

Meat safety

Status and perspective

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Summary

- Essentials of global meat safety systems
 - LISA concept
 - FSO concept
- The main meat safety issues in the EU
 - Most frequent bacterial pathogens
 - BSE
 - Avian influenza
- What to choose for my meat safety research (FP7)?

What are essentials of meat safety systems, nowadays?



International basis of modern food safety assurance system

- **World Trade Organisation (WTO) principles 1995:**
 - No discrimination between imported and locally produced foods
- **Codex Alimentarius Commission (CAC; founded 1962) is the reference institution for:**
 - International food standards
 - International disagreements on food safety issues
- **European Union (EU)**
 - Animals and foods included in the EU founding documents
 - “White paper” 2000 – thorough revision of food legislation
 - Regulation (EC) 178/2002 –EFSA founded
 - Novel approach – “risk assessment-based” & “farm-to-fork”

Longitudinal and Integrated Safety Assurance

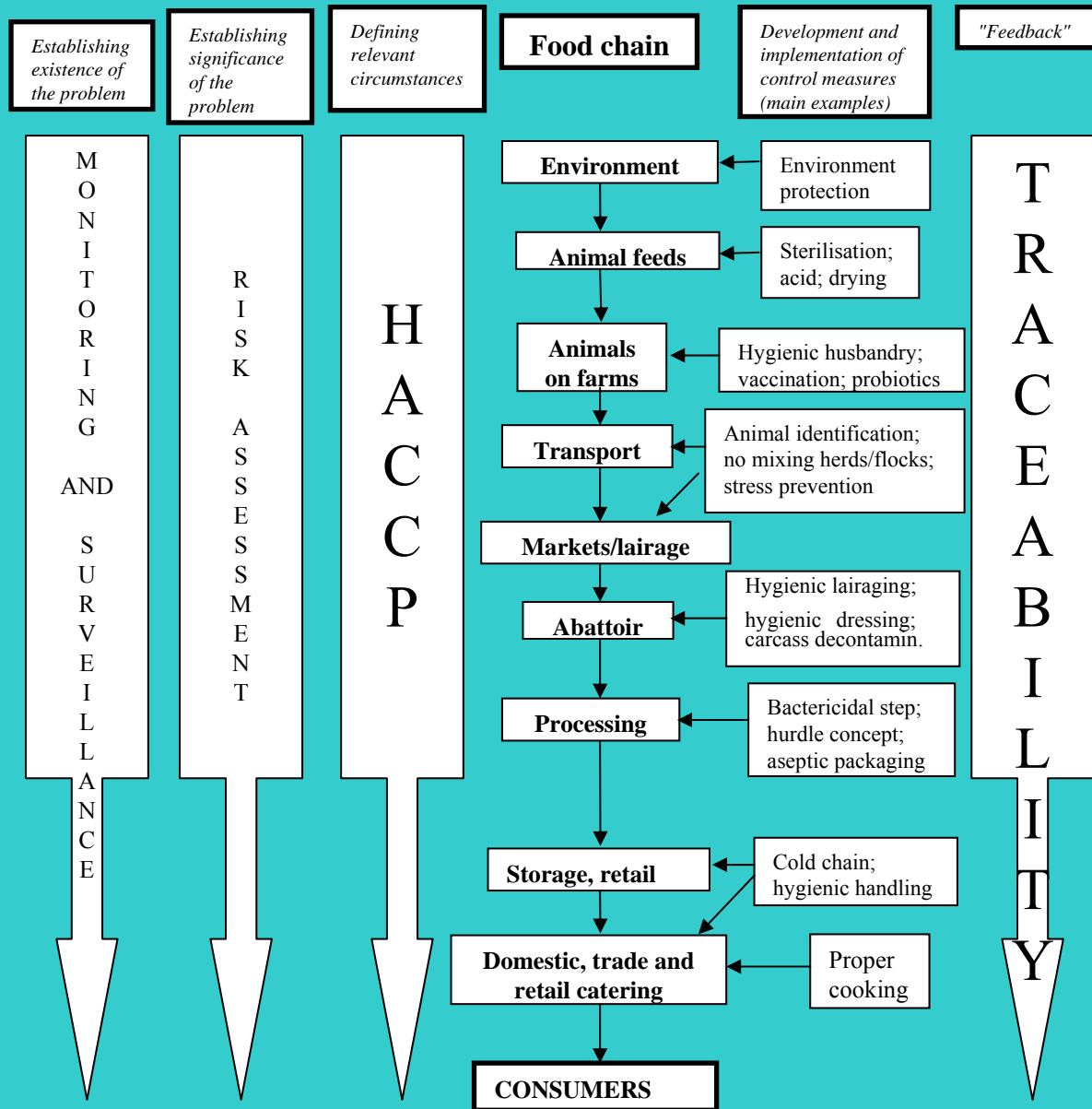
(LISA) approach: **Scientific frame**

- **Health hazards (harmful agents) enter the food chain at different, sometimes multiple, points**
- **Events on one point affects the adjacent points of the chain (longitudinal effects)**
- **Hazards are controlled in a coordinated (integrated) way**
- **Reduction of risks where they cannot be totally eliminated**
- **Using multidisciplinary and science-based approach**

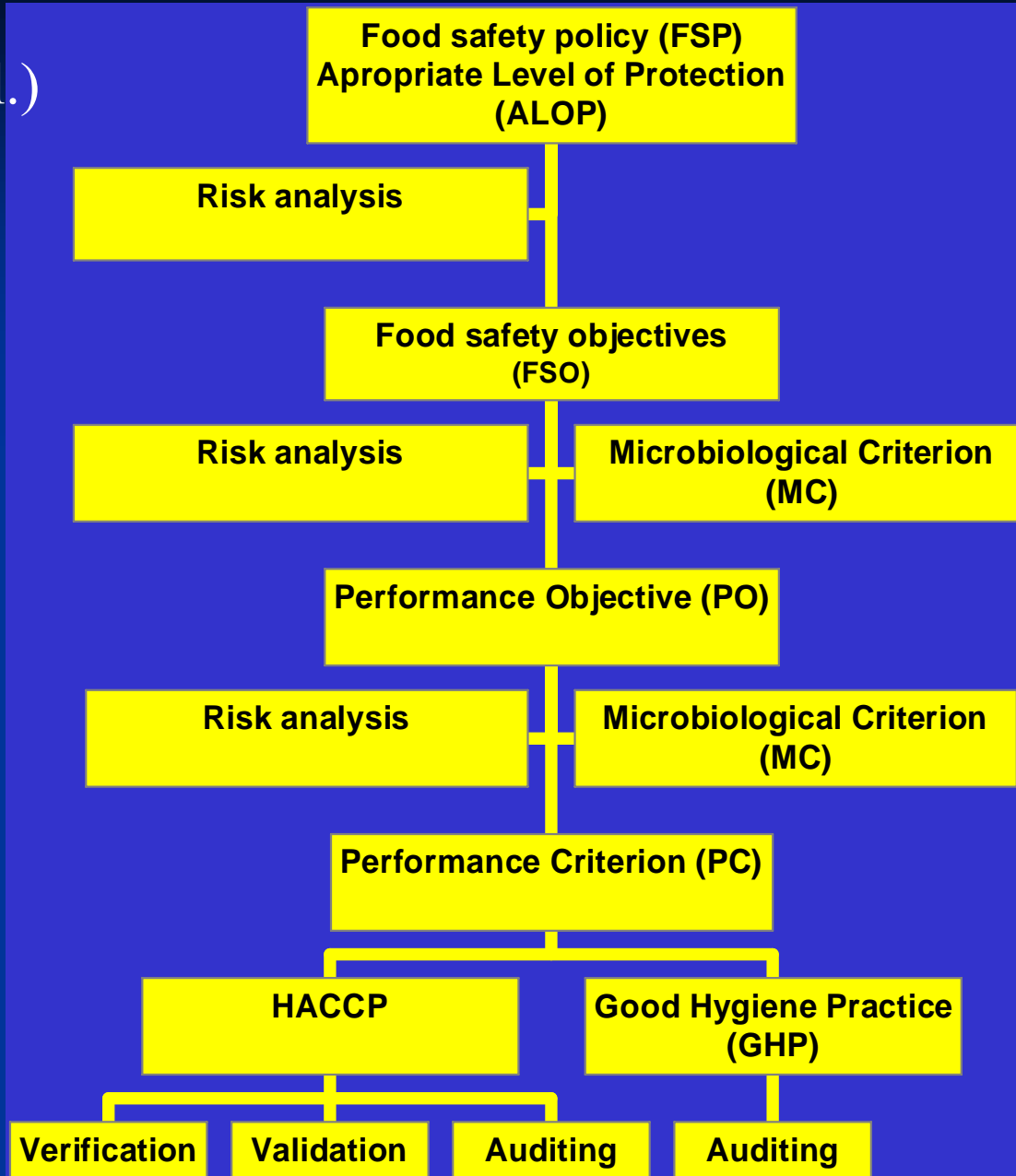
Longitudinal and Integrated Safety Assurance (LISA) approach: **Commercial frame**

