

## Development of the Model to Predict the Growth of *Salmonella amsterdam* and *Salmonella bangkok* in Stirred Fried Rice with Crab Meat

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### ABSTRACT

*Central Composite Design (CCD) was used to study the main factors (temperature, pH, salt concentration, initial inoculum and incubation time) affecting Salmonella enteritidis growth in stirred fried rice with crab meat (Khao Pad Pu). The result obtained from the CCD fitting by a second-order model, using a quadratic polynomial equation, was as follow:*

$$Y = 37.024 - 0.005 \text{ INOC} + 7.7 \times 10^{-7} \text{ INOC}^2 + 0.001 \text{ INOC} \cdot \text{pH} + 3.5 \times 10^{-4} \text{ INOC} \cdot \text{Time} + 3.131 \text{ NaCl} + 7.713 \text{ NaCl}^2 - 6.8 \times 10^{-5} \text{ NaCl} \cdot \text{INOC} - 2.20 \text{ NaCl} \cdot \text{pH} + 0.148 \text{ NaCl} \cdot \text{Time} - 11.0 \text{ pH} + 0.0927 \text{ pH}^2 + 0.037 \text{ pH} \cdot \text{Time} + 0.489 \text{ Temp} - 0.003 \text{ Temp}^2 - 2.3 \times 10^{-4} \text{ Temp} \cdot \text{INOC} - 0.056 \text{ Temp} \cdot \text{NaCl} - 0.019 \text{ Temp} \cdot \text{pH} + 0.007 \text{ Time} \cdot \text{Temp} - 0.619 \text{ Time} - 6.00 \times 10^{-4} \text{ Time}^2.$$

$$R\text{-square} = 0.8659$$

*This equation was used to predict the population of Salmonella amsterdam and Salmonella bangkok in Khao Pad Pu, growing under different conditions. The predicted values were compared with viable counts for validation. It was found that the R<sup>2</sup> were 0.618 and 0.691 for S. amsterdam and S. bangkok, respectively.*

**Key words:** *Salmonella*, Growth model, Central Composite Design (CCD)

### INTRODUCTION

All *Salmonella* strains are potentially pathogenic to human. *Salmonella* has O, H and V antigens. *Salmonella* grows at the temperature of 5°-47°C, pH 3.6-9.5 and a<sub>w</sub> between 0.93-0.99. The heat at 62°C for 4 minutes can kill *Salmonella* in food (Labbe and Garcia, 2001). *Salmonella* is one of the main causes of diarrheal disease in Thailand. *Salmonella* species in 6 serovars were detected in yum ruam mit, khao pad pu and yum pla duk phoo from 3 supermarkets in Bangkok (Boonyaratanakornkit et al., 2000). Several mathematical models have been applied to predict the effects of temperature, pH, water activity and other factors on bacterial