

Food safety assessment in the European and global context

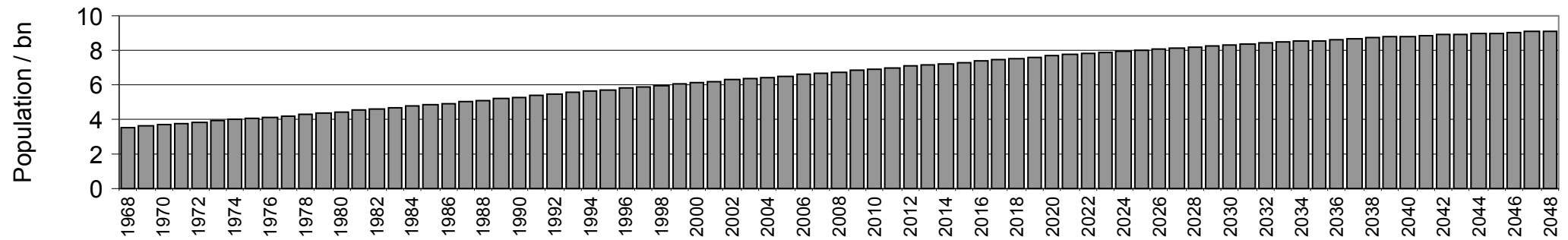
Andreas Hensel

Challenges of globalisation

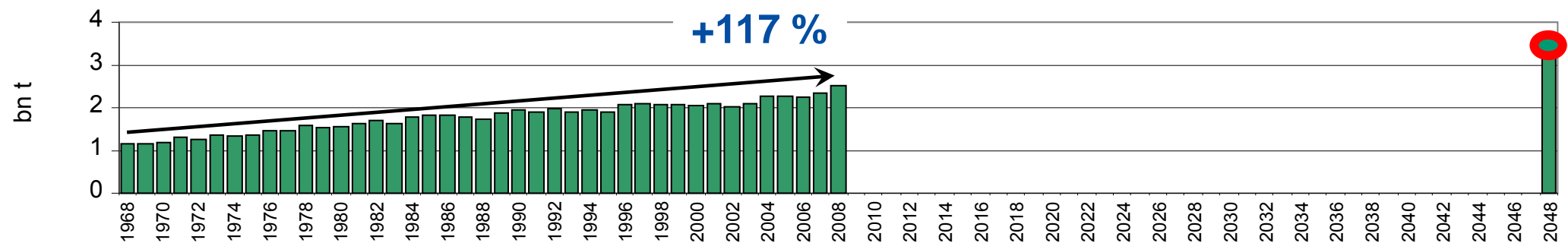
- Further growth of world population to 10.9 bn in 2100
- Changes in consumption behavior in developing countries and increase in purchasing power (China, India *etc.*)
- Competition of food and feed production with renewable resources and energy plants
- Development of supply, demand, and prices increase the trade in food of low quality and safety
- Systematic control of all commodities and science-based services at borders impossible

