

# Traceability and food safety – what is the relationship?

Joop van der Roest

Des Moines, IOWA 11<sup>th</sup> June 2009



RIKILT  
INSTITUTE OF FOOD SAFETY  
WAGENINGEN UR

# Good afternoon

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- Name: Joop van der Roest  
BSc, 58
- Profession: Researcher  
Quality Systems/Food safety
- Employer: RIKILT – Institute  
of Food Safety
- Residence: Wageningen, The  
Netherlands

E-mail:

[joop.vanderroest@wur.nl](mailto:joop.vanderroest@wur.nl)



# Content

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- RIKILT – Institute of Food Safety
- Traceability and stakeholders
- Food safety and recall
- Case: Incident dioxins in milk (2004)

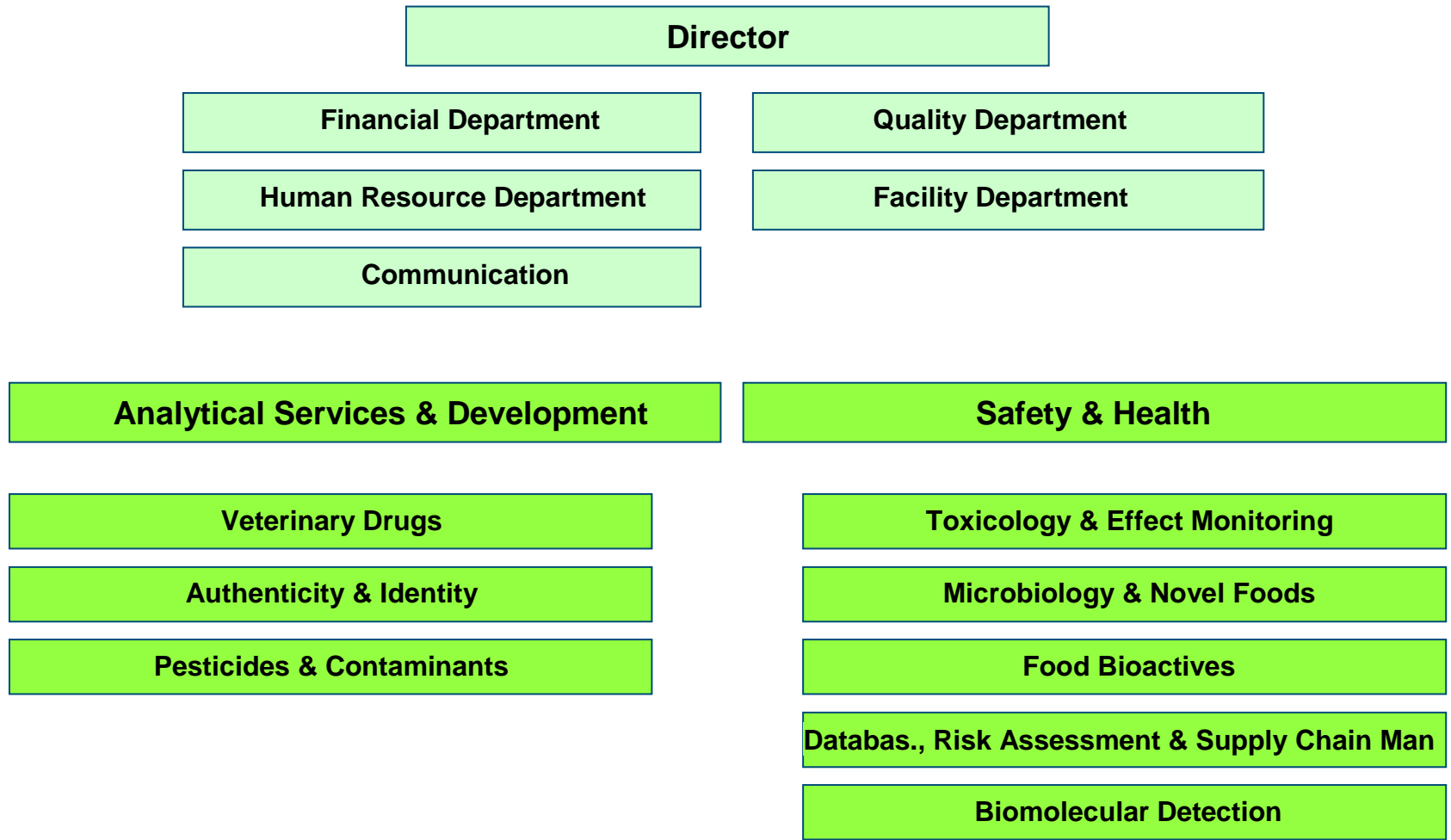
# RIKILT - Institute of Food Safety

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- RIKILT is an independent research institute
- RIKILT is a national reference laboratory
- RIKILT performs statutory tasks for the Dutch and international government(s) in the field of food and feed safety
- RIKILT has a staff of about 180 employees and has about 20 PhD students and foreign scientific visitors
- RIKILT is part of Wageningen University & Research Centre

# RIKILT organisation

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# Activities RIKILT

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- Analyses
- Research
- Quality Assurance/NRL
- Risk assessment
- Consultancy & training

## Themes

- Chemical contaminants
- Biological agents
- Veterinary drugs
- Feed
- Regulations

