2016 Reciprocal Meat Conference – Meat and Poultry Processing, Ingredient Technology and Packaging

Meat and Muscle Biology™

Effects of the Addition of Frozen Mechanically Separated Pork on Functional Properties and Lipid Oxidation of Emulsion Type Pork Sausage

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Keywords: functional properties, Lipid oxidation, meat products, mechanically separated pork
Meat and Muscle Biology 1(2):20 **doi:10.221751/rmc2016.019**

Objectives

Mechanically separated meats (MSM) allow the recovery of valuable protein during carcass fabrication and are used throughout the world due to their low cost. MSM are generally shipped under frozen conditions and are used in processing of various meat products. It is not unusual to have MS meats available long after production, but how does the quality change with length of frozen storage and how does that affect functionality? Therefore, the objective of the present study was to investigate functional properties of emulsion type meat product added with various levels of frozen MS pork (MSP; 5- and 8-months post production).

Materials and Methods

The MSP (22.5% fat, 14.3% protein) was obtained through commercial channels, subdivided and randomly assigned to two frozen storage (–20°C) periods (5- and 8-mo). After each frozen storage interval, the MSP meats were thawed at 1°C for 48 h, and coarsely ground. The control sausage formulation consisted of fresh boneless pork shoulder (regular pork), 26 to 28% water, 3% salt, 0.3% sodium tripolyphosphate with ~10.5% fat and 12.5% protein content. MSP was substituted for the fresh pork (1:1). Four treatments (3.7 kg/treatment) of emulsion type sausage were produced with four addition levels of frozen MSP [0 (control), 5 (MSP-5), 10 (MSP-10), and 15% (MSP-15)]. The meats were chopped and emulsified with ingredients using a silent cutter and emulsion mill, respectively. Batters were stuffed in casings and then cooked in a water bath to a final internal temperature of 71°C. Meat batters were assessed for protein solubility, water holding capacity, viscosity and lipid oxidation (TBARS). The functional properties of cooked sausage such as texture profile analysis, shear stress and strain at failure and TBARS were also evaluated. Lipid oxidation of regular pork and MSP were also determined. The data were analyzed using the General Linear Model (GLM) procedure of the SAS statistical package. Differences in means between treatments were determined using Duncan's multiple range tests ($P < 0.05$).

Results

The MSP had higher ($P < 0.05$) lipid oxidation compared to regular pork. In general, with an increase in addition levels of frozen MSP, the cook loss, expressible moisture and lipid oxidation increased and viscosity and hardness were decreased ($P < 0.05$). However, 5 and 10% of frozen MSP addition did not influence WHC (cook loss, expressible moisture and drip loss) and protein solubility (total soluble and sarcoplasmic protein) compared to the control sausage. Extended freezing storage periods of MSP generally lead to deterioration in WHC, lipid oxidation and instrumental hardness, while viscosity and shear stress and strain at failure were not affected by freezing storage periods of MSP.

Conclusion

The results suggested that substitution of 5% frozen MSP could contribute similar functional properties compared to the control formulation. In general, sausages with up to 10% addition level of frozen MSP had similar WHC and torsional shear as the control. Functionality of frozen MSP continues to decline during frozen storage, with noticeable differences in sausage properties due to a 3 mo difference in frozen storage time (8 mo vs 5).

