



Animal Health Matters.
For Safe Food Solutions.



Schweizerische Eidgenossenschaft
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Confederazione Svizzera
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Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER

State Secretariat for Economic Affairs SECO



Сучасні інструменти для мікробіологічної оцінки ризиків

Марко Де Нарді

Джерело інформації

- Ідентифікація та характеристика небезпечних факторів
- <http://www.efsa.europa.eu/en/science/biological-hazards>
- <http://foodrisk.org/>
- https://ec.europa.eu/food/safety_en
- <http://www.ucd.ie/microbialrisknetwork/index.html>
- <http://www.who.int/foodsafety/en/>
- <http://www.foodsafety.govt.nz/science-risk/hazard-data-sheets/pathogen-data-sheets.htm>





Home > Science > Biological hazards

Biological hazards



Scientific advice on biological substances relating to food. This includes diseases transmitted from animals to humans through food, microorganisms such as viruses, fungi and bacteria - including those causing food spoilage - and food hygiene. Reporting of data on zoonotic diseases and antimicrobial resistance.

Latest publications

[see all](#)

[The European Union summary report on surveillance for the presence of transmissible spongiform encephalopathies \(TSE\) in 2016](#)

Scientific Report of EFSA | *Biological hazards* | published: 30 November 2017

[Annual report of the Scientific Network on Microbiological Risk Assessment 2017](#)

Technical Report | *Biological hazards* | published: 28 November 2017

[Evaluation of the Application for new alternative biodiesel production process for rendered fat of Cat 1 \(BDI-RepCat process, AT\)](#)

Scientific Opinion | *Biological hazards* | published: 14 November 2017

Topics in this subject area

Expert groups

Working groups

Members and minutes >

BIOHAZ

Panel on Biological Hazards >

Networks

Member State organisations working with us >

Regulated products

Biological hazard applications: overview and procedure >

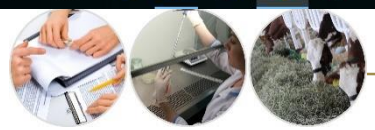
Upcoming Events

[go to calendar](#)

DEC 06 2017
117th Plenary meeting of the BIOHAZ Panel - Open for observers
Parma

18th meeting of the EFSA Network on

Feedback



www.who.int/mediacentre/factsheets/fs139/en/

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Salmonella (non-typhoidal)

Fact sheet
Reviewed September 2017

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Key facts

- *Salmonella* is 1 of 4 key global causes of diarrhoeal diseases.
- Most cases of salmonellosis are mild; however, sometimes it can be life-threatening. The severity of the disease depends on host factors and the serotype of *Salmonella*.
- Antimicrobial resistance is a global public health concern and *Salmonella* is one of the microorganisms in which some resistant serotypes have emerged, affecting the food chain.
- Basic food hygiene practices, such as "cook thoroughly", are recommended as a preventive measure against salmonellosis.

Overview

The burden of foodborne diseases is substantial: every year almost 1 in 10 people fall ill and 33 million of healthy life years are lost. Foodborne diseases can be severe, especially for young children. Diarrhoeal diseases are the most common illnesses resulting from unsafe food, 550 million people falling ill each year, including 220 million children under the age of 5 years. *Salmonella* is 1 of the 4 key global causes of diarrhoeal diseases.

Salmonella is a gram negative rods genus belonging to the Enterobacteriaceae family. Within 2 species, *Salmonella bongori* and *Salmonella enterica*, over 2500 different serotypes or serovars have been identified to date. *Salmonella* is a ubiquitous and hardy bacteria that can survive several weeks in a dry environment and several months in water.

