



# Lesson 1.6 – Food safety and Food quality

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*After this lesson you will...*

- understand the main features of the EU food safety regulation,
- assess issues of compliance with food safety law for different agents in the food supply chains,
- Understand consumers' attitudes and behaviour in the contexts of decisions related to the safety of the food products they purchase and consumer,
- Assess how the infolding of crises affects different agents in the supply chain.

## Some concepts of quality

In a marketplace with different types of products in each category where consumers have different options to choose from (i.e. a differentiated product market) product's quality affect their choices.

We can look at quality attributes in two ways:

- **Horizontal**: consumers have heterogeneous preferences regarding the mix of attributes – no agreement as of which particular product or brand is the best.
- **Vertical**: consumers unanimously agree on which product or brand is preferred.

## Differentiation in Attribute Space (from Lancaster 1966)

- Consumers purchase goods because of the utility obtained from the attributes embedded into them
- Each consumer chooses products with the optimal bundles of characteristics to maximize her utility.
- Every product should represent a unique combination of characteristics (i.e. no two products in the market should include the same bundles of attributes).
- Redundant product should not be found in the market.

## Differentiation in Attribute Space (from Lancaster 1966)

- Consumers will substitute products more similar to one another. → Cross price elasticities larger for those products that are closer in attribute space.
- Distance (or closeness) in attribute space determine what products should actually be considered as direct competitor of a firm's products.

# Food Safety

- Food Safety is a quality prerequisite of food products → Consumers expect products in the marketplace to be safe for consumption
  - **Q:** Is it a source of vertical or horizontal differentiation?
- As it is a prerequisite, consumers may only be willing to pay a premium if product are “extra-safe” in terms of providing additional guarantee of safety
- Thus, the cost of increased safety is often absorbed by the industry and not passed onto consumers
- During and after a food scare (food safety incident) things may change...

# Food Safety Throughout the Food System

Q: Who is responsible?

## Food Safety Throughout the Food Systems

- Food retailers have gained traction and have become the “channel captain” in food chains.
  - Gradual shift of power from manufacturers to retailers (farmers have little to no saying on many of strategic decisions along the channels)
  
- BUT many contaminations are still related to farm/manufacturing-level issues.
  - European Commission “White Paper on Food Safety” (2000) → food safety responsibility of feed manufacturers, farmers and food operators
  
- EU’s General Food Law ([Regulation \(EC\)178/2002](#); General Principles and requirements of Food Law) makes **traceability** compulsory for all food and feed businesses.
  - “Traceability” means the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution



## Food Safety Throughout the Food Systems

**Traceability** deals with INFORMATION (“where” / “when”)

- “The ability to trace the history, application or location of an entity by means of recorded information” (ISO)
- “The ability to trace and follow a food, feed, food-producing animal or substance through all stages of production, processing and distribution” (EU)
  
- Requirements for a traceability scheme to work properly:
  - All partners within a supply chain should be identifiable
    - Q: (How about small farmers? – there are plenty of them)
  - Unique identification system (particularly important for animal products– especially meat)
    - Q: (Is there a unique EU system? Who decides on what?)
  - Credible and “complete” information transfer among all participants in the supply chain.
    - Q: (All the information is transferred from producers to retailers: what should consumers see?)

## Food Safety Throughout the Food Systems

TRACING



TRACKING



EU system related to T&T

➤ TRACES (Trade Control and Expert System)

- Decision [2003/623/EC](#): management tool for tracking the movement of animals / products of animal origin outside of and within the EU.

➤ The Rapid Alert System for Food and Feed (RASFF)

- Warning system / network created in 1979; enhanced by the General Food Law in 2002. Includes Member States, the EC, EFSA, Iceland, Liechtenstein and Norway. It enables rapid exchange of information once a risk to food or feed safety is identified.

(see [http://ec.europa.eu/food/food/foodlaw/traceability/factsheet\\_trace\\_2007\\_en.pdf](http://ec.europa.eu/food/food/foodlaw/traceability/factsheet_trace_2007_en.pdf))

## Economic hurdles in adopting a traceability/certification program

1. What is the “Break-even Point.” ?
2. Is there an “Acceptable Level of Risk”?
3. Hurdles in Participation
  1. Distribution of Costs and benefits:
  2. Disproportionate requests compared to means:
  3. The role of small/hobby farmers:
  4. Free riding:
4. Reconsideration of Insurance.
5. What do consumers want?

# Consumers Perceptions and Food Safety

## Eurobarometer

- Established in 1973. The purpose of the general and “special” surveys is to monitor the evolution of public opinion in the Member States.
- Each survey consists of circa 1000 face-to-face interviews per Member State (with some exceptions) conducted multiple times a year (2-5 times) and published twice yearly.
- Special Eurobarometer 354 (on Food Risks)  
Representative sample of 26.691 individuals, age 15 or over in all 27 Member States (face-to-face interviews with consumers in their mother tongue from 9 to 30 June 2010).