# Wageningen UR

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- Wageningen University
  - 5.000 students (BSc & MSc)
  - 1.200 PhD students
  - 2.950 employees
  
- Research Centre
  - 2.700 employees
  
- Van Hall Larenstein
  - 'Green' education at bachelors level
  - 450 employees



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# Fairy tale Hansel and Gretel



# Quote

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“It is clear that traceability comes at a cost. But the costs of not having it in place may be severe both for governments, consumers, individual companies and the food industry as a whole”

*(Food Standards Agency, 2002)*



# Incidents with food and feed

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**DES in meat**

1979

**Meltdown Chernobyl**  
April 1986

**Chlormequat in Dutch Pears**

Spring 1999

**Dioxins in Brazilian citrus pulp**

Spring 1998

**Effect Pesticides in food on children**

Autumn 2000

**Nitrofurans in shrimps and poultry meat**

March 2002

**Dioxins in Belgium Chicken feed**

May 1999

**MPA in Dutch pig meat**

Summer 2002

**Dioxins in German bakery waste**  
February 2003



# Interests of stakeholders (1)

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- Consumers:
  - Hidden benefits
  - Perceived control in food chain
  - Right to know origin of food



## Interests of stakeholder (2)



### ■ Industry:

- Prompt action in case of food safety incident
- Minimise size of withdrawal
- Diagnose problems in production
- Minimise spread of contagious disease amongst livestock



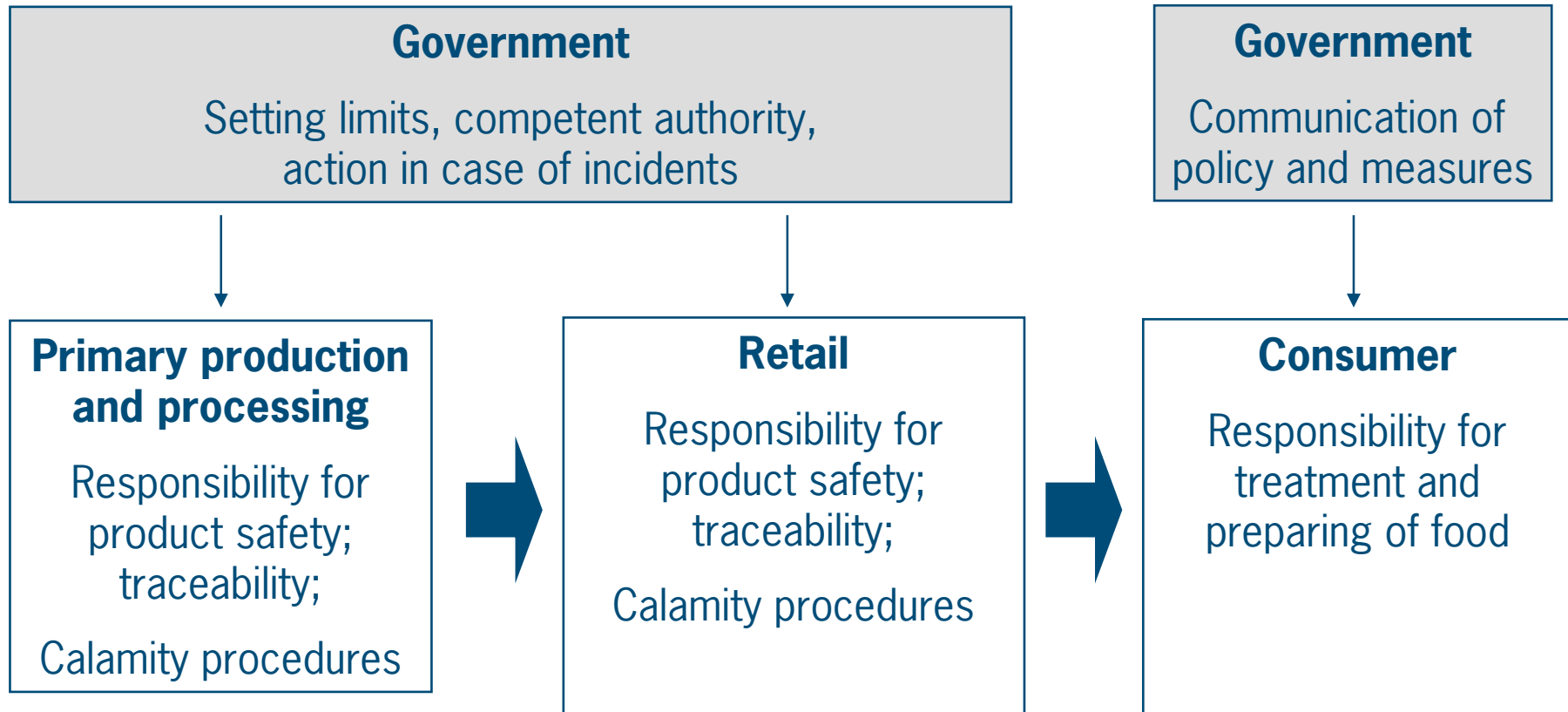
## Interests of stakeholder (3)



- Government:
  - Protect public health
  - Help prevent fraud (when analysis  $\neq$  authenticity)
  - Enable control human and animal health in emergencies
  - Control zoonotic diseases

