



Department of Food Science and  
Technology  
Aristotle University of Thessaloniki

# Διάρκεια ζωής και ημερομηνία ανάλωσης των τροφίμων στην Ε.Ε.

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# Guidance on date marking and food information

SCIENTIFIC OPINION



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## Guidance on date marking and related food information: part 1 (date marking)

EFSA Panel on Biological Hazards (BIOHAZ),

Konstantinos Koutsoumanis, Ana Allende, Avelino Alvarez-Ordóñez, Declan Bolton, Sara Bover-Cid, Marianne Chemaly, Robert Davies, Alessandra De Cesare, Lieve Herman, Maarten Nauta, Luisa Peixe, Giuseppe Ru, Marion Simmons, Panagiotis Skandamis, Elisabetta Suffredini, Liesbeth Jacxsens, Taran Skjerdal, Maria Teresa Da Silva Felicio, Michaela Hempen, Winy Messens and Roland Lindqvist



SCIENTIFIC OPINION



ADOPTED: 10 March 2021

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## Guidance on date marking and related food information: part 2 (food information)

EFSA Panel on Biological Hazards (BIOHAZ),

Konstantinos Koutsoumanis, Ana Allende, Avelino Alvarez-Ordóñez, Declan Bolton, Sara Bover-Cid, Marianne Chemaly, Robert Davies, Alessandra De Cesare, Lieve Herman, Friederike Hilbert, Maarten Nauta, Luisa Peixe, Giuseppe Ru, Marion Simmons, Panagiotis Skandamis, Elisabetta Suffredini, Liesbeth Jacxsens, Taran Skjerdal, Maria Teresa Da Silva Felicio, Michaela Hempen, Winy Messens and Roland Lindqvist

## Background

- A Commission study published in February 2018<sup>2</sup> estimated that up to 10% of the 88 million tonnes of food waste generated annually in the EU is linked to date marking.
- an immediate priority is the development of EU guidance based on the existing EU requirements in order to ensure more consistent date marking and related food information practices.

## Background

- FBOs should follow a risk-based approach when deciding on the type of date marking
- Clarity was needed on the differentiation between foods that at the end of shelf-life might become
  - 'injurious to health' due to growth of pathogenic microorganisms
  - 'unfit for human consumption' due to growth of spoilage non-pathogenic microorganisms
- To support FBO and national authorities in implementing correct and consistent practices, EFSA was asked to provide scientific advice

## Providing guidance on **date marking** and related food information (Part 1)

- **ToR 1:** The **factors** that, from a microbiological point of view, make certain foods **highly perishable** and therefore likely after a short period to constitute an **immediate danger to human health**, and on how those factors should be considered by food business operators when deciding whether a **'use by'** date is required and setting the shelf-life and the required storage conditions
- **ToR 2:** The **factors** that, from a microbiological point of view and limited to foods intended to be stored at controlled temperatures, make certain foods become **unfit for human consumption**, but still without constituting an immediate danger to human health, and on how those factors should be considered by food business operators when deciding whether a **'best before'** date is appropriate and setting the shelf-life and the required storage conditions

## Providing guidance on **date marking** and related food information (Part 2)

- **ToR 3:** Storage conditions and/or time limit for consumption after opening the package in order to avoid increase of food safety risks particularly on:
  - The characteristics of a food and the intrinsic/extrinsic factors which might change once the package is opened
  - The factors to be considered in deciding to indicate the storage conditions and/or time limit for consumption after opening the package.
- **ToR 4:** Defrosting of frozen foods including good practices, storage conditions and/or time limit for consumption in order to avoid increase of food safety risk



## Background

- Use-by date: for foods that at the end of shelf-life constitute 'an immediate danger to human health' or become 'injurious to health' due to growth of pathogenic microorganisms
- Best before date: for foods that at the end of shelf-life might become 'unfit for human consumption' due to growth of spoilage non-pathogenic microorganisms

# Background

- Some foods have date marking specified by EU regulations

## **Table eggs**

Regulation (EC) No 589/2008 laying down detailed rules for implementing Council Regulation (EC) No 1234/2007 as regards marketing standards for eggs

- Article 12(1) states that 'Packs containing Class A eggs shall bear on the outer surface in easily visible and clearly legible type: ... (d) the date of minimum durability in accordance with Article 13 of this Regulation; ... (f) as a special storage condition in accordance with Article 3(1)(6) of Directive 2000/13/EC, an indication advising consumers to keep eggs chilled after purchase'.
- Article 13 states that 'The date of minimum durability referred to in Article 3(1)(5) of Directive 2000/13/EC shall be fixed at not more than 28 days after laying. Where the period of laying is indicated, the date of minimum durability shall be determined from the first day of that period'.
- Article 16 states that 'For loose egg sales, the following information shall be given in such a manner as to be easily visible and clearly legible to the consumer: ... (e) the date of minimum durability'.

