

# Outbreak of *Escherichia coli* O157:H7 infection linked to consumption of ground beef, France, 2005

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## Introduction

- In France, there is no routine screening for Shiga-toxin producing *E. coli* (STEC) in clinical laboratories
- Since 1996, the surveillance of STEC infections is based on the nation-wide surveillance of hemolytic uremic syndrome (HUS) in children under 15 years
  - Voluntary network of pediatric nephrology services of 31 hospitals
- HUS characteristics in France
  - Incidence per year: 0.70/100,000 children under 15 years
  - Most cases were sporadic and the majority were due to *E. coli* O157:H7 (84% of confirmed cases)
  - Two small family clusters of *E. coli* O157 with an identified source (unpasteurised goats' cheese, saucisse)
- Outbreak alert** on the 24 - 25 October 2005
  - Five HUS cases were notified to the National public health institute by two hospitals in southwestern France
  - The HUS cases were hospitalized between 15 and 23 October 2005
  - They are resident of two neighbouring districts
- 25 October 2005: an outbreak investigation was prompted to identify the source, the vehicle of transmission and implement control measures

## Method

### ÉPIDÉMIOLOGICAL INVESTIGATION

- Case definition:** Person living in southwestern France with an onset of symptoms after 20 September 2005
  - Confirmed case: HUS or diarrhea with
    - . isolation of *E. coli* O157:H7 in stools or
    - . positive antibody response to *E. coli* O157 lipopolysaccharide
  - Probable case: bloody diarrhea with an epidemiological link with a confirmed case
- Retrospective and prospective case finding**
  - In hospitals and clinical laboratories
  - Through paediatricians and general practitioners
- First cases were initially interviewed with a trawling questionnaire
- Following a meeting of three sets of parents, a second focused questionnaire was administered
  - To confirm the hypothesis of a common risk exposure to beef burgers of brand 'X'
  - To check the date and place of purchase of frozen beef burgers
- Confirmation of *E. coli* O157:H7 infection**
  - Serology
  - Stool sample: culture, serotyping, PCR *stx* and *eae* and pulsed field gel electrophoresis (PFGE)

### VETERINARY AND ENVIRONMENTAL INVESTIGATIONS

- Trace back investigation of the beef burgers of brand 'X'
- Plant and abattoir
  - Physical inspection
  - Sampling of production line and environment
  - Inspection of quality control procedures
- Food samples
  - Sampling of beef burgers at cases' homes, the supermarket stores and the production plant
  - Culture, serotyping, PCR *stx* and *eae* and PFGE

## Results

### CASE CHARACTERISTICS

- 69 cases in 56 families: 63 confirmed
- Age distribution
  - 57 children (15 months - 13 years)
  - 12 adults (17 - 98 years)
- Clinical symptoms
  - 33 with bloody diarrhea and 19 with non bloody diarrhea
  - 17 HUS (16 children and 1 adult)
  - 83% hospitalization
  - No death
- Microbiological results
  - Serology *E. coli* O157 : 23 cases
  - Isolation of *E. coli* O157:H7 (*stx1+ stx2+ eae+*) : 46 cases
- 100% of cases consumed frozen beef burgers of brand 'X', distributed in a single supermarket chain 'Y'

FIGURE 1 DATE OF SYMPTOM ONSET FOR CASES OF *E. COLI* O157:H7, FRANCE, OCT-NOV 2005 (N=69)

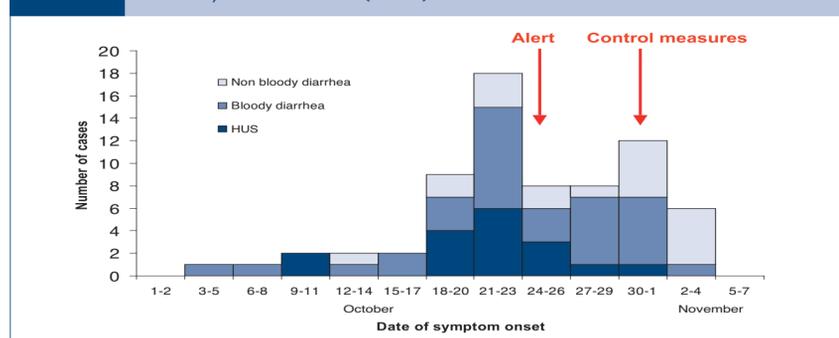
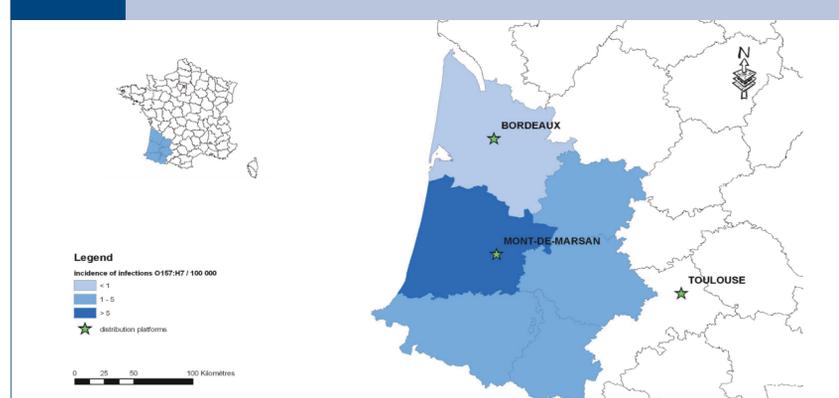