# Relation stakeholders (NL)

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# Traceability: costs and benefits stakeholders

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## Industry:

### ■ Costs and efforts:

- Investments
- Operational costs
- Competition
- Risk factors

### ■ Benefits:

- Decrease size recalls
- Options for added value
- Brand name, company and image



## Government:

### ■ Costs and efforts:

- Incidents
- Questions in parliament
- Relation with trade partners
- Monitoring and control

### ■ Benefits:

- Consumer trust
- Public safety and health
- Quick response incidents



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# Food safety and product recall (1)

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Information required:

- What products delivered to which customer
- Which raw materials processed in products
- Did deviations also occur in other products?
- Origin of raw materials



## Food safety and product recall (2)

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Matching HACCP data to identified products:

- Results of inspections and analyses of raw materials, half products and end products
- Service and cleaning of equipment
- Trace possible cause or source of deviation in products

# Risk matrix consequence / probability food safety

Probability category

		A	B	C	D	E
C O N S E Q. .	1	High	High	High	Medium	Low
	2	High	Medium	Medium	Medium	Low
	3	High	Medium	Low	Low	Low
	4	Medium	Low	Low	Low	Low

Potential risk:



# Quality and hygiene parameters

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- Consequence category:

1. Customer fatality  
Product recall via press  
Malicious contamination
2. Customer ill health  
Unsatisfactory customer audit  
Major contamination
3. Multiple retail complaints  
Local authority investigation  
Minor product contamination
4. Individual retail complaint  
Product out of specification  
Non-compliance

- Probability category:

- A. Possibility of repeated incidents
- B. Possibility of isolated incidents
- C. Possibility of occurring sometime
- D. Not likely to occur
- E. Practically impossible



# Food safety approach

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Preventative approach:

- Prevent incidents by quality assurance (HACCP)

Curative approach:

- Trace 'unsafe' products when incident has occurred (traceability)

# Traceability and food safety

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## Objective:

- In case of incident:
  - Picture the problem
  - Organise recall
  - Trace to whom product has been sold
  - Evaluation of origin of problem



# Content

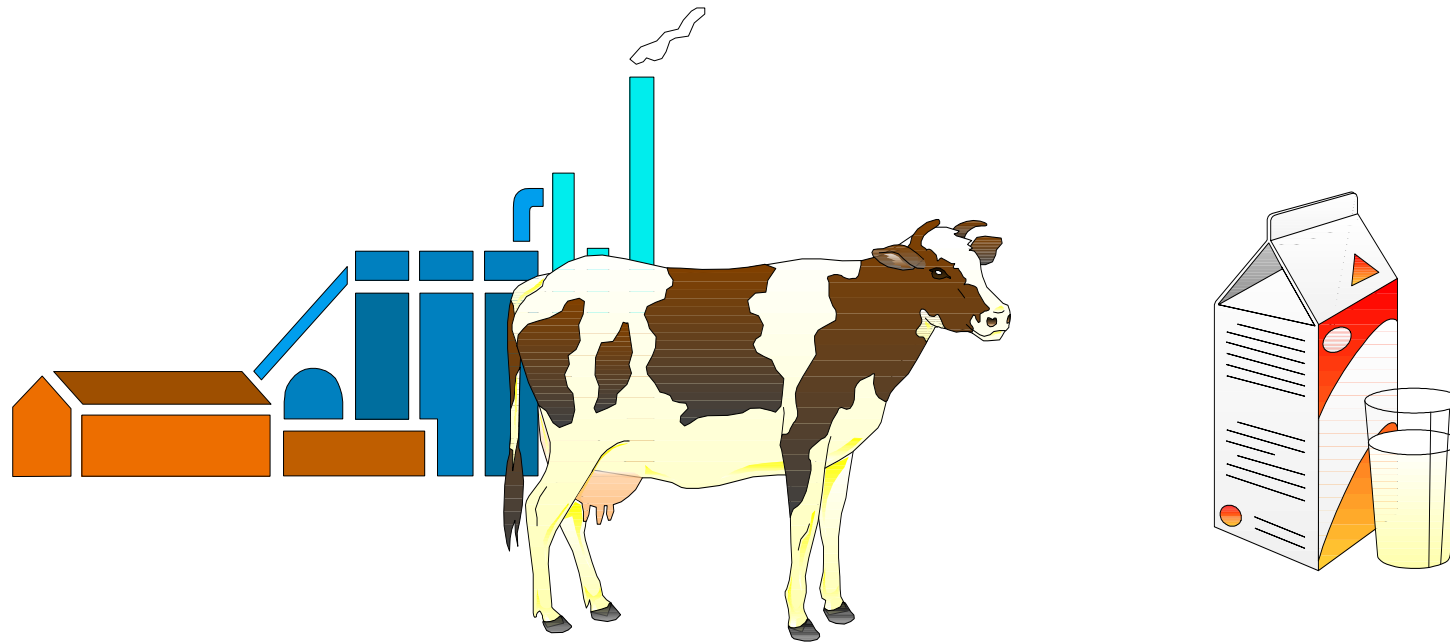
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# Incident dioxins in milk (2004)