Regulation (EC) No 853/2004 laying down specific hygiene rules for food of animal origin

- Annex III, Section X, Chapter I, point 3 states that 'Eggs must be delivered to the consumer within a maximum time limit of 21 days of laying'.



## Background

- Some foods have date marking specified by EU regulations

### **Fresh poultry meat**

Regulation (EC) No 543/2008 laying down detailed rules for the application of Council Regulation (EC) No 1234/2007 as regards the marketing of poultry meat

- Article 5(3) states that 'In the case of fresh poultry meat, the date of minimum durability shall be replaced by the 'use by' date in accordance with Article 10 of Directive 2000/13/EC'.

### **Live bivalve molluscs**

Regulation (EC) No 853/2004 laying down specific hygiene rules for food of animal origin

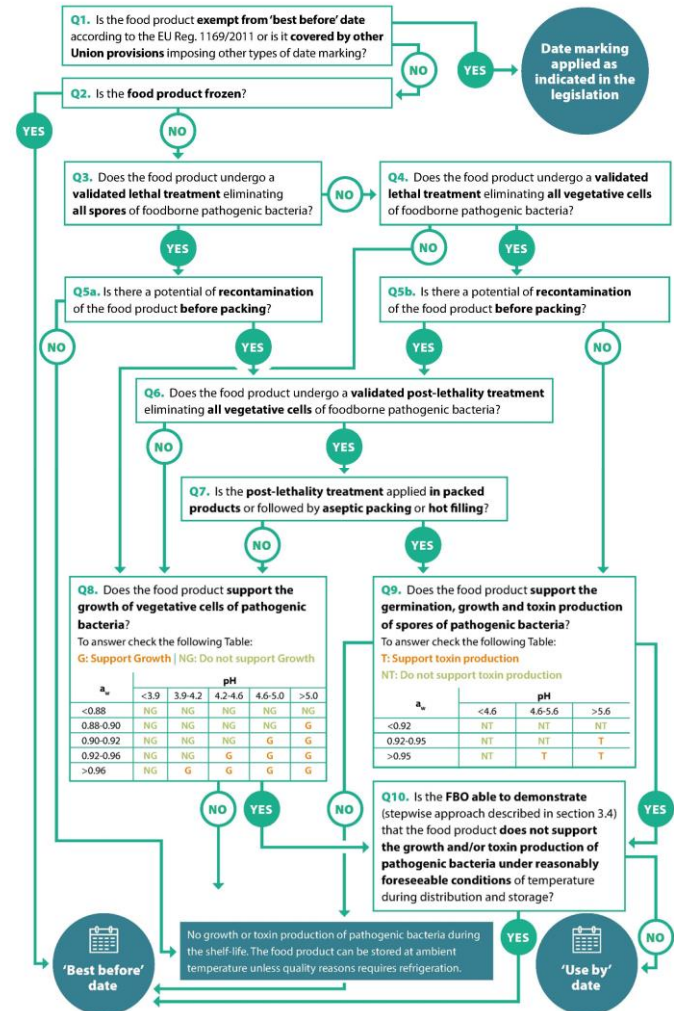
- Annex III, Section VII, Chapter VII, point 2 states that 'In addition to the general requirements for identification marks contained in Annex II, Section I, the following information must be present on the label: (a) the species of bivalve mollusc (common name and scientific name); (b) the date of packaging, comprising at least the day and the month. By way of derogation from Directive 2000/13/EC, the date of minimum durability may be replaced by the entry "these animals must be alive when sold".'