40 years in retrospect, 40 years ahead

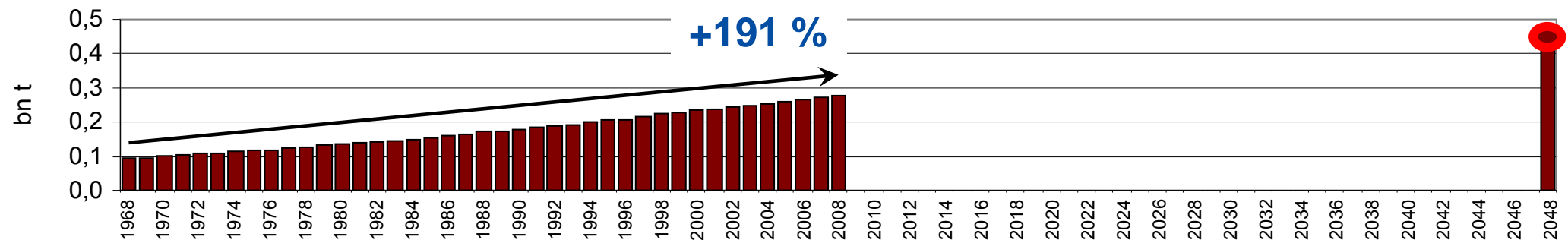
World population / bn



World cereal production / bn t

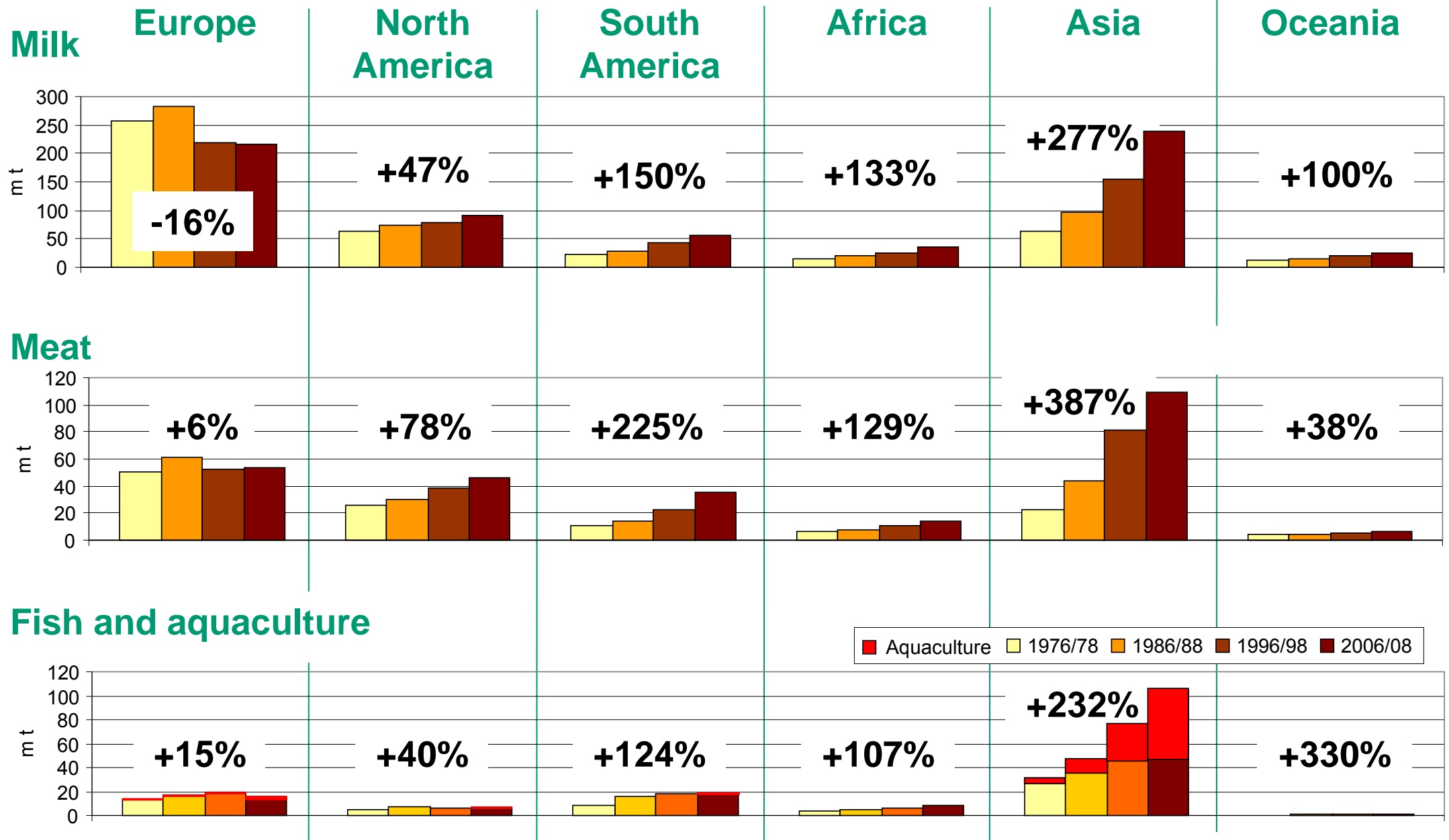


World meat production / bn t



Source: FAOSTAT and TI

Animal products produced in different regions

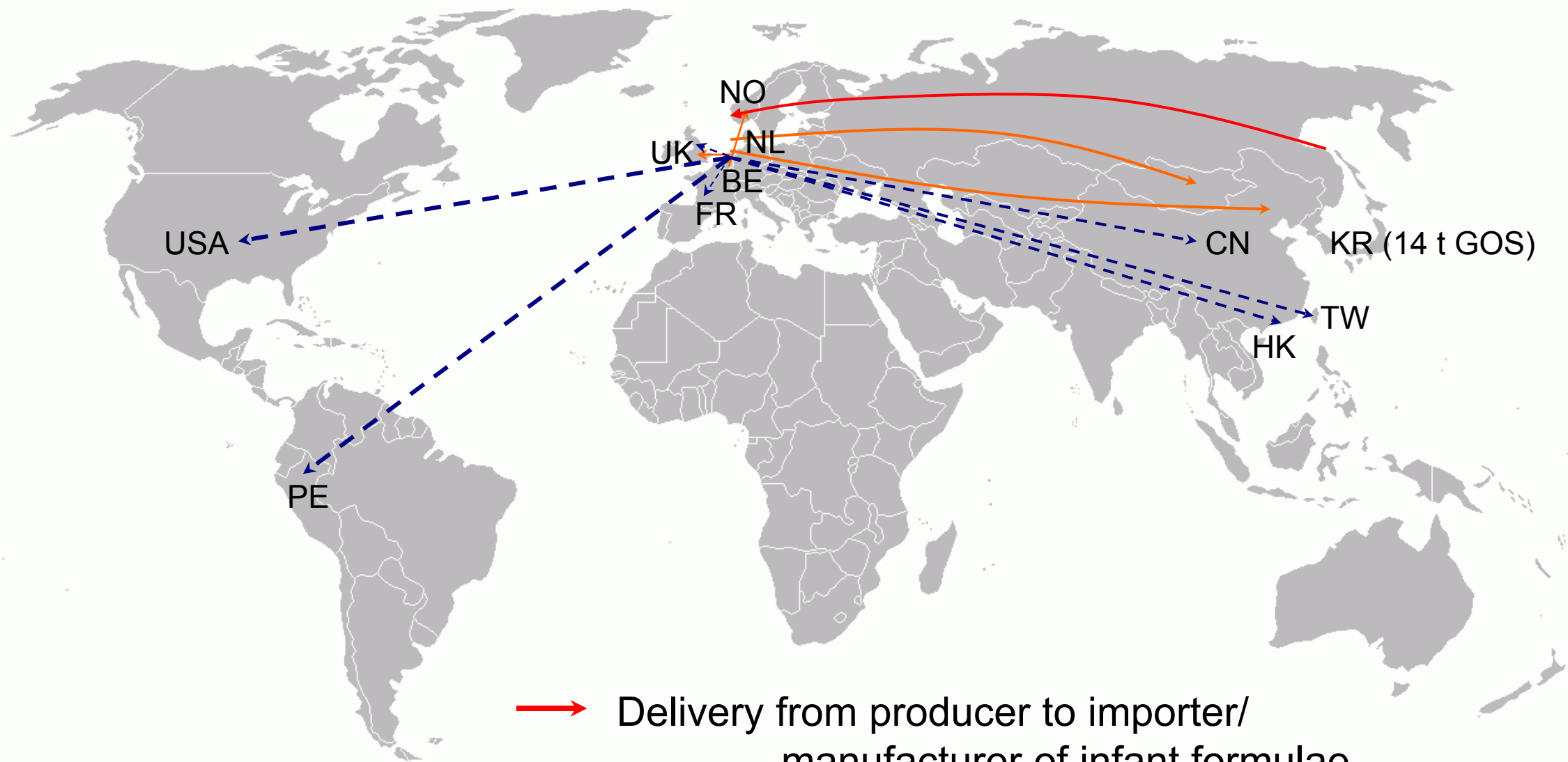


Source: FAOSTAT, TI

Globalization of food chains

Are we prepared for the global food chain network ?

RASFF: Distribution of Galacto-Oligosaccharides (GOS)



- Delivery from producer to importer/
manufacturer of infant formulae
- - -> Onward sale to companies from
- Sale of GOS / infant formulae to ...