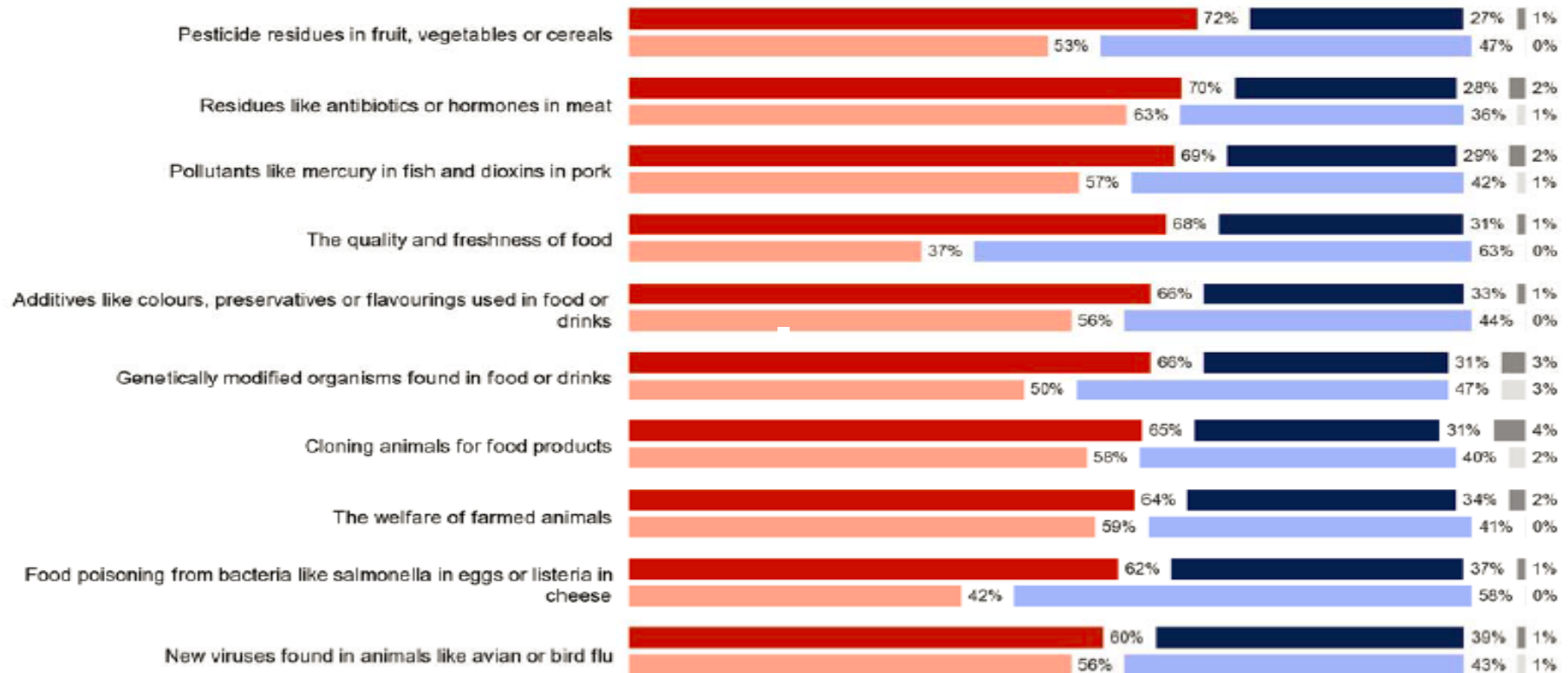
## Results

### Public concerns about food-related risks

- No single, widespread concern mentioned spontaneously by a majority of respondents (<1/5 chemicals, pesticides and other substances, same as 2005)
- 3/10 Europeans mention to be very worried about chemical residues from pesticides (31%), antibiotics (30%) and pollutants like mercury and dioxins (29%), together with cloning animals for food products (30%) (from a list of possible issues associated with food)
- Fewer citizens are “very worried” about health and nutrition risks [putting on weight (15%); not having a healthy / balanced diet (15%)]