## Guidance on the decision to apply a 'use by' or 'best before' date

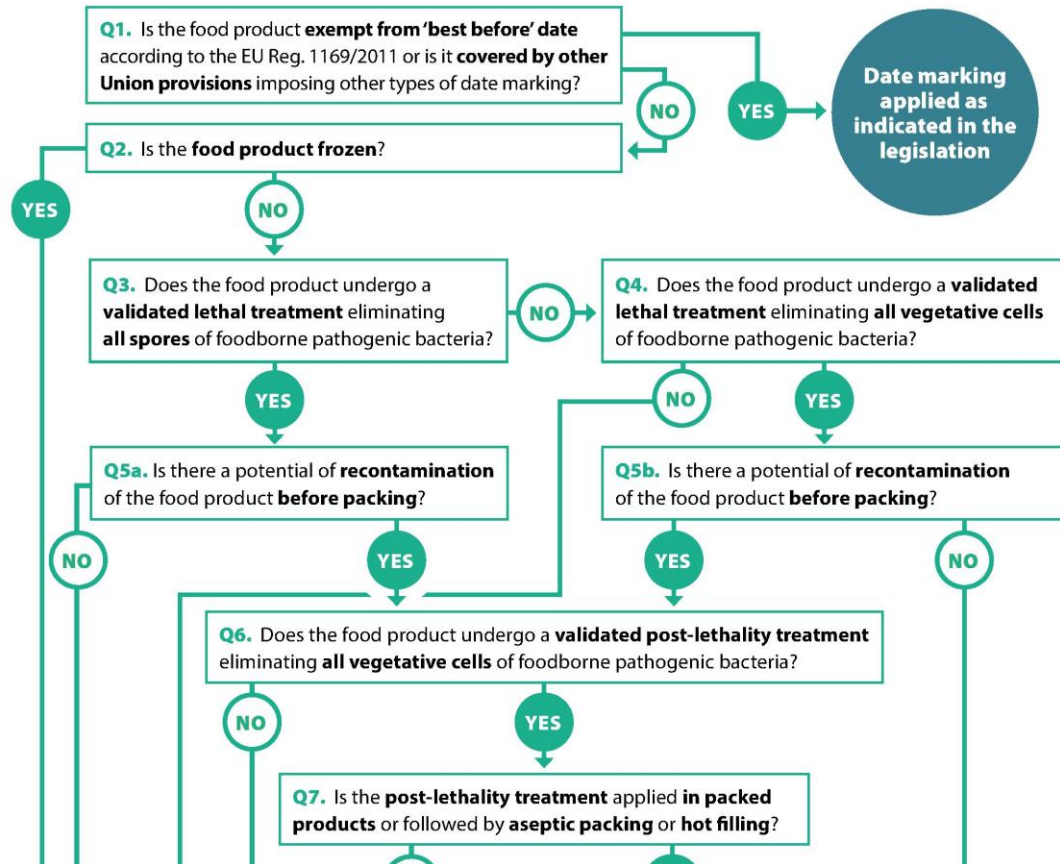
A DT was developed to assist FBOs in deciding whether a 'use by' or 'best before' date is appropriate for a certain prepacked food product. The DT is based on the interpretation of the definitions of the 'use by' and 'best before' dates in Regulation (EU) No 1169/2011 and the considerations in Section 1.3.2. In particular, the underlying assumptions for the DT are that:

- 1) the decision about the type of date marking is based on whether any pathogenic microorganisms may be present at the end of processing, and if they can grow or produce toxin during the shelf-life
- 2) in the absence of defined acceptable levels of pathogenic microorganisms, any significant growth during shelf-life may increase the risk of illness for the consumers including normal and susceptible populations
- 3) cooking alone, before consumption, may not eliminate the risk, due to the possibility of cross-contamination post-cooking and/or undercooking at the consumer stage
- 4) if both spores and vegetative cells of pathogenic microorganisms are present in a food product, growth limits targeting vegetative cells apply as these will also ensure spores do not germinate, grow and form toxin.

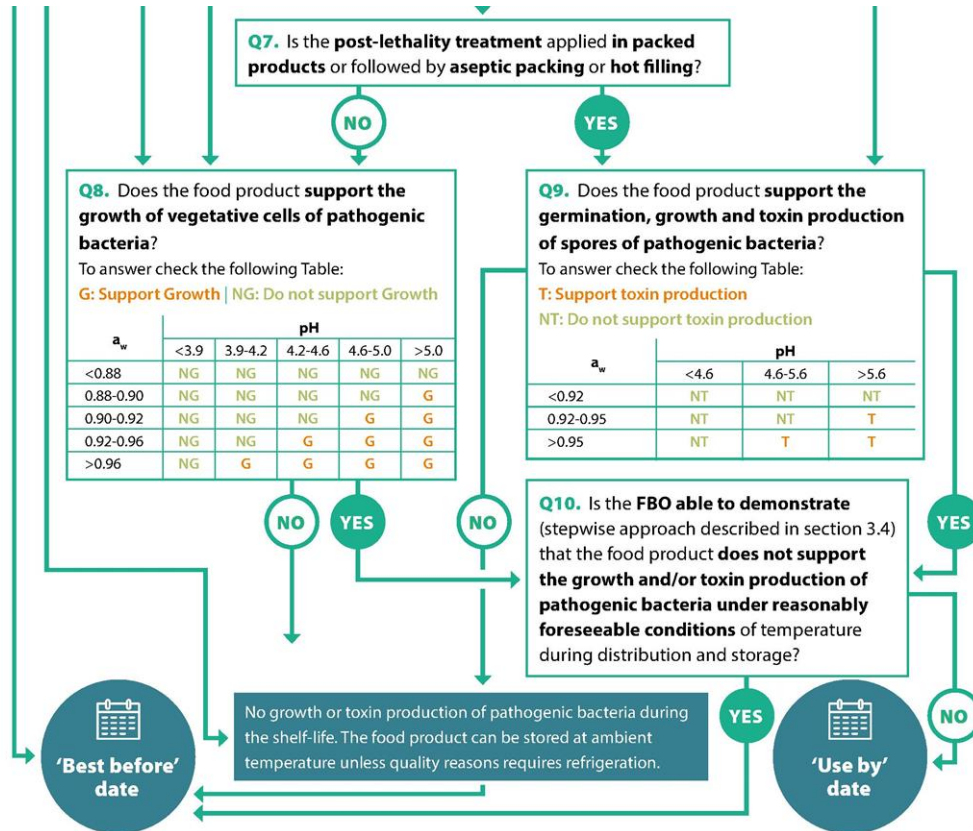
# Guidance on the decision to apply a 'use by' or 'before' date