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# Analysis of dioxins

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- Only institute that analyses dioxins for Dutch government
- Application of both reference and screening method
- Involved in all major incidents in Europe during last decade



# Dioxin poisoning

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BEFORE



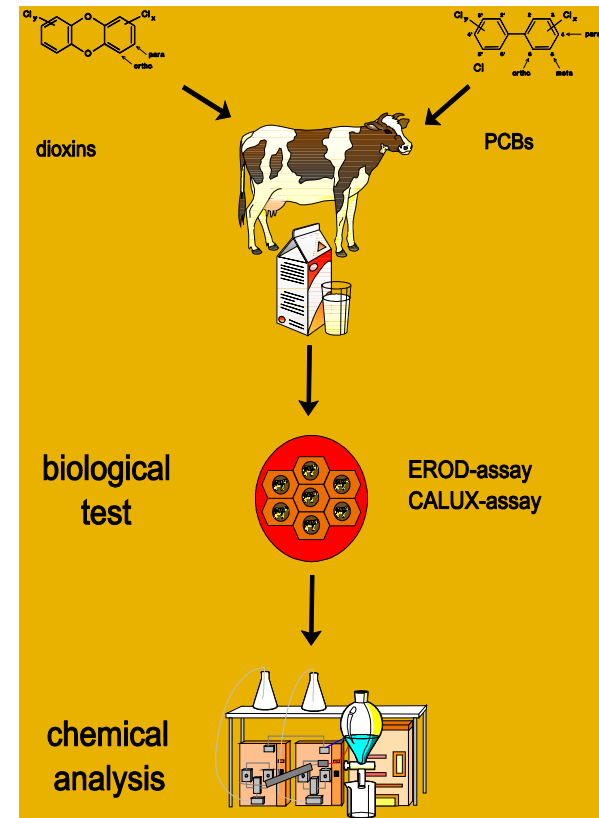
AFTER



# Screening method for dioxins

## ■ Requierments:

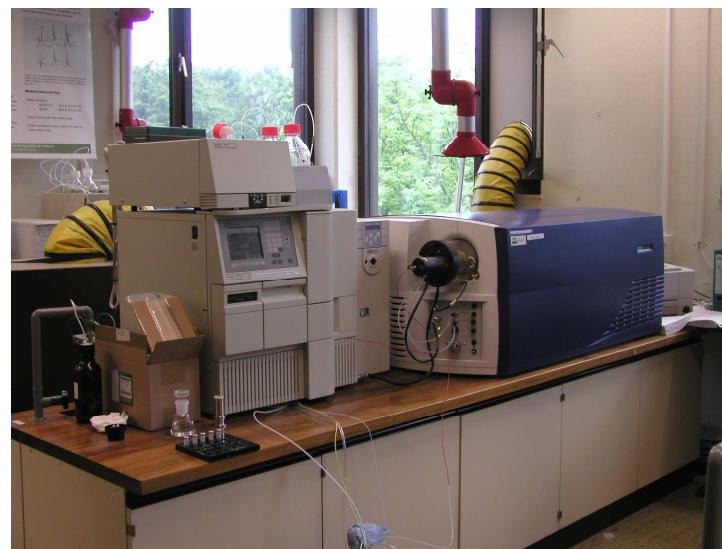
- quick and relatively cheap
- high sample throughput
- rapid expansion of capacity (crisis)
- no false-negatives, few false-positives
  
