

PORK SAFETY

Title: Improving the Safety of Pork Products (Hams, Bacon and Frankfurters) Processed to Simulate Traditionally Cured Pork but Without Addition Of Nitrite or Nitrate. – **NPB #06-008**

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Scientific Abstract.

The rapid growth in consumer demand for natural and organic foods has resulted in a proliferation of processed pork products that are marketed as natural and organic. However, in the case of cured pork products like hams, bacon and frankfurters, the traditional curing agents, nitrite and nitrate, are not permitted in natural and organic products because the regulations for natural and organic products do not permit the use of “preservatives”. Because these products cannot be produced with typical cured meat properties without nitrite or nitrate, the industry has developed a new approach that utilizes vegetable juice powder as a natural source of nitrate which is then used to provide the typical cure. However, this approach results in significantly less nitrite in the products. It has been suggested that these products represent a greater risk of bacterial pathogens and will require additional antimicrobial measures to provide consumers with the degree of safety that is expected of these products. Therefore this project was proposed to determine the relative risk of bacterial pathogens in natural and organic “cured” pork products and to suggest means of assuring safety of these products.

Our study first involved collection of commercially available natural and organic hams, bacons and frankfurters to compare the chemical properties of these products to conventionally cured commercial products of the same type. Traditionally cured commercial products were included as controls for the comparison. All of the products were first analyzed for nitrite, cured pigment content, salt concentration and available water. After chemical analyses were complete, another set of samples of each of the commercial products were collected and each was separately inoculated with bacterial pathogens (*Listeria monocytogenes* and *Clostridium perfringens*) to assess the potential risk of pathogen growth. Following the inoculations, additional antimicrobial treatments that might be used to provide for improved safety were investigated and evaluated for effectiveness. The results showed that the most significant chemical difference between the natural and organic products and the controls was for residual nitrite with the controls containing a higher concentration in most cases, as expected. The inoculation challenge resulted in faster growth by both pathogens on almost all of the natural and organic products, confirming our hypothesis that these products represent a greater safety risk. A screening of a variety of natural antimicrobial ingredients suggested two commercially available products with significant potential for safety improvement. One is a combination of acetic acid from naturally fermented vinegar combined with lactate, the other is natural vinegar with lemon powder (citric acid). For the final phase of this project, these ingredients were incorporated into naturally cured products manufactured in the ISU Meat Laboratory and challenged with inoculations of the two pathogens used earlier. Both antimicrobial treatments showed a level of inhibition of the pathogens that was comparable to that achieved by traditionally cured products for control of *L. monocytogenes* and improved control of *Cl. perfringens*. Therefore, use of natural blends of acetic acid (vinegar) and lactate or acetic acid (vinegar) and citric acid (lemon powder) offer the meat industry a means by which the safety of natural and organic processed pork products can be improved to a level that appears to be equivalent to that of conventionally cured products.

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