# Guidance on the decision to apply a 'use by' or 'best before' date



# Guidance on the decision to apply a 'use by' or 'best before' date



## Guidance on the decision to apply a 'use by' or 'best before' date

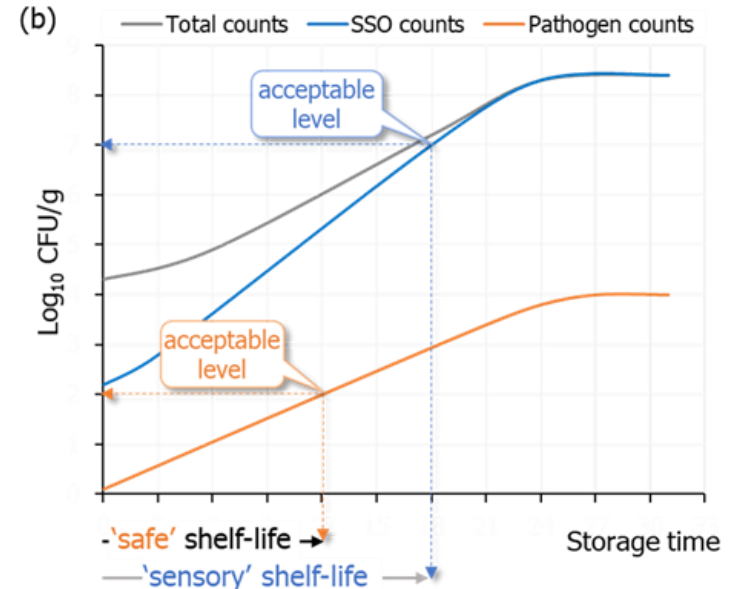
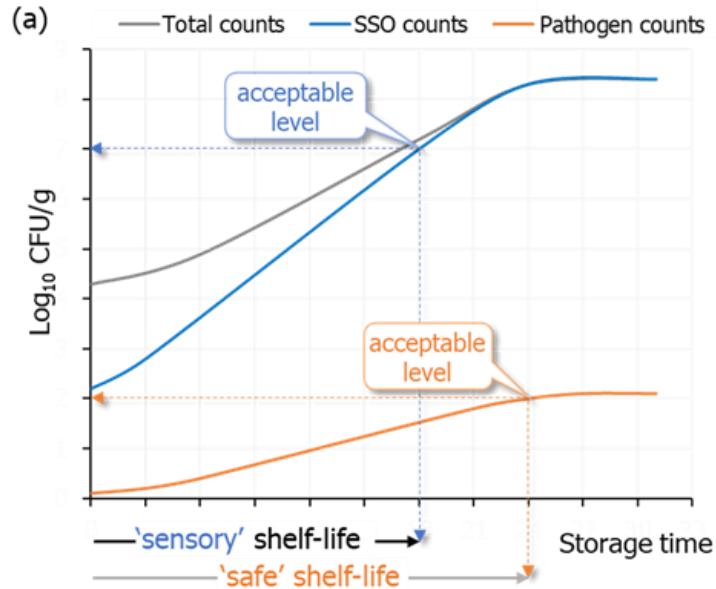
**UHT milk** is not exempt from the 'best before' date according to Annex X to Regulation (EU) No 1169/2011 (Q1: No) and is not distributed or stored as frozen food product (Q2: No). UHT treatment ( $> 135^{\circ}\text{C}$  for 2–5 s) is expected to eliminate all spores of food-borne pathogenic bacteria (Q3: Yes). Normally the dairy industry uses aseptic filling units for packing the milk and so there is no potential for recontamination after the heat treatment and before packing (Q5a: No). Based on the above, the in-package product is free of food-borne pathogenic bacteria and the milk can be stored at ambient temperature unless quality reasons require refrigeration, and thus a 'best before' date marking of UHT milk is appropriate. However, when the packing is not aseptic, there is a potential for recontamination with vegetative cells of pathogenic bacteria before packing (Q5a: Yes). When the milk is not undergoing a validated post-lethal treatment (Q6: No) and considering that the pH ( $> 6.5$ ) and  $a_w$  ( $> 0.99$ ) of UHT milk support growth of vegetative pathogenic bacteria microorganisms (Q8: Yes), the milk should be distributed and stored under refrigeration and requires a 'use by' date, unless the FBO has evidenced that the product does not support growth of pathogenic bacteria under reasonably foreseeable conditions of temperature during distribution and storage (Q10: No).