- **Vertical integration of production operations farm-to-market = longitudinal risk management**
- **Examples of good vertical commercial integration :**
 - **Poultry meat chain**
 - **Milk/dairy product chain**
- **Main commercial engines are large, often multinational, retailer chains (e.g. Tesco, Wal-Mart)**

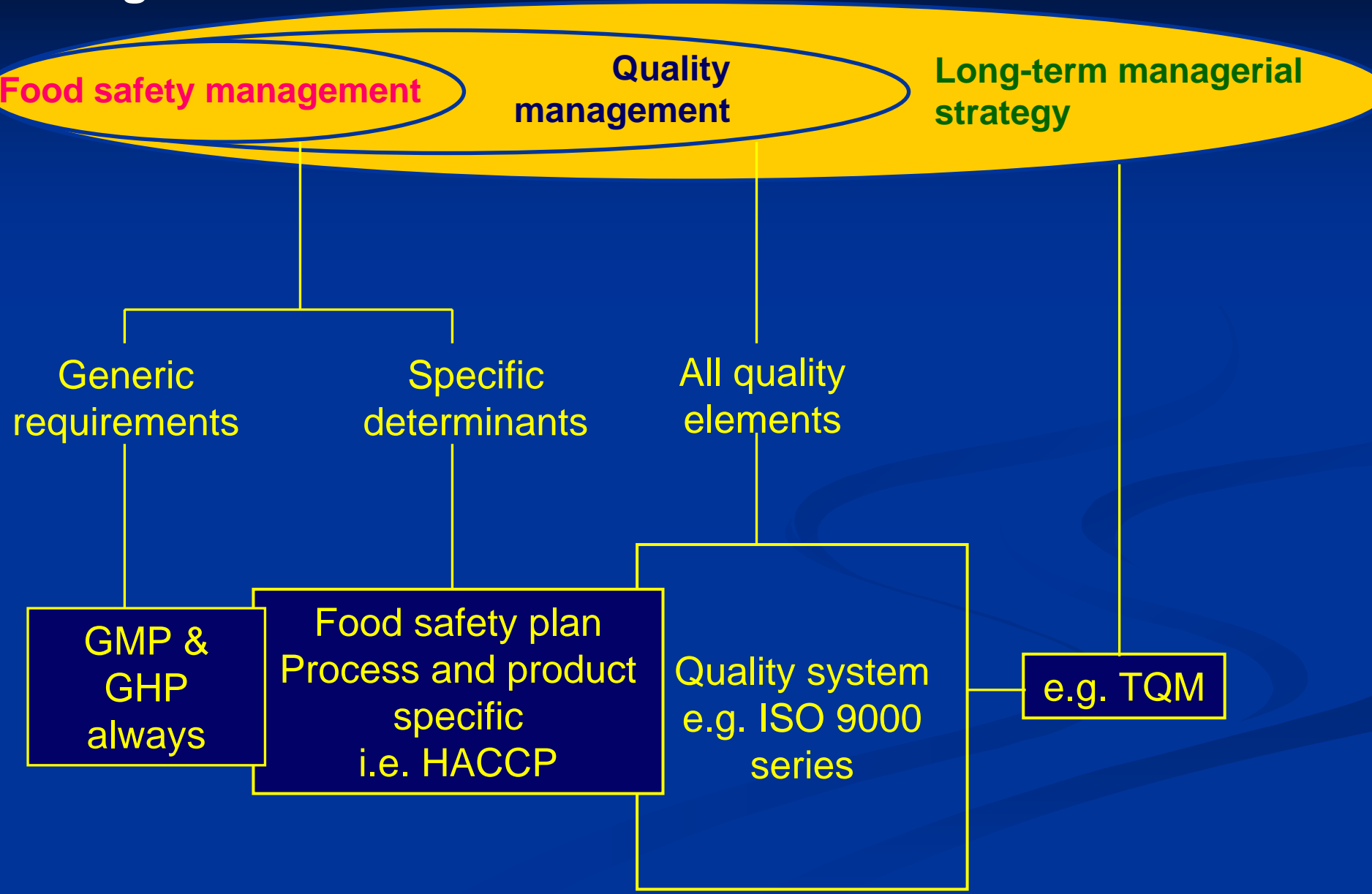
OPERATIVE ASPECTS OF INTEGRATED FOOD SAFETY ASSURANCE



FSO concept (Codex Al.)



