Predicting the effect of salt on heat tolerance of Listeria monocytogenes in meat and fish products

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89: PREDICTING THE EFFECT OF SALT ON HEAT TOLERANCE OF *LISTERIA MONOCYTOGENES* IN MEAT AND FISH PRODUCTS

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Introduction: *Listeria monocytogenes* **is a potentially fatal foodborne pathogen that can be found in various food products, including meats. It can tolerate adverse conditions such as high salt concentrations, thus, the elimination of the organism is difficult in food processing. This study was conducted to enable prediction of the effect of salt on heat tolerance of** *L. monocytogenes* **in food.**

Methodology: The experimental work involved minced pork, chicken and salmon samples with different water phase salt (WPS) concentrations from 0 to 5.6 % inoculated with late-stationary phase *L. monocytogenes* **cultures from three strains associated with fish, meat and industrial environment, respectively. Samples were vacuum-packed in sterile bags, immersed in water bath, and held at different constant temperatures from 57 to 65 °C. Heat tolerance was defined as the time to achieve 3 decimal reductions,** *i.e.* **3D-values, by using both log-linear and non-linear-regression models. Subsequently, development of a secondary predictive model describing the combined effect of temperature and salt on heat tolerance of** *L. monocytogenes* **was carried out. The mathematical structure of the model was adopted from previous studies. Three different approaches, denoted i) Log-linear, ii) GInaFiT and iii) F-test, were applied for selection of the 3D-values to be included as response in the development of the model followed by a validation process of the most accurate of those three approaches.**

Results: The study showed that the most heat tolerant strain was the one from industrial environment. Heat tolerance increased with up to 3-fold for 3 % WPS and up to 5-fold for 5.6 % WPS depending on *L. monocytogenes* **strain and heating temperature.**

Conclusion and Relevance: The F-test approach provided the best model by estimating model parameters with the lowest RSS = 0.257. Validation was executed by including independent log3D-values from nine different studies. The bias factor and accuracy factors were used for evaluating model performance. Bf =1.22 and Af =1.33 implied that the model was acceptable with room for improvement. The model obtained from this study enables food processors to design proper thermal processes to eliminate *L. monocytogenes* **in meat and fish products to ensure safety and prevent foodborne listeriosis.**

Keywords: Food safety; heat treatment; meat; fish; salt

92: SURVIVAL OF *SALMONELLA ENTERICA* SER. ENTERITIDIS IN STRAWBERRIES DURING STORAGE AT DIFFERENT TEMPERATURES

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Introduction: Strawberries can be susceptible to microbial contamination after harvesting by enteric pathogens such as *Salmonella* **spp., being an emerging risk for public health. As strawberries can be stored at a wide temperature range, the risk of** *Salmonella* **survival in contaminated fruits is not negligible. In this study, the survival kinetics of** *Salmonella* **was studied during storage at different temperatures. Predictive models were fitted to observed data to estimate the inactivation rates at the studied conditions.**

Methodology: *Salmonella enterica* **ser. Enteritidis strain was spot inoculated on fresh strawberries considering an initial concentration of 4 log CFU/g. Temperature of storage and relative humidity were considered as external variables. After drying for 1h in a flow cabinet, strawberries (50 g/sample) were stored aerobically in plastic containers at 20°C, 7°C y 4°C until the end of the shelf-life. Survival kinetics was modelled through Weibull, and log-linear inactivation models included in the Bionactivation package in R. Univariate analysis ANOVA was carried out for temperature to evaluate the effect of different external variables on the inhibition of** *S.* **Enteritidis with a Tukey post-hoc test ($p<0.05$).**

Results: The microbial population of *S.* **Enteritidis declined at 20°C until 72 h where** spoilage of strawberries caused by moulds' growth were **observed. At refrigeration temperatures, a reduction of approx. 2 log CFU/g was observed at the 8th day of storage. No significant differences were observed in pH values, with a mean of 3.7 ($p>0.05$). Weibull and log linear models presented a good adjustment to observed data, most them having R^2 values >0.9 (MSE <0.50). Storage of strawberries at ambient temperature produced an increased survival of S. enterica since significant differences were obtained for the inactivation rates ($p<0.05$) in comparison to the studied refrigeration temperatures.**

Conclusion and Relevance: It is concluded that temperature control used as a single factor cannot guarantee *Salmonella* **inhibition in contaminated strawberries. Additional preventive measures at primary, transformation, distribution and consumption steps should be implemented to eradicate pathogenic contamination in strawberries. This study could be applied by food processors and risk managers to set harmonized temperature and time conditions along the strawberries processing chain.**

Keywords: Strawberries; *Salmonella*; **temperature; fruit**