

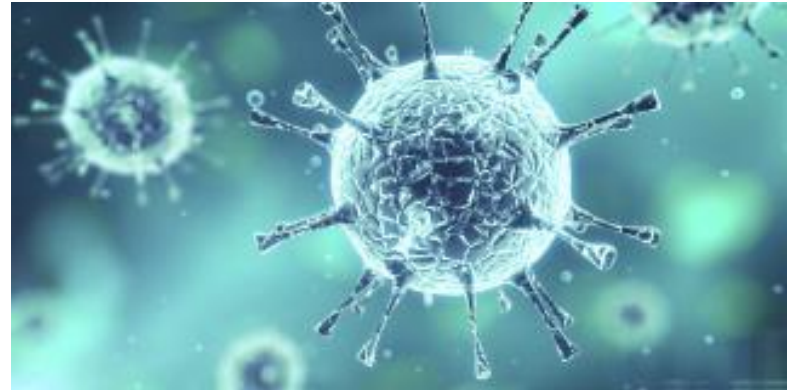


# EFSA's activities on *Listeria monocytogenes* in RTE foods

**Winy Messens**

Workshop - Evaluating the risk from the presence of *Lm* in RTE meat products, Athens, 14-15 February 2019

# **EFSA's Scientific Process and the remit of the BIOHAZ Panel**



# EFSA'S SCIENTIFIC PROCESS

## Request from



- outlines what is being asked of EFSA
  - e.g. the issue, the terms of reference, the timeframe

## Assessment

The Working Group experts do the detailed scientific work



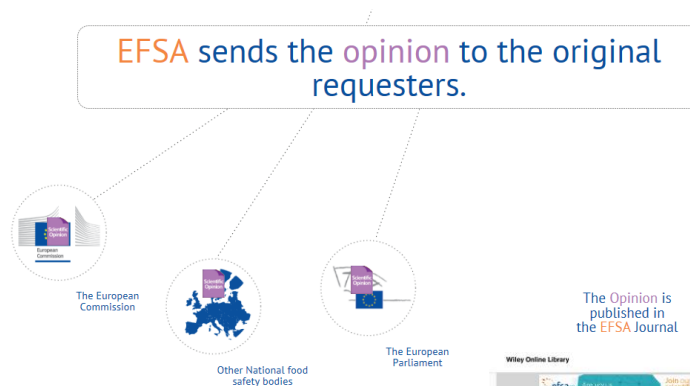
# EFSA'S SCIENTIFIC PROCESS

## ■ Adoption



The **Scientific Committee or Panel**  
**adopts the opinion** by consensus  
Possible minority opinions are recorded

## ■ Publication



The Opinion is  
published in  
the **EFSA Journal**



# REMIT BIOHAZ PANEL

- The BIOHAZ Panel provides scientific advice on biological hazards in relation to food safety and food-borne diseases
- This covers
  - animal diseases transmissible to humans
  - transmissible spongiform encephalopathies
  - food microbiology
  - food hygiene and associated waste management issues



# EU summary report and baseline survey

## SCIENTIFIC REPORT



APPROVED: 19 November 2018

doi: 10.2903/j.efsa.2018.5500

## The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2017

European Food Safety Authority and European Centre for Disease Prevention and Control (EFSA and ECDC)