Food chain management

Meeting the challenges of global food chains

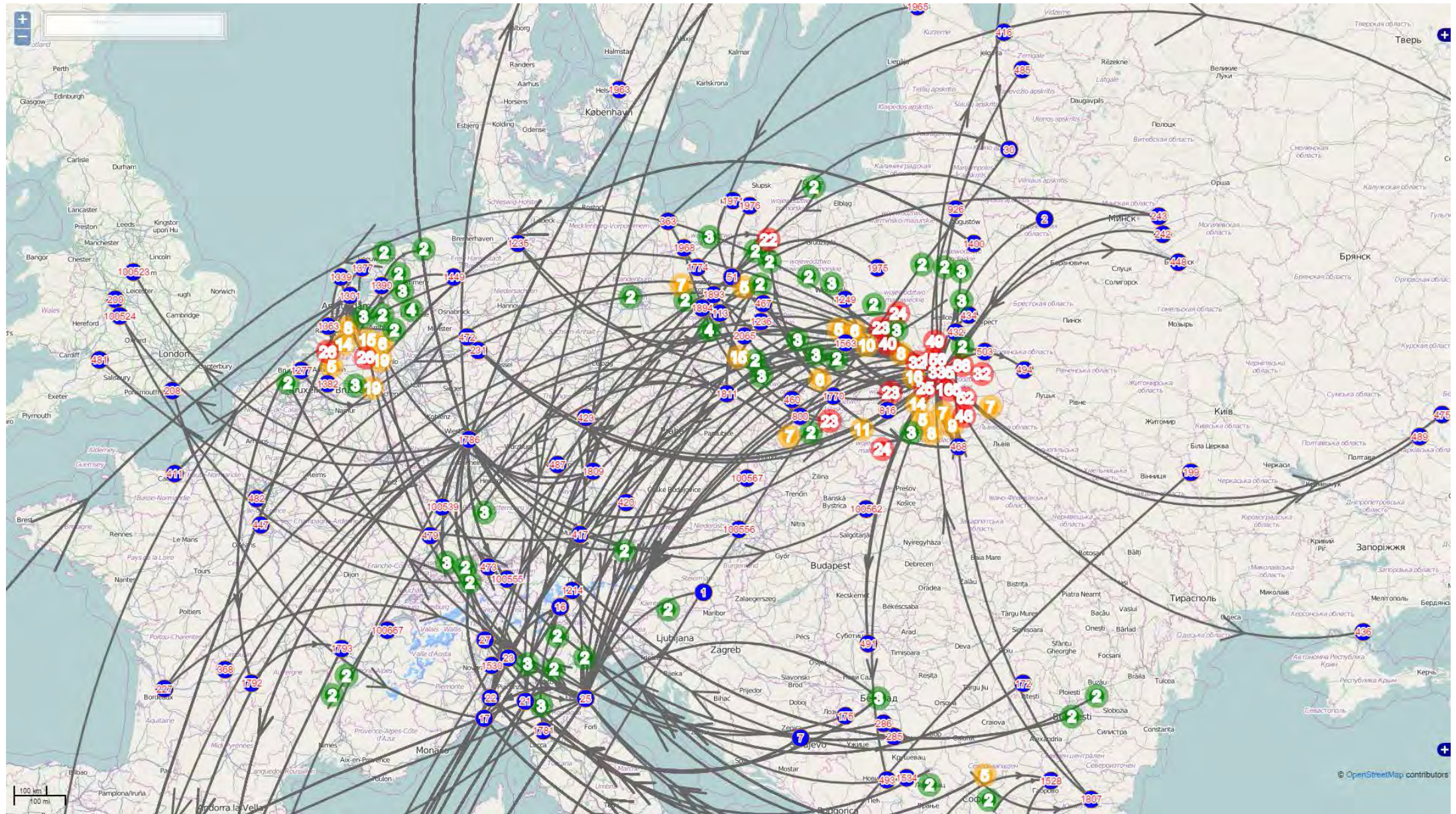
**A conceptual framework for supply chain collaboration:
Empirical evidence from the agri-food industry**

Supply Chain Management 12(3):177-186 · May 2007
DOI: 10.1108/13598540710742491

Web Service: Food Chain-Lab

Visualisation and interactivity using web tools

(Currently planned project to monitor the spread of contaminations)



Hazard and risk

Hazard

A negative health effect that is induced by a biological, chemical, or physical agent.