While all serotypes can cause disease in humans, a few are host-specific and can reside in only one or a few animal species: for example, *Salmonella enterica* serotype Dublin in cattle and *Salmonella enterica* serotype Choleraesuis in pigs. When these particular serotypes cause disease in humans, it is often invasive and can be life-threatening. Most serotypes, however, are present in a wide range of hosts. Typically, such serotypes cause gastroenteritis, which is often uncomplicated and does not need treatment, but disease can be severe in the young, the elderly, and patients with weakened immunity. This group features *Salmonella enterica* serotype Enteritidis and *Salmonella enterica* serotype Typhimurium, the two most important serotypes of *Salmonella* transmitted from animals to humans in most parts of the world.

For more information contact:
 Food Safety Department
 WHO/Geneva
 Fax: +41 22 791 48 07
 E-mail: foodsafety@who.int

Related links

- [A guide on safe food for travellers](#)
- [Five keys to safer food](#)
- [Five keys to growing safer fruits and vegetables](#)
- [Five keys to safer aquaculture products to protect public health](#)

New_Zealand_data....pdf

Mostra tutto

09:45
05/12/2017



STAPHYLOCOCCUS AUREUS

THE ORGANISM/TOXIN

Growth and toxin production is best in the presence of oxygen but can grow anaerobically. It is not regarded as a good competitor with other bacteria. Infected food handlers are a significant cause of food poisonings.

GROWTH AND ITS CONTROL

Growth:

Temperature: Optimum 37°C, range 6-48°C. Upper limit of growth can be extended above 44°C by addition of NaCl, monosodium glutamate (MSG) and soy sauce.

pH: Optimum pH for growth is 7.0-7.5. Minimum pH for growth is 4.2, maximum 9.3.

Growth was inhibited in the presence of 0.1% acetic acid (pH 5.1).

Atmosphere: Grows best in the presence of oxygen. Capable of growing anaerobically.

Growth is retarded in the presence of 80% CO₂ compared to growth in an air atmosphere.

Water activity: The low a_w at which *S. aureus* grows is particularly significant. The organisms are resistant to drying and may grow and produce enterotoxins in foods with a_w as low as 0.85. Can grow in up to 25% NaCl. Grows well in 7-10% NaCl. Optimum a_w for growth is 0.99.

Its ability to grow at low a_w means that it has a competitive advantage on low a_w foods.

Toxin Production: Combinations of different inhibitory factors (e.g. NaCl content and pH) can be used to control toxin production (and growth), i.e. multiple hurdles can be used. In summary, organisms exposed to an extreme of one inhibitory factor become more susceptible to others.

Temperature: Optimum 35-40°C, range 10-45°C.

pH: Optimum pH for toxin production is 5.3-7.0, minimum 4.8, maximum around 9.0. Toxin production is inhibited more effectively when the pH is reduced by lactic acid rather than hydrochloric acid.

Atmosphere: Greatest toxin production is in the presence of oxygen. Less toxin is produced under anaerobic conditions.

Water activity: Optimum for toxin production is ≥0.90 a_w. Range 0.86 ≥0.99.

Survival:

Temperature: The organisms is usually readily killed at cooking and pasteurisation temperatures. Heat resistance is increased in dry, high-fat and high-salt foods.

Survives frozen storage.

Toxins are extremely resistant to heat. For example the D time of enterotoxin B at 149°C is 100 min at an a_w of 0.99, and 225 min at an a_w of 0.90.

pH: *S. aureus* can survive in foods down to pH 4.2 but this is dependent on the type of acid present.

Atmosphere: Cells survive longer under anaerobic conditions.

Water Activity: Survive for long periods in dried foods.

Inactivation (CCPs and Hurdles):

Temperature: D₉₀ is approx. 2 min. However, the D₉₀ for salty foods, e.g. cheese, bacon and ham, is considerably longer (can reach >50 min). Heat resistance is reduced at high and low pH.

pH: Rapid destruction of *S. aureus* has been demonstrated in lemon and lime juices at pH 2.3.

During food fermentations, lactic acid bacteria produce substances that are inhibitory to *S. aureus* including lactic acid, hydrogen peroxide and bacteriocins.

Water activity: Withstands desiccation well.