## Extent worried about following food risks (NL)



EU27   
NL 

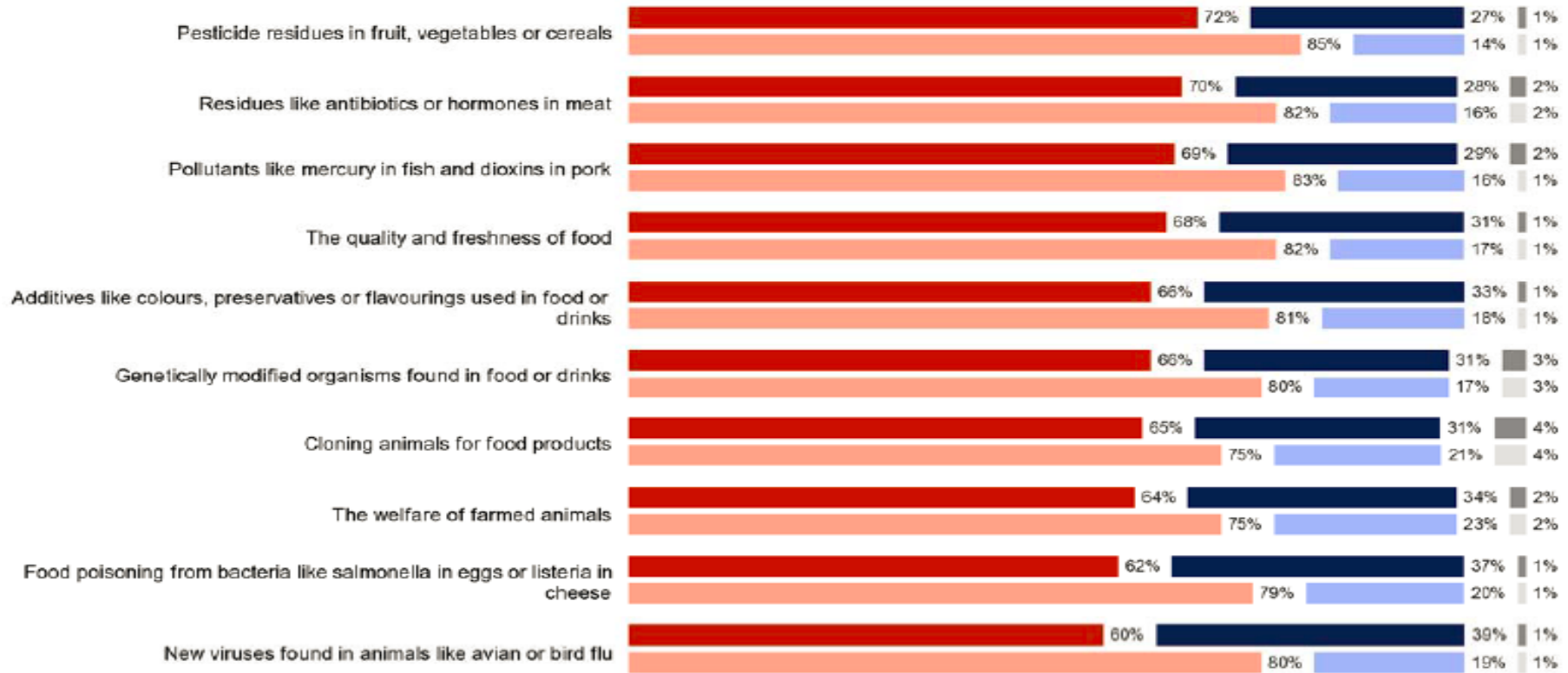
   
Total "Worried"

   
Total "Not worried"

   
Don't know



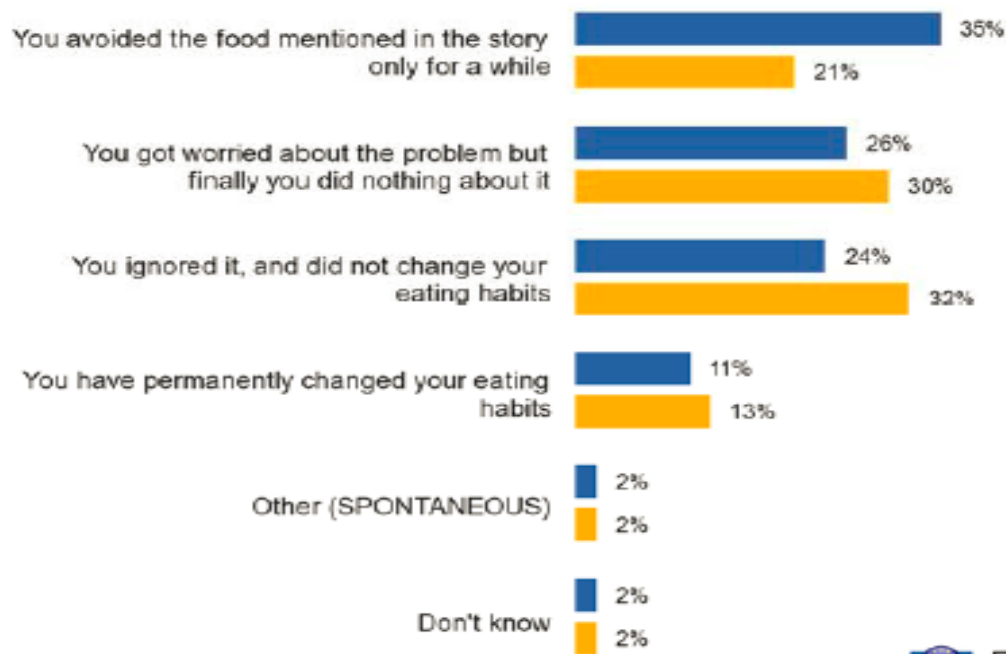
# Extent worried about following food risks (IT)





