Austin Journal of Nutrition & Metabolism

Austin Publishing Group

Open Access Full Text Article

Editorial

Improvement of Food Quality and Safety Using New Processing and Intervention Techniques

Ike Kang*

Michigan State University, USA

***Corresponding author:** Ike Kang, Michigan State University, USA

Received: August 15, 2014; **Accepted:** August 18, 2014; **Published:** August 20, 2014

Dr. Ike Kang' research interests focus on the improvement of food quality and safety. Currently, he works toward two research topics: 1) sodium reduction in processed meats, and 2) prevention of food-borne pathogens in animal carcasses. His long-term research interests have two main foci: 1) basic research aiming at development of innovative meat processing technique for product quality and safety improvement, and 2) applied studies for improvement of processing efficacy and generation of value-added products.

Sodium Reduction on Processed Meats using a New Processing Technology

Issue

Processed meats have received negative publicity due to their typically high sodium content, which have been linked to adverse effects on human health. In conventional processing of ground or emulsified meats, high amounts of salt (2– 4%) are traditionally added. Sodium, consumed above the recommended level (2.3 grams/day for the general U.S. population), is associated with greater risk for hypertension, heart disease, strokes, and kidney failure. To address the issues, meat processors are challenged to reduce the levels of sodium in their products. In doing this, they are faced with many technological and quality issues because salt (Na Cl) is not only contributing flavor but also playing a major role in enhancing protein functionality and shelf life. Therefore, reducing the ingredient, while maintaining desired product quality, is a significant technical problem.

Research

To recue sodium content on processed meats, our current research has focused on utilization of cold-batter (meat paste) mixing, an emerging technology that has the potential for salt reduction in processed meats while maintaining desirable sensory characteristics. Mixing meat proteins for an extended period, at or near freezing temperature, may cause the proteins to unfold in a manner that would improve protein binding functionality and texture firmness. It is postulated that internal hydrophobic protein residues are subtly twisted outward and exposed to the surface during cold-mixing, thereby improving gel-forming ability. Based on this possibility, our research plan is to conduct fundamental research to elucidate the underlying structural, functional, and organoleptic changes, or the interactions between chemical and physical factors (e.g., shear power intensity or shear rate) during the mixing. Three step-wise approach in our research will be: 1) utilizing pre-rigor muscle for relaxed and opened structure (quality raw meat); 2) preventing natural disappearance of the pre-rigor conditions (by pre-salting and/or curst-freezing); and 3) applying cold-mixing technology for protein functionality and sensory improvement (by structural modification).

Impact

A study showed that reduced intake of salt to 6 g per day in the Norwegian population led to a drop in systolic blood pressure by 2 mm Hg and reduced health care costs by 4.7 million dollars annually. Additional study conducted in Canada showed that reduction of salt intake to 4.6 g daily can save approximately 430 million dollars annually in treatment costs, visits to doctors and laboratory testing for the causes of hypertension. Through this study, the effect of cold-mixing on protein structure alternation and molecular interactions will be better understood. This novel technology can also be more readily applied to production of a wide range of low sodium meat products. Moreover, coupling the use of pre-rigor meat (opened structure) instead of the conventional post-rigor meat (closed structure) with cold-batter mixing would further improve the protein functionality, process efficacy, and product quality. Thus, implementation of the results of this project will have a significant positive national public health impact as a result of reduced sodium consumption.

Pathogen Reduction on Poultry Carcass during Post-harvest Processing

Issue

For more than 20 years, the incidence of poultry-borne salmonellosis has remained relatively unchanged despite the introduction of various intervention strategies on farms and at processing plants. One of consumer reports in 2013 indicated that about 90% of ground turkey sold at retail contained at least one disease-causing organism including *Salmonella*. The Centers for Disease Control and Prevention (CDC) also stated that salmonellosis was the most common infection in 10 U.S. sites. Concerning the on-going issue, we hypothesis two potential factors: 1) Sampling method - current industrial methods may falsely indicate the absence of *Salmonella* when the pathogen is still present because whole carcass rinsing or skin swabbing favors the recovery of loosely as opposed to tightly-attached microorganisms. 2) Intervention strategy - current industrial intervention strategies (chemical dip or physical spray) may be less capable of reducing internalized as opposed to surface organisms. Because of those issues, the overall goal of this research is to explore if the continuous outbreaks of salmonellosis is due to inappropriate sampling method or insufficient intervention strategy, or both.

Research

Based on the hypothesis above, our research projects have

Citation: Kang I. Improvement of Food Quality and Safety Using New Processing and Intervention Techniques. Austin J Nutr Metab. 2014;1(1): 2.

initially focused on an accurate detection of loosely-attached and tightly-attached bacteria on poultry skin. For loosely-attached bacteria, samples were stomached while the stomached-sample was then subjected to grinding for tightly-attached bacteria. Secondly, we assessed individual and combined effects of physical/chemical interventions during processing, especially for the elimination of tightly-attached bacteria. Broiler skin samples were taken at three major processing steps: 1) before scalding, 2) before chilling, and 3) after chilling. Thirdly, we visualized bacterial populations on smooth and ridge areas on skin before/after application of antibacterial agents. Fourthly, we assessed for the best sampling and intervention methods based on initial elimination of pathogen and minimal recovery after processing. It is essential to use an accurate detection method to precisely assess the bacterial populations on carcasses regardless of intervention methods. It is also important to insure no bacterial recovery after processing to extend product shelf-life. Given positive results, the technology of this research can be implemented to not only poultry products but also red-meat carcasses.

Impact

Poultry, carrying millions of bacteria internally and externally, is an excellent vehicle for food borne pathogens. The USDA's Economic Research Service (ERS) estimated that *Salmonella* infections from all sources cost about $2.65 billion per year based on the CDC's estimate of almost 1.4 million *Salmonella* cases annually. Considering *Salmonella*-mediated food borne illness as a continuous and serious problem, reduction of the pathogen on poultry meat is urgently required.

Austin J Nutr Metab - Volume 1 Issue 1 - 2014
Submit your Manuscript | www.austinpublishinggroup.com

Citation: Kang I. Improvement of Food Quality and Safety Using New Processing and Intervention Techniques. Austin J Nutr Metab. 2014;1(1): 2.