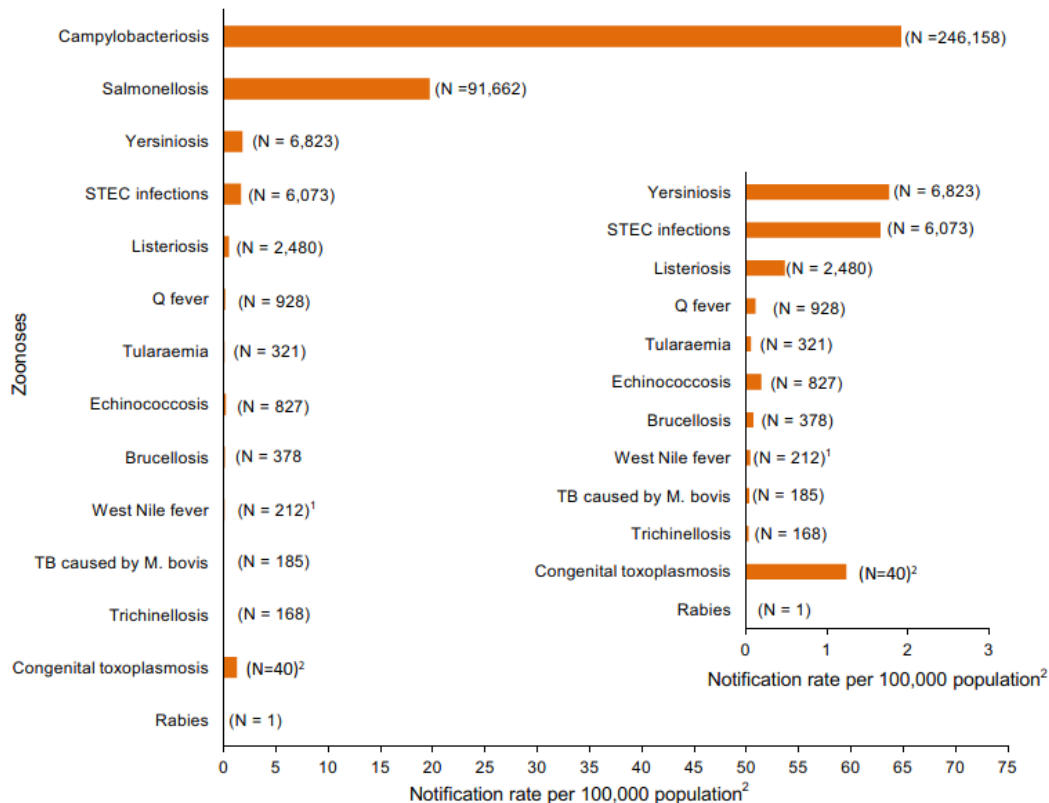
### Abstract

This report of the European Food Safety Authority and the European Centre for Disease Prevention and Control presents the results of zoonoses monitoring activities carried out in 2017 in 37 European countries (28 Member States (MS) and nine non-MS). Campylobacteriosis was the commonest reported zoonosis and its EU trend for confirmed human cases increasing since 2008 stabilised during 2013–2017. The decreasing EU trend for confirmed human salmonellosis cases since 2008 ended during 2013–2017, and the proportion of human *Salmonella* Enteritidis cases increased, mostly due to one MS starting to report serotype data. Sixteen MS met all *Salmonella* reduction targets for poultry, whereas 12 MS failed meeting at least one. The EU flock prevalence of target *Salmonella* serovars in breeding hens, laying hens, broilers and fattening turkeys decreased or remained stable compared to 2016, and slightly increased in breeding turkeys. *Salmonella* results on pig carcasses and target *Salmonella* serovar results for poultry from competent authorities tended to be generally higher compared to those from food business operators. The notification rate of human listeriosis further increased in 2017, despite *Listeria* seldom exceeding the EU food safety limit in ready-to-eat food. The decreasing EU trend for confirmed yersiniosis cases since 2008 stabilised during 2013–2017. The number of confirmed shiga toxin-producing *Escherichia coli* (STEC) infections in humans was stable. A total of 5,079 food-borne (including waterborne) outbreaks were reported. *Salmonella* was the commonest detected agent with *S. Enteritidis* causing one out of seven outbreaks, followed by other bacteria, bacterial toxins and viruses. The agent was unknown in 37.6% of all outbreaks. *Salmonella* in eggs and *Salmonella* in meat and meat products were the highest risk agent/food pairs. The report further summarises trends and sources for bovine tuberculosis, *Brucella*, *Trichinella*, *Echinococcus*, *Toxoplasma*, rabies, *Coxiella burnetii* (Q fever), West Nile virus and tularaemia.

# MONITORING OF ZONNOSES AND FBO

- EU system is based on the Directive on the monitoring of zoonoses and zoonotic agents (2003/99/EC)
  - obliges EU Member States (MS) to collect data on zoonoses, zoonotic agents, antimicrobial resistance (AMR) and food-borne outbreaks (FBO)
  - EFSA examines these data and publishes the EU annual Summary Reports (EUSR)
- Data collection mandatory for 8 zoonotic agents
  - *Salmonella*, *Campylobacter*, *Listeria monocytogenes (Lm)*, *Brucella*, Tuberculosis due to *Mycobacterium bovis*, Verotoxigenic *Escherichia coli*, *Trichinella*, *Echinococcus*

# REPORTED CONFIRMED HUMAN ZOOSES, EU, 2017



Note: Total number of confirmed cases is indicated in parenthesis at the end of each bar.

<sup>1</sup>Exception: West Nile fever where total number of cases were used.

<sup>2</sup>Exception: congenital toxoplasmosis notification rate per 100,000 live births.



