

Nationwide outbreak of *Salmonella* Kedougou linked to infant formula milk. Spain, 2008

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Background

- Infant powder formula milk is not a sterile product
- *Salmonella* was associated with powder formula milk in many outbreaks:
 - *S. Tennessee* (Canada and USA, 1993)
 - *S. Virchow* (Spain, 1994)
 - *S. London* (Korea, 2000)
 - *S. Agona* (France, 2005)
 - *S. Give* (France, 2008)

Background

- *Salmonella* Kedougou: uncommon worldwide
 - Only two outbreaks reported
 - Linked to Salami consumption (Norway, 2006)
 - Linked to ham and turkey meat (UK, 1992)
- In Spain:
 - National Center of Microbiology:
 - Identified a mean of 3 isolations/year in humans, between 2002 and 2007

The Alert

| August | | | | | | 2008 | |
|--------|----|----|----|----|----|------|--|
| Su | Mo | Tu | We | Th | Fr | Sa | |
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| 17 | 18 | 19 | 20 | 21 | 22 | 23 | |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 | |
| 31 | | | | | | | |

The National Centre of Microbiology **reported** an increase in isolates of *S. Kedougou* during 2008:

- Up to date, **21** isolates vs. 6 in 2007
- 90% of cases were **under 1 year old**

Actions in the outbreak

August

2008

| Su | Mo | Tu | We | Th | Fr | Sa |
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The National Centre of Epidemiology (NCE):

- **Sent an alert** to:
 - Regional Epidemiology Services
 - Food Safety Agency (FSA)
 - Ministry of Health
 - European Food and Waterborne Diseases Network:
11 countries answered: Not *S. Kedougou* increases
- **Began a study** to confirm the outbreak

Objectives

- To confirm and to know the magnitude of the outbreak
- To identify the source of infection, mode of transmission and risk factors

In order to implement appropriate control measures

Outbreak investigation

- Active Case Finding
- Matched Case-Control Study
- Microbiological Investigation
- Environmental Investigation

Active Case Finding

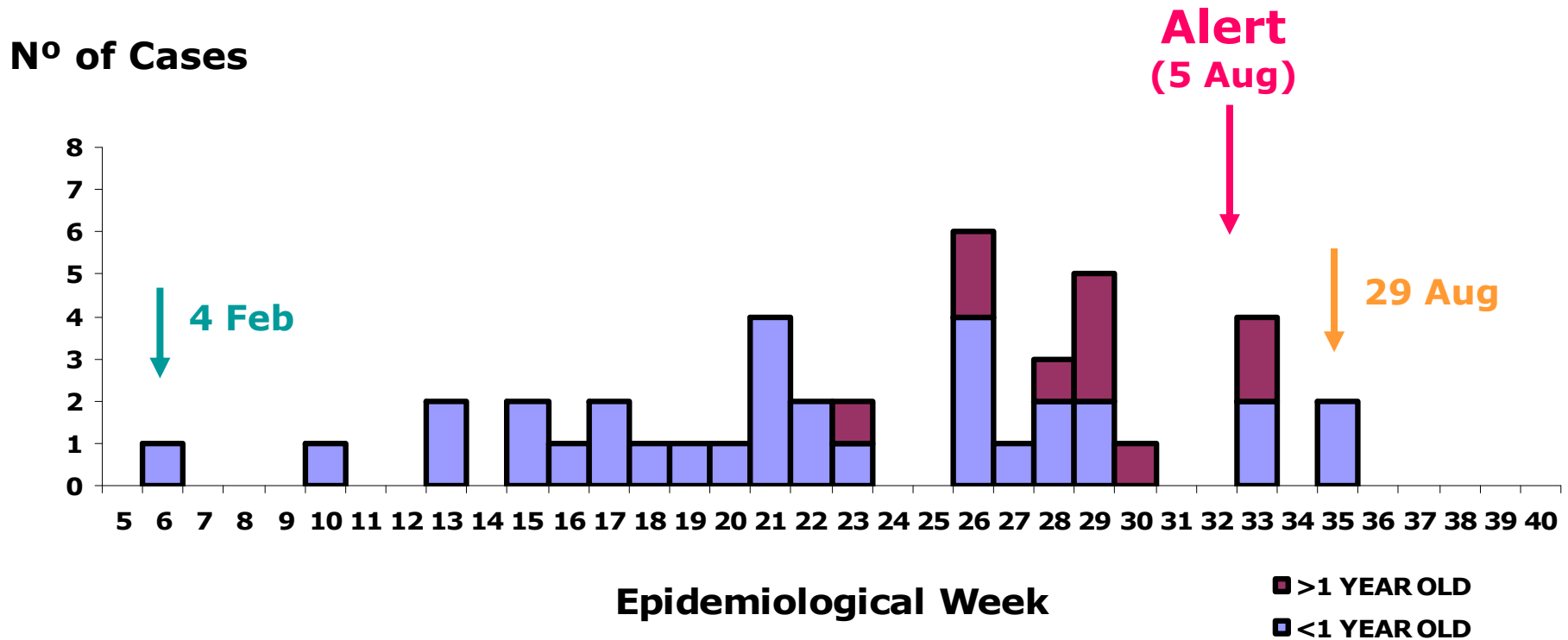
- Any *Salmonella* Group G isolates in 2008 should be sent to the National Center of Microbiology for serotyping
- A questionnaire designed:
 - Filled in by regional epidemiologists
 - Information about: illness, contacts, food consumed (72 h), food preparation, conservation and disinfection
 - Sent to the NCE: collect and analyze information