Preservatives: (NB: Some of the preservatives discussed here may not be permitted in New Zealand) *S. aureus* shows no unusual resistance to common food preservative methods except for its osmotolerance (permits survival and growth in high concentrations of NaCl). Cells grown in high salt foods at high temperatures are less sensitive to some food preservatives.

When reduced pH and a_w are used in combination to control *S. aureus*, less stringent levels of these parameters can be applied.

Sorbate and benzoate are effective inhibitors of *S. aureus* with a minimum inhibitory concentration at pH 6.1 of 1000 mg/kg. The effectiveness of these preservatives increases as pH is reduced.

Methyl and propyl parabens are also effective. High concentrations of CO₂ substantially reduce growth.

Sanitisers/Disinfectants: (These products must be used as directed by the manufacturer).

Most chemical sanitisers used routinely in the food industry, such as chlorine, other halogens, and quaternary ammonium compounds will destroy *S. aureus* on surfaces when correctly applied.

Some strains found in poultry processing plants have been found to possess resistance to sanitisers.

(NB. The absence of a sanitiser/disinfectant from this section does not necessarily imply that it is ineffective)

Radiation: Relatively resistant to ionising radiation, but not to UV irradiation, when compared with other

Prepared for the Ministry of Health by ESR Ltd. 1 Issued May 2001
These data sheets contain a summary of information available in the literature. Because of the many variables which impact on the survival of organisms in foods, information in this sheet must be used as a guide only. Specific processes must be checked by the food manufacturer to ensure their product is safe.

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- Invia e traccia
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Передові сучасні інструменти

- MOP інструмент (Safefood 360)

<http://safefood360.com/free-resources/download/>

360_MRA-Profiling-Tool-(Excel-2010).xlsx - Excel

Microbiological Risk Assessment

Product:

Micro-organism:

Updated:

Step	Question	Answers/Options	Score (Enter Score)	Uncertainty of Score	Notes and References
STEP 1 HAZARD IDENTIFICATION (Output from Questionnaire)					
1	1. What is the name and type of product?	Milk			
2	2. What is the name of the micro-organism realistically associated with the product?	Toxins of <i>Staphylococcus aureus</i>			
3	2.1 Is it toxigenic or not?	Yes			
STEP 2 HAZARD CHARACTERISATION					
4	3.1 Who are the consumers of concern?	Elderly consumers			
5	3.2 How many distinctive sub-groups are there in the population of consumers?	YQPI			
6	3.3 What is the severity of the hazard (the sensitivity of each group should be considered or that the most sensitive consumer should be used for a single assessment)?		3		
7	3.4 What is the hazardous level of the micro-organism covered by this risk assessment?		3		
8	3.5 What is the uncertainty of this estimate?			2	
STEP 3 EXPOSURE ASSESSMENT (E.A.)					
E.A. - Occurrence of the hazardous micro-organism					
9	4.1 What is the frequency of contamination of raw materials making up the product?		4		
10	4.2 What is the range of levels of contamination found in the raw materials?		0		
E.A. - Effect of processing / decontamination					
11	5.1 What is the effect of storage before processing on the level of the hazard?		0		
12	5.2 What is the intended effect of all processing and any decontamination stages on the level of the micro-organism?		0		
13	5.3 What is the uncertainty of this estimate?			0	
E.A. - Occurrence of toxin (if the hazardous micro-organism is toxigenic)					
14	6.1 What is the likelihood of toxin presence if the micro-organism contaminates the raw materials or product?		0		
15	6.2 What is the uncertainty of this estimate?			0	
E.A. - Re-contamination after processing or decontamination					
16	7.1 What is the frequency of re-contamination of the product in the		0		