# REPORTED CONFIRMED HUMAN ZONNOSES, EU, 2017

Disease	Number of confirmed <sup>(a)</sup>		Hospitalisation			Deaths			
	Human cases	Status available (%)	Number of reporting MS <sup>(b)</sup>	Reported hospitalised cases	Proportion hospitalised (%)	Outcome available (%)	Number of reporting MS <sup>(b)</sup>	Reported Deaths	Case Fatality (%)
<b>Campylobacteriosis</b>	246,158	27.6	17	20,810	30.5	72.8	16	45	0.04
<b>Salmonellosis</b>	91,662	43.1	14	16,796	42.5	67.8	17	156	0.25
<b>Yersiniosis</b>	6,823	27.1	14	616	33.4	65.5	15	3	0.07
<b>STEC infections</b>	6,073	41.0	18	933	37.5	66.1	21	20	0.50
<b>Listeriosis</b>	2,480	40.4	16	988	98.6	65.8	18	225	13.8
<b>Q-fever</b>	928	NA <sup>(c)</sup>	NA	NA	NA	56.0	10	7	1.35
<b>Echinococcosis</b>	827	31.2	14	140	54.3	30.1	14	1	0.40
<b>Brucellosis</b>	378	45.8	10	104	60.1	33.9	10	1	0.78
<b>Tularaemia</b>	321	38.3	9	76	61.8	51.1	9	1	0.6
<b>West Nile fever<sup>(a)</sup></b>	212	72.2	8	134	87.6	98.6	9	25	12.0
<b>Trichinellosis</b>	168	44.6	9	56	74.7	40.5	9	0	0.0
<b>Congenital toxoplasmosis</b>	40	57.9	3	18	NA	63.2	3	0	0.0
<b>Rabies</b>	1	NA <sup>(c)</sup>	NA	NA	NA	0.0	0	NA	NA

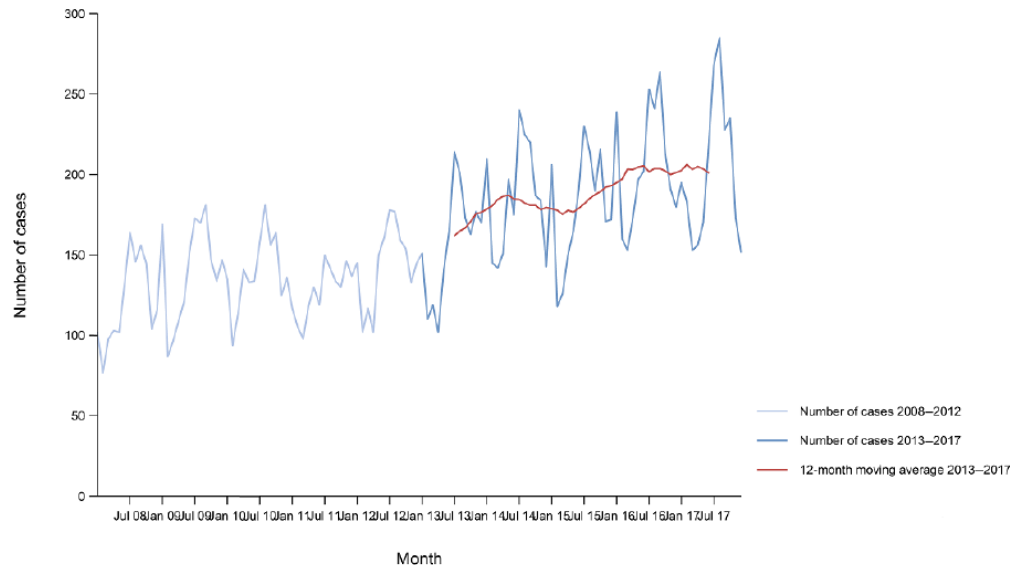
(a): Exception: West Nile fever where total number of cases were included.

(b): Not all countries observed cases for all diseases.

(c): NA: Not applicable as the information is not collected for this disease.

# TREND IN LISTERIOSIS CASES, EU/EEA

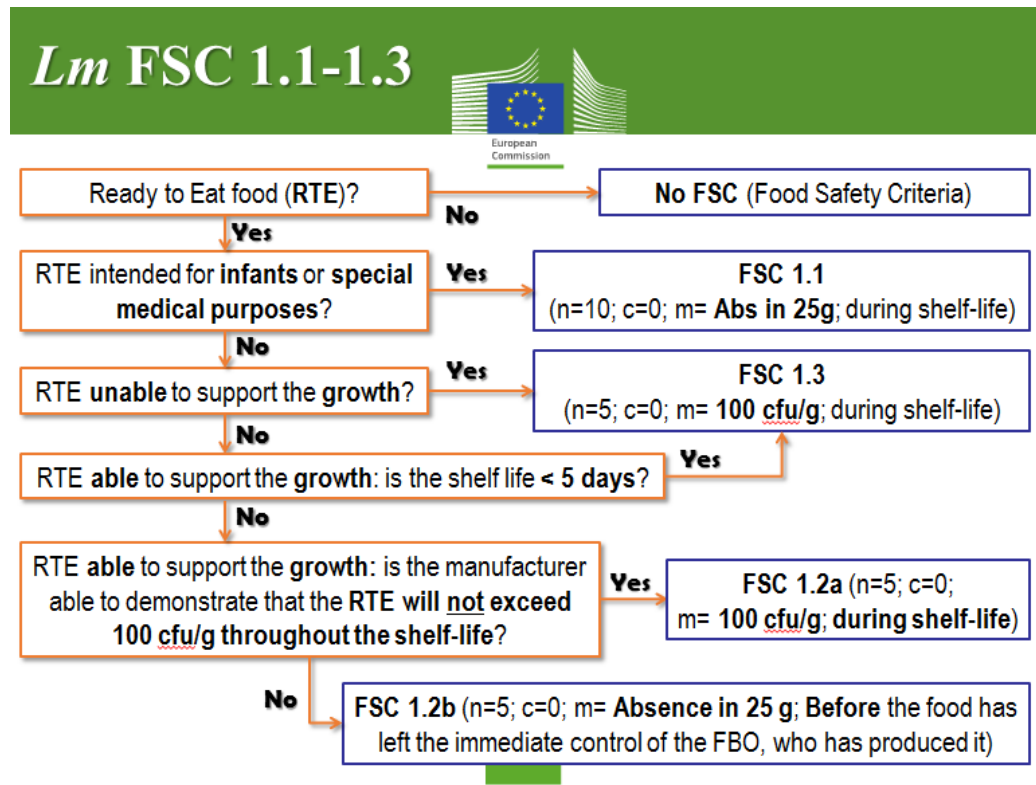
- In 2008–2017, a statistically significant increasing trend of confirmed human listeriosis cases was observed in the EU/EEA ( $p < 0.01$ )
- Also in the last 5 years (2013–2017)



