4.1. Introduction

In the last few decades, the incidence of foodborne diseases has increased despite the introduction of HACCP and the proliferation of food safety regulations. The increased incidence of foodborne diseases, caused by changes in agricultural and food processing practices, increasing international trade and social changes, stresses the need for more effective food quality and safety assurance systems. Current approaches to food safety that rely heavily on regulatory inspection and sampling regimes cannot sufficiently guarantee consumer protection since they are time-consuming, the 100% inspection and sampling is financially and logistically impossible [ARM 97], and temperature abuses, a major cause of safety problems especially for products that are stored at chill conditions, cannot be controlled and often deviate from specifications [KOU 15, KOU 10].

An alternative approach to traditional methods of safety assurance is to use quantitative microbiological tools [MCM 97]. Quantitative microbiology seems as an attractive and pertinent tool for food safety management. Advancement of quantitative microbiology has allowed the significant progress toward effective, validated modeling of food safety in the last years, while significant effort for developing new predictive microbiology tools is still in progress. Deterministic models, models that provide point estimates of microbial populations, have been recognized as being incompetent to take into account the important sources of variability, and as such, they have been questioned with regard to

Chapter written by Maria GOGOULI and Konstantinos KOUTSOUMANIS.