

DIN EN ISO 20976-1:2019-09 (E)

Microbiology of the food chain - Requirements and guidelines for conducting challenge tests of food and feed products - Part 1: Challenge tests to study growth potential, lag time and maximum growth rate (ISO 20976-1:2019)

Contents

	Page
European foreword.....	4
Foreword.....	5
Introduction.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions.....	7
4 Principle.....	10
4.1 General.....	10
4.2 Estimation of the growth potential.....	12
4.3 Estimation of the growth kinetics parameters (lag time and maximum growth rate).....	13
5 Apparatus.....	13
6 Culture media and reagents.....	13
7 Study design and sampling.....	14
7.1 General.....	14
7.2 Setting decision criteria for growth potential.....	14
7.3 Number of batches and selection criteria.....	14
7.4 Preparation of the test units.....	14
7.5 Number of test units to be inoculated.....	15
8 Selection of strains.....	15
9 Preparation of the inoculum.....	16
9.1 General.....	16
9.2 Preparation of the vegetative cell suspensions.....	16
9.3 Preparation of the spore suspensions.....	16
10 Inoculation of the tests units.....	16
11 Controls.....	17
11.1 Food controls.....	17
11.2 Control units.....	17
12 Storage of the test units.....	18
12.1 General.....	18
12.2 Estimation of growth potential.....	18
12.3 Estimation of growth kinetics parameters (lag time and growth rate).....	18
13 Analysis.....	18
14 Expression of the results.....	19
14.1 General.....	19
14.2 Growth potential (Δ).....	19
14.3 Growth kinetics parameters (lag time and growth rate).....	20
15 Test report.....	20
15.1 General.....	20

15.2	Aim of the study and type of challenge test.....	20
15.3	Experimental protocol.....	21
15.4	Sample analysis	21
15.5	Results	21
15.6	Conclusions	22
15.7	Reference documents.....	22
Annex A (informative) Inter-batch variability assessment based on pH and a_w		23
Annex B (normative) Minimum number of units to prepare for the challenge test study.....		24
Annex C (informative) Examples of protocols to prepare inocula.....		25
C.1	General	25
C.2	Examples of protocols inducing injury of vegetative cells.....	25
C.2.1	General	25
C.2.2	Preparation of cultures prior to the injury treatments.....	25
C.2.3	Injury protocols.....	25
C.2.4	Injury measurement.....	26
C.3	Example of protocol to produce spores.....	26
C.3.1	General	26
C.3.2	Preparation of the cell suspension prior to sporulation.....	26
C.3.3	Preparation of the spore suspension	26
Annex D (informative) Examples of how to estimate growth potential, lag time and maximum growth rate from results of challenge tests		28
D.1	Example applications of challenge tests designed to estimate growth potential	28
D.1.1	When three batches are inoculated simultaneously	28
D.1.2	When three batches are not inoculated simultaneously.....	29
D.2	Example application of challenge tests designed to estimate lag time and maximum growth rate	29
Annex E (informative) Use of simulation to assess a microbial population under different temperature conditions		32
Bibliography		33