Source: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. Bulgaria, Croatia, Luxembourg and Portugal did not report data to the level of detail required for the analysis.

# Lm FOOD SAFETY CRITERIA FOR RTE FOODS

- Different *Lm* food safety criteria (FSC) have been laid down for RTE foods
- Non-satisfactory results were consistently higher at the processing stage compared with retail and highest in fish and fishery products followed by soft and semi-soft cheeses and other dairy products



# EU-WIDE BASELINE SURVEY

- Conducted in 2010 and 2011
- Estimation of the EU prevalence (and contamination levels) of *Lm* in three RTE food categories at retail
  - ✓ packaged (not frozen) smoked or gravad fish: 10.3%
  - ✓ packaged heat-treated meat products: 2.07%
  - ✓ soft or semi-soft cheese: 0.47%

## SCIENTIFIC REPORT OF EFSA

**Analysis of the baseline survey on the prevalence of *Listeria monocytogenes* in certain ready-to-eat foods in the EU, 2010-2011**  
**Part A: *Listeria monocytogenes* prevalence estimates<sup>1</sup>**

European Food Safety Authority<sup>2,3</sup>

European Food Safety Authority (EFSA), Parma, Italy

## SCIENTIFIC REPORT OF EFSA

**Analysis of the baseline survey on the prevalence of *Listeria monocytogenes* in certain ready-to-eat foods in the EU, 2010-2011**  
**Part B: analysis of factors related to prevalence and exploring compliance<sup>1</sup>**

European Food Safety Authority<sup>2,3</sup>

European Food Safety Authority (EFSA), Parma, Italy

# BIOHAZ Self-task mandate

Home News Campylobacter and Listeria infections still...

17 December 2015

Biological hazards  
DATA

print

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## Campylobacter and Listeria infections still rising in the EU – say EFSA and ECDC



Human cases of listeriosis and campylobacteriosis rose once again in 2014, continuing an upward trend that began in 2008. Salmonellosis cases increased slightly for the first time since 2008. These are the main findings of the latest annual report by EFSA and ECDC on zoonoses and foodborne outbreaks in the European Union.

Listeriosis infections reported in humans increased by 16% compared with 2013: there were 2,161 confirmed cases in 2014. Although this number is relatively low, the rise of reported listeriosis cases is of concern as the surveillance of these infections is focused on severe forms of the disease, with higher death rates than for other food-borne diseases, particularly among the elderly, and patients with a weak immune system. However, *Listeria monocytogenes*, the bacterium that causes listeriosis in humans and animals, seldom exceeded the legal safety limits in ready-to-eat foods – the most common foodborne source of human infections.

### Subject area

Biological hazards

### Related topics

Food-borne zoonotic diseases

### Related News

[EFSA provides scientific advice on Enterotoxigenic E. coli](#)

News in brief

Biological hazards

published: 16 Dec 2015

[EFSA advises on heat treatment of bivalve molluscs](#)

News

Biological hazards

published: 14 Dec 2015

[European Antibiotic Awareness Day](#)

News

# TERMS OF REFERENCE

The BIOHAZ panel is requested by EFSA to issue a Scientific Opinion on *Lm* contamination of RTE foods and the risk for human health in the EU. In particular, the BIOHAZ Panel is requested:

**ToR 1** - To summarise and critically evaluate the most recent information on *Lm* in RTE foods, and in particular from:

- the EU-wide baseline survey and monitoring data
- the three ongoing EFSA outsourcing activities

**ToR 2** - To discuss and evaluate the factors related to the contamination in the food chain and the consumption patterns that may contribute to the reported trend of listeriosis incidence in the EU

# OUTSOURCING ACTIVITIES

## “Closing gaps for performing a risk assessment on *Lm* in RTE foods”

**Activity 1:** an extensive literature search and study selection with data extraction on *Lm* in a wide range of RTE foods