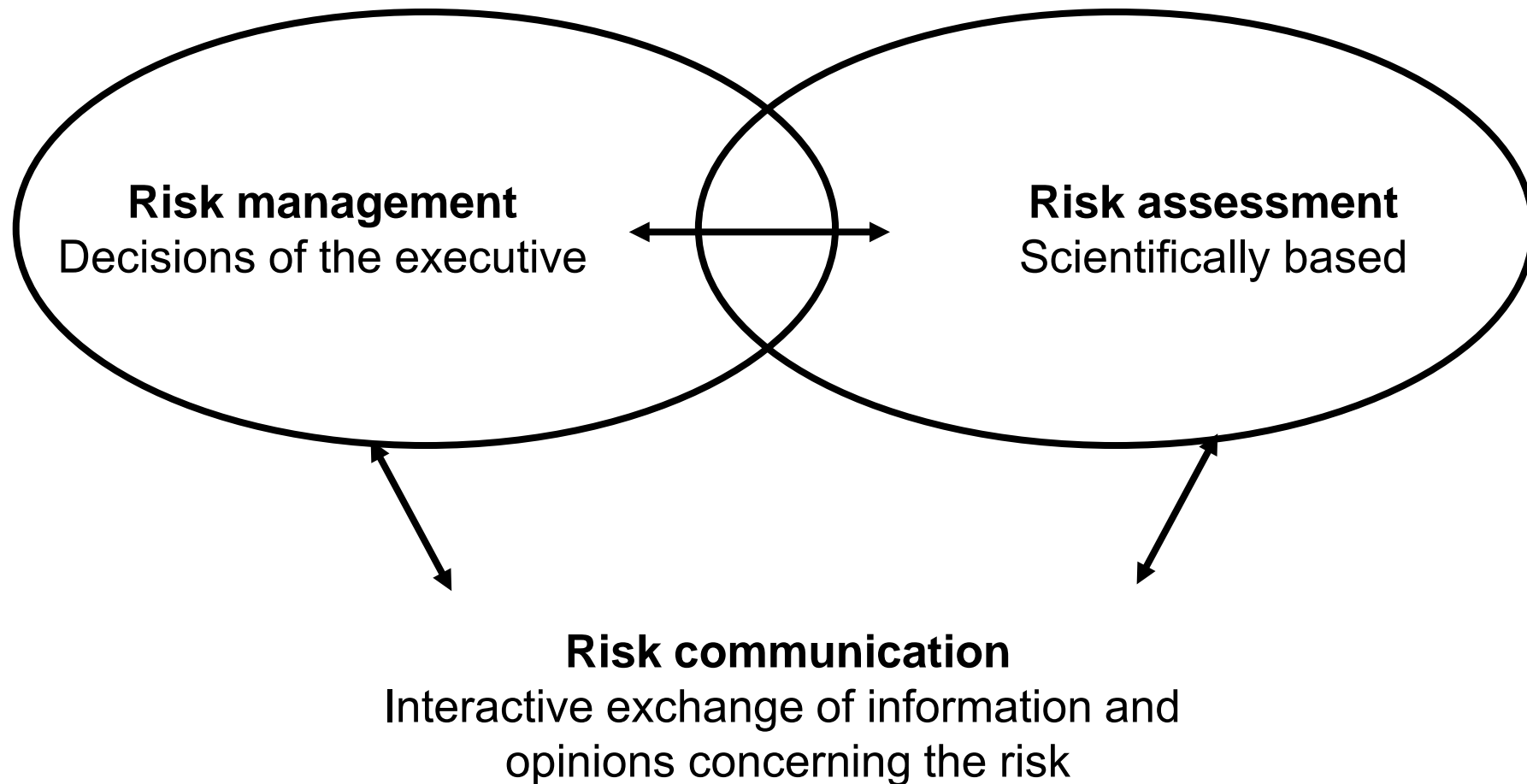
Risk

Describes the probability of health impairment by a certain amount / dose of a given substance.

Public Authorities

- Public agencies face similar problems all over the world.
- Solutions found elsewhere are often effective and acceptable in other countries.
- Interests of public authorities are not identical to the interests of food / feed enterprises.
- Interests of public authorities are not identical on national and global level.
- International networking benefits consumers in the home country.
- International networking benefits fair trade in the world.

Risk analysis framework



Application of Risk Analysis to Food Standards Issues, a Joint FAO/WHO Expert Consultation, Geneva, Switzerland, 13-17 March 1995

Regulation (EC) No 178/2002 of the European Parliament and of the Council



- 28.1.2002
- laying down the general principles and requirements of food law
- establishing the European Food Safety Authority
- laying down procedures in matters of food safety



European Food Safety Authority



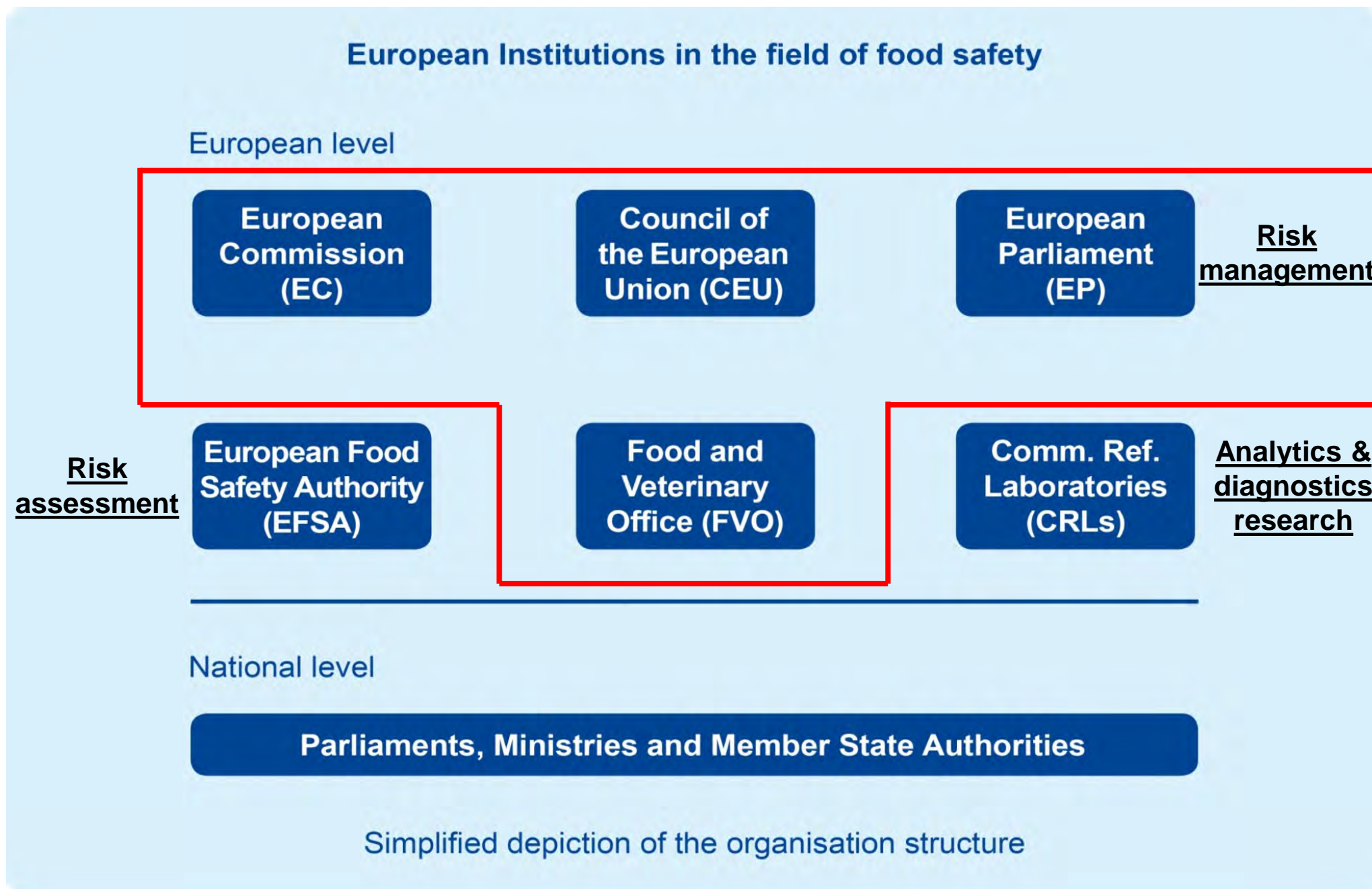
Legal structures of agencies

- 130 public authorities to work on food safety
- Who does what in Europe?



www.bfr.bund.de/cm/364/eu-food-safety-almanac.pdf

Structure in the European Union



Present situation in Europe in food safety



- Member States have undertaken numerous reforms of their structures in order to bring their systems in line with the EU legislation.
- This has led to a network of public authorities and institutions linking the national and European levels.
- Smaller countries have difficulties in building up institutionally separate risk assessment units.

