

# The role of risk assessment in addressing the safety of foods of animal origin

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# What is risk assessment?

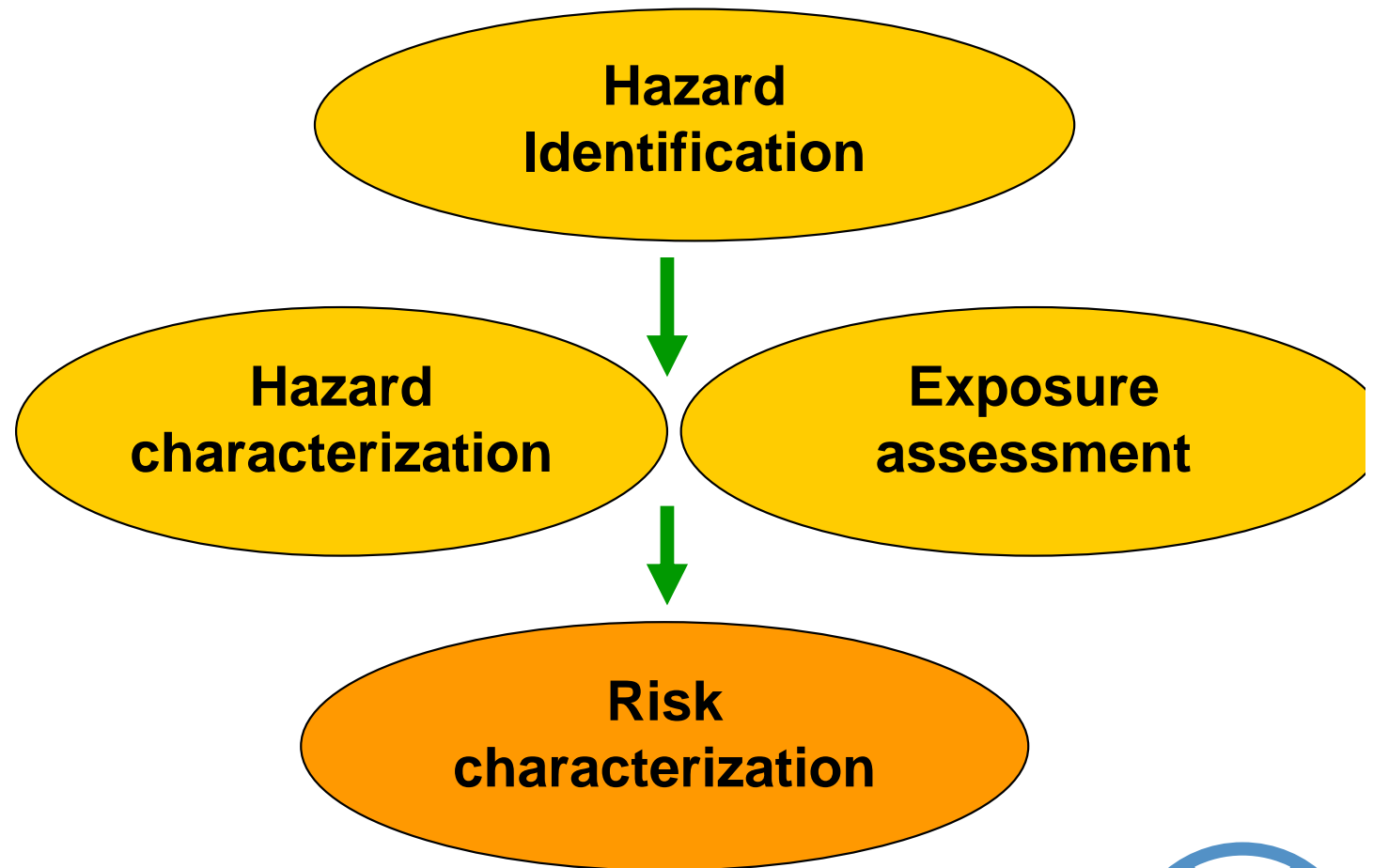
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- A tool
  - for use in improving food safety
  
