Use of epidemiological data in microbiological risk assessments

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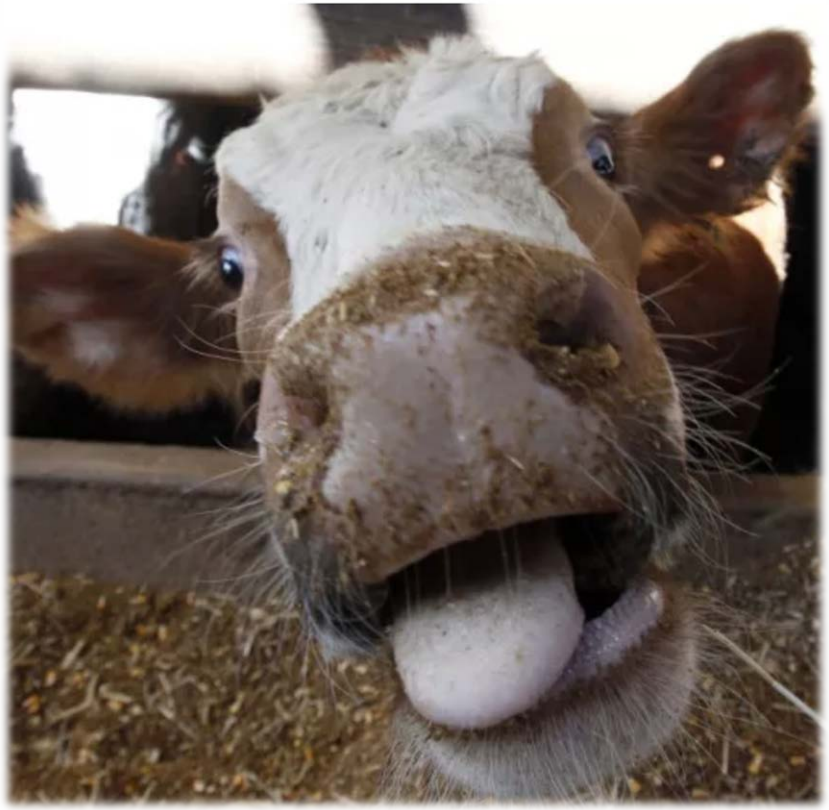
UK Food Standards Agency

Outline

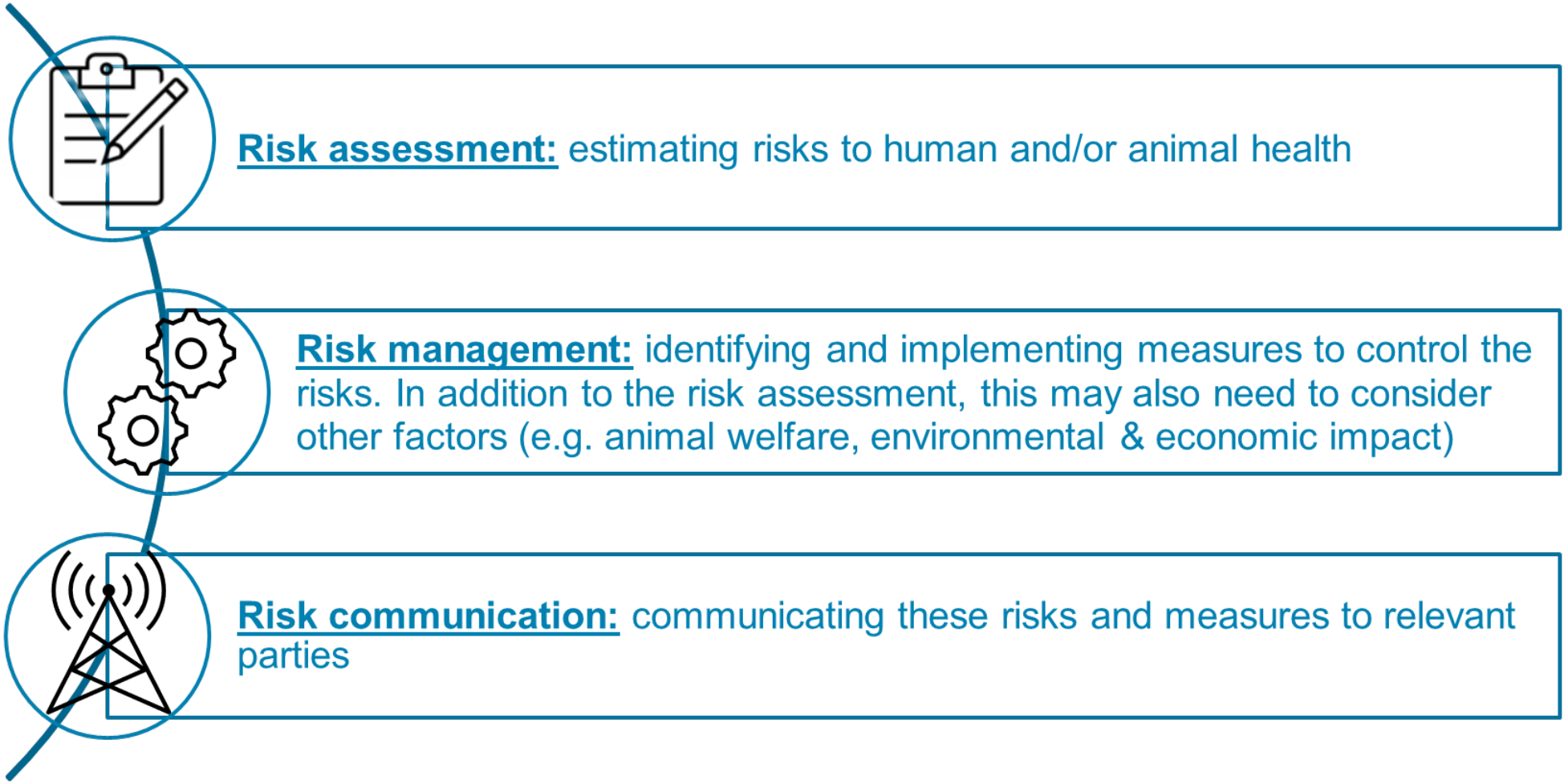
- UK Food Standards Agency
- Case Study #1: *Listeria monocytogenes* in smoked fish
- Case Study #2: Avian influenza in poultry and wild game products
- Conclusions

