RESEARCH ABSTRACT

PORK SAFETY

Title: Effects of pH, temperature, sodium chloride, sodium nitrite and sodium tripolyphosphate on the fate of *Arcobacter* – **NPB #98-157**

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Abstract

Arcobacter spp. are considered to be emerging pathogens with potential food safety implications involving raw foods, including pork and poultry products. Prior to this project, little was known concerning environmental factors suitable for growth of the primary pathogen of the genus, *Arcobacter butzleri*, on foods. In this project, the growth characteristics of *A. butzleri,* were studied under various multiple stress conditions in order to develop a means of predicting their growth in environmental and food product situations utilizing these stress conditions. The effect of combinations of temperature, initial pH, sodium chloride (%), sodium nitrite (µg/ml) and sodium tripolyphosphate (%) levels on *A. butzleri* were studied. Growth data generated were fitted to the modified Gompertz function and the Gompertz parameters A, C, M & B were calculated for each treatment combination. Derived growth kinetics: LPD (lag phase duration), GT (generation time), EGR (exponential growth rate) and MPD (maximum population density) values were then calculated for each stress combination.

It was determined that the *A. butzleri* studied are highly sensitive to low levels of sodium tripolyphosphate (STPP) and do not grow or survive at STPP levels above 0.016% and 0.02% respectively. MPDs achieved were largely independent of environmental conditions, and ranged from 8.8-9.2 $\log_{10}$ CFU/ml. When temperature and pH were the two interacting factors, temperature was found to exert a primary influence on LPDs and GTs, with the temperature of 19□C showing the highest values for these variables. Within each temperature, an initial pH of 6.45 was found to have the longest LPD. STPP levels were found to play an important role in extending LPD values, in comparison with sodium nitrite or sodium chloride levels. Some interaction effects were noted between the five variables studied. The data obtained from the curve fitting analysis was used to identify mathematical relationships to predict the growth responses of *A. butzleri* to these environmental stresses.

Studies were then carried out to validate the data obtained from the broth studies into growth responses for *A. butzleri* in raw ground pork. Our studies indicate that the *A. butzleri* strains studied do not grow in raw ground pork under the variable conditions considered in the validation experiments. Thus, since the organism may survive, but does not increase in numbers under these variable conditions, the primary purpose of the microbiological safety study i.e., to ensure the safety of the food product is fulfilled.