- APPLICATION: To assist risk managers in taking actions that lead to safer food



# Risk assessment framework

- Defined by Codex Alimentarius
- A systematic approach for the provision of scientific advice to risk managers



# Benefits and role of risk assessment?

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- Enables a linkage between management action and impact on consumer health
- Provides a transparent science based foundation to underpin risk management actions, standards, regulations
  - Meeting SPS obligations
- Facilitates comparisons of different approaches
  - before implementation (helps in selection of best options)
  - after implementation - establishment of equivalence



# Benefits and role of risk assessment

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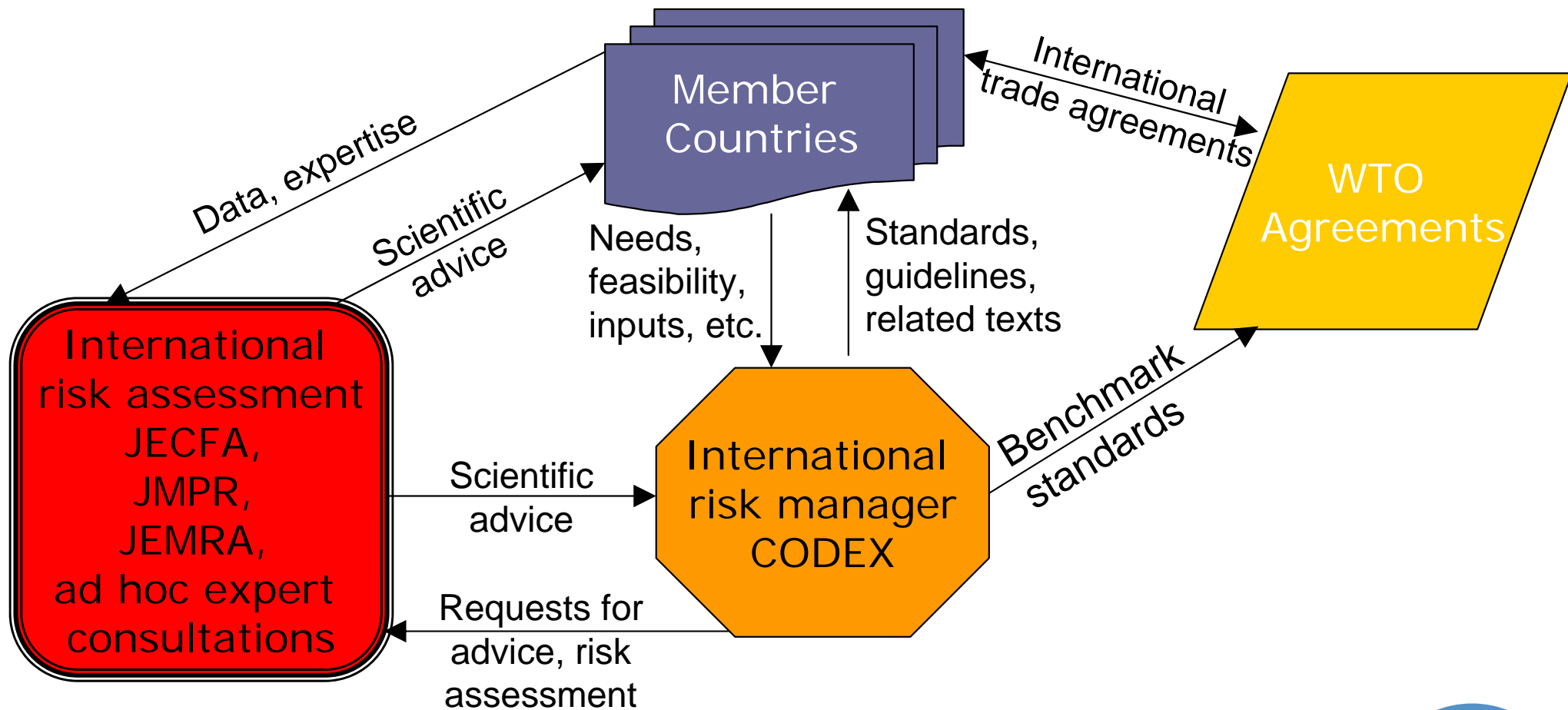
- ❑ Not always needed but of particular value when issues are complex
- ❑ Facilitates an in-depth look at the food chain of concern – gain greater insight into issues, problems