28 countries



28 different systems

Risk Assessment Bodies

Institutional separation of Risk Assessment and Risk Management

- Germany (BfR)
- France (ANSES)
- Denmark (DTU)

- Austria (AGES)
- Hungary (NÉBIH)
- Italy (ISS)
- Lithuania (NMVRVI)
- Poland (NIZP-PZH, PIWET)
- Slovakia (VÚP)

Authorities responsible for Risk Assessment and Risk Management

- Belgium (FPS)
- Bulgaria (MZH)
- Cyprus (MOH)
- Czech Republic (MZE)
- Estonia (VTA)
- Finland (Evira)
- Greece (EFET)
- Ireland (FSAI)
- Latvia (PVD)
- Luxemburg (OSQCA)
- Malta (MCCAA)
- Netherlands (VWA)
- Portugal (ASAE)
- Romania (ANSVSA)
- Spain (AESAN)
- Sweden (SLV)
- United Kingdom (FSA)
- Iceland (MAST)

Structure dependent on



- Population size (Malta: 0.4 m \neq Germany: 81.8 m)
- Federal or centralised tradition of administration
- Scientific traditions
- Variety of institutions requesting risk assessments
- Actual necessities

Rights to protect by law



1. health
 - no harmful substances

2. freedom of choice
 - no wrongful information
 - no misleading information

3. health and freedom
 - basic needs in democratic societies

4. interdisciplinary approach
 - chemists, veterinarians, lawyers, journalists

How to protect the rights - how to influence the system

1. administrative law: the traditional way

- setting up regulations (health and information standards)
- controlling the standards on the market
- taking forbidden food from the market

2. penal law

- punishing breach of law

3. civil law:

- The first responsibility lies with the businesses!
- fair-trade problems
- product liability problems

Encouraging self-regulatory mechanisms: the „new approach“

- norms and standards, **not** made by parliament or ministries,
e. g. EN/ISO norms,
Dt. Lebensmittelbuch, Stiftung Warentest
- associations, trade partners, enterprises become motivated
by government and authorities to fulfil the requirements,
e. g. QS in Germany
- strengthening competition
- risk communication and participation

Requirements for risk assessments

- starting point: the legal provision, the scientific question
- define the state of appropriate science
- scientifically sound (intramural scientists, external experts)
- wording: regarding scientific and legal terminology, understandable for the audiences
- harmonising risk assessments leads to harmonised risk management decisions

Risk management options

- no action needed
- legislation for some products
- ban of dangerous products
- withdrawal of a charge of a product
- (rapid) alert
- recommendation by the competent authority
- even raising awareness may reduce a risk remarkably

Safe food in an era of global trade?

Challenge: **Dynamic Reality**

Objective: **Strategies to improve**

- ✓ food safety
- ✓ communication of risks arising from food

Challenge: **Dynamic Reality**

- New technologies and new products (novel foods)
- New contaminants
- Product piracy and food fraud
- Packaging materials
- New substances, additives, technical aids (pesticides, veterinary drugs, flavourings *etc.*)
- Process contaminants (acrylamide, 3-MCPD, furan, glycidol fatty esters *etc.*)
- Higher standards in using alternative methods of animal experiments

Predictable Trends – Emerging Challenges

- Climate change, global warming
- Increasing world population
- Globalisation in production, trade, and consumption
- New markets
- Demographic trends
- New energy policies

Consequences of global trends

- New strategies for agricultural production
- New technologies (nanotechnology, genetic engineering)
- Traceability to fight fraud and product piracy
- Problems from recycling processes
- Increase of aquaculture production
- Active packaging
- Import controls
- Bioethanol production
- New feeding stuffs

Risk Assessment: What is needed

- New analytical strategies
- Global harmonisation of standards, methods, and data interpretation
- Global quality assurance and traceability systems
- Science-based approach
- Harmonisation of risk assessment procedures (assessment criteria, uniform terminology)
- Joint risk assessment
- Transparent and target group-oriented risk communication that integrates public's risk perception

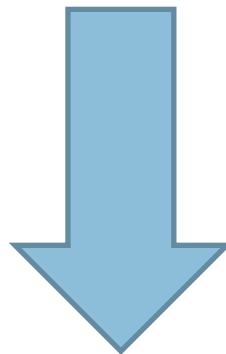
Professional risk assessment – a rational factor in consumer safety

- Less subjectivity - more objectivity
- Less undercover influence of stakeholders, more transparency
- Less prejudice, scientific and other
- **Better reasons and arguments**
 - for **interpreting existing law**
target groups: authorities, food business, law courts
 - for **changing / not changing existing law**
target groups: politicians, associations, parliament