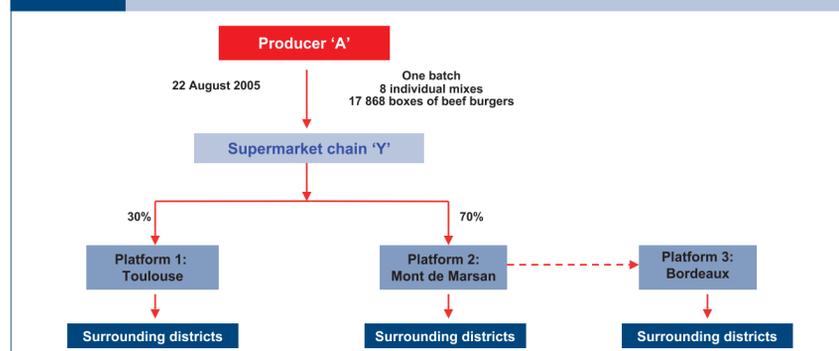
FIGURE 2 INCIDENCE OF CASES OF *E. COLI* O157:H7, FRANCE, OCT-NOV 2005 (N=69)



### VETERINARY AND ENVIRONMENTAL INVESTIGATION

- Burgers of brand 'X'
  - Deep frozen box of ten 100g patties
  - Produced by the same plant
- Batch number known for 31/56 case-families :
  - Same batch number
- The suspected batch
  - Produced on 22 August 2005 from 8 individual mixes
  - Distributed since late September 2005 only in southwestern France, by three platforms of the supermarket chain 'Y'

FIGURE 3 DISTRIBUTION CIRCUIT OF THE BATCH OF BEEF BURGERS IMPLICATED IN *E. COLI* O157:H7 OUTBREAK, FRANCE, OCT-NOV 2005



### MICROBIOLOGICAL RESULTS

- E. coli* O157:H7 (*stx1+ stx2+ eae+*) isolated from
  - 50 burgers from 11 case-families
  - 14 burgers from 4 supermarket stores and production plant
- At the plant, 5 of the 8 mixes produced on the 22 August 2005 were positive for *E. coli* O157: H7
- The contamination levels ranged from < 5 to 30 cfu/g
  - High level in burgers of 3 case-families
  - High level in the first mix produced at the beginning of the day
- PFGE of patients strains and beef burger strains were indistinguishable

### CONTROL MEASURES

- Full national recall of product on the 30 October 2005
  - 4 200 boxes were returned/recalled
- Public alerted through media and press released
- The supermarket stores contacted customers who had bought burgers of the contaminated brand since early September 2005 to inform them not to consume these burgers
  - 750 staff were involved
  - 85% customers found via loyalty cards and the others via bank details
- The owners of suspected source-herds were contacted and informed
  - Enhanced hygienic practices were encouraged

## Discussion

- Suspected source of contamination
  - Lapse in hygiene practice during carcass evisceration
  - Presence of temporary employees at the abattoir during August 2005
- The size of outbreak was probably underestimated
  - Milder cases might not have been identified
  - No routine laboratory screening for *E. coli* O157:H7
- The first five mixes of the batch were contaminated, but the cases identified were only associated with the first mix
  - Level of contamination decreased with successive mixes during production on 22 August 2005 ?

## Conclusion

- First outbreak of *E. coli* O157:H7 in frozen beef burgers in France
- Control measures effective
- Need for reinforced *E. coli* O157:H7 safety regulations in beef burger production

### RECOMMENDATIONS AND RESULTANT ACTIONS, 2006

- Public health campaign to raise awareness of
  - Risk of HUS in children under 15 years
  - Need for thorough cooking of beef burgers for children
- Multi-agency review of safety controls for beef burger production
- Re-education programme for professionals
  - Risks of *E. coli* O157:H7