- sensitive at low levels
- obeying the TEQ-principle



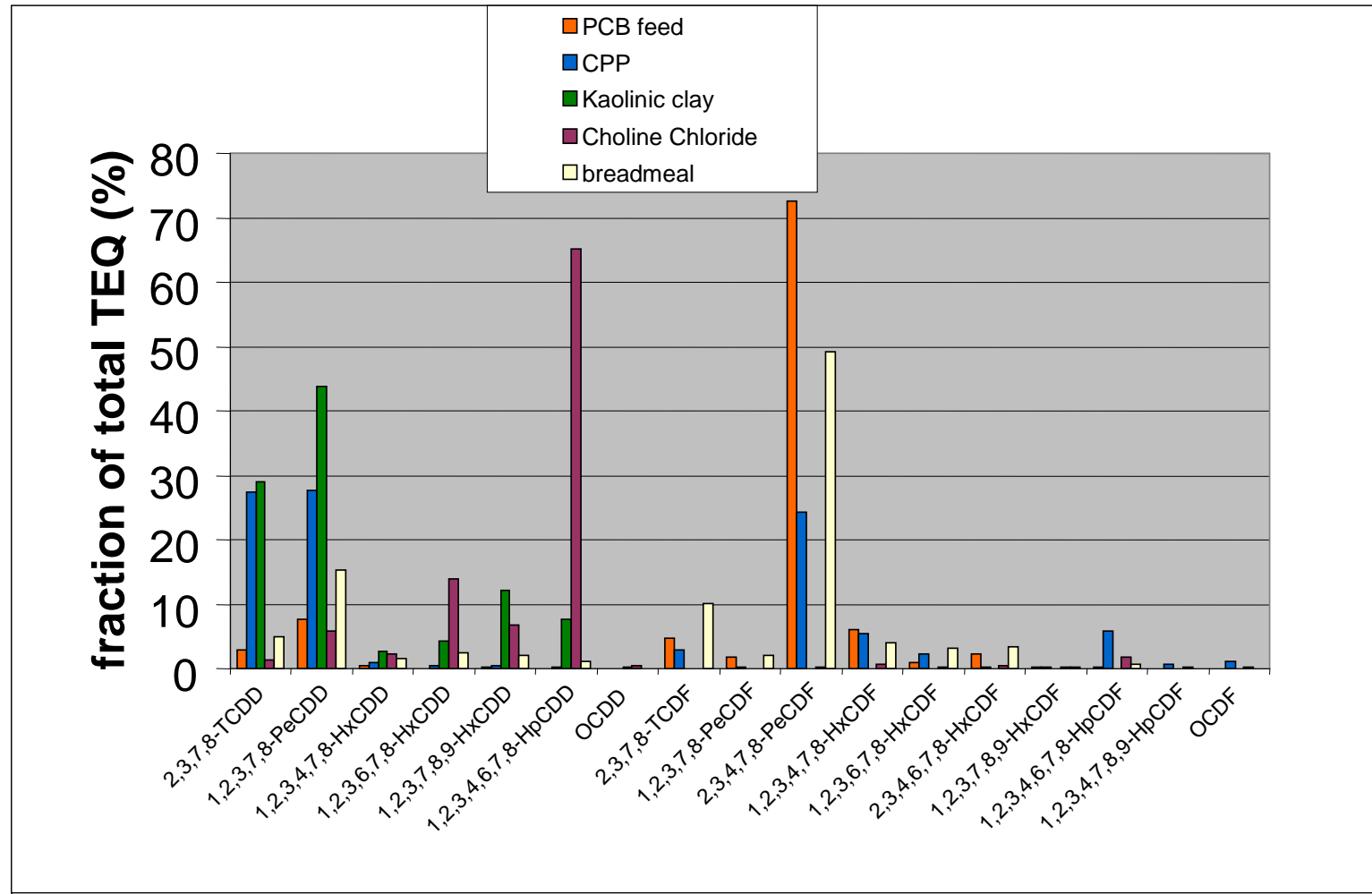
# Analysis of dioxins (GC/HRMS reference method)

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- GC/HRMS: confirmation
  - detection at pg/g levels
  - removal of fat
  - removal of pesticides
  - removal of non dl-PCBs
  - detection with GC/HRMS
- Drawbacks
  - Expensive
  - Time-consuming
  - Low sample throughput



# GC/MS: congener pattern



# Elevated dioxin content in milk in 2004

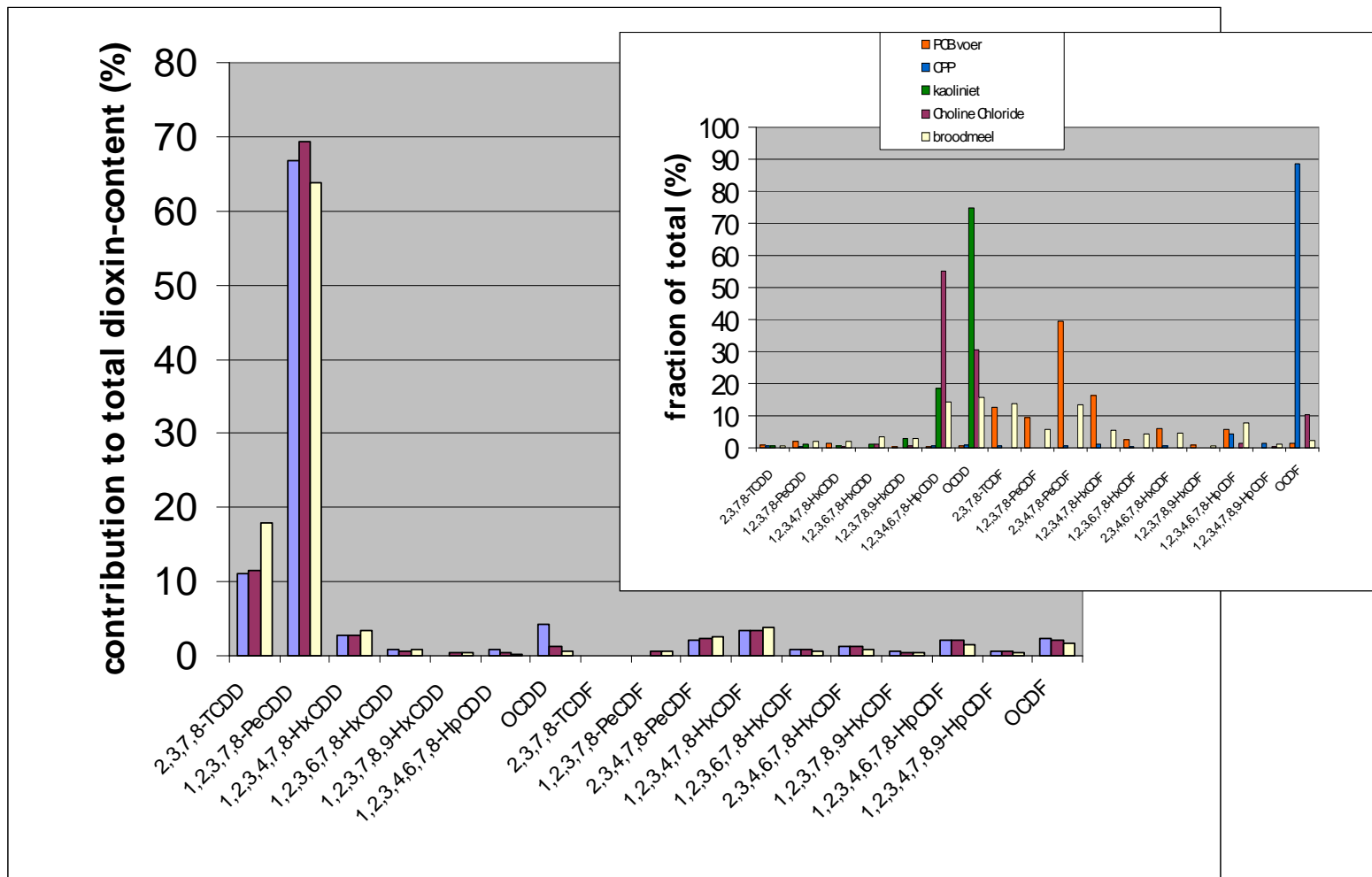
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(Lelystad affaire)

