PRO1411: Enhancing Vuality and ±alue of a eat Lngredients for Curther trocessing

Use of mechanically separated meats (MSM) and finely textured meats (FTM) allows the industry to recover valuable edible protein from the surface of poultry and pork bones, as the resulting meat material contains 10-15% protein. However, there are several drawbacks to using MSM and FTM in further processing: its high susceptibility to oxidation limiting its storage stability and its fine texture makes it suitable only for finely minced sausages. The study found that MS and FT pork had reduced ability to form a strong gel on heating, which also limits its utilization and decreases its value. The techno-functional and chemical properties of these meats contribute greatly to final product quality and consumer acceptance, so maintaining or improving the quality of these meat ingredients is critical.

Emphasis in this project was how to: firstly, understand variability of the meat ingredients and secondly to slow or stop oxidation in these meats by utilizing the antioxidant activity of infrared heated lentil flour and thirdly, to better understand MS meat gelation properties. Lentils represent a major crop in Canada and proving its antioxidant capability (in addition to its utility as a protein, starch, and fibre source) in a range of meat systems will widen and strengthen its local and international markets, specifically to that of the meat processing sector.

Characterization of the oxidative status and composition of mechanically recovered meat ingredients, including mechanically separated chicken, mechanically separated pork and finely textured pork was completed and samples retested at several frozen storage intervals (up to 14 months). Evidence of protein degradation immediately after the mechanical separation process for pork bones was noted. Evaluations of functional quality of these meats in meat model systems (emulsion/bologna type and as meat balls) was completed. Substitution of chicken meat in an emulsion-type sausage with 100% mechanically separated chicken was possible, while the degree of substitution of pork with mechanically separated pork or finely textured pork was in the order of 5 to 10% of the formulation. As frozen storage time of the raw meat materials increased, textural properties and oxidative quality of the emulsion products were compromised. Generally, MS meats under standard frozen storage showed good oxidative stability for at least six months, but quality markedly dropped after one year.

Lentil flour was useful as a binder and antioxidant in fully cooked MS chicken-based sausages and meat balls with similar textural and water holding properties to those made with isolated soy protein and modified corn starch. Lentil flour based formulations had improved oxidative stability and would appeal to consumers looking for non-genetically modified and gluten free ingredients.

Lentil seed coat was finely ground and extracts made with food-grade solvents. Their antioxidant activity was evaluated in raw and cooked mechanically separated chicken and after fresh and frozen storage. Lentil seed coat extracts exhibited significant antioxidant activity against lipid oxidation in cooked MS chicken stored at 4°C and -18°C with the antioxidant activity comparable to that exhibited by several commercial antioxidants. However, no beneficial effect on raw meat colour stability was noted, likely due to their lower myoglobin content than beef.

An attempt was made to replace the colour and antioxidant functions of sodium nitrite in a bologna system by adding beet powder and lentil flour, however, this approach was only moderately successful with the natural antioxidant activity of the lentil flour insufficient to completely replace the antioxidant function of sodium nitrite in cured meat products. Further work is also needed on stabilizing the colour imparted by the beet powder.

Overall, knowledge gained on the biochemical properties of MS pork may lead to improved quality and increased value for lentil ingredients. In addition, further proof of the useful role of infrared heated lentil flour and of lentil seed coat extracts on delaying oxidation of cooked meats under both fresh and frozen storage was shown.