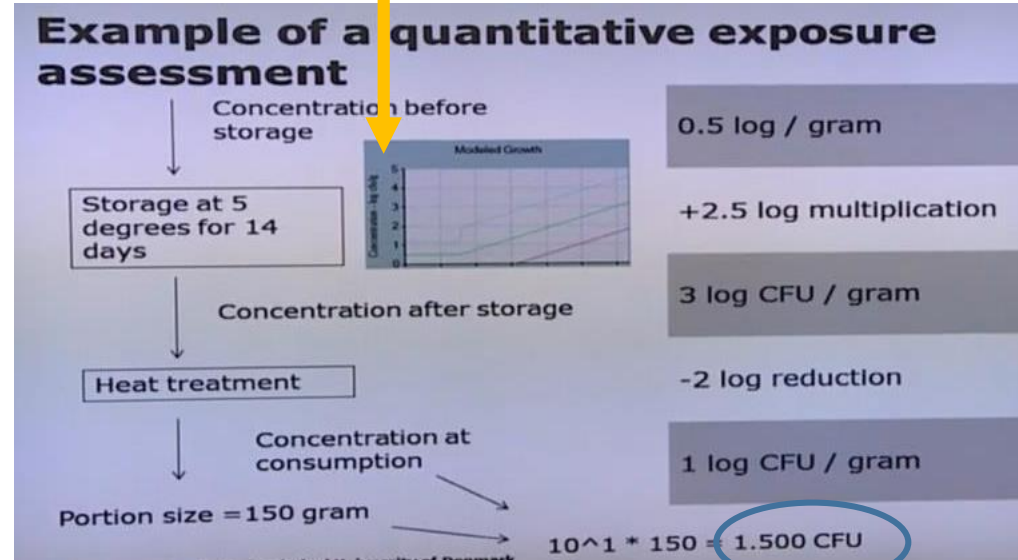
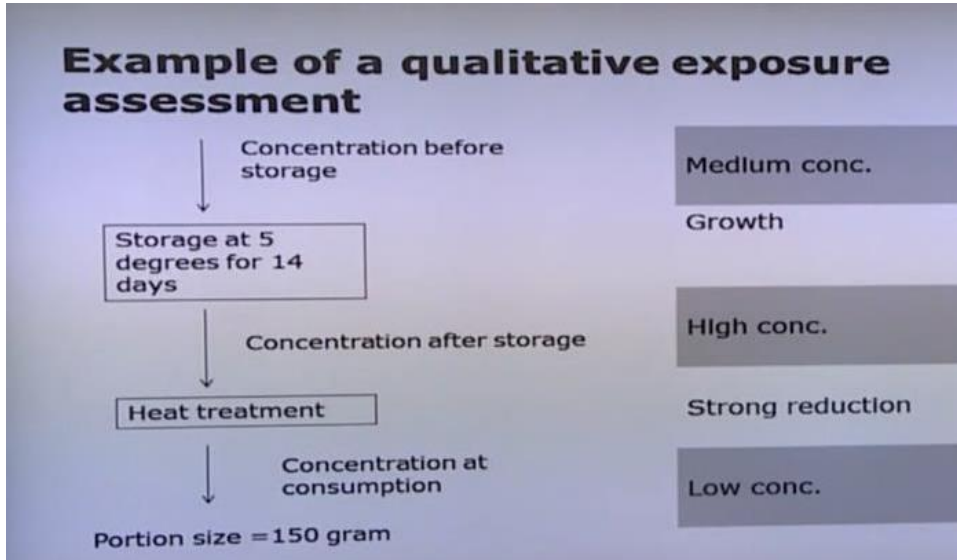
- Ваш час спробувати.....