Standards are influencing



Food Safety/Security



Food Fraud



Freedom of Choice

Challenge: Analytics



Challenge: Traceability

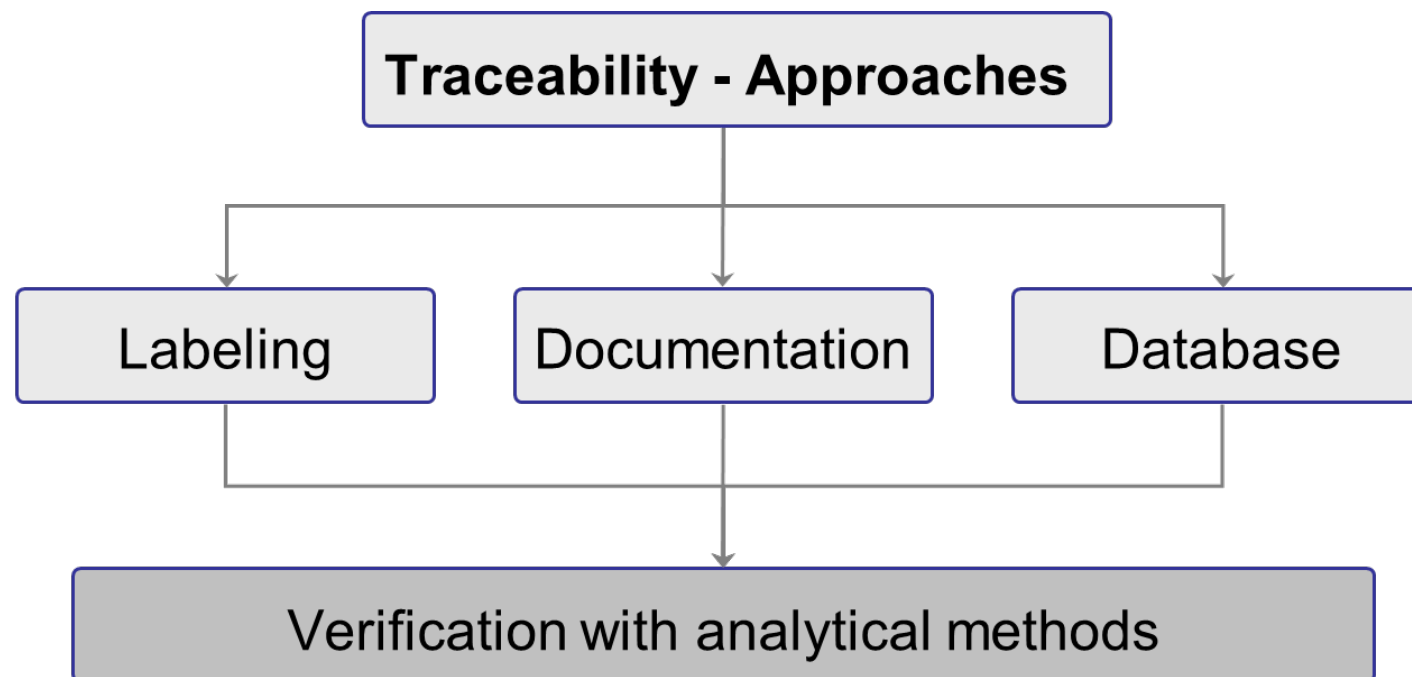


Definition Traceability

Codex Alimentarius: **Traceability / product tracing:**

the **ability** to follow the movement of a food through specified stages of production, processing and distribution.

Regulation (EC) No 178/2002 §3 p 15



Traceability systems trace and track food packaging

Authenticity of food

		Motivation
Food Quality	Food Fraud I ¹	Gain: Economic
Food Safety	Food Fraud II Food Defense	Harm: Public Health, Economic or Terror
Unintentional	Intentional	
Action		

¹ Includes economically motivated adulteration and food counterfeiting

Integrated traceability systems
are being developed for the food industry
that can verify:

- Geographical origin
- Production origin
- Species origin

Benefits of traceability

for the **consumer**:

- Food safety
- More targeted recalls
- Access to all food properties
- More informed choice when buying

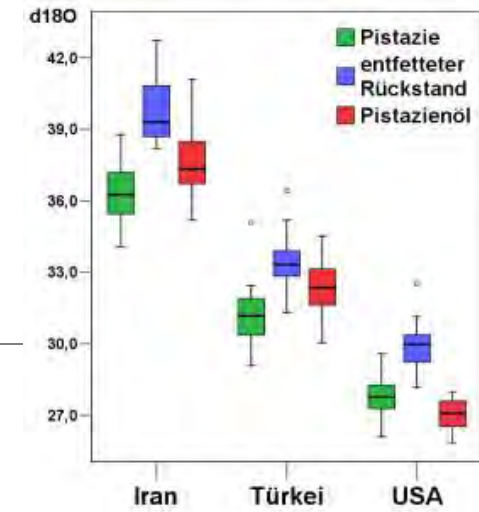
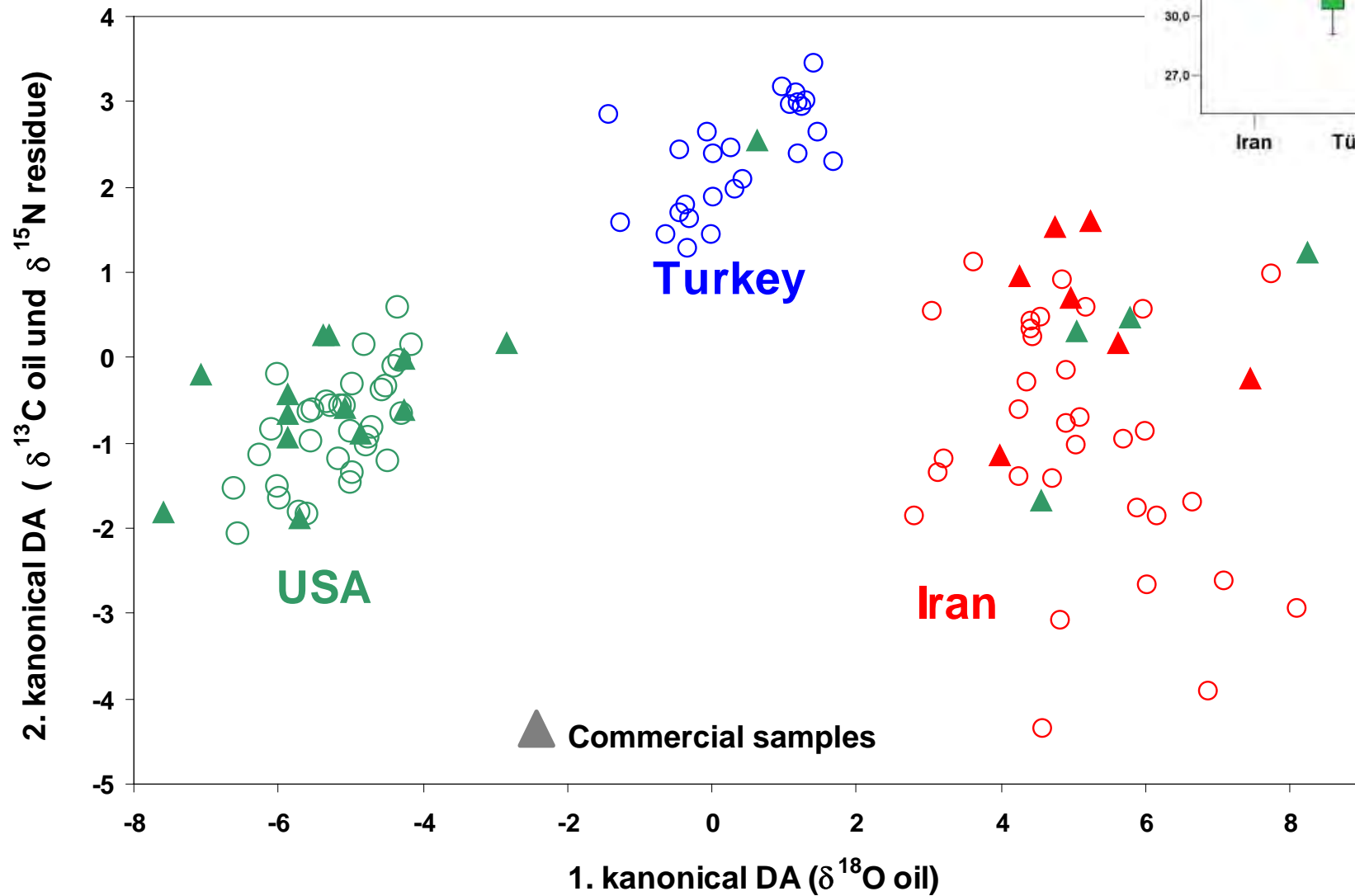
for the **food industry**:

- Meet legislation and commercial requirements, including certification
- Labour and cost reduction, rationalisation, better control
- Satisfy needs of buyers and consumers
- Competitive advantage

for the **authorities**:

- Effective control
- More targeted recalls

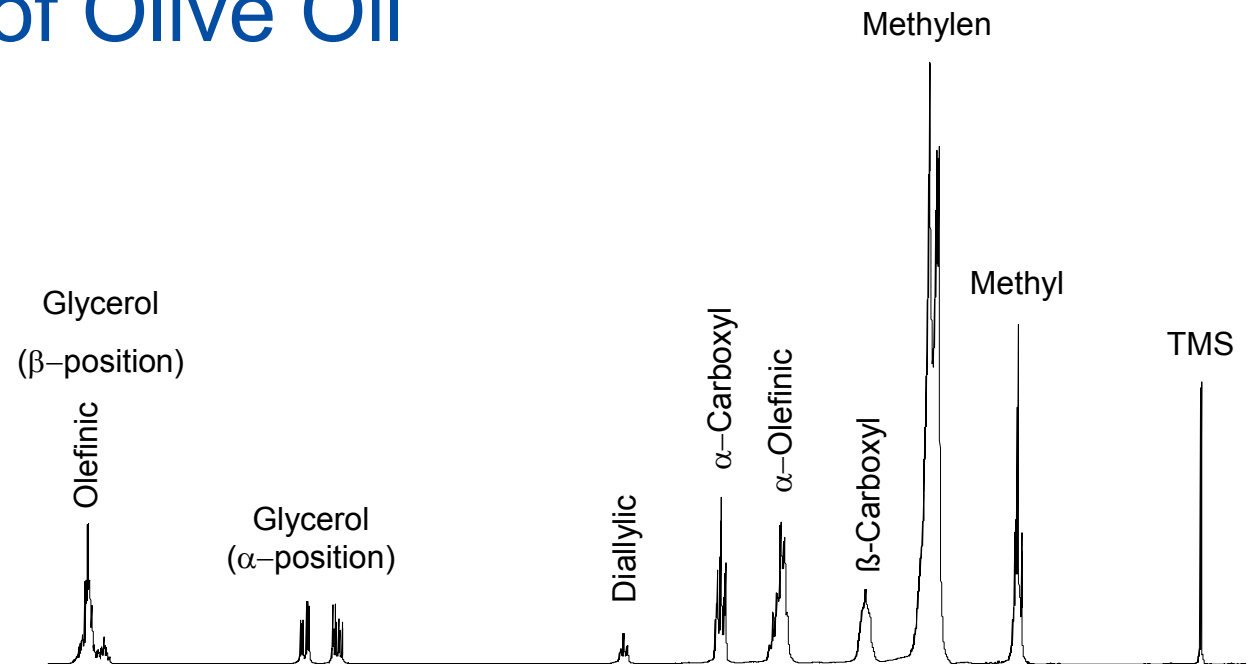
Stable Isotope Ratios: Origin of Pistachios