## Guidance on the decision to apply a 'use by' or 'best before' date

**Vacuum-packed sliced thermally treated meat product (e.g. Genoa Salami)** are not exempt from the 'best before' date according to the Regulation (EU) No 1169/2011 (Q1: No) and are not distributed or stored as frozen food products (Q2: No). The validated heat treatment does not eliminate spores of food-borne pathogenic bacteria (Q3: No) but is expected to eliminate vegetative cells (Q4: Yes). When the product is sliced after the primary validated heat treatment (Q3–4), there is a potential for recontamination (Q5b: Yes). Assuming no validated post-lethal treatment (Q6: No), a pH = 5.0 and  $a_w = 0.94$ , the meat product can support growth of pathogen's vegetative cells (Q8: Yes). If the FBO is not able to demonstrate that the meat product does not support growth of pathogens under reasonably foreseeable conditions of temperature during distribution and storage (Q10: No), the product requires a 'use by' date. The outcome of the DT can change if the processing/packing conditions and the intrinsic/extrinsic factors of the meat product are different. For example, in the case of a vacuum-packed sliced thermally treated meat product, which is treated after slicing once in the final package with high pressure (HHP) thereby eliminating all vegetative cells of food-borne pathogenic bacteria (Q6: Yes), and the HHP treatment is in the package (Q7: Yes), while the combination of pH and  $a_w$  (pH = 5.0 and  $a_w = 0.94$ ) does not support germination, growth and toxin production of spores of pathogenic bacteria (Q9: No), the output of the DT would indicate that a 'best before' date is appropriate.

# Approaches for setting shelf-life and required storage conditions

- Food characteristics and storage conditions support the growth of both pathogenic (hazard) and specific spoilage organisms (SSO) during storage

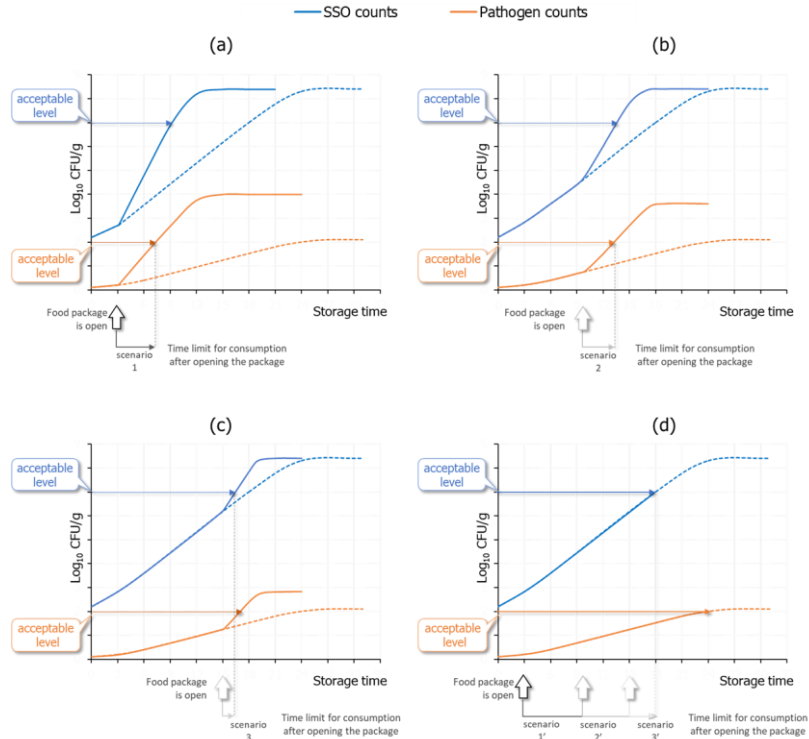




## Recommendations

- To provide training activities and support (food characteristics and DT)
- To collect time-temperature data during distribution, retail and domestic storage of foods, and to carry out consumer-based studies (characterise RFC)
- To clarify and provide guidelines on how to use reasonably foreseeable conditions in date marking decisions, i.e. what ranges of the existing variation to include, for instance about storage
- To develop ALOP/FSO for most food-pathogen combinations