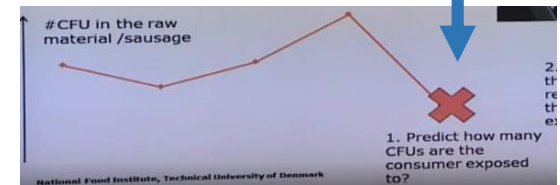
Прогнозуюче моделювання / мікробіологія



NB: Прогнозуюче моделювання/мікробіологія

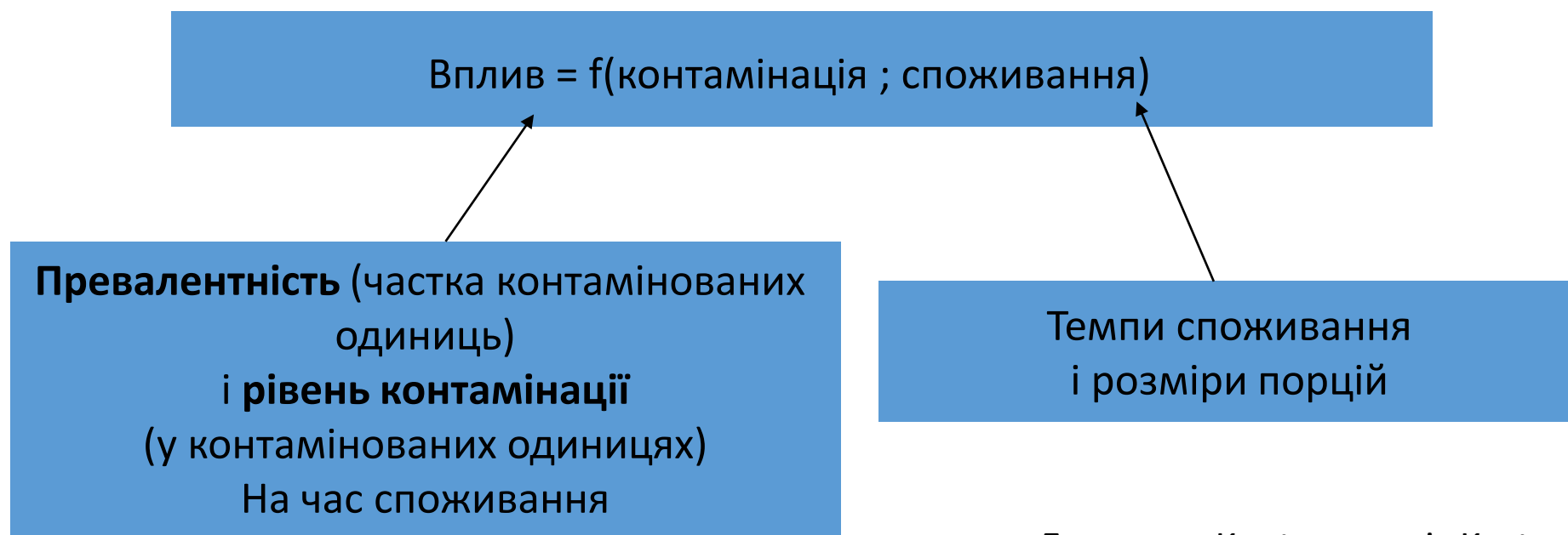


<https://www.youtube.com/watch?v=zKdIPiPAhWU>



Оцінка впливу

Оцінка впливу забезпечує оцінку виникнення та рівня патогену у визначеній частині певного продукту під час споживання в певній популяції