Two decades protecting consumers

- The Food Standards Agency was set up 2000 in the wake of a number of food safety crises
- We are an independent statutory body
- We are proud of our independence and its importance in delivering food you can trust.



FSA Risk Analysis Process

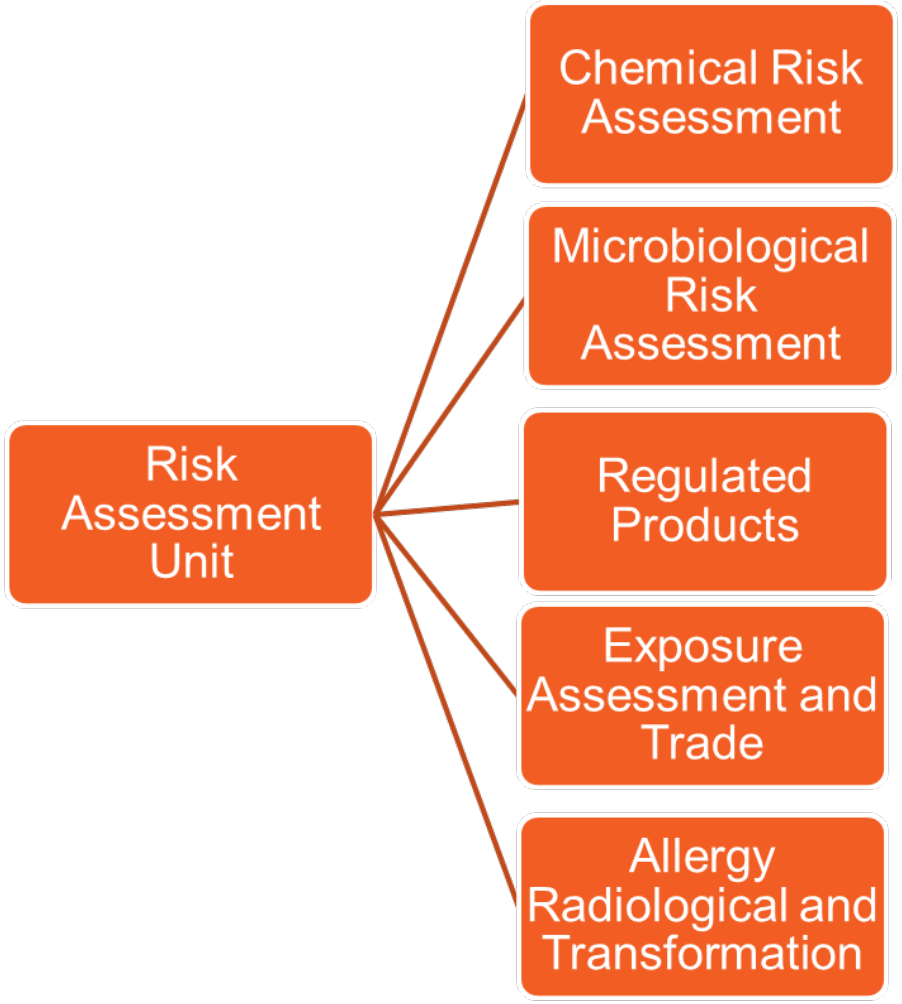