- ❑ Establishment of performance objectives

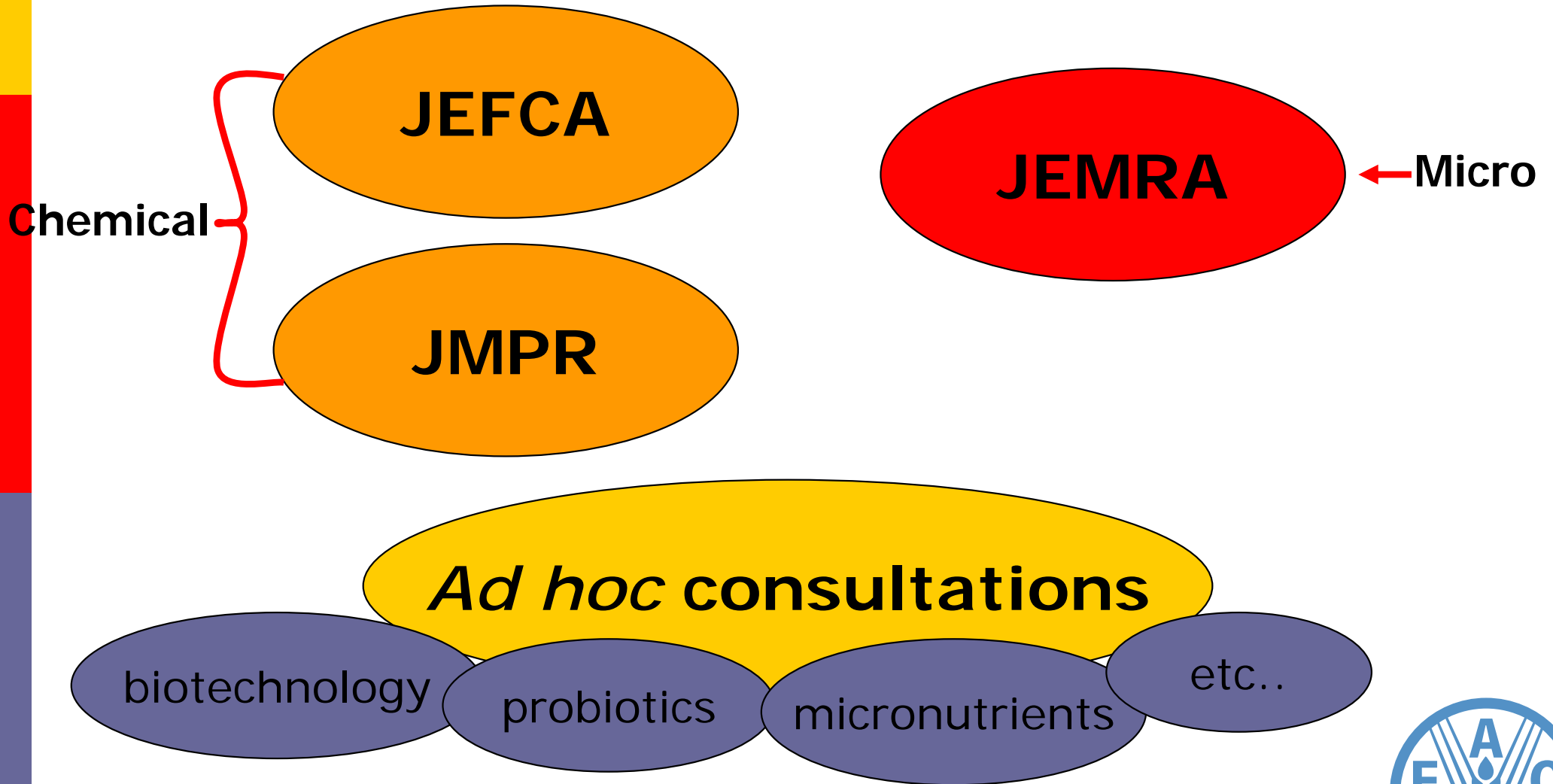


# Risk assessment in an international arena



# Risk assessment groups at FAO

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# International risk assessments

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- Not a new activity
- JECFA celebrated 50<sup>th</sup> anniversary in June
- But risk assessment process continues to evolve
- Expands to cover new areas of hazards
  - only began looking at microbiological hazards in 2000
- Undertaken in response to specific requests from Codex and member countries
  - Underpin international standard setting process
  - Provide risk based advice for countries





# Areas of risk assessment relevant to foods of animal origin

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## Chemical

- Residues of veterinary drugs
- Food additives and flavouring agents
- Pesticide residues
- Naturally occurring toxicants
- Acrylamide
- Dioxins

## Microbiological

- Well known pathogens
  - *Salmonella*
  - *Listeria monocytogenes*
  - *Campylobacter*
  - Enterohaemorrhagic *E. coli*
- Antimicrobial resistant microorganisms

- Foods derived from genetically modified animals
- Lactoperoxidase system



# EXAMPLE 1: Residues of veterinary drugs

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- the treatment of the animal with veterinary drugs prior to slaughtering
  
- JECFA establishes
  - Maximum Residue Limits (MRLs)
  - Acceptable Daily Intakes (ADI's)