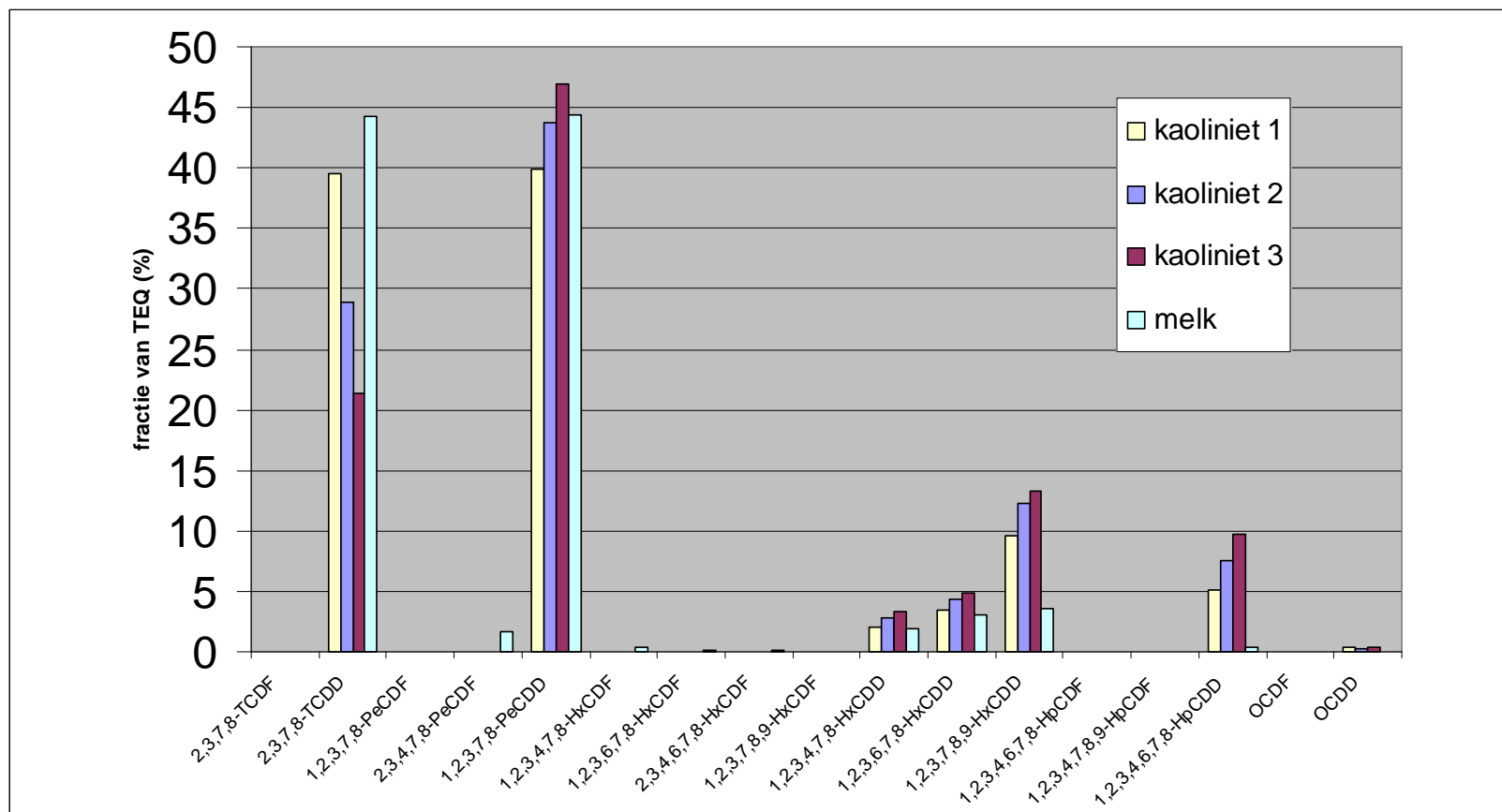
- Mixed pooled (RMO) sample of September contains dioxins  
(= four RMO's  $\approx$  20 farms)  
1,5 pg TEQ/gram fat
- Individual RMO samples analysed using CALUX, one suspected
- Confirmation of suspected sample with GC-HRMS  
5,1 pg TEQ/gram fat (three farms)
- Samples of these farms analysed using CALUX  
two on background level, one suspected
- GC-HRMS 20 pg TEQ/gram fat