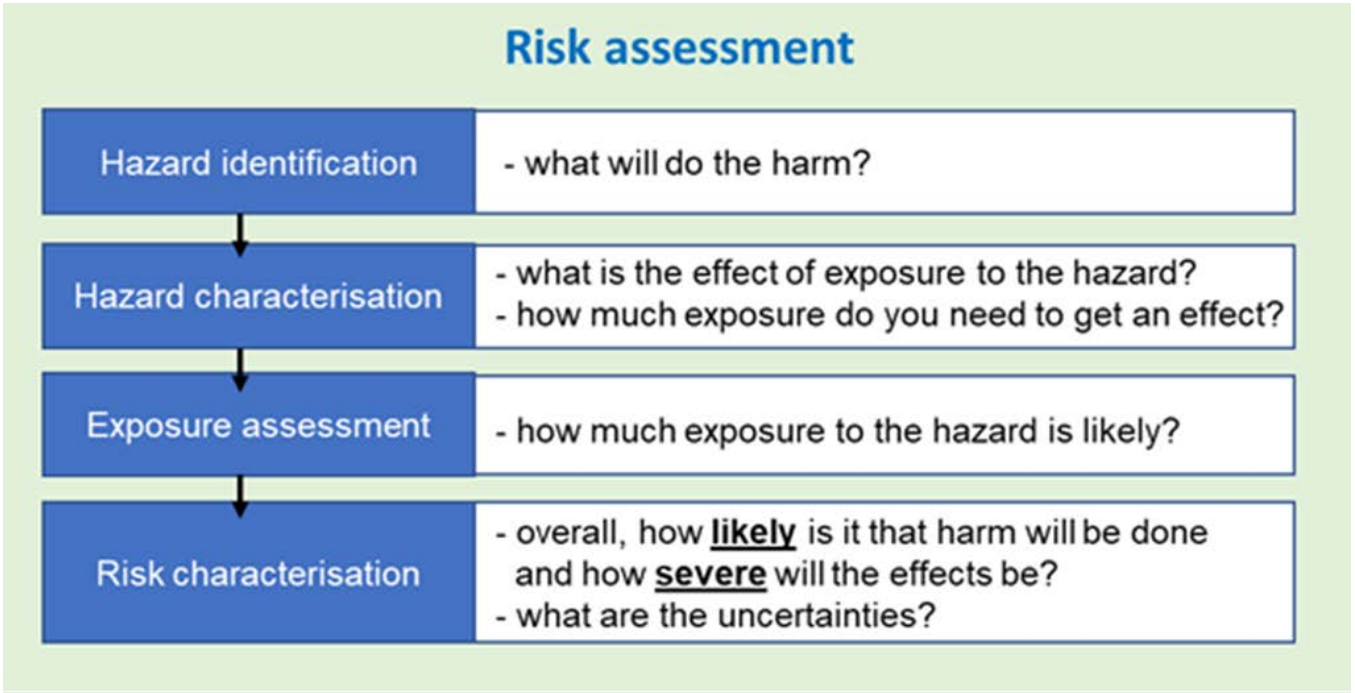
Risk assessment: estimating risks to human and/or animal health

Risk management: identifying and implementing measures to control the risks. In addition to the risk assessment, this may also need to consider other factors (e.g. animal welfare, environmental & economic impact)