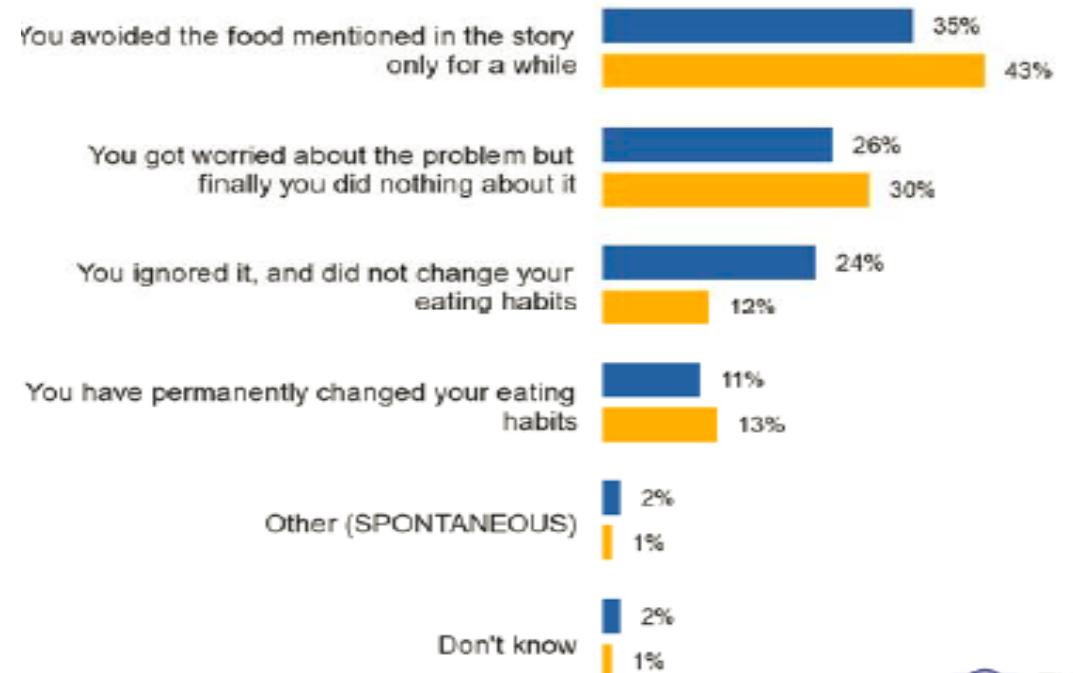


# Reaction to information regarding food being unsafe



 EU27  
 NL

\* for example, due to a chemical found in it

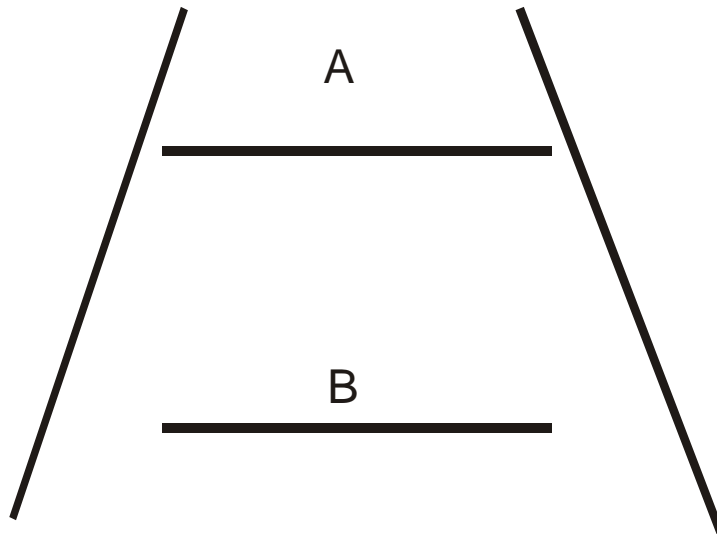


 EU27  
 IT

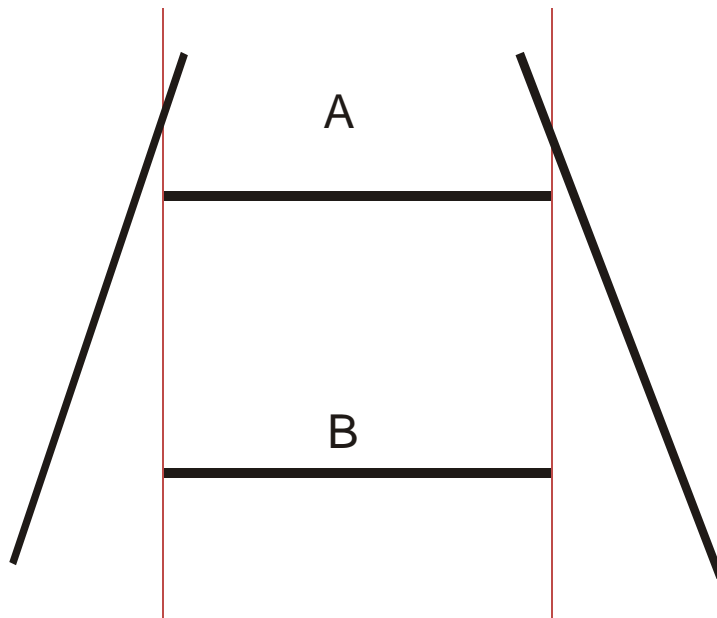
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## Perceptions vs “reality”

- Which line is longer?



## Perceptions vs “reality”



- Scientific objectivity:
  - Length line A = length line B
- Human subjectivity:
  - Length line A > length line B

### **Consumers:**

There is only one reality and that is the perceived one...