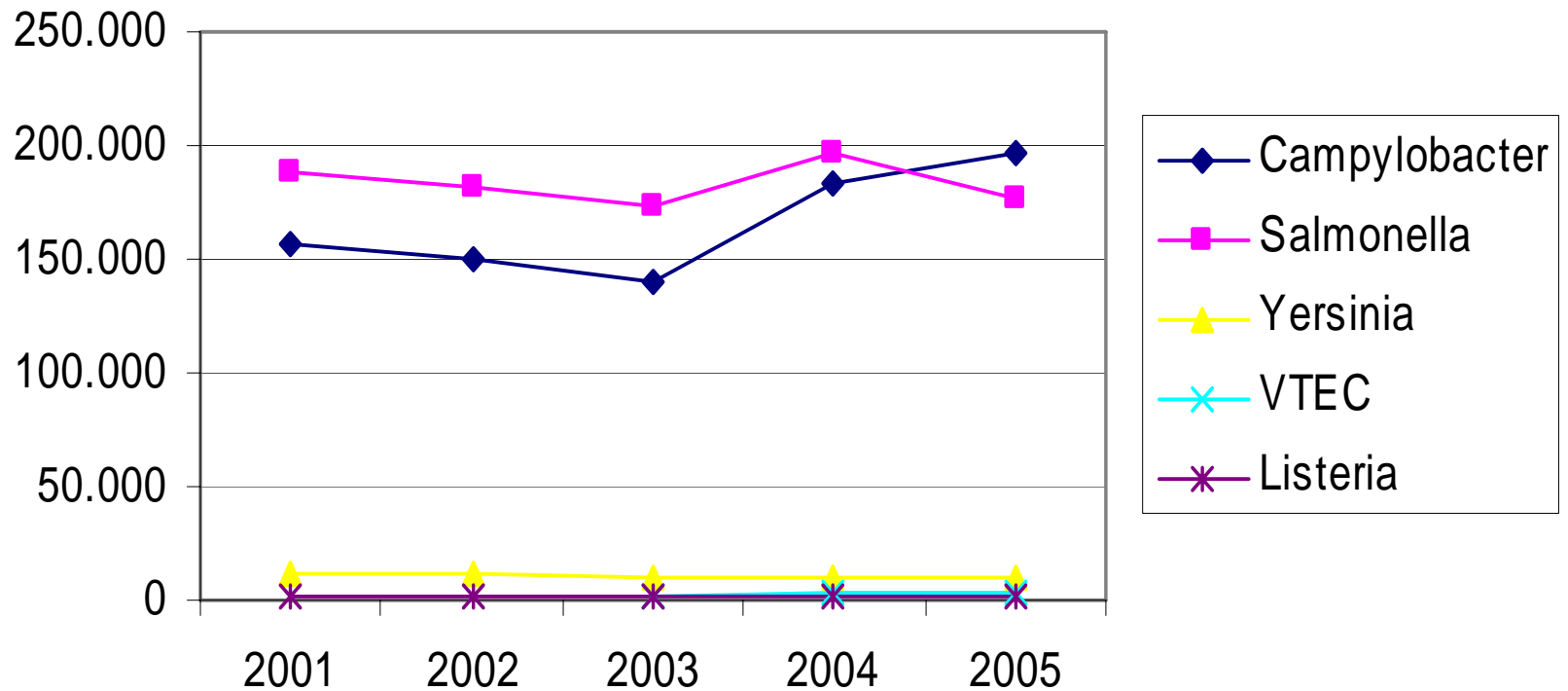
Relation between food safety management and food quality management



What are the main meat safety issues in the EU?



Total reported human cases in EU



Relative relevance of meat for Campylobacteriosis

(EU, 2005)

(Adapted from data: EFSA Zoonoses Report, 2006)

- 11.6% from poultry meat
- 0.5% from “meats” (“unspecified” or bovine)
- 0.2% eggs and related products
- 85% from “other” (water, unknown”, fruit/vegetables)

*Campylobacter** in meat (EU, 2005)

(Data source: EFSA Zoonoses Report, 2006)

- **Poultry (broilers):**
 - Positive flocks 0.2 to 85.2%
 - Positive fresh meat 3.1 to 66.4%