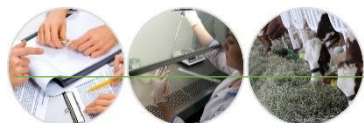
Джерело: Koutsoumanis Kostas



Програмне забезпечення для прогнозуючої мікробіології

Software	Description of utilities in microbial exposure assessment	Modeling technique	Availability	Source-Link
Baseline	Prediction of growth, prediction of inactivation, sampling plan module	Deterministic	Free, internet access	www.baselineapp.com
ComBase	Prediction of growth, prediction of inactivation, growth fitting tool, inactivation fitting tool, database portal	Deterministic	Free, internet access	http://www.combase.cc
Dairy Products Safety Predictor	Risk assessment module	Stochastic	Commercial, internet access	www.aqr.maisondulait.fr
DMFit	Growth fitting tool, Excel add-in	Deterministic	Free, downloadable	http://www.ifr.ac.uk/Safety/DMfit/default.html.old
FDA-iRISK	Risk assessment module, database portal	Stochastic	Free, internet access	https://irisk.foodrisk.org
FILTREX	Growth fitting tool, inactivation fitting tool, optimal sequential designs, comparison of models and selection	Stochastic	Free, downloadable	http://w3.jouy.inra.fr/unites/miaj/public/logiciels/filtrex/
FISHMAP	Prediction of growth, growth fitting tool	Deterministic	Free, downloadable	http://www.azti.es/downloads/downloads/fishmap/#tab-description
Food Spoilage and Safety Predictor (FSSP)	Prediction of growth, prediction of Growth/No Growth, prediction of histamine formation in marine fin-fish, product- specific relative rate of spoilage models, prediction of shelf life as a function of storage temperature	Deterministic	Free, downloadable	http://fssp.food.dtu.dk

Source: Koutsoumanis Kostas



Програмне забезпечення для прогнозуючої мікробіології

Software	Description of utilities in microbial exposure assessment	Modeling technique	Availability	Source-Link
GInaFiT	Inactivation fitting tool	Deterministic	Free, downloadable	http://cit.kuleuven.be/biotec/downloads.php
GroPIN	Prediction of growth, prediction of inactivation, Prediction of Growth/No Growth, predictive microbiology models' database	Deterministic and stochastic	Free, downloadable	www.aua.gr/psomas/gropin
Integrated Pathogen Modeling Program (IPMP)	Growth fitting tool, inactivation fitting tool	Deterministic	Free, downloadable	http://www.ars.usda.gov/Services
Listeria Meat Model	Prediction of growth, sensitivity analysis module	Deterministic	Commercial, downloadable	www.cpmf2.be
Micro Hibro	Prediction of growth, prediction of inactivation, prediction of Growth/No Growth, risk assessment module, sensitivity analysis module, database portal	Stochastic	Free, internet access	www.microhibro.com
Microbial Responses Viewer (MRV)	Database portal, based on ComBase database it provides growth rates	Deterministic	Free, internet access	http://mrviewer.info/
NIZO Premia	Prediction of growth, prediction of inactivation, growth fitting tool, inactivation fitting tool, biofilm formation module is available through external software	Deterministic	Commercial, without internet access	<i>Without internet access</i>