  - Principles for evaluating the safety of residues of veterinary drugs in food and for establishing ADIs and MRLs for certain drugs when they are administered to food-producing animals in accordance with good veterinary practices



# EXAMPLE 1: -Neomycin

- **Acceptable daily intake:** The ADI of 0-60 mg/kg bw (established at the forty-seventh meeting of the Committee (WHO TRS 876, 1998)) was maintained.
- **Residue definition:** Neomycin
- *Recommended maximum residue limits (MRLs)<sup>a</sup>*

<b>Species</b>	<b>Liver (mg/kg)</b>	<b>Kidney (mg/kg)</b>	<b>Milk (mg/kg)</b>
<b>Cattle</b>	<b>500</b>	<b>10 000</b>	<b>1500</b>

<sup>a</sup>The MRLs of 500 mg/kg for cattle muscle and fat and all other MRLs recommended at the forty seventh meeting of the Committee (WHO TRS 876, 1998) were maintained.



# EXAMPLE 1: Impact of no risk assessment

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2001/2002 - DISRUPTIONS IN FOOD TRADE CAUSED BY DETECTION OF TRACE AMOUNTS OF CHLORAMPHENICOL AND NITROFURANS IN ANIMAL PRODUCTS

## → Veterinary drug residues without ADI/MRL

- **FAO/WHO meeting, 2004**
- Identified the scientific, technical and regulatory problems
- Appropriate follow-up steps
  - Analytical methodology – considered measures and made recommendations
  - Recommended that work on international MRLs for veterinary drugs that have been evaluated by national governments and are currently in use is completed within the coming ten years
  - Require innovative approaches to capacity building.