Risk communication: communicating these risks and measures to relevant parties

FSA Risk Assessment





FSA Micro Risk Assessment

- Quality assured by ACMSF
- Multidimensional representation of risk

Advisory Committee on the Microbiological Safety of Food

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Case Study #1

Listeria monocytogenes in smoked fish

L. mono in smoked fish

Background

- Outbreak of *Listeria monocytogenes* from smoked fish identified in July 2021
- Difference in advice on consumption of smoked fish during pregnancy amongst UK 4 nations
- Risk assessment requested to review advice for vulnerable consumers early 2022

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Food Standards Scotland
For safe food and healthy eating

L. mono in smoked fish

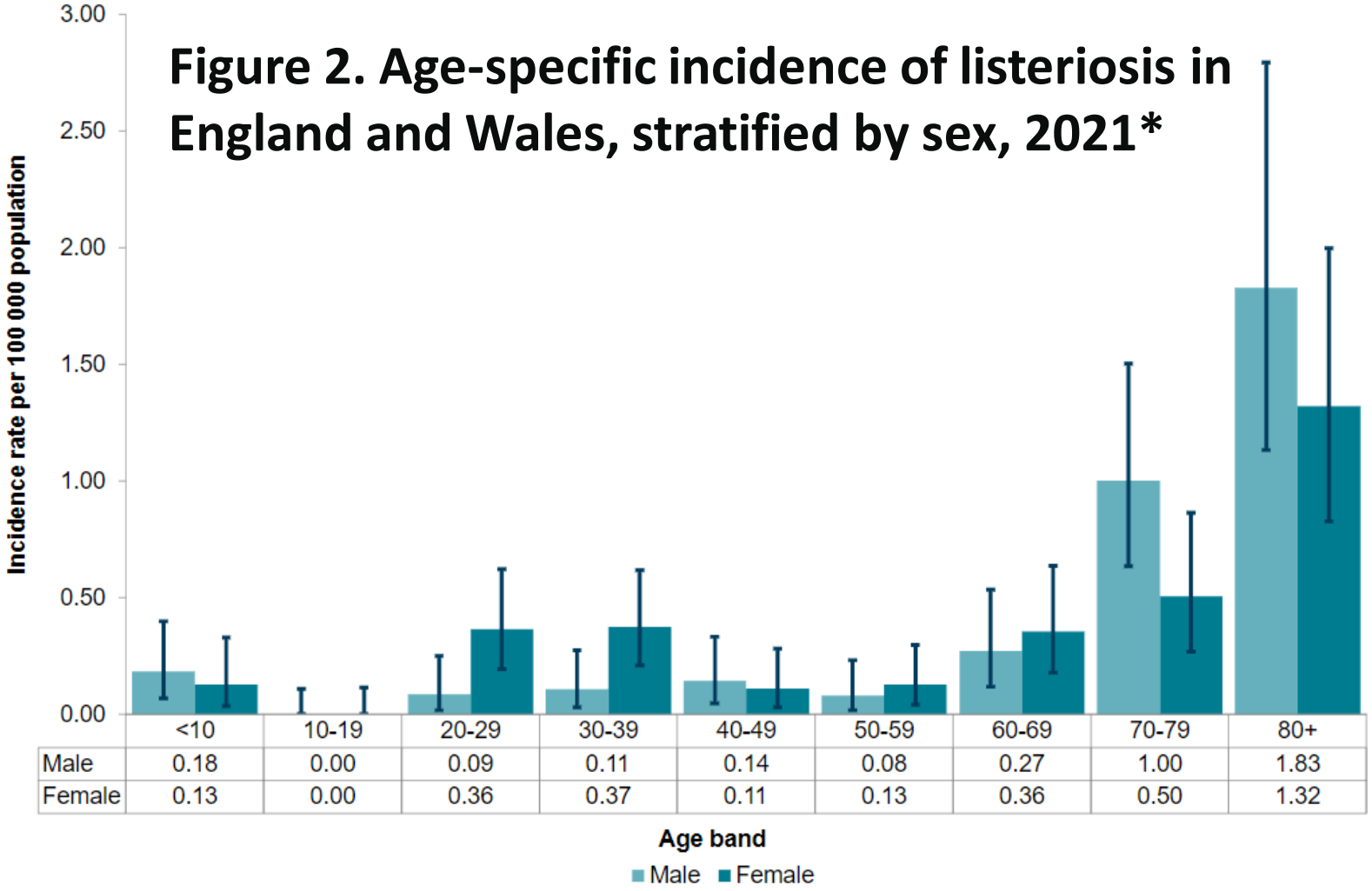
Risk Question

What is the risk to vulnerable consumers from *Listeria monocytogenes* in ready-to-eat smoked fish?