- NP/EFSA/BIOCONTAM/2015/04-CT1
- 3/11/2015-2/10/2016

### EXTERNAL SCIENTIFIC REPORT



APPROVED: 28 November 2016  
doi:10.2903/sp.efsa.2016.EN-1141

**Closing gaps for performing a risk assessment on *Listeria monocytogenes* in ready-to-eat (RTE) foods: activity 1, an extensive literature search and study selection with data extraction on *L. monocytogenes* in a wide range of RTE food**

Anna Jofré<sup>1</sup>, Margarita Garriga<sup>1</sup>, Teresa Aymerich<sup>1</sup>, Fernando Pérez-Rodríguez<sup>2</sup>, Antonio Valero<sup>1</sup>, Elena Carrasco<sup>2</sup> and Sara Bover-Cid<sup>1</sup>

<sup>1</sup>IRTA, Monells, Spain, <sup>2</sup>University of Cordoba, Córdoba, Spain

**Activity 2:** a quantitative risk characterization on *Lm* in RTE foods; starting from the retail stage

- OC/EFSA/BIOCONTAM/2014/02-CT1
- 1/10/2014-31/01/2017

### EXTERNAL SCIENTIFIC REPORT



APPROVED 31 May 2017  
doi:10.2903/sp.efsa.2017.EN-1252

**Closing gaps for performing a risk assessment on *Listeria monocytogenes* in ready-to-eat (RTE) foods: activity 2, a quantitative risk characterization on *L. monocytogenes* in RTE foods; starting from the retail stage**

Fernando Pérez-Rodríguez,<sup>1</sup> Elena Carrasco,<sup>1</sup> Sara Bover-Cid,<sup>2</sup> Anna Jofré,<sup>2</sup> and Antonio Valero<sup>1</sup>

<sup>1</sup>Departamento de Bromatología y Tecnología de los Alimentos, University of Cordoba (UCO), Córdoba, Spain, <sup>2</sup>Institut de Recerca i Tecnologia Agroalimentàries (IRTA), Food Safety Programme, Monells, Spain

**Activity 3:** the comparison of isolates from different compartments along the food chain, and in humans using Whole Genome Sequencing

- OC/EFSA/BIOCONTAM/2014/01-CT1
- 7/10/2014-7/10/2016

### EXTERNAL SCIENTIFIC REPORT



APPROVED: 13 December 2016  
doi:10.2903/sp.efsa.2017.EN-1151

**Closing gaps for performing a risk assessment on *Listeria monocytogenes* in ready-to-eat (RTE) foods: activity 3, the comparison of isolates from different compartments along the food chain, and from humans using whole genome sequencing (WGS) analysis**

Eva Møller Nielsen<sup>1</sup>, Jonas T. Björkman<sup>1</sup>, Kristoffer Kill<sup>1</sup>, Kathie Grant<sup>2</sup>, Tim Dallman<sup>2</sup>, Anaïs Painset<sup>2</sup>, Corinne Amar<sup>2</sup>, Sophie Roussel<sup>2</sup>, Laurent Guillier<sup>3</sup>, Benjamin Félix<sup>3</sup>, Ovidiu Rotariu<sup>4</sup>, Francisco Perez-Reche<sup>5</sup>, Ken Forbes<sup>6</sup>, Norval Strachan<sup>4</sup>

<sup>1</sup>Statens Serum Institut, Copenhagen, Denmark; <sup>2</sup>Public Health England, Colindale, UK; <sup>3</sup>Anses, Maisons-Alfort, France; <sup>4</sup>University of Aberdeen, UK

# OPENNESS AND TRANSPARENCY

In line with EFSA's policy on openness and transparency

- **Public consultation** of the endorsed draft opinion from 24 Jul - 29 Sep 2017

## DRAFT SCIENTIFIC OPINION



ADOPTED: dd mmmm yyyy

doi:10.2903/j.efsa.20YY.NNNN

- 1 ***Listeria monocytogenes* contamination of ready-to-eat**
- 2 **foods and the risk for human health in the EU**
- 3 EFSA Panel on Biological Hazards (BIOHAZ),
- 4 Antonia Ricci, Ana Allende, Declan Bolton, Marianne Chemaly, Robert Davies, Pablo Salvador
- 5 Fernández Escámez, Rosina Girones, Lieve Herman, Konstantinos Koutsoumanis, Birgit
- 6 Nørrung, Lucy Robertson, Giuseppe Ru, Moez Sanaa, Marion Simmons, Panagiotis
- 7 Skandamis, Emma Snary, Niko Speybroeck, Benno Ter Kuile, John Threlfall, Helene
- 8 Wahlström, Johanna Takkinen, Martin Wagner, Davide Arcella, Maria Teresa Da Silva Felicio,
- 9 Marios Georgiadis, Winy Messens and Roland Lindqvist
- 10 **ENDORSED FOR PUBLIC CONSULTATION ON 6 JULY 2017**