- **Pigs:**
 - Positive herds 24.7 to 85.4%
 - Positive fresh meat 0 to 0.5%

- **Cattle:**
 - Positive herds 0.3 to 46.9%
 - Positive fresh meat 0 to 2.1%

* Most dominant was *C. jejuni*, followed by *C. coli*

Relative relevance of meat for Salmonellosis in the EU (2005)

(Adapted from data: EFSA Zoonoses Report, 2006)

Number of people in foodborne outbreaks that were infected:

- 11% from eggs and related products
- 2.7% from poultry meats
- 1.5% from porcine meat
- 0.3% from bovine meat
- 75% from “other” (“unknown”, seafood, fruit/vegs, water)

Salmonella in meat (EU, 2005)

(Data source: EFSA Zoonoses Report, 2006)

- **Poultry*:**
 - Positive broiler flocks 0 to 18.2%
 - Positive fresh meat 3.9 to 18.5%

- **Pigs**:**
 - Positive herds 0 to 60.0%
 - Positive fresh meat 0 to 18.4%

- **Cattle**:**
 - Positive herds 0 to 6.7%
 - Positive fresh meat 0 to 8.3%

- **Sheep: no data available**

* *S. Enteritidis* most dominant

** *S. Typhimurium* (incl. DT104) most dominant

Other pathogens in meat (EU, 2005)

(Data source: EFSA Zoonoses Report, 2006)

■ VTEC in raw meat:

- Beef 1 to 7.1
- Pork 0 to 6.2

■ *Yersinia enterocolitica* in raw meat:

- Beef 0 to 4.4
- Pork 0 to 16.7

■ *Listeria monocytogenes* in ready-to-eat meats:

- Bovine 0.7 to 5.3
- Porcine 0 to 26.5
- Poultry 0 to 3.1

Controls: farm and transport-lairaging levels

- **Farming (to follow Good Farming Practice)**
 - Feeds/diet: probiotics, competitive exclusion
 - Stress management (animal welfare)
 - Biosecurity: vermin, movements
 - Hygienic animal husbandry
 - Prevent recycling of pathogens via manure/slurry
 - Vaccination
- **Transport-lairaging (to be as short as possible)**
 - Stress management: animal welfare, space allowance
 - Effective cleaning/sanitation of vehicles/pens

Controls: abattoir level

- **Good Hygiene Practice (GHP) programmes are pre-requisite, including:**
 - **Cleaning-sanitation of abattoir**
 - **Staff training and health**
 - **Standard Operating Procedures for individual steps**
- **HACCP-based meat safety management system:**
 - **Has to be validated and verified.**
 - **Generic Critical Control Points (CCPs), including: acceptance of animals, skinning, evisceration and chilling**
- **Possible additional controls/CCPs :**
 - **Decontamination of hides and/or carcasses**

Controls: processing-retail-consumer

- **Universal requirements for whole chain of events:**
 - **Effective sanitation of all meat-related premises;**
 - **The cold chain uninterrupted**
- **Processing stage:**
 - **Prevent cross-contamination during cutting, and further processing;**
 - **Include bactericidal step (e.g. heating) in the process;**
 - **Prevent re-contamination during slicing, packaging;**
 - **Apply “hurdle” concept for non-heated products;**
- **Retail and consumer stages:**
 - **Prevent cross-contamination of ready-to-eat products from raw ingredients during food preparation**
 - **Cook properly; hold post-cooking at $>60^{\circ}\text{C}$ or $<4^{\circ}\text{C}$**

Occurrence in animals in “positive EU-MS”: Bovine Spongiform Encephalopathy (BSE)

(Source: OIE data)

■ BSE in cattle:

- In EU (by 2003): 187,568 cases in total (large majority in UK)
- BSE in other countries (by 2003): Israel 1, Japan 9, Canada 2, USA 1

■ BSE in goats

- In France (2004) a single case

■ vCJD in humans

- In UK (1995-2003) >130 cases
- BSE-vCJD epidemiological link: only one cluster of 5 vCJD cases

Avian influenza (H5N1)

