

Contents

1	Predictive Microbiology in Foods	1
1.1	Historical Remarks	2
1.2	Framework and Concepts	3
1.2.1	Predictive Microbiology: Models and Types	3
1.2.2	Predictive Microbiology: General Framework	5
1.3	A Tool for Improving Food Safety and Quality	6
2	Experimental Design and Data Generation	11
2.1	Experimental Design	11
2.2	Growth Matrix: Food Versus Artificial Medium	14
2.3	Data Generation	16
2.3.1	Traditional Methods: Challenge Testing	17
2.3.2	Rapid Methods	19
3	Predictive Models: Foundation, Types, and Development	25
3.1	Introduction	25
3.2	Primary Models	26
3.2.1	Growth Models	27
3.2.2	Inactivation Models	31
3.3	Secondary Models	35
3.3.1	Polynomial Models	36
3.3.2	Square Root-Type Models	37
3.3.3	The Gamma Concept and the Cardinal Parameter Model (CPM)	37
3.3.4	Artificial Neural Networks (ANNs)	39
3.3.5	Secondary Inactivation Models	42
3.4	Predictive Modeling at Dynamic Conditions	43
3.5	Developing Predictive Models: Fitting Methods	46
3.5.1	Selection of the Model	46
3.5.2	Fitting Methods	47

3.5.3	Implications of the Error Term and Variable Transformations	48
3.5.4	Goodness-of-Fit Indexes	49
3.6	Model Validation	51
4	Other Models and Modeling Approaches	57
4.1	Bacterial Transfer Models	57
4.1.1	Air-to-Food Transfer	58
4.1.2	Surface-to-Food Transfer in Liquids	59
4.1.3	Surface-to-Food Transfer by Contact	60
4.2	Growth/No Growth Models	63
4.3	Between-Species Interaction Models	68
4.4	Single-Cell Models	71
5	Software and Data Bases: Use and Application	75
5.1	The Data Base as a Source of Data for Modeling Purposes	75
5.2	Fitting Software for Modeling Purposes	79
5.3	Prediction Software: Some Examples	81
6	Application of Predictive Models in Quantitative Risk Assessment and Risk Management	87
6.1	The Risk Analysis Framework	87
6.2	Quantitative Microbial Risk Assessment Needs Predictive Models	91
6.3	Uncertainty and Variability	94
6.3.1	Definition of Uncertainty and Variability	94
6.3.2	Uncertainty and Variability in QMRA	96
6.3.3	Operating with Probability Distributions	96
7	Future Trends and Perspectives	99
7.1	Introduction	99
7.1.1	Meta-Analysis Approach and Benchmarking Data	99
7.2	Mechanistic Predictive Models	101
	References	107
	Index	127

Predictive Microbiology in Foods

Perez-Rodriguez, F.; Valero, A.

2013, VI, 128 p. 21 illus., 11 illus. in color., Softcover

ISBN: 978-1-4614-5519-6