- **Stakeholder meeting** on 19 – 20 Sep 2017 during the public consultation; presentations available  
<https://www.efsa.europa.eu/en/events/event/170919-2>



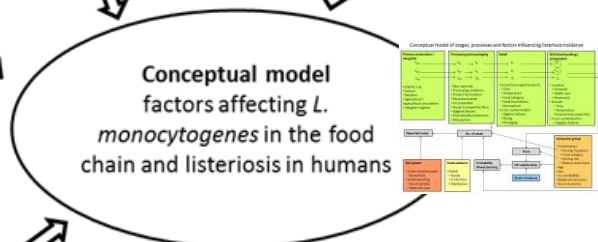
# APPROACH TO ToR



Baseline survey,  
consumption data  
and reports



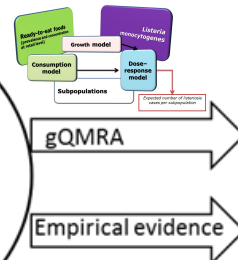
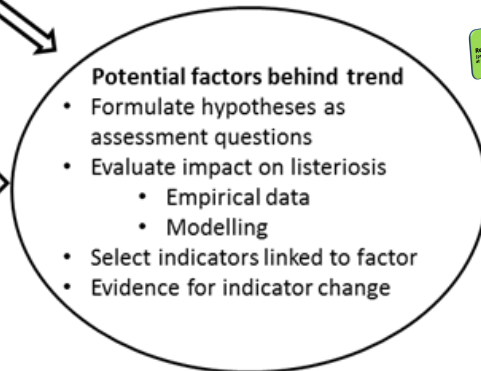
Other scientific information  
(literature, data)



Review of sensitivity  
analyses in published  
QMRA's



Time Series Analyses  
listeriosis incidence



ToR 1

**Updated evidence for**

- Hazard identification
- Hazard characterization
- Exposure assessment
- Risk characterization

ToR 2

**Evaluation of epidemiological  
trend and hypotheses**

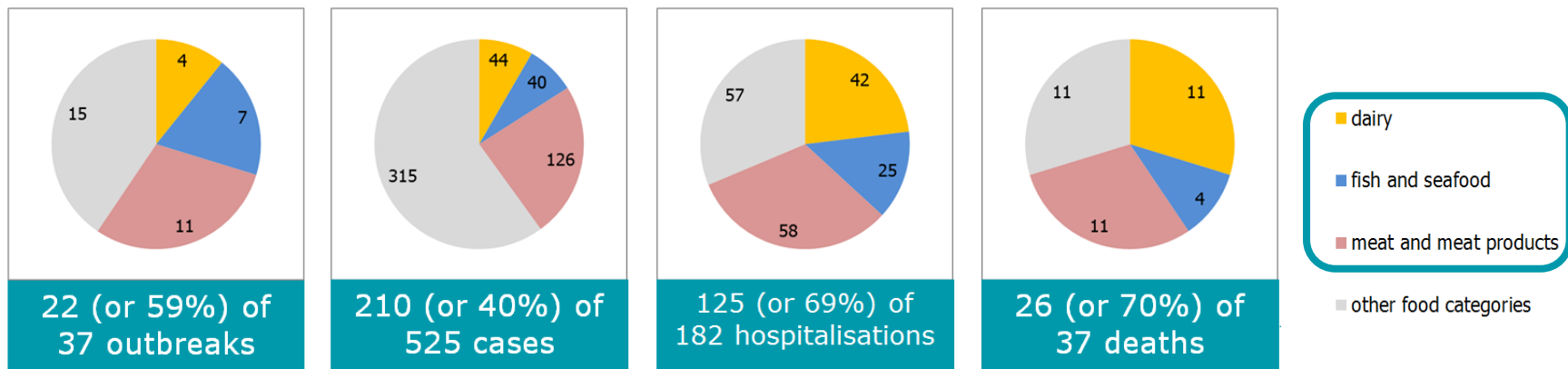
- Outcomes TSA
- Importance analyses
- Uncertainty analysis
- Synthesis of evidence on support for different hypotheses

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# HAZARD IDENTIFICATION

## What foods are involved in human listeriosis?

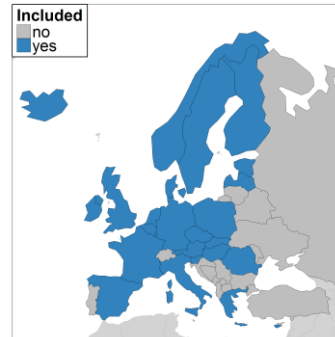
- ✓ The RASFF food product categories 'meat and meat products other than poultry', 'fish and fish products' and 'milk and milk products' accounted for **87%** of the 690 **RASFF notifications** related to *Lm* in RTE food (2008–2016)
- ✓ Strong-evidence **food-borne outbreaks** caused by *Listeria* (EU/EEA, 2008–2015)



This finding reinforces the fact that these food categories continue to have public health significance from a food safety perspective

# THE LISTERIOSIS TREND

Have the human listeriosis cases in the EU/EEA increased (2008-2015)?