## Case: Coca-Cola crisis in Belgium (June 1999)

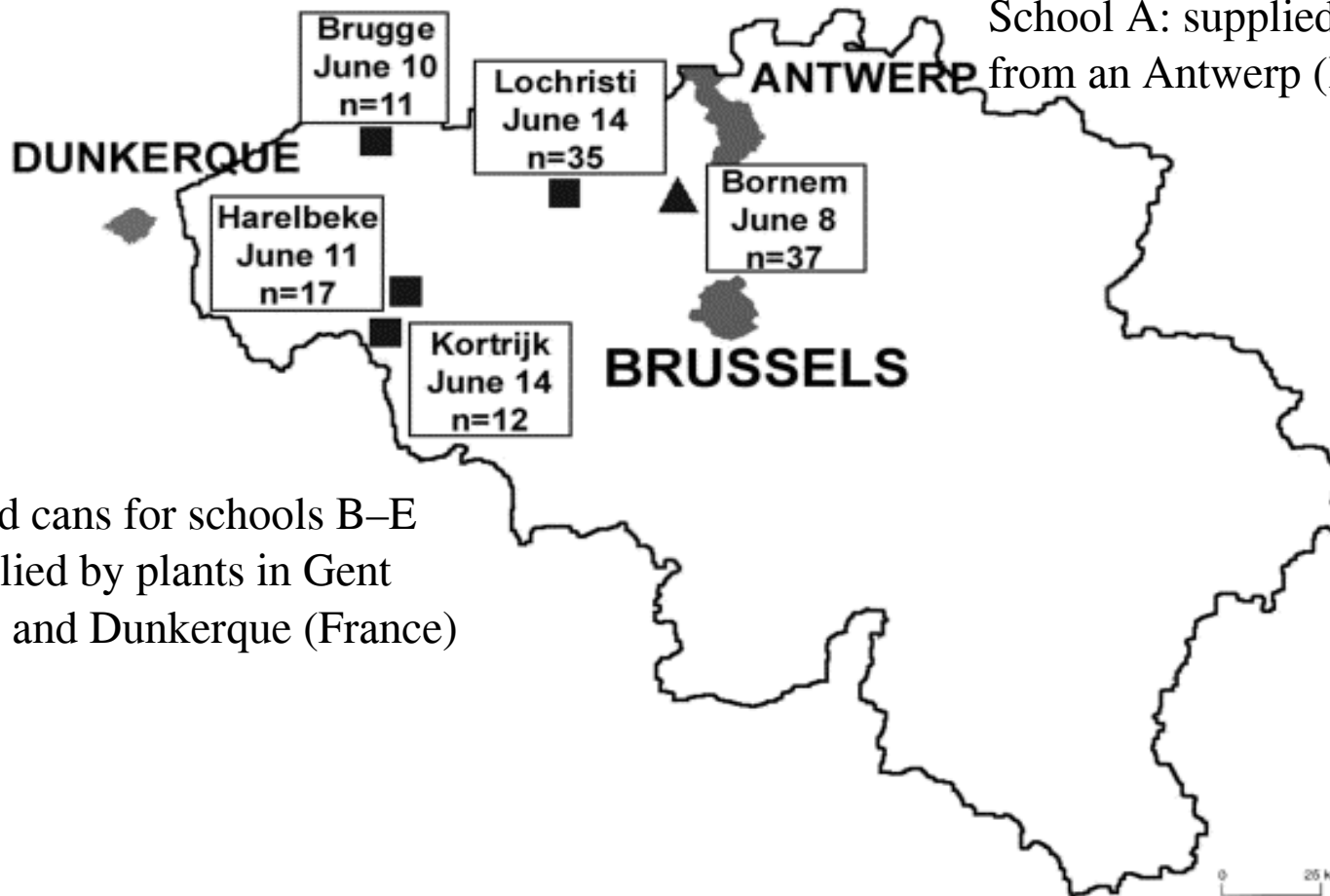
- The Belgian division of the Coca-Cola Company **recalled several million bottles** of Coke because about **30 children** became ill after drinking it.
- A company spokesperson said that consumers complained about an "off taste." The children, who live in the northern Belgium community of Bornem, were hospitalized, but the cause of the illness was not known.
- More cases of similar illnesses in students from other Belgian schools were recorded

(For more details see Gallay et al. 2002; Johnson and Peppas 2003)



The events at school A (Bornem) and schools B–E (others) occurred at different times.

School A: supplied with glass bottles from an Antwerp (Belgium) plant



Bottles and cans for schools B–E were supplied by plants in Gent (Belgium) and Dunkerque (France)

## What Happened?

The Coca-Cola Company had identified different toxicologic substances in the soft drinks delivered to school A and schools B–E;

- Sulfide compounds in school A's products - main symptoms observed (headache, nausea, and dizziness) compatible with the compounds;
- School B-E products: low concentration of chlorocresol on the external surface of cans from the Dunkerque plant; observed symptoms not compatible with expected ones (eye/skin irritation - severe effects on mucous membranes caused by ingestion); lab results and physical examinations normal.

## What Happened?

The outbreak occurred among adolescents / preadolescents in a school setting, clustering of cases in specific classrooms

Some evidence of mental stress among those reporting illness.