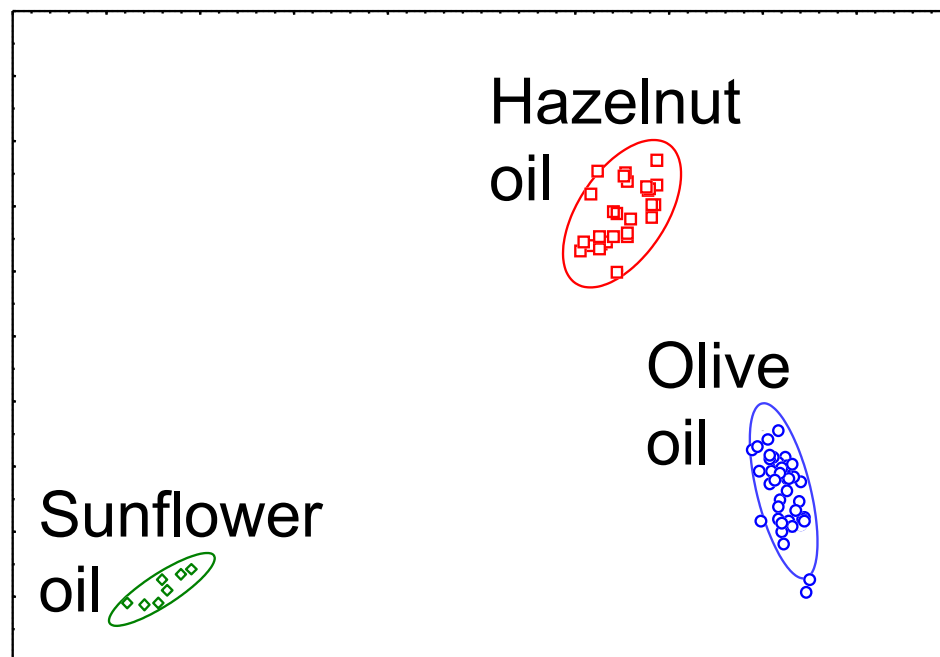
Heier, 2006, PhD thesis

Blending of Olive Oil

Detection of blending
with
hazelnut oil



Discriminant Analysis



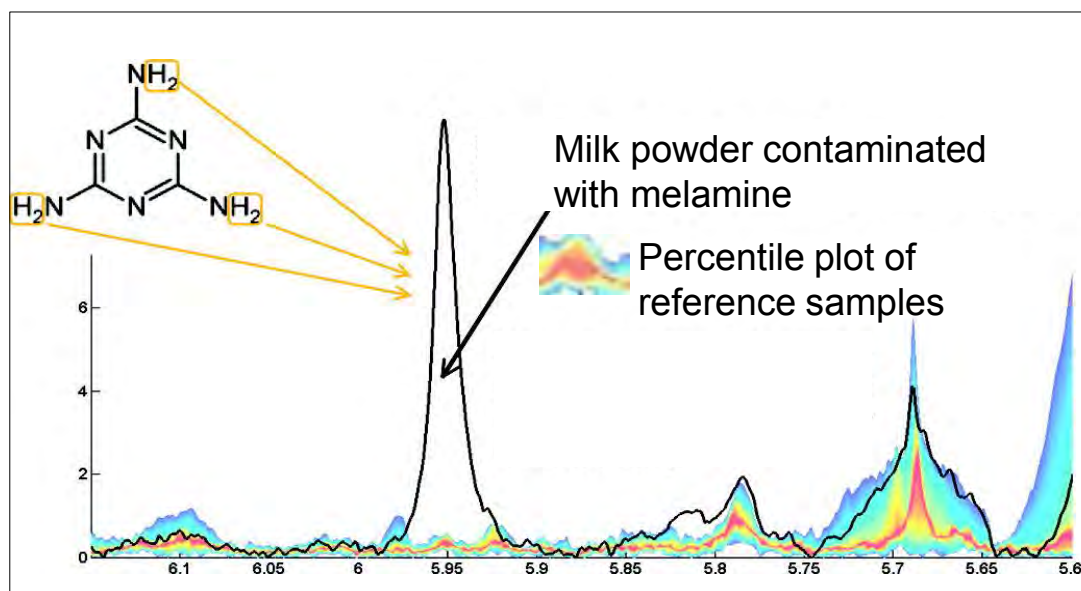
$^1\text{H-NMR}$ measurements



Fingerprinting

Example: Determination of melamine

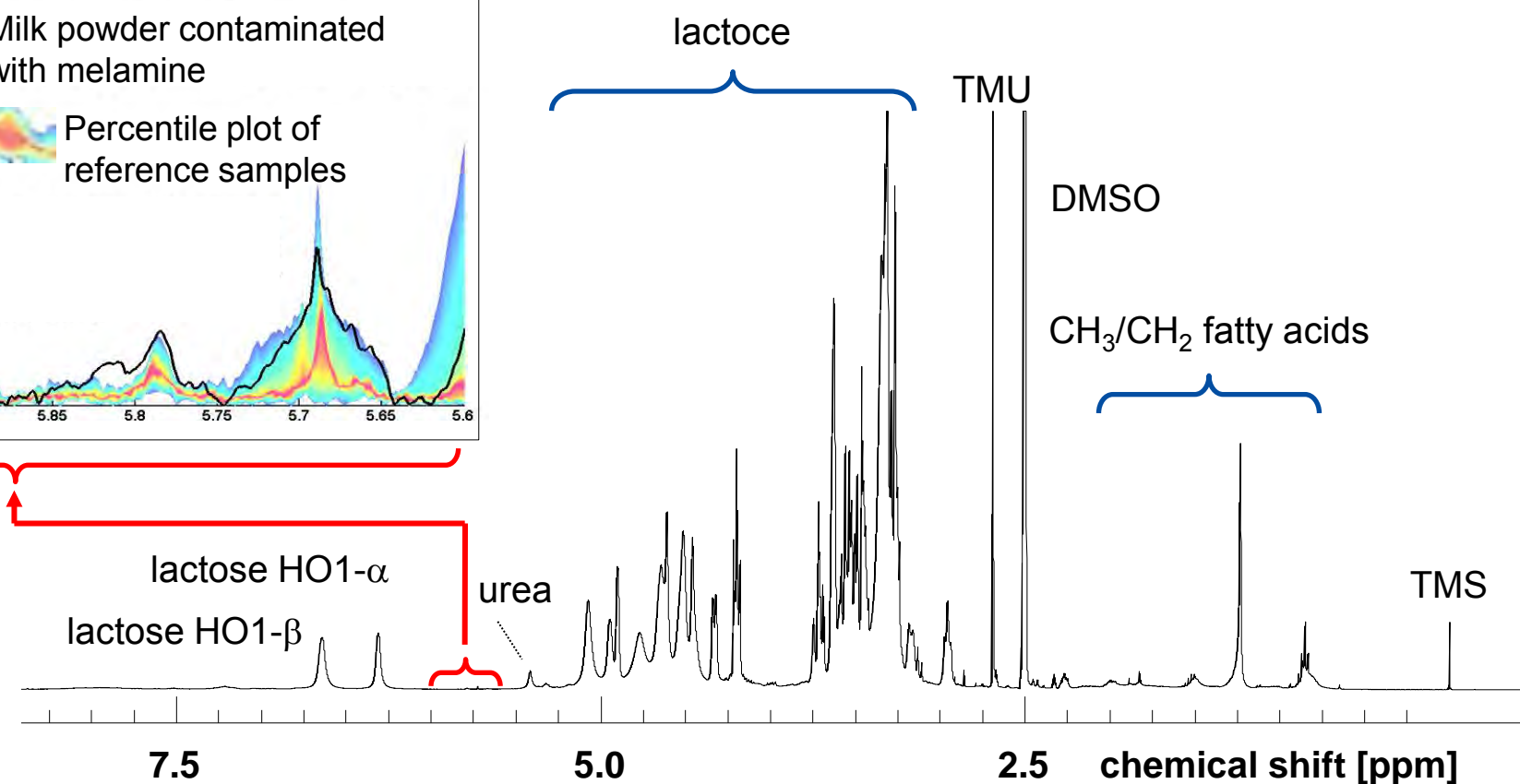
- Investigation of different **milk powders** (bought in 2008)
- Analysis using $^1\text{H-NMR}$ (400 MHz)
- Identification of melamine via **exogenous signal** at 5.93 ppm (NH_2 groups)



Milk powder contaminated with melamine

Percentile plot of reference samples

Non-targeted analysis



Thank you for your attention

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