Source: Koutsoumanis Kostas



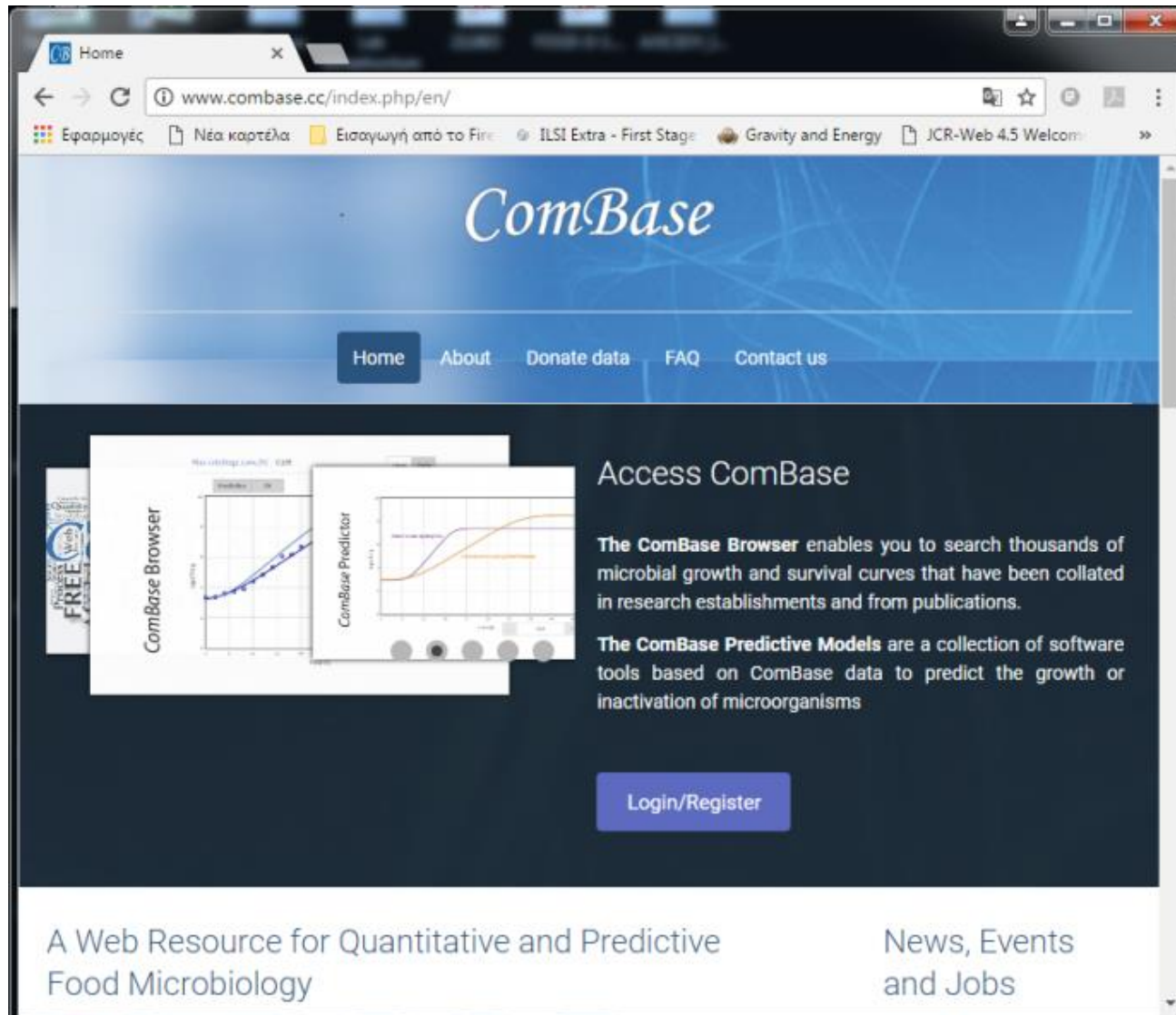
Програмне забезпечення для прогнозуючої мікробіології

Software	Description of utilities in microbial exposure assessment	Modeling technique	Availability	Source-Link
PMM-Lab	Prediction of growth, prediction of inactivation, growth fitting tool, inactivation fitting tool, prediction of Growth/No Growth, database portal, new utilities can be incorporated	Deterministic	Free, internet access	https://sourceforge.net/projects/pmmlab/
Prediction of Microbial Safety in Meat Products	Prediction of growth, prediction of inactivation, prediction of Growth/No Growth	Deterministic	Free, internet access	http://dmripredict.dk
Pathogen Modeling Program (PMP)	Prediction of growth, prediction of inactivation,	Deterministic	Free, internet access, downloadable	http://pmp.errc.ars.usda.gov/PMPOnline.aspx
Sym'Previus	Prediction of growth, prediction of inactivation, growth fitting tool, inactivation fitting tool, prediction of Growth/No Growth, sensitivity analysis module, HACCP module, F-value calculation tool database portal	Deterministic and stochastic	Commercial, internet access	www.symprevius.org

Source: Koutsoumanis Kostas



Програмне забезпечення для прогнозуючої мікробіології



Home

www.combase.cc/index.php/en/

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ComBase

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Access ComBase

The ComBase Browser enables you to search thousands of microbial growth and survival curves that have been collated in research establishments and from publications.