No clinical / lab evidence of illness, relapse of illness, and rapid spread and dissolution of the outbreak

## What Happened?

- Outbreak took place during the end-of-school examination period;
- Dioxin crisis in Belgium was only 2 weeks earlier, heightening anxiety in the population about food safety;
- The period was that of Belgian general election;
- Media coverage of the incident in school A probably played a substantial role in transmitting the outbreak.
- Lack of transparency about the safety of Coke products and controversial information from officials intensified the community's concern.



## Mass Sociogenic Illness

*“... rapid spread of illness signs and symptoms affecting members of a cohesive group, originating from a nervous system disturbance involving excitation, loss or alteration of function, whereby physical complaints that are exhibited unconsciously have no corresponding organic aetiology” (Bartolowew and Wessley, Br J Psychiatry 2002)*

- Psychosomatic Illness - Similar to Mass Hysteria
- Researchers argued “... clear evidence that there was a psychological contribution to the crisis” (Adler, 2000).

## Impact on Coca Cola Co. Image

Coca Cola Co products banned from Belgian stores (mandated recall – lasted from June 16 to June 22) estimated 15 million bottles recalled (Johnson and Peppas, 2003).

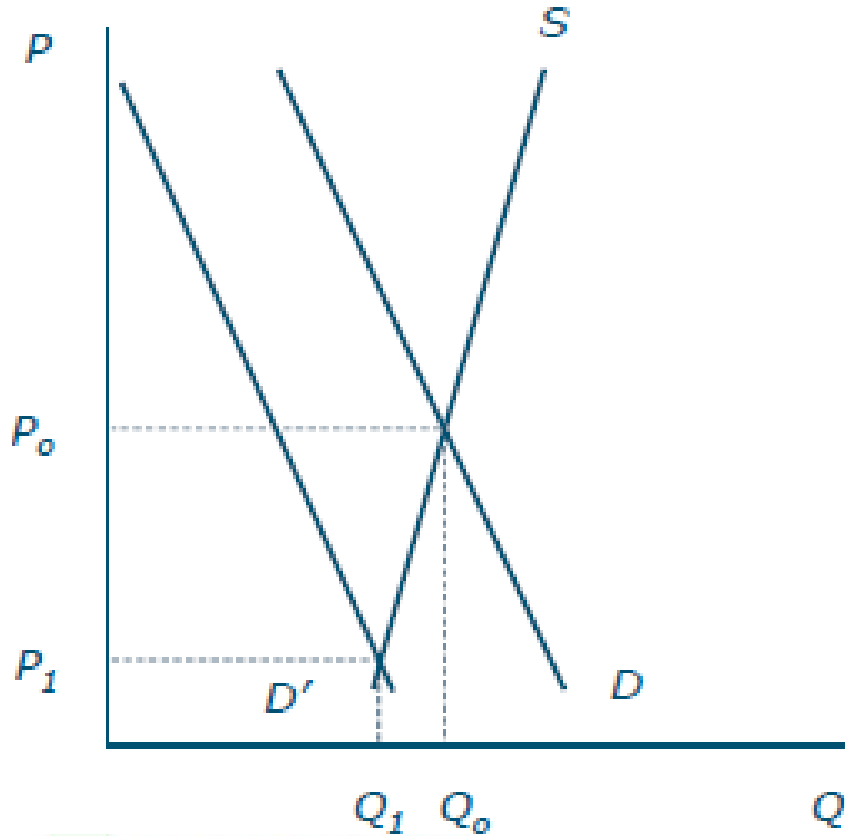
- Company unprepared for a crisis of this magnitude;
- Crisis mishandled, it took several days before it was made a priority - ten days after the first child became dizzy and nauseated for top executives to arrive in Belgium
- Coca-Cola's initial response attempted to minimize the number and severity of the illnesses
- Public admission that there were manufacturing mistakes, but apology to consumers came too late (more than a week after the first report of illness).
- Communication inadequate on the steps taken to repair to the crisis.

## The effect of a food safety crisis on the food chain: prices



# How do Crises Impact Prices?

Supply Shock (Ex: BSE, Mandated Culling)