### REPORT:

[http://www.fao.org/es/ESN/food/meetings\\_vetdrugs\\_en.stm](http://www.fao.org/es/ESN/food/meetings_vetdrugs_en.stm)



# Other residues/chemicals of concern

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- Contaminants in animal feedstuffs
  - Mycotoxins
  - Heavy metals
  - Dioxans
  - Pesticide residues
  
- Growth promoters
  - Antimicrobials - issue of antimicrobial resistance – risk assessment forthcoming
  - Hormones – risk assessments undertaken, some ADI,s established



# EXAMPLE 2: Aflatoxin M<sub>1</sub> in milk

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- Question from Codex - 0.05 or 0.5 µg/kg?
- JECFA risk assessment
  - Used data from a range of countries
  - Considered susceptible populations (prevalence of Hep B)
  - Looking at risk of liver cancer
  - Risk estimate – worst case scenario
  - Non hepatitis carriers – risk so low impossible to demonstrate
  - With 1% Hep+
    - 0.05 µg/kg – 3.2 cases cancer / 1000 million / year
    - 0.5 µg/kg - 32 cases cancer / 1000 million / year
    - Conclusion – small difference – focus on vaccination and control of hepatitis



# EXAMPLE 2: Aflatoxin M<sub>1</sub> in milk

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- JECFA risk assessment → CCFAC
- Discussed and debated
- Differing opinions
- Results of risk assessment – scientific advice  
→ 0.5 µg/kg adopted
- adequate for the protection of consumer health
- reasonably achievable for all countries
- Implications of lower ML
  - a significant reduction in the availability of milk in developing countries
  - negative implications from a nutritional point of view.



# Microbiological hazards in foods of animal origin

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- Pathogens can enter at various places along food chain
- Dynamic hazard....can decrease or increase depending on the microorganism
- Risk assessments on
  - *Salmonella* in eggs and broiler chickens
  - *Campylobacter* in broiler chickens
  - *Listeria monocytogenes* in milk, fermented meats





# EXAMPLE 3: *Listeria monocytogenes* (milk, fermented meats)

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- ❑ Differences in national approaches to addressing the problem of *Listeria* contamination and so difficult for Codex to agree on a management approach
- ❑ Risk assessment undertaken from retail to consumption
- ❑ Output
  - Predicts that nearly all cases of listeriosis result from the consumption of high numbers of *Lm*.
  - Preventing exposure to high levels has the greatest impact.
  - Most cases of listeriosis are associated with the consumption of foods that do not meet current standards (e.g. absence in 25g, 100cfu/g,.....)



# EXAMPLE 3: Criteria vs compliance - which is more important?

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<b>Assumed percentage of "defective" servings</b>	<b><u>Predicted number of listeriosis cases per year</u></b>	
	<b>Initial standard of 0.04 cfu/g</b>	<b>Initial standard of 100 cfu/g</b>
<b>0</b>	<b>0.5</b>	<b>5.7</b>
<b>0.00001</b>	<b>1.7</b>	<b>6.9</b>
<b>0.0001</b>	<b>12.3</b>	<b>17.4</b>
<b>0.001</b>	<b>119</b>	<b>124</b>
<b>0.01</b>	<b>1,185</b>	<b>1,191</b>
<b>0.018</b>	<b>2,133</b>	<b>2,133</b>
<b>0.1</b>	<b>11,837</b>	<b>11,848</b>
<b>1</b>	<b>117,300</b>	<b>117,363</b>