L. mono in smoked fish

Epidemiological evidence

Figure 2. Age-specific incidence of listeriosis in England and Wales, stratified by sex, 2021*



	<10	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
Male	0.18	0.00	0.09	0.11	0.14	0.08	0.27	1.00	1.83
Female	0.13	0.00	0.36	0.37	0.11	0.13	0.36	0.50	1.32

Pregnancy-associated cases were 21.3% of all cases in 2021 (ranged from 10.2% - 19.5% between 2012-2019).

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UK Health Security Agency

L. mono in smoked fish

Epidemiological evidence

- Data from UK Health Security Agency

Years	Incidents	Cases	Size of incidents (avg, range)	Deaths	Evidence
2015-2019	3	5	2 (1-2)	3	Micro
2015-2019	2	2	1 case each	1	Micro & Epi
2020 – March 2022	4	16	4 (1-10)	5	Micro & Epi

Cases per year in UK (all listeriosis) 2015-2021: 143-203

L. mono in smoked fish

Epidemiological evidence

Systematic literature search for outbreaks

- 8 outbreaks identified

Years and Locations	Range in cases	Range in deaths	Vulnerable Groups	Product
August 1994 – October 2020 All EU	4 – 27 (total = 99)	0 – 5 (total=19)	6/8 majority	7/8 majority = cold-smoked fish

L. mono in smoked fish

Epidemiological evidence

Systematic literature search for outbreaks

Invasive listeriosis outbreaks and salmon products: a genomic, epidemiological study

Raskit Lachmann, Sven Halbedel, Stefanie Lüth, Alexandra Holzer, Marlen Adler, Ariane Pietzka, Sascha Al Dahouk, Klaus Stark, Antje Flieger, Sylvia Kleta & Hendrik Wilking ...show less

Pages 1308-1315 | Received 04 Jan 2022, Accepted 03 Apr 2022, Published online: 23 May 2022

- 22 individual outbreaks
  - 2010-2021
  - 228 cases, 50 deaths (22%)

L. mono in smoked fish

Epidemiological evidence

- Published quantitative risk assessments

The mean risk of contracting invasive listeriosis per serving of cold-smoked salmon in France (taken from Pouillot *et al*., 2009)

Subpopulation	Mean risk per serving	Increase in risk
Pregnant	1.4×10^{-5}	x140
Immunocompromised	5.4×10^{-6}	x54
Over 65 years	1.3×10^{-6}	x13
Immunocompetent	1.0×10^{-7}	reference

L. mono in smoked fish

Risk Characterisation

For cold-smoked fish:

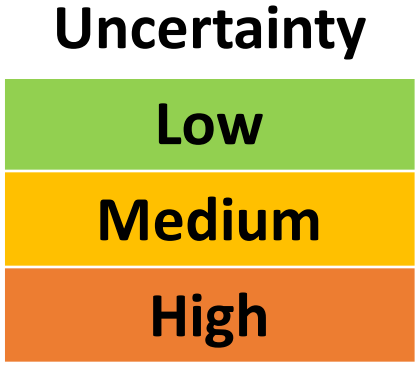
Frequency of occurrence is **low**

For hot-smoked fish:

Frequency of occurrence is **very low**

Medium uncertainty for both

Severity of illness is **high (low uncertainty)**



ACMSF 2020

L. mono in smoked fish

- Use of epidemiological evidence:
  - Confirmed link between food source and cases
  - Supported issuing advice specific to vulnerable groups for smoked fish
  - Separating risk between cold-smoked and hot-smoked products

NEWS

Food Standards Agency and Food Standards Scotland issue updated advice to higher risk consumers on ready-to-eat cold-smoked and cured fish following publication of a risk assessment

The Food Standards Agency (FSA) and Food Standards Scotland (FSS) are advising pregnant women and those with a weakened immune system to avoid eating ready-to-eat cold-smoked or cured fish