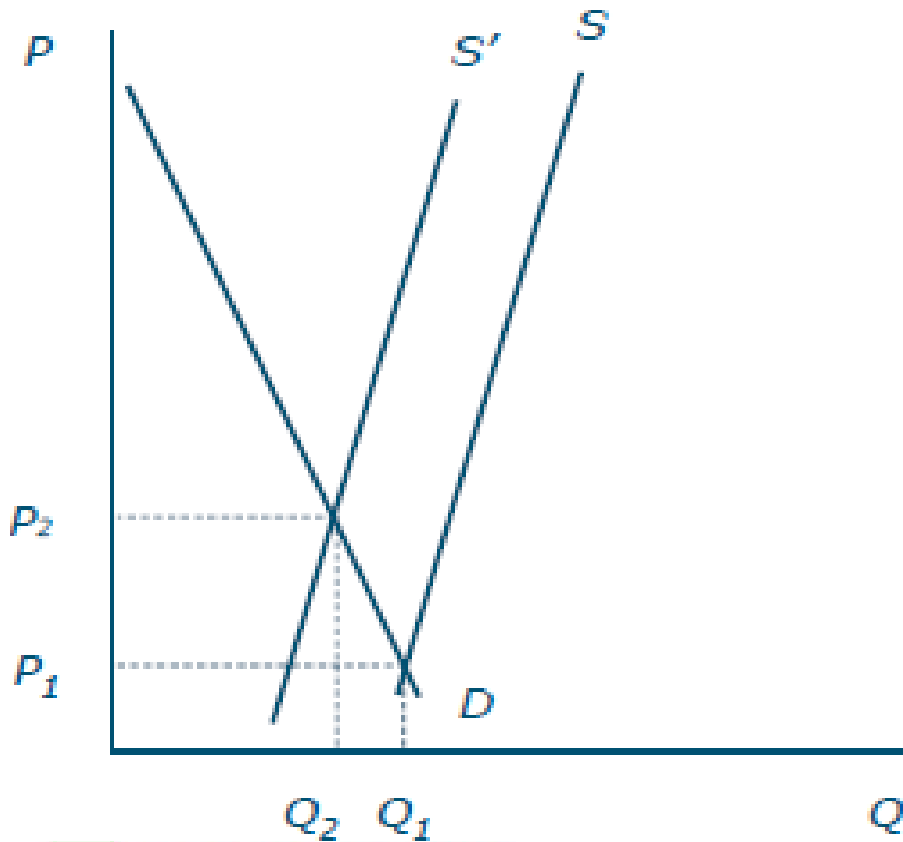
Crisis announced:

Demand Shrinks  $\rightarrow$  price declines



# How do Crises Impact Prices?

Supply Shock (Ex: BSE, Mandated Culling)



Crisis announced:

Demand Shrinks  $\rightarrow$  price declines

If recalls or restrictions in supply are mandated, supply shrinks  $\rightarrow$  increase in prices  $\rightarrow$  further reduction in quantity

# How do Crises Impact Prices?

- “Price transmission:” how changes in prices at one level of the channel “transfer” to the **next level** (DOWNSTREAM)
- “**pass through rate**”  $\Delta P_u / \Delta P_d$  (change in upstream price / change in downstream price): changes in price at farm level may result in more / less than proportional changes in price at the retail level.
  - “pass through” rate = 1: price change *proportionally* transferred to the next agent.
  - “pass through” rate < 1: price change *less than proportionally* transferred to the next agent.
  - “pass through” rate > 1: price change *more than proportionally* transferred to the next agent.
- It may be “asymmetric:” price increases can transfer more (less) than price decreases
- Possible explanations :
  - Costs are not uniform along the channel
  - Firms have bargaining power along the channel

# How do Crises Impact Prices?

- If DOWNSTREAM firms have market power, they may pass price increases onto consumers more rapidly than price decreases
  - → "Pass-through" would be higher in the case of price increases than in the case of price decreases (asymmetric price transmission).
    - If a price decrease → Farm price will decrease more than retail prices.
    - If a price increase → Farm price will increase less than retail prices.

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## Why Worry?

- Assume that EFSA announces the implementation of more stringent controls on leafy vegetables pesticide residues contamination. This will result in an increase in costs:
  - If costs rise, will producers rise prices as well?
  - Will price increases be transferred more than proportionally to consumers?
  - What happens if the final demand is **elastic**?



# Case: Price Effects of the BSE crisis in the UK

# BSE crisis in UK: Background

- Bovine spongiform encephalopathy (BSE) discovered in 1986;
- 1995 Stephen Churchill, 19, becomes the first known victim of a new variant of Creutzfeldt Jakobs disease (vCJD);
- 20 March 1996: public announcement (Ministry to Parliament) suggest a link between BSE and vCJD;
- Immediate 40% fall in beef consumption in the UK, and complete loss of export worth circa \$ 1.4 billion in 1995;
- £1.4 billion compensation cost to farmers. Disposing of the carcasses cost > £575 million.

# BSE crisis in UK: Policy Measures

1. EU-wide ban on UK beef sales: March 1996 (export ban for British farmers). Ban lifted from all EU countries in 2002
  - UK monthly exports of beef ~ 39,000 calves and 23,000 fresh and frozen carcasses
2. Culling Order
  - ‘Over 30 Month’ cull; ‘Selective Cull’ [known infected cattle culled]; ‘Offspring Cull’ [young of infected cows culled]. → 4.9 million cattle destroyed (until 2000).
3. ‘Specified risk material’ (neurological tissues and some types of offal) removed from abattoirs; more rigorous regime of inspection → costly to run → Abattoir numbers: 1986: 1,000 → 1999:412 (49% initial overcapacity)

# Case: Price Effects of the BSE crisis in the UK

Lloyd, T. A., S. McCorrison, W. Morgan and A. J. Rayner (2006) “Food scares, market power and price transmission: the UK BSE crisis” *European Review of Agricultural Economics* 33 (2) 119–147

- Hypothesis: the impact of a food scare (UK BSE crisis) across agents along the chain
    - In the case of a food crisis, as demand drops and supply shrinks, prices will necessarily decrease → Prices along the channel decrease too !!! → Is “Price transmission” symmetric ?
  - They use 10 years of monthly retail prices for beef pork and lamb and a producer price of beef (PB)
    - Indicator of “meat scare index” – Demand Shock
    - Net Withdrawals (net exports and cattle removed from the chain) – Supply Shock
    -
- WHY do they control for BOTH demand and Supply Shock?**