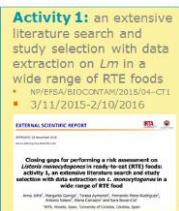


- At an **aggregated level**, human listeriosis cases pattern with strong seasonality & presence of auto-correlation, but **no significant trend**
- At a **disaggregated** level (i.e. age-gender subgroups) significant human listeriosis cases **trends in** following groups: **F25-44, F75+, M75+**
- Highest incidence rates in the 75+ group with an incidence rate of 2.2 & 1.3 cases per month per million persons for the males & females in 2015

# EXPOSURE ASSESSMENT

To what extent is the consumer exposed to *Lm* by consuming RTE foods?

- ✓ **ELS:** The median of the prevalence was  $< 10\%$  for all subcategories, with some exceptions
- ✓ *Lm* concentration  $> 2 \log_{10} \text{ CFU/g}$  in  $\sim 80\%$  and  $65\%$  of RASFF notifications
- ✓ **Cooked meat and heat-treated sausage** had the most consumed servings per person and year in the EU/EEA
- ✓  $\sim 55$  million servings contaminated with  $> 100 \text{ CFU/g}$  may be consumed by the  $\geq 75$  yo group per year in EU/EEA
- ✓ Unsafe practices are not uncommon within the elderly group
- ✓ **Temperature of domestic refrigerators** is highly variable



# EXPOSURE ASSESSMENT

## What is the impact of different factors on the exposure?

- Growth of *Lm* = **risk determining step**. Storage times-T, antimicrobials & competition → control the risk
- At retail, cross-contamination of RTE foods from other products/retail environment = **important risk factor**

**Activity 2:** a quantitative risk characterization on *Lm* in RTE foods; starting from the retail stage

- OC/EFSA/BIOCONTAM/2014/02-CT1
- 1/10/2014-31/01/2017

### EXTERNAL SCIENTIFIC REPORT

APPROVED on May 2017  
 and published on 10/10/2017

Closing gaps for performing a risk assessment on *Listeria monocytogenes* in ready-to-eat (RTE) foods; activity 2, a quantitative risk characterization on *L. monocytogenes* in RTE foods; starting from the retail stage

Fernando Pérez Rodríguez, Iñaki Carrozzini, María Bener-Gil, Anna Jellé, and Antonio Valler

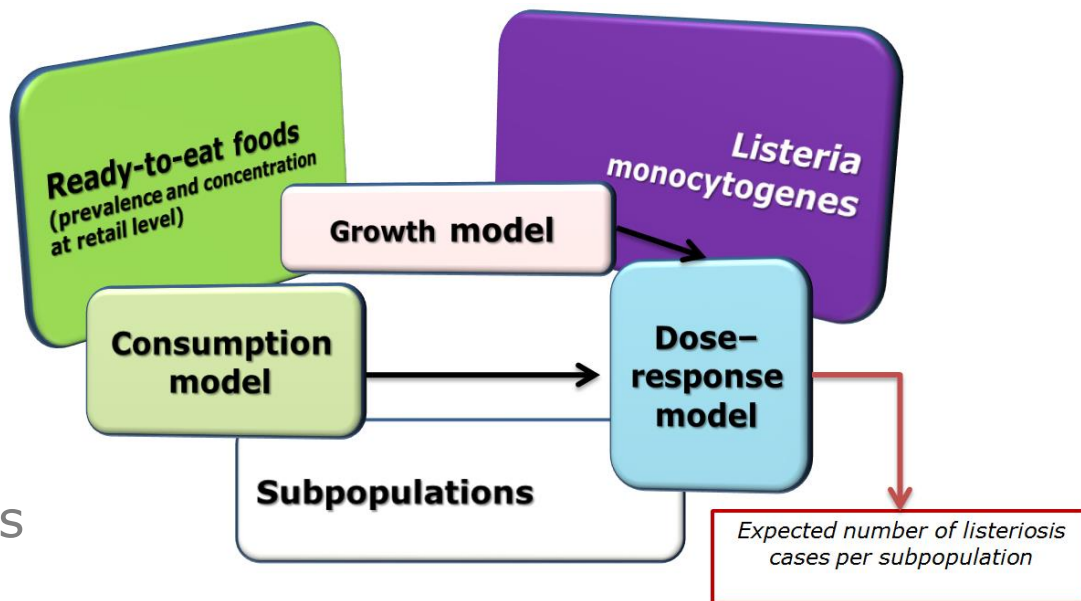
Universidad de Zaragoza, Universidad de las Islas Baleares, Universidad de Córdoba (USC), Gobierno de Aragón, Institut de Recerca i Tecnologia Agrària i Alimentària (IRTA), Food Safety Programme, Madrid, Spain