## EXAMPLE 3: Importance of compliance with established criteria

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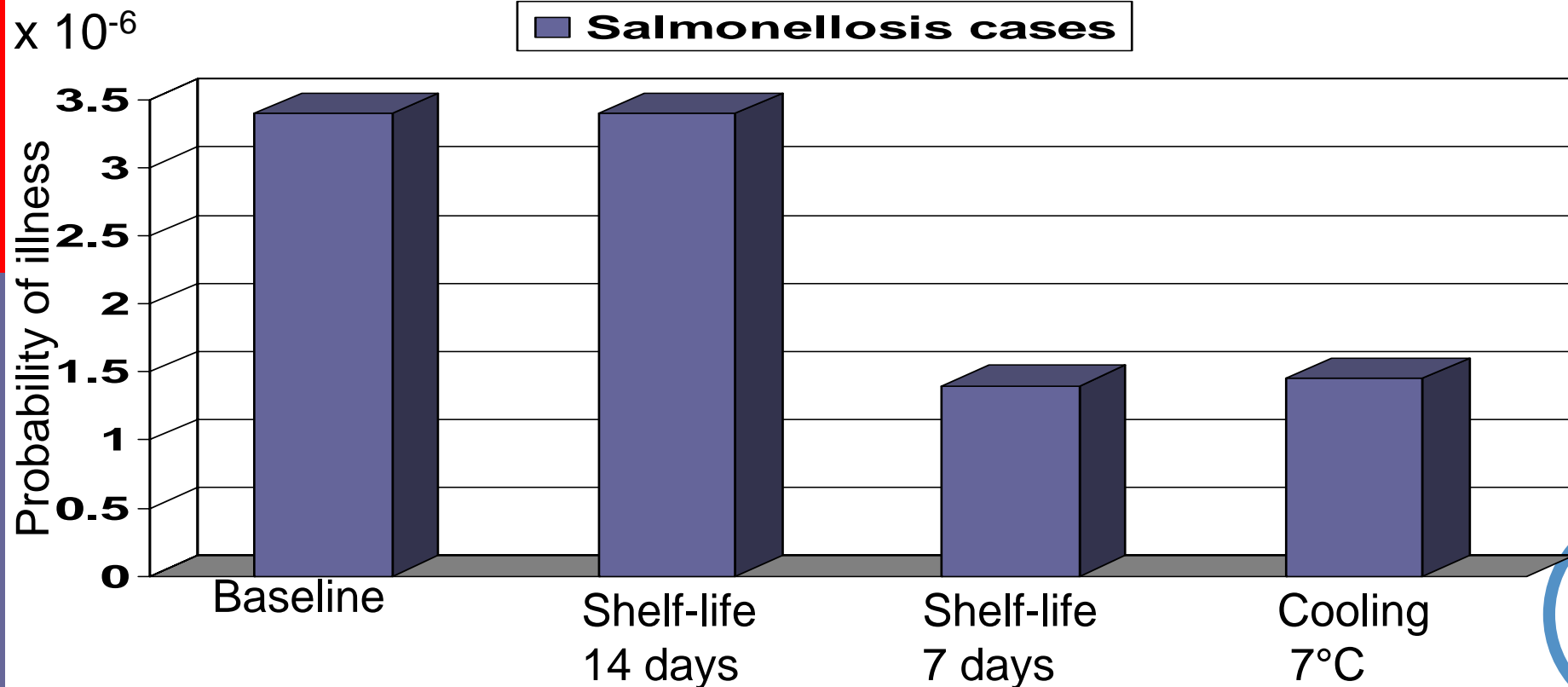
**The rate of defective servings is a more significant risk factor than the numeric value of the criterion within the range that CCFH asked the risk assessment team to consider**



## EXAMPLE 4: *Salmonella* in eggs

- Risk assessment focussed on evaluating a range of control measures – comparative assessment

### *Salmonella* in eggs: Shelf-life and cooling scenarios



# Future work – EHEC's in meat and meat products

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- Addressed by existing approaches – GHP, GMP etc.
- But e.g. July/August 2006:
  - 28 events/outbreaks of *E.coli* 0157:H7 with approx 248 human cases.
  - 8 of these events have led to changes in control measures; 6 recalls; 10 in public education campaigns; and 4 in legal actions.
  - Large economic costs to society



