Traceability and food safety – what is the relationship?

Joop van der Roest
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Good afternoon

- 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
Content

- RIKILT – Institute of Food Safety
- Traceability and stakeholders
- Food safety and recall
RIKILT - Institute of Food Safety

- 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

Director

Financial Department

Quality Department

Human Resource Department

Facility Department

Communication

Analytical Services & Development

Safety & Health

Veterinary Drugs

Toxicology & Effect Monitoring

Authenticity & Identity

Microbiology & Novel Foods

Pesticides & Contaminants

Food Bioactives

Analytical Services & Development

Databas., Risk Assessment & Supply Chain Man

Biomolecular Detection
Activities RIKILT

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

Themes
- Chemical contaminants
- Biological agents
- Veterinary drugs
- Feed
- Regulations
Wageningen UR

- 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

Total: about 6,100 employees in over 43 locations all over NL
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Fairy tale Hansel and Gretel
“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

DES in meat
1979

Chlormequat in Dutch Pears
Spring 1999

Effect Pesticides in food on children
Autumn 2000

Nitrofurans in shrimps and poultry meat
March 2002

MPA in Dutch pig meat
Summer 2002

Meltdown Chernobyl
April 1986

Dioxins in Brazilian citrus pulp
Spring 1998

Dioxins in Belgium Chicken feed
May 1999

Dioxins in German bakery waste
February 2003
Interests of stakeholders (1)

- 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
Government:
- Protect public health
- Help prevent fraud (when analysis ≠ authenticity)
- Enable control human and animal health in emergencies
- Control zoonotic diseases
Relation stakeholders (NL)

**Government**
- Setting limits, competent authority, action in case of incidents

**Primary production and processing**
- Responsibility for product safety; traceability;
- Calamity procedures

**Retail**
- Responsibility for product safety; traceability;
- Calamity procedures

**Consumer**
- Responsibility for treatment and preparing of food

**Government**
- Communication of policy and measures
Traceability: costs and benefits stakeholders

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)

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)

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

Potential risk:

High  Medium  Low
Quality and hygiene parameters

- **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

Preventative approach:
- Prevent incidents by quality assurance (HACCP)

Curative approach:
- Trace ‘unsafe’ products when incident has occurred (traceability)
Traceability and food safety

Objective:

- In case of incident:
  - Picture the problem
  - Organise recall
  - Trace to whom product has been sold
  - Evaluation of origin of problem
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Incident dioxins in milk (2004)
Analysis of dioxins

- 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

BEFORE

AFTER
Screening method for dioxins

- Requirements:
  - 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)

- 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

The graph shows the fraction of total TEQ (%) for various congeners across different feeds and treatments. The congeners include 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, 1,2,3,4,7,8-HpCDD, 1,2,3,4,7,8,9-HpCDF, 1,2,3,4,7,8,9-HpCDF, 1,2,3,7,8,9-HpCDF, OCDD, OCDF.

Different feeds and treatments are represented by different colors:
- PCB feed
- CPP
- Kaolinic clay
- Choline Chloride
- breadmeal

The y-axis represents the fraction of total TEQ (%) ranging from 0 to 80%.
Elevated dioxin content in milk in 2004
(Lelystad affaire)

- Mixed pooled (RMO) sample of September contains dioxins (= four RMO’s ≈ 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 in milk resembles kaolinic clay (1999)
Samples from contaminated farm

- All feeding stuffs sampled (~ 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
Hint from AlD: 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

Release
16 December
Dioxin fingerprint in milk and kaolinitic clay

Source found
Actions have been taken
Case solved
Conclusion

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.