# Pattern: unknown source



# Pattern in milk resembles kaolinic clay (1999)



# Samples from contaminated farm

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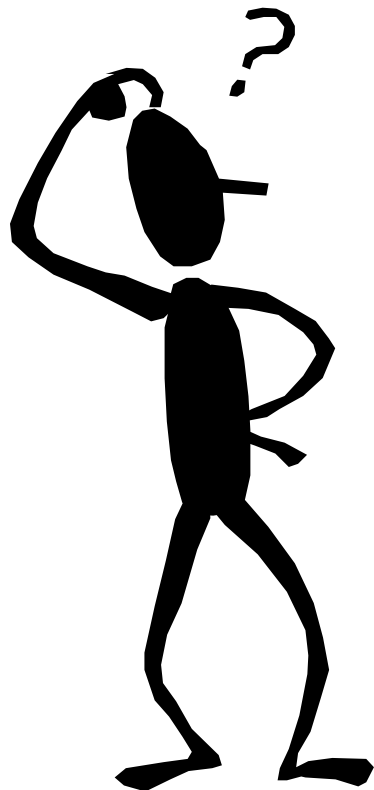
- All feeding stuffs sampled ( $\approx 25$ )
- No kaolinic clay present on farm
- Several samples suspected using CALUX, only **potato peels** highly contaminated, level in milk can be explained
- CALUX result confirmed using GC/HRMS; pattern comparable with milk



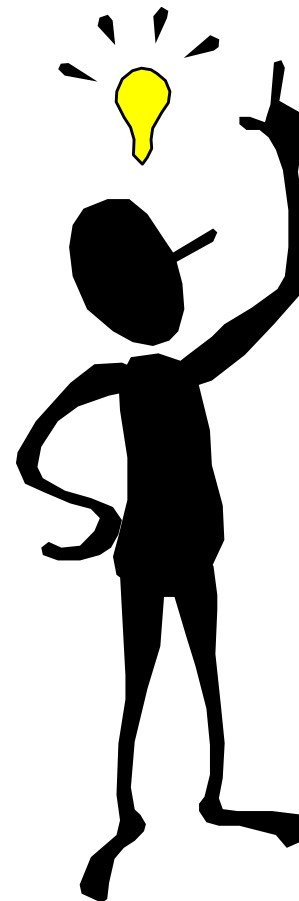
# Potato peels

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source ????