# New work – EHEC's in meat and meat products

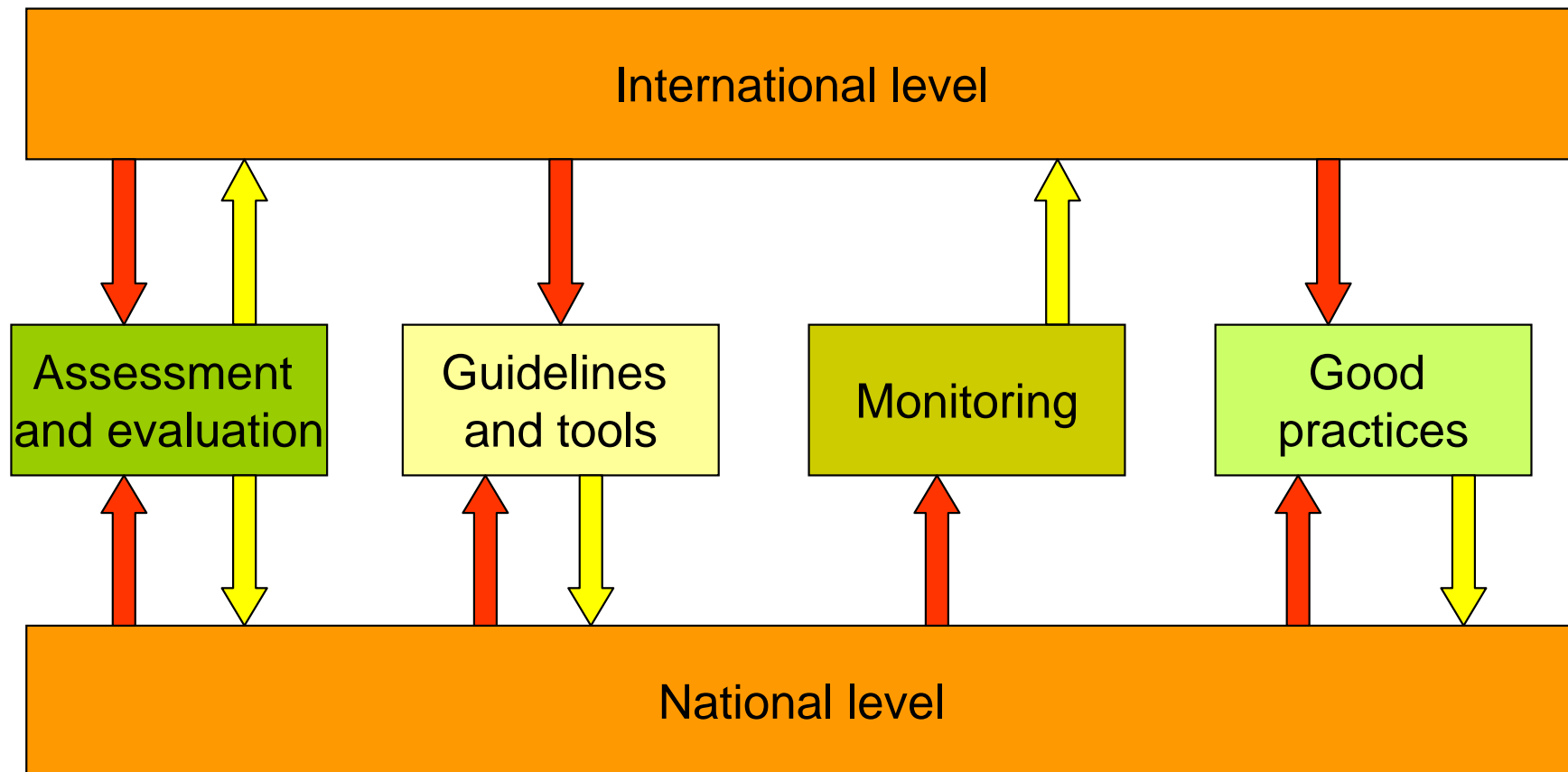
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- 5 risk assessments developed at national level over a 10 year period
- Learning process – only the most recent had true interaction between risk assessors and risk managers
- Many undertaken as a research exercise
  - But good basis for future work
  - Move in some countries to re-evaluate their measures using risk assessment



# Risk assessment integral part of overall system

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# For more information

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- FAO webpage

[http://www.fao.org/ag/agn/food/riskassessment\\_en.stm](http://www.fao.org/ag/agn/food/riskassessment_en.stm)

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