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A web-based application customized to food safety requirements of small-sized enterprises*

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Abstract

Today, European legislation considers predictive microbiology as a tool to define food safety. People in the food industry, including those in small-sized enterprises, even if they are unable to avail themselves of specific knowledge, are encouraged to use the same approach. To extend a bridge between both sides, a user-friendly, simplified, web-based application (*Praedicere Possumus*, PP) has been developed. Through this application, users have access to different modules, which apply a set of models, some of them already validated and considered reliable for determining the compliance of a food product with EU safety criteria[1]. In particular, the PP applies the growth/no-growth boundary model[2], coupled with a three-phase linear growth model and thermal/non-thermal models. Two complementary functionalities, such as the fractional contribution of each inhibitory factor to growth probability (f) and the time evolution of the growth probability (P_t) have also been included[3]. The PP application is expected to assist users in defining processing and storage conditions to attain a desirable food safety level and to support food safety authorities in demonstrating compliance with legislation.

Key words: simplified modelling approach; *Praedicere Possumus*; factor fractional contribution; time-dependent growth probability

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1. Introduction

Predictive microbiology is a well-established and well-recognised scientific discipline[4]. Recently, this discipline has been accepted as a tool to define food safety, which is fundamentally based on the control of hazard. Food safety should be managed and guaranteed by the food business operators (FBOs), including those in small-sized enterprises (SEs). Small-sized businesses require cost-effective and less time-consuming ways to define food safety, and more specifically, they are interested in: i) understanding the factors that impact positively or negatively on the ability of pathogenic bacteria to survive or grow; ii) assessing the compliance of food to safety criteria; iii) validating the control measures; iv) predicting an appropriate shelf-life. Thus, to meet these requests, people in SEs, even if not availing themselves of specific knowledge, should be encouraged to use the modelling approach. Since SEs are more interested in solutions rather than in scientific findings, an effective modelling tool should be intended for practical use, enabling users to retrieve information intuitively and providing an easy way to access prediction.

This paper describes the web-based application *Praedicere Possumus* (PP) to evaluate the queried pathogen responses, which are translated into outcomes of practical uses to meet the demand of small producers and those of food control authorities. Based on an adapted version of the Polese et al.[1,2] model, the proposed application introduces two functionalities[3], namely the fractional contribution of each inhibitory factor to growth probability (f) and the time-dependent probability parameter (P_t), which offers the possibility to account for the storage time in evaluating the probability of growth.

2. The web-based application Praedicere P*ossumus*

2.1.The models incorporated in PP

The PP application, which provides a deterministic approach for prediction, contains a group of models that address the growth/no-growth[1,2], the growth[5] and the thermal[6] and non-thermal inactivation[7] of 10 foodborne pathogenic bacteria. The fractional contribution (f) of each inhibitory factor to growth probability (P) is evaluated as a function of the difference between the actual level of the factor and the inhibiting value, adjusted for the sub-optimal interval of the factor, whereas the time-dependent probability parameter (P_t) can be described as a function of the growth probability and the growth rate (GR) and represents the change in growth probability over time[3].