Last updated: 27 July 2023

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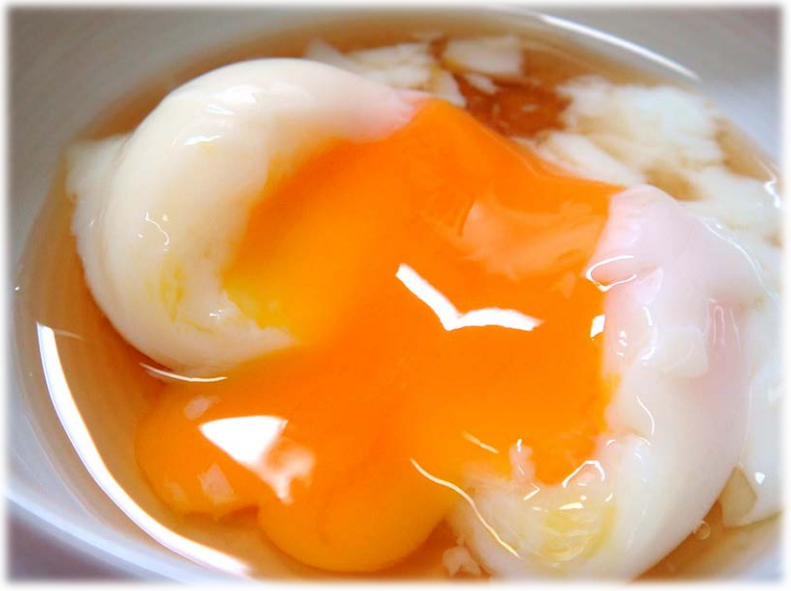
Case Study #2

Avian Influenza in poultry and wild game products

Avian influenza

Background

- Increase in number of cases in poultry and wild birds beginning in October 2021
- FSA risk managers wanted to ensure advice still appropriate
  - Last RA in 2015
  - Change in advice for consumption of eggs less than thoroughly cooked in 2017

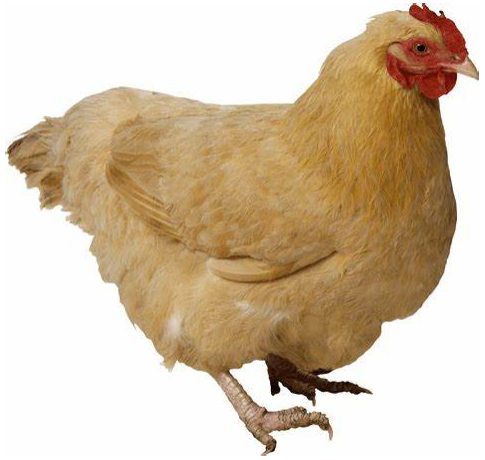


Avian influenza

Risk Question

What is the risk to consumers of becoming ill with AI viruses via consumer handling of feathered birds and food consumption, specifically of poultry, game meat, and eggs?

- Not specific to outbreak strain circulating at time of request



Avian influenza

- Previous risk assessments (ACMSF 2015, EFSA 2006):

  “There is no epidemiological evidence that avian influenza can be transmitted to humans through consumption of thoroughly cooked food, notably poultry and eggs.”

Avian influenza

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  "There is no epidemiological evidence that avian influenza can be transmitted to humans through consumption of thoroughly cooked food, notably poultry and eggs."

- Human cases from drinking raw blood
- Animal cases

EMERGING INFECTIOUS DISEASES®
Volume 10, Number 12—December 2004
Avian Influenza H5N1 in Tigers and Leopards

Avian influenza

- For current risk assessment
  - Update searches for new evidence
  - Consider less-than-thoroughly cooked products
- Updated literature search (Dec 2022)

Avian influenza

- For current risk assessment
  - Update searches for new evidence
  - Consider less-than-thoroughly cooked products
- Updated literature search (Dec 2022)
  - No new epidemiological evidence

Avian influenza

Risk Characterisation

Product/Activity	Frequency of occurrence	Uncertainty
Commercial poultry (chicken & turkey)	Negligible	Low
Commercial poultry (farmed duck & geese)	Very Low	Medium
Handling/consuming game birds	Very Low	Medium
Home processing of game birds	Low (HPAI) Very Low (LPAI)	Medium
Hen eggs	Very Low	Low

2015 Risk Assessment: “The health risk related to avian influenza viruses via the food chain is classified as **very low**.”

Avian influenza

Policy advice

- Advice remained appropriate
- Updates to guidance “cooking your food” on food.gov.uk to reassure consumers

FSA Explains: Avian Influenza

Properly cooked poultry, game birds and other poultry products are safe to eat. Avian Influenza (also known as bird flu) poses a very low food safety risk for UK consumers, and does not change our advice on consumption of poultry products, including eggs and game birds.