The ComBase Predictive Models are a collection of software tools based on ComBase data to predict the growth or inactivation of microorganisms

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A Web Resource for Quantitative and Predictive Food Microbiology

News, Events and Jobs

<https://www.combase.cc/index.php/en/>

Основна увага ComBase полягає у визначенні та прогнозуванні того, як мікроорганізми виживають і ростуть у різних (перш за все у харчових продуктах) умовах.

Combase Предиктор (той хто прогнозує)

Browser window showing the ComBase Predictor interface. The URL is https://browser.combase.cc/ComBase_Predictor.aspx?model=1.

The interface displays the **Growth Model** for **Staphylococcus aureus**. The model is set to **Static** and **Aw** (Water Activity).

Parameters and sliders:

- Init. level: 3
- Phys.state: 1.3e-2
- Temp (°C): 20
- pH: 7
- Aw: 0.997
- Slider 1: 0 to 7
- Slider 2: 0 to 1
- Slider 3: 7.5 to 30
- Slider 4: 4.4 to 7.1
- Slider 5: 0.907 to 1

Calculated values:

- Max.rate (log.conc/h): 0.179
- Dbl. time(Hours): 1.682

[Add prediction]

Graph showing log₁₀CFU/g vs Time (h). The curve shows a sigmoidal growth pattern, reaching a plateau around 8 log₁₀CFU/g after approximately 40 hours. The x-axis ranges from 0 to 60 hours, and the y-axis ranges from 0 to 10 log₁₀CFU/g.

Buttons: Chart, Data points, Plot custom points

Footer: ComBase © 2017

- Browser
- ComBase Predictor
- Food Models
- DMFit
- Resources
- Help

Growth Model

Prediction **Uncertainty**

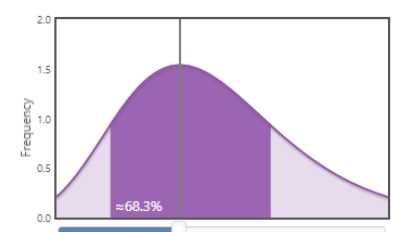
[Aw | NaCl]

Staphylococcus aureus

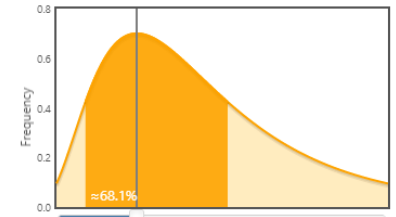
Init. level	3	0	7
Phys.state	1.3e-2	0	1
Temp (°C)	20	7.5	30
pH	7	4.4	7.1
Aw	0.997	0.907	1

Max.rate (log.conc/h) 0.179 Dbl. time(Hours) 1.682

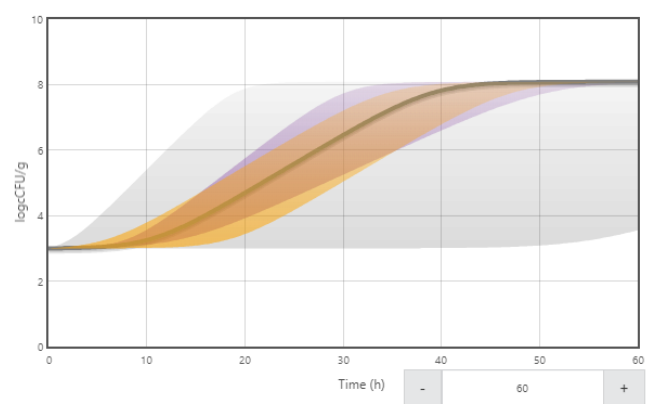
Rate uncertainty Phys. state uncertainty **Combined uncertainty**



Max. rate = 1.79e-1
Pr(1.38e-1 ≤ X ≤ 2.32e-1) = 0.68



Alpha0 = 1.27e-2
Pr(8.45e-3 ≤ X ≤ 4.41e-2) = 0.68



- Ваш час для вивчення....