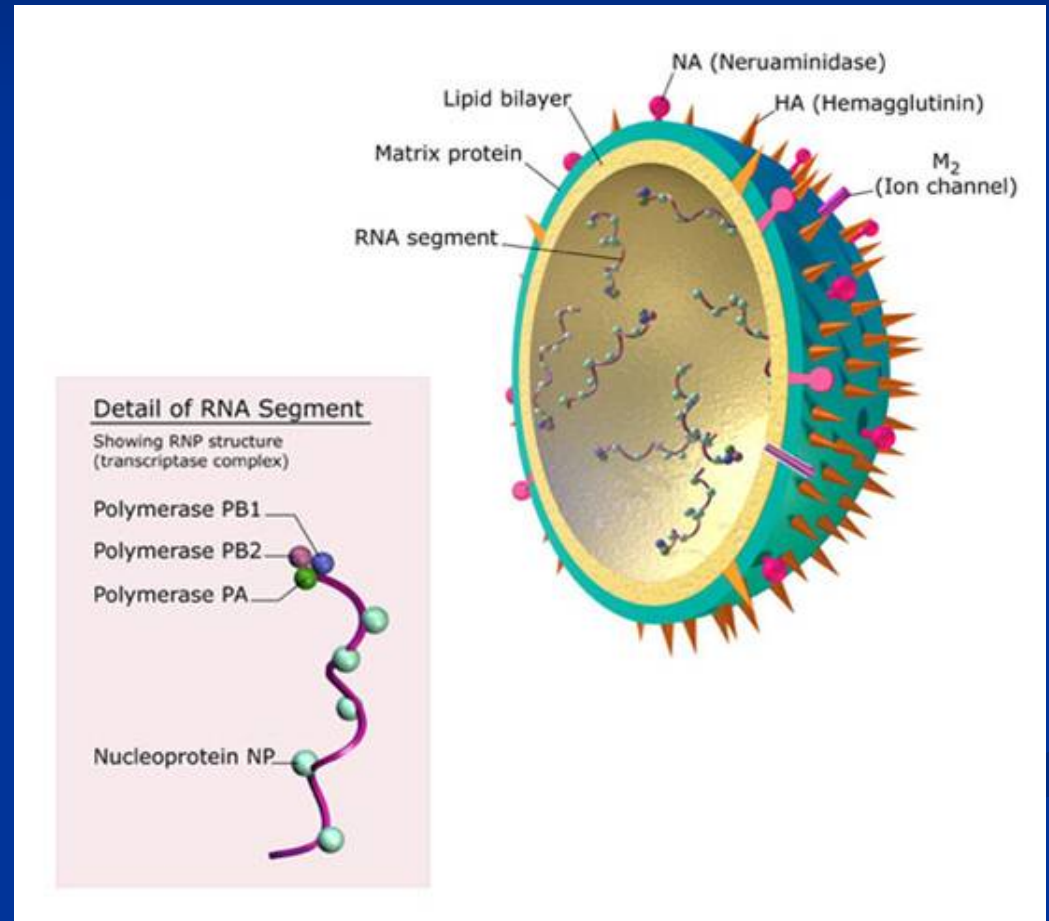
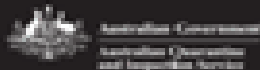
BIRD FLU ALERT!



YOU MUST DECLARE

**all poultry meat,
poultry products,
feathers, eggs or
egg products to a
Quarantine Officer.**

Quarantine Matters!



Images by Dewulf

Transmission of AI



Controls for AI include

Prevention

- **Border control to prevent introduction**
- **Good biosecurity**
- **Preventing (in)direct contact with free-flying birds**
- **Avoid live bird markets**
- **Surveillance systems for early detection**

In case of outbreak

- **Eradication of infected herds**
- **Destruction of all meat from infected (or potentially infected) animals**
- **Emergency vaccination**
 - **Birds**
 - **Humans**

What to choose for my meat safety research?

FP7 – Work programme: Food, Agriculture, Biotechnology



FP7 Fork to farm

- Food, health and well being -

Consumer aspects:

- Novel foods?
- Dietetic-nutritional foods?
- Traditional-local foods?

FP7 Fork to farm

- Food, health and well being -

Food industry innovation:

- Animal feeds towards safe foods?
- Improved-advanced, “ecological” food technologies?
- “Sophisticated” process controls?
- Functional foods?
- “Active” and “Intelligent” packaging?
- Safe use of wastes and by-products?

FP7 Fork to farm

- Food, health and well being -

Safety and quality of foods:

- Microbial ecology?
- Detection and quantification methods?
- Risk analysis: practical aspects of its use?
- Modelling of integrated food chain?

Novel hazards?

Chemical:

- New chemical products (additives, preservatives)?
- Phytotoxins?
- New medicines?
- Wastes-food chain?
- Domestic chemicals?
- Uncertainties?

Biological:

- Enteroviruses?
- Antimicrobial resistance?
- Arthropod vectors?
- People-food mobility?
- Prion-related?
- GMO-GMF?
- Uncertainties?

Thank you!

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