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Conclusions

Conclusions

Use of Epidemiological Evidence

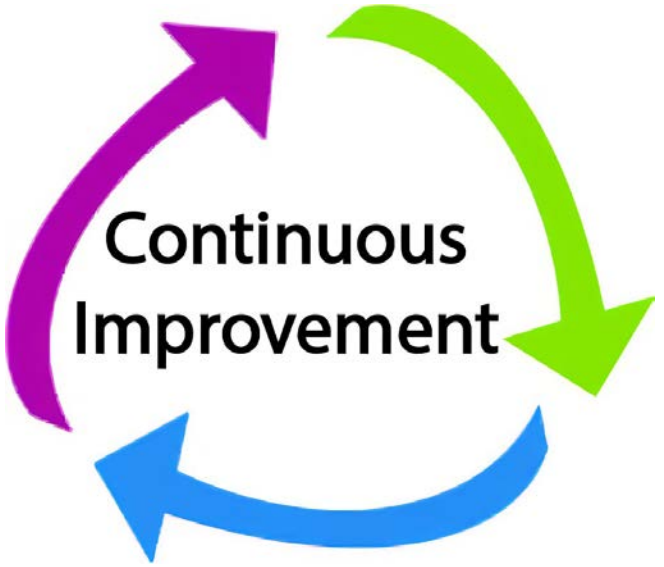
- Abundant and consistent evidence allowed decisions to be made at pace
- Supported decisions to split risk characterisation
  - Allowed risk managers to tailor advice
- Lack of epidemiological evidence can be informative

Conclusions

Next steps

Ways to improve future use of epidemiological data:

- ACMSF subgroup to explore *Listeria monocytogenes* strain-level variation and impact on disease
- Work with UKHSA to increase sequencing of isolates from food businesses
  - PATH-SAFE programme



Risk Assessments

Publicly available at:

L. monocytogenes in smoked fish:

www.foodstandards.gov.scot

Standard Reporting Framework for Risk Assessments (foodstandards.gov.scot)

Avian Influenza:

www.food.gov.uk

Risk assessment of acquiring Avian Influenza from Poultry Products: Executive Summary | Food Standards Agency

Final thanks to co-authors:

L. monocytogenes in smoked fish:

- Production: Karen Pearson (FSS) and Ara Chobanova (FSS)
- Sign off/Review: Marianne James (FSS) and Kathyrn Callaghan (FSA)

Avian Influenza:

- Production: Elaine Pegg, Wendy Perry, Wioleta Trzaska
- Sign off/Review: Anthony Wilson

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Thank you!

Any questions?

Risk Characterisation

Multidimensional representation endorsed by ACMSF in 2020

Frequency of occurrence:

A qualitative scale for the frequency of occurrence of foodborne risks (EFSA 2006):

Frequency category	Interpretation
Negligible	So rare that it does not merit to be considered
Very Low	Very rare but cannot be excluded
Low	Rare but does occur
Medium	Occurs regularly
High	Occurs very often
Very High	Events occur almost certainly

Risk Characterisation

Multidimensional representation endorsed by ACMSF in 2020

Severity of illness:

A qualitative scale for the severity of detriments of foodborne risks (ICMSF 2002):

Severity category	Interpretation
Negligible	No effects, or so mild they do not merit to be considered
Low	Mild illness: not usually life-threatening, usually no sequelae, normally of short duration, symptoms are self-limiting (e.g. transient diarrhoea)
Medium	Moderate illness: incapacitating but not usually life-threatening, sequelae rare, moderate duration (e.g. diarrhoea requiring hospitalisation)
High	Severe illness: causing life-threatening or substantial sequelae or illness of long duration (e.g. chronic hepatitis)

Risk Characterisation

Multidimensional representation endorsed by ACMSF in 2020

Uncertainty:

A qualitative scale for the level of uncertainty in food risk assessment:

Uncertainty category	Interpretation
Low	There are solid and complete data available; strong evidence is provided in multiple references; authors report similar conclusions
Medium	There are some but no complete data available; evidence is provided in small number of references; authors report conclusions that vary from one another
High	There are scarce or no data; evidence is not provided in references but rather in unpublished reports or based on observations, or personal communication; authors report conclusions that vary considerably between them