# Intrinsic, extrinsic and implicit factors that affect microbiological food safety



- Conceptual figure illustrating three different scenarios in which the secondary shelf-life (time limit after opening the package) is influenced by the time of opening the package of the food product

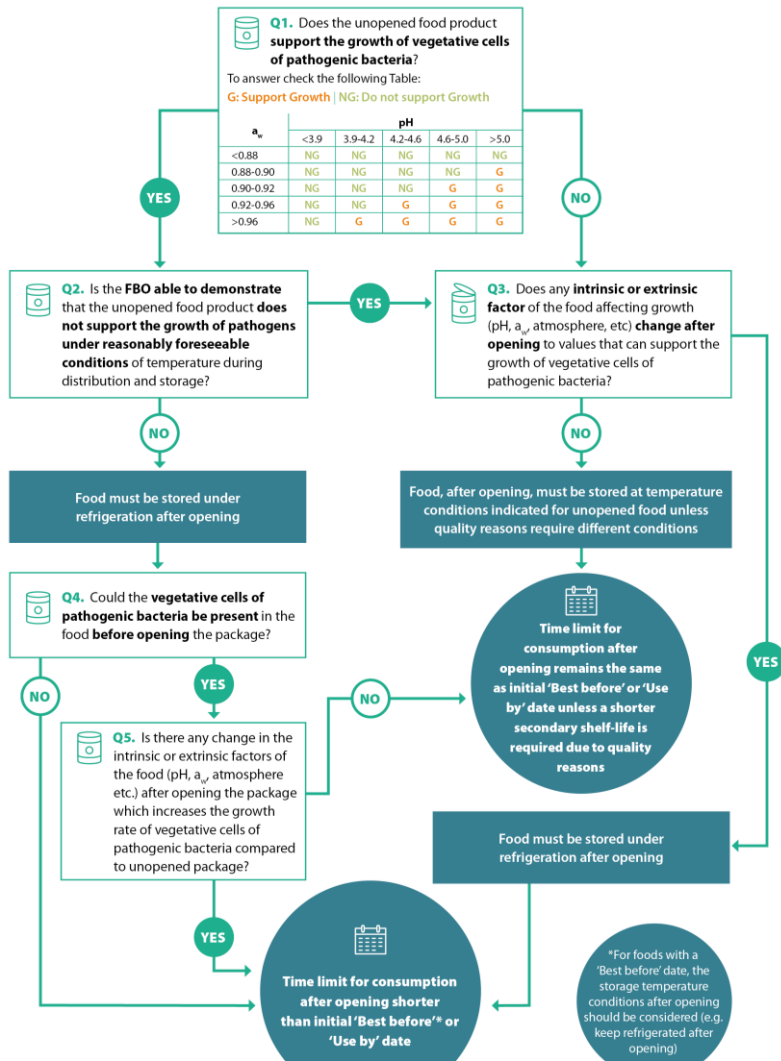
## Decision tree on time limit for consumption

- A decision tree was developed to assist FBOs in the decision whether it is appropriate to indicate the storage conditions and/or time limit for consumption after opening the package,

The DT will assist FBOs in deciding whether it is appropriate to indicate the storage conditions and time limit for consumption after opening the package. The underlying assumptions for the DT are that:

- After opening the package, contamination of the product with pathogenic microorganisms is always possible
- The time limit for consumption after opening the package in relation to the initial 'use by' or 'best before' date depends on whether opening the package changes:
  - the type of pathogenic microorganisms in the food (e.g. contamination with vegetative cells not present in the unopened food package with, in general, a wider range of growth capabilities compared to growth and/or toxin production from spores), or
  - the factors affecting growth of pathogenic microorganisms compared to the unopened product.

# Decision tree on time limit for consumption



- A decision tree was developed to assist FBOs in the decision whether it is appropriate to indicate the storage conditions and/or time limit for consumption after opening the package,

## Advice to be given to consumers regarding good thawing practices

- Choose a mode of thawing that ensures sufficiently rapid heating and/or sufficiently low temperature to avoid growth of pathogens which have survived during freezing
- Keep thawed foods in the original package or a suitable container to avoid contamination;
- Use of thawed food in other products or storage of the food after thawing should only be done according to the instructions from the FBO.
- Create awareness that certain frozen foods that are intended to be cooked may contain pathogens, and are not to be consumed without cooking.