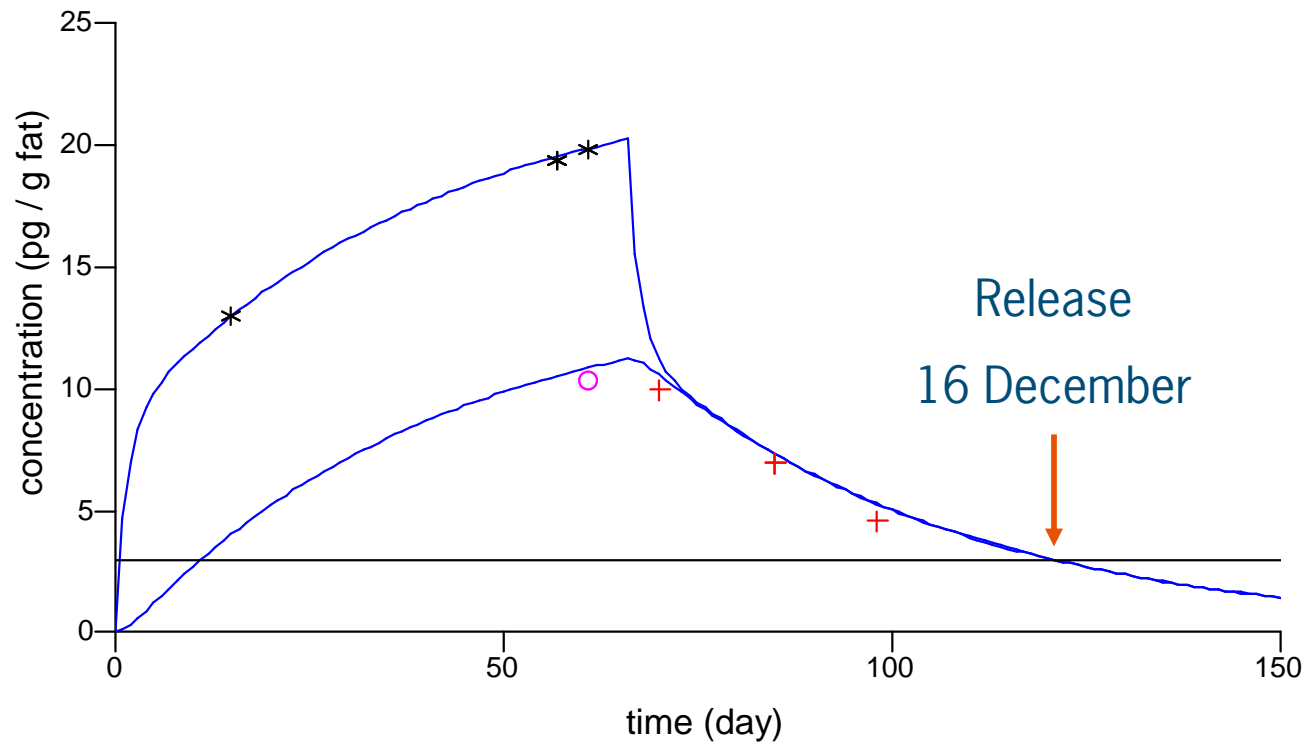


# Source ??

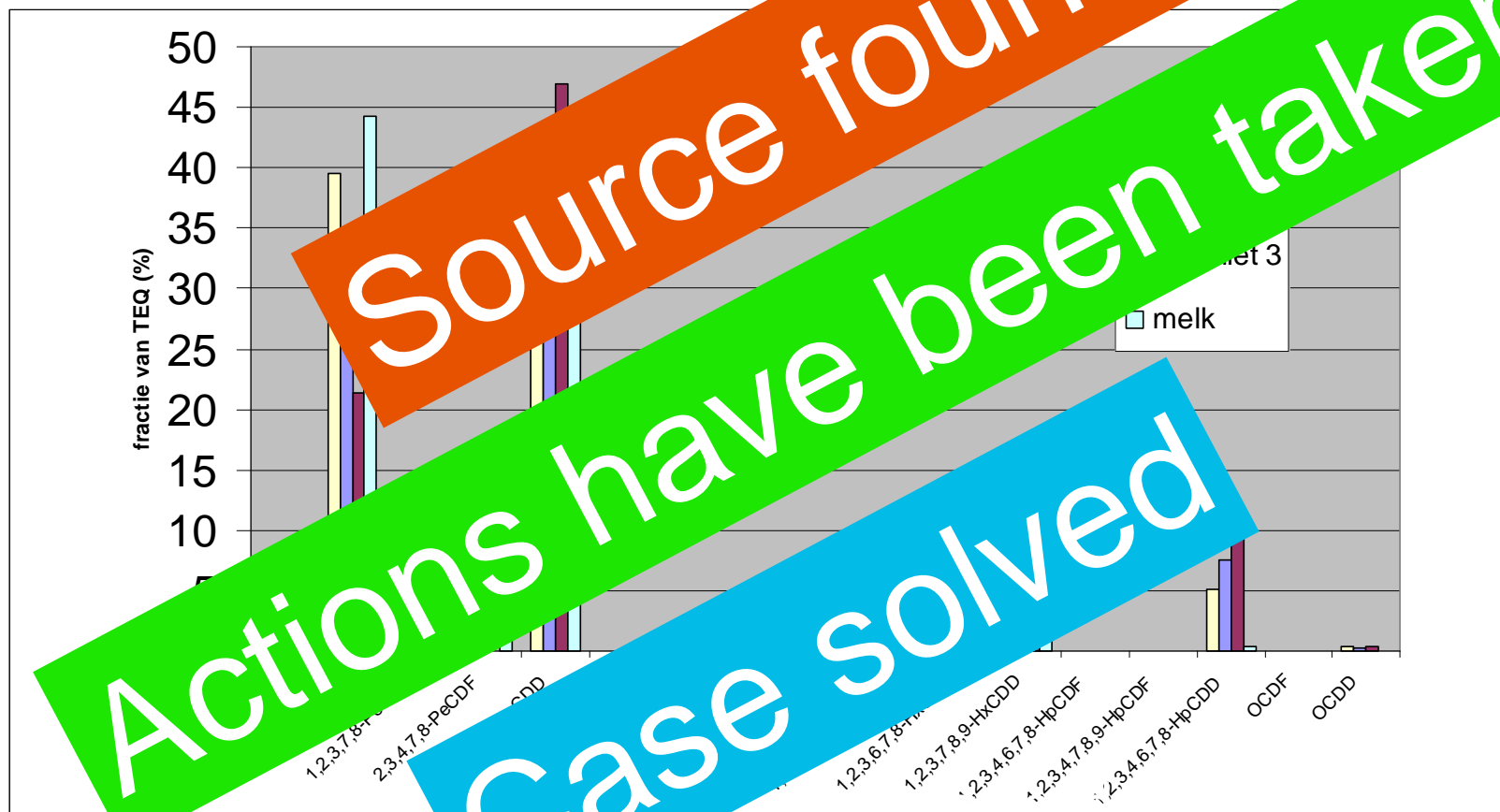
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- Hint from AID: Since the summer of 2004 McCain uses a different procedure for selection starch in the potatoes
- Clay instead of salt
- Samples clay taken
- Content 1600 ng TEQ/kg
- Similar pattern as potatoes

# Contamination of farm in Lelystad in time



# Dioxin fingerprint in milk and kaolinitic clay



# Conclusion

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Traceability and food safety:

*Relationship? Do we have a matching combination?*

- Dioxin case proved milk traced back to farm
- Detective work to find real source of contamination
- Lesson: assess, monitor and verify before changes are implemented in production process.

