

2017 Reciprocal Meat Conference – Meat and Poultry Processing, Ingredient Technology and Packaging

Meat and Muscle Biology™



Effect of Potassium Sorbate Addition on Germination and Outgrowth of Clostridium Sporogenes Pa 3679 Spores in Low Cost Bologna Type Sausage During Ambient Temperature Storage

S. E. Yotsuyanagi¹, M. M. H. Haguiwara², M. D. S. Nascimento¹, M. G. Marquezini², M. G. Sidone¹, and A. L. D. S. C. Lemos^{2*}

¹FEA, UNICAMP; ²CTC- Centro de Tecnologia de Carnes, ITAL- Instituto de Tecnologia de Alimentos, Campinas, Brazil

Keywords: bologna, clostridium sporogenes pa3679, residual nitrite, sorbate
Meat and Muscle Biology 1(3):53

doi:10.221751/rmc2017.049

Objectives

Low cost Bologna type product reaches high production volumes in Brazil and is marketed at ambient temperature. Previous studies including challenge test with Clostridium sporogenes PA 3679 indicated that water activity (aw) up to 0.96 prevented spores germination. The objective of this study was to evaluate the efficacy of potassium sorbate addition (0.25%) on limiting germination of Clostridium sporogenes PA 3679 in low cost Bologna type product formulated with aw 0.96 and 0.965 during 90 d storage at 27°C.

Materials and Methods

The experiment comprised 4 treatments formulated with mechanically deboned chicken meat (60%), edible offal (2%), pork skin (8%), 80/20 pork trimmings (15%), water (4%), texturized soy protein (3.5%), tapioca starch (5%), 150ppm ingoing sodium nitrite, 500ppm sodium isoascorbate, 0.15% sodium acid pyrophosphate and 0.35% sodium tripolyphosphate. The amount of sodium chloride varied to achieve the desired aw (0.96 and 0.965). Potassium sorbate was added at 0.25% in the final product. Raw material was comminuted in a bowl chopper. The raw batter was vacuum stuffed in 60mm PVDC impermeable casing. The samples were cooked in a cooking chamber with direct steam until 75°C was reached in the center of the product. Cooling was performed in running tap water until 27°C and the samples were kept in a chamber at 27°C ($\pm 2^\circ\text{C}$) during 90 d. Lactic acid bacteria, Enterobacteriaceae, mesophilic aerobic, sulphite-reducing clostridia (spores and vegetative cells) counts, residual nitrite and pH value were evaluated in 3 samples of each

treatment 24h after processing and at 15, 30, 60, and 90 d. Data (log CFU/g, residual sodium nitrite and pH value) were analyzed using GLM model procedure of SAS (SAS Inst. Inc., Cary, NC) as a 2 aw (0.96, 0.965) X 2 potassium sorbate amounts (0, 0.25%) X 5 storage time (0, 15, 30, 60, 90) factorial design with repeated measurements. Interactions and main effects were considered significant at $p < 0.05$. Least square means for significant effects ($p < 0.05$) were separated by Tukey's test.

Results

Lactic acid bacteria and Enterobacteriaceae counts were below 1 Log CFU/g during shelf life for all treatments. There was a significant effect ($p < 0.05$) of the interaction aw X sorbate X storage on mesophilic aerobic and sulphite-reducing counts (spores and total) and residual nitrite concentration. It was observed that sorbate addition prevented mesophilic aerobes growth and sulphite-reducing clostridia spores germination during 90 d storage at aw 0.96 and during 60 d at aw 0.965. Regarding residual nitrite, the addition of potassium sorbate decreased nitrite depletion at both water activities until 30 d and marked difference has been perceived at 0.965.

Conclusion

Addition of potassium sorbate may enhance microbial stability of this type of emulsified product and prevent spores germination during storage at ambient temperature. The amount of sodium in the product due to its high amount of sodium chloride required to reach 0.95 may be reviewed especially after other experiments including other shelf life enhancers such as sodium or potassium lactate which are effective at inhibiting different microorganisms.