# Acknowledgements

- BIOHAZ Panel:
  - Ana Allende, Avelino Alvarez-Ordóñez, Declan Bolton, Sara Bover-Cid, Marianne Chemaly, Robert Davies, Alessandra De Cesare, Lieve Herman, Friederike Hilbert, Konstantinos Koutsoumanis, Roland Lindqvist, Maarten Nauta, Luisa Peixe, Giuseppe Ru, Marion Simmons, Panagiotis Skandamis and Elisabetta Suffredini
- Working group:
  - Sara Bover-Cid, Liesbeth Jacxsens, Konstantinos Koutsoumanis, Roland Lindqvist, Taran Skjerdal
- BIOCONTAM Unit:
  - Maria Teresa Da Silva Felicio, Sandra Correia, Michaela Hempen, Winy Messens

# MRA in One Health approach

EDITORIAL

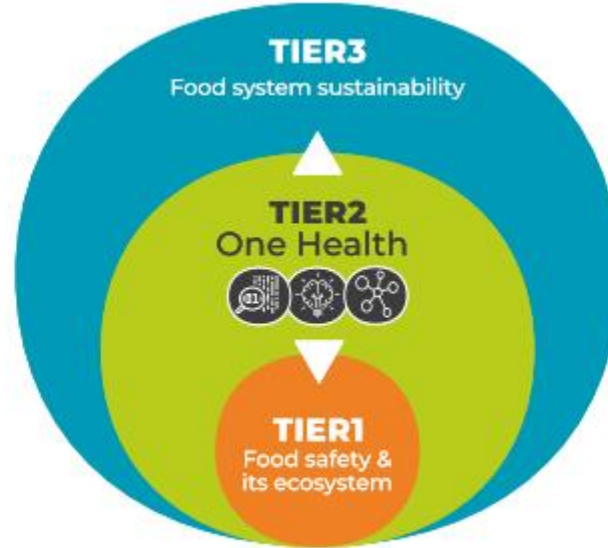


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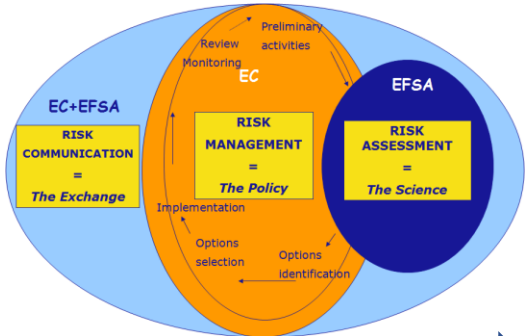
## Advancing food safety: strategic recommendations from the 'ONE – Health, Environment & Society – Conference 2022'

Yann Devos, Edward Bray, Stef Bronzwaer, Barbara Gallani and Bernhard Url



**Figure 1:** The One Health approach serving as a steppingstone between food safety and food system sustainability. Reprinted from Devos et al. (2022)

# MRA in One Health approach



MRA

Scenario Analysis

Selection of option reducing microbial risk

Human Health Risk



Environment



Food Prices



Animal Welfare

Food Security



“Isolated Risk” Approach



# MRA in One Health approach

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For instance,  
while a zero-tolerance strategy against a foodborne hazard might reduce microbial safety risks.....

it may lead to

- an increased used of **chemical preservatives**...
- a significant increase in **food prices** and **food waste**.....
- which would negatively impact **food security**
- and ultimately contribute to **health inequalities**.

Human Health Risk



Environment



Food Prices



Animal Welfare



Food Security

# MRA in One Health approach

## Challenge

“Το όλον είναι ανώτερο από το άθροισμα των μερών του”

(The whole is “bigger” than the sum of its parts)