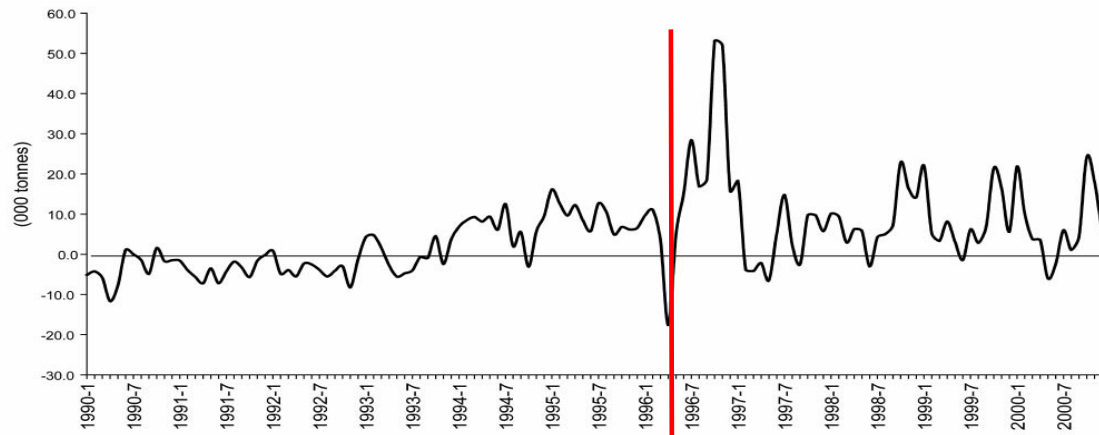


Figure 2. Net withdrawals from the UK beef sector (1990–2000).

Source: Lloyd, et al (2006)

Supply Side Shock:

Net Withdrawals: sum of net exports (live cattle fresh and frozen beef) and cattle removed from the chain (culling order)

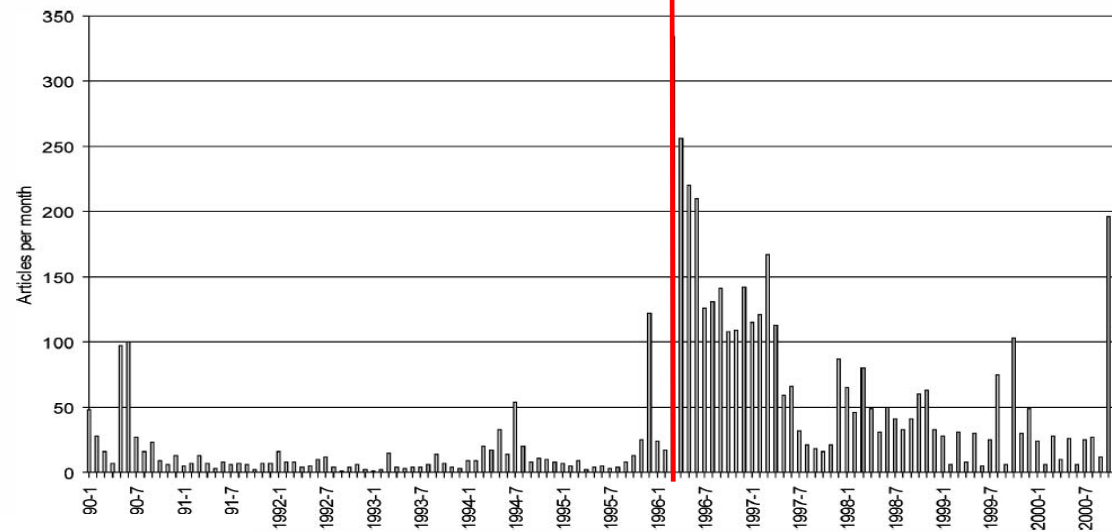


Figure 1. The newspaper count (January 1990 to December 2000).

Demand Side Shock:

Monthly count of newspapers covering food / health related issues (mostly BSE / beef consumption related)

## Lloyd et al (2006) findings

- The demand shock impacts considerably retail prices (it lowers them)
- Prices at the producer level fell more than twice as much than those at the retail level;  
→ The effect of the “Scare” on consumers causes the margin to widen
- Gap between retail and producer prices widened as a result of the crisis;
- Supply restriction has a positive effect on retail prices BUT very small; culling only impacted producer prices, not retail prices.
- Little support for cost-based explanations of margin growth

The UK’s Competition Commission investigated market power through the crisis.

## Take-Home Messages

- Safety is a prerequisite quality attribute for food products
- Although the benefits are mostly accruing for retailers, the costs are shifted towards the upstream actors in the supply chain – economic hurdles may give incentives not to comply to regulations
- Consumers' may not be willing to pay extra for safety but their reaction to food scares can be substantial – role of perception / media very important
- When crises occur most agents in the supply chain are affected, however, not all of them suffer the same consequences;
- The distribution of market power along the channel may affect the outcome for the different agents along the supply chain

# Questions?