- Cooked meat (863) > sausage (541) > gravad fish (370) > cold smoked fish (358) > pâté (158) > soft and semi-soft cheese (19) and hot-smoked fish (7 cases)
- Estimated risk/10<sup>6</sup> servings in general highest for the pregnant population > elderly > healthy population
- Most cases predicted in the elderly (48%) > pregnant population (41%) > healthy population (11%)

# LM GENERIC QMRA MODEL

The gQMRA model used to explain the trend in listeriosis cases

- Developed upon
  - Activity 2: a quantitative risk characterization on *Lm* in RTE foods; starting from the retail stage
    - OC/EFSA/BIOCONTAM/2014/02-CT1
    - 1/10/2014-31/01/2017
- Consistent with TSA analysis: same 14 age-gender groups
- Implementation in R
- Seven RTE food categories



Cold-smoked fish, hot-smoked fish, gravad fish, cooked meat, sausage, pâté, soft and semi-soft cheese

# EVIDENCE TO EXPLAIN TREND

## Factors considered as **likely (66–90%)**

An increased **proportion** of susceptible persons in age groups > 45 yo for both genders (other factor as well)

An increased population size of the elderly and susceptible population (except for the 25–44 female age group)

This factor would **only** contribute to the **number** of listeriosis cases but **not** the increase in **incidence**

## Factors considered **as likely as not (33–66%)**

An increased consumption (number of servings per person) of RTE foods in the EU/EEA

An improved surveillance of human listeriosis in the EU/EEA

# EVIDENCE TO EXPLAIN TREND

## Inconclusive factors

*Lm* prevalence and concentration in the three considered RTE food categories at retail



*Lm* virulence potential



Storage conditions after retail  
(time and temperature)



Due to data limitations the present evaluation was based on only three RTE categories which is a limitation of the assessment



# Ongoing work



# MANDATE

EFSA is asked to issue a scientific opinion on the public health (PH) risk posed by *Lm* and if considered relevant by EFSA other pathogens that may contaminate fruit, vegetables and herbs (FVH) which are processed (e.g. blanched) prior to be placed on the market frozen.

Ref. Ares(2018)6211656 - 04/12/2018



EUROPEAN COMMISSION  
DIRECTORATE-GENERAL FOR HEALTH AND FOOD SAFETY

Directorate G - Crisis management in food, animals and plants  
Director

Brussels,  
sante.ddg2.g.4/PA/eth (2018)6250140

Dear Mr Url,

**Subject:** Request for a scientific opinion on the public health risk posed by *Listeria monocytogenes* in frozen fruit and vegetables including herbs, blanched during processing

By this letter and in accordance with Article 29(1) (a) of Regulation (EC) No 178/2002, the Commission requests EFSA for a scientific opinion on the risk posed by *Listeria monocytogenes* and if considered relevant by EFSA, other foodborne pathogens in blanched and frozen fruit and vegetables including herbs.

A recent multistate outbreak implicating frozen vegetables, caused by *Listeria monocytogenes*, and its follow-up indicated indeed the need for a scientific opinion on the risk factors of contamination of this type of food and possible risk mitigation options.

The Terms of Reference of the request are attached to this letter. The Commission would appreciate receiving the EFSA opinion by the end of March 2020.

My services remain at your disposal for further information. The coordinating desk officer for this file is Mr Petros Angelopoulos. For procedural matters the contact person is Ms Marina Marini. Their respective phone and email addresses are indicated below.

Yours sincerely,

Bernard Van Goethem

# TERMS OF REFERENCE

**ToR 1** - to provide an estimation of the PH impact of *Lm* contamination, and if considered relevant of other pathogens of frozen FVHs blanched before freezing

**ToR 2** - to assess the main risk factors of contamination and growth of pathogens in frozen FVH during all stages from processing (excluding at primary production) until consumption (including e.g. storage after thawing food preparation and consumption habits)

**ToR 3** - to provide recommendations:

- on possible control options that may be implemented by food business operators during the production process of frozen FVH and assess their efficacy to reduce PH risks
- on routine monitoring for *Lm* in frozen FVH taking into account Good Hygiene Practises and procedures based on the HACCP principles

# ACKNOWLEDGEMENTS

- BIOHAZ Panel
- Contractors
- WG members

Name	Role	Affiliation
Roland Lindqvist	Chair	<i>Swedish National Food Agency (Sweden)</i>
Kostas Koutsoumanis	WG member	<i>Aristotle University of Thessaloniki, Greece</i>
Moez Sanaa	WG member	<i>ANSES, France</i>
Panagiotis Skandamis	WG member	<i>Agricultural University of Athens, Greece</i>
Niko Speybroeck	WG member	<i>Université Catholique de Louvain, Belgium</i>
Johanna Takkinen	WG member	<i>ECDC, Sweden</i>
Martin Wagner	WG member	<i>University of Veterinary Medicine Vienna, Austria</i>
Andy Hart	Hearing expert	<i>Fera Science Limited, York, UK</i>
Sophie Roussel	Hearing expert	<i>EURL L. monocytogenes, ANSES, France (until Feb 2017)</i>



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