the 30 panelists were able to pick the odd sample correctly (P>0.05) at the 2% usage level of pork collagen.

Conclusions

- Pork collagen significantly improved cooked and chilled yields in emulsified products at a usage level of 1% and above.
- Pork collagen effectively controlled purge in emulsified products such as frankfurters and whole muscle products such as hams after both 4 and 8 weeks of refrigerated storage.
- No significant differences in texture was observed in emulsified or whole muscle products.
- Addition of pork collagen did not significantly affect the color measurements on the surface of the frankfurters or the hams although a slight increase in b values was observed in the internal measurements of the frankfurters as the level of pork collagen increased above 2%.