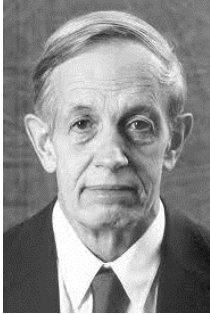
Aristotle 384-322 BC

Selection of options reducing microbial risk

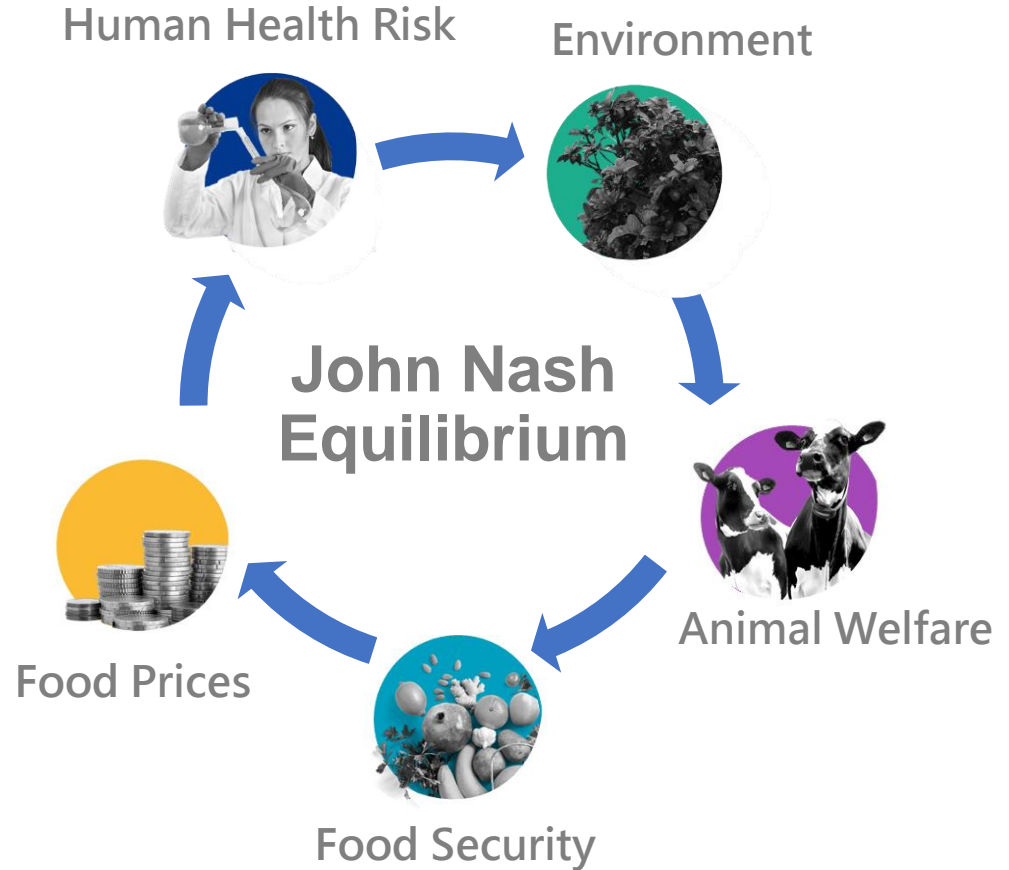


# MRA in One Health approach

Multi Risk Game involving interactions between Risks

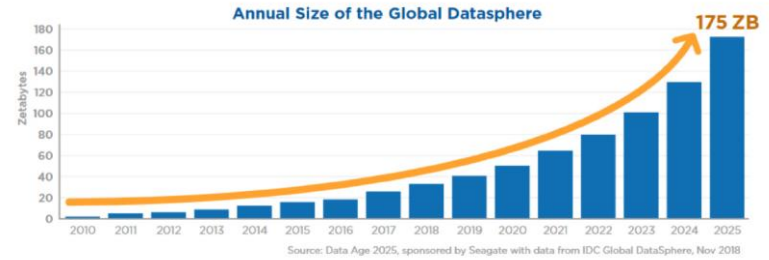


**Game Theory:** Determine mathematically and logically the actions to secure the best outcomes for all risks

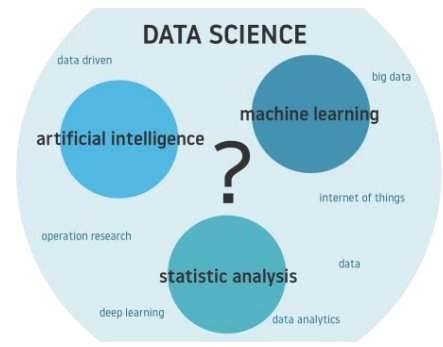


# MRA in One Health approach

*We can now deal with high Complexity*



More data produced in the last 5 years than the previous 5000 years.....



Progress in data analysis

# MRA in One Health approach

## *Risk Negotiation*

### AI-assisted Risk Negotiation: Integrated Risk Analysis for One Health (Submitted to WHO Bulletin)

Monika Ehling-Schulz<sup>1</sup>, Matthias Filter<sup>2</sup>, Jakob Zinsstag<sup>3</sup>, Konstantinos Koutsoumanis<sup>4</sup>, Mariam Ellouze<sup>5</sup>, Josef Teichmann<sup>6</sup>, Angelika Hilbeck<sup>7</sup>, Mauro Tonolla<sup>8</sup>, Danai Etter<sup>9</sup>, Katharina Stärk<sup>10</sup>, Martin Wiedmann<sup>11</sup>, Sophia Johler<sup>9</sup>

multi-player games involving  
cooperation and competition



**Fig. 1: Risk analysis framework.** The novel Risk-Negotiation-centered risk analysis framework enables stakeholders to negotiate a balanced solution, taking different risk dimensions and trade-offs (risk valorization) into account.



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