Results

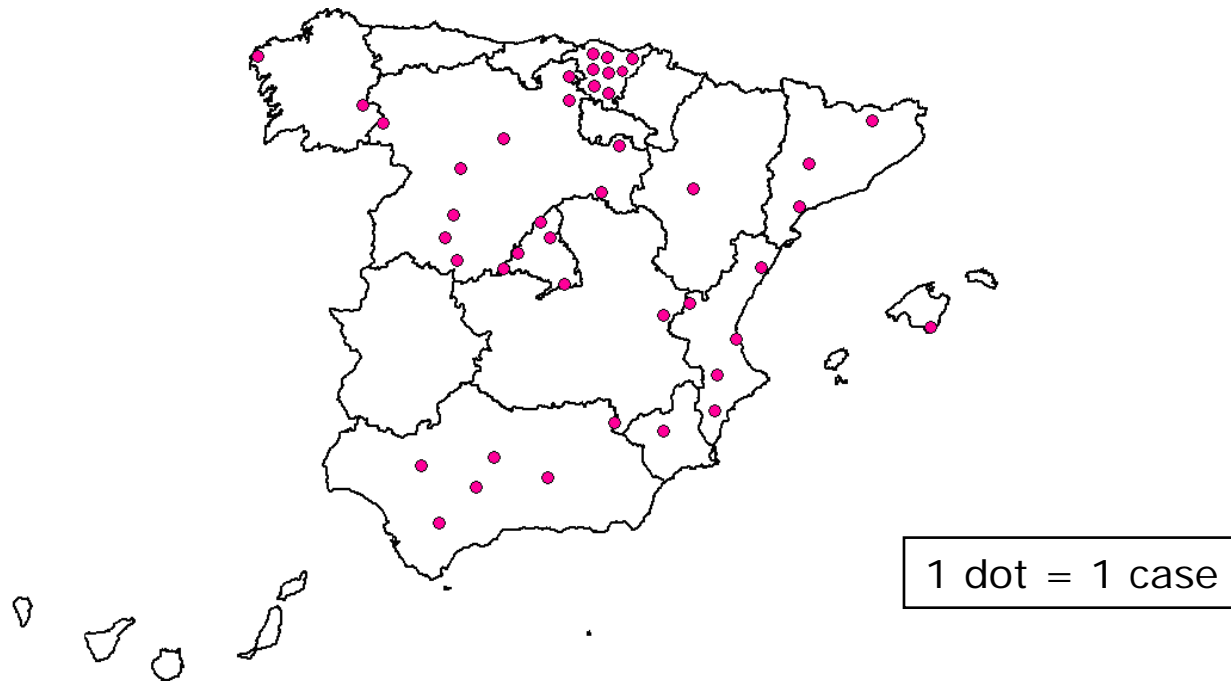
42 cases were identified

- Questionnaire Response Rate: 93%
- 42% male
- 74% < 1 year old
- 28% required hospitalization
- 2 adults: parents of cases

Cases of *Salmonella* Kedougou by age and week of isolation. (N=42)



Cases of *Salmonella* Kedougou by regions, 2008 (N=42)



Cases were located in 11 of 19 Spanish Regions

Case characteristics: <1 year old

- Response rate: 31/32
- Median age : 4.3 months
- Clinical Findings:

| | |
|----------------|--------|
| Diarrhea | (100%) |
| Blood in stool | (64%) |
| Fever | (38%) |
| Vomiting | (27%) |
- Hospitalization: 10 cases (32%)

Findings in cases <1 year old

| PRODUCT | N | % |
|--|-----------|------------|
| Milk "Brand A" | 31 | 100 |
| Mineral water (diferent brands) | 24 | 77 |
| Baby puree | | |
| Fruit (homemade) | 7 | 23 |
| Fruit (commercial food) | 5 | 16 |
| Vegetables and chicken (homemade) | 8 | 26 |
| Baby cereal | 11 | 35 |
| Animal contact | 9 | 29 |

N = 31 cases

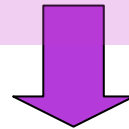
Case characteristics: ≥ 1 year old

- Response rate: 8/10
- Median age: 28 years old (range: 1-84 y.o.)
- Hospitalization: 1 case
- Two cases were parents of cases < 1 year old
- Three cases consumed infant powder formula milk "Brand A"

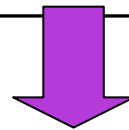
Hypothesis generation

From the first 12 questionnaires collected:

- 11 children consumed milk "Brand A"
- 1 adult was a father of a case < 1 year old



Hypothesis: The consumption of infant formula milk "Brand A" is associated with the illness



We began an analytical study

Matched Case-Control Study

- **Case definition:**
 - Children under 1 year
 - *S. Kedougou* isolated in 2008
- **4 controls per case**
- **Matched for:**
 - Age (± 1 month)
 - Sex
 - Health centre
 - Time of visit (± 1 week)
 - No gastrointestinal symptoms
- **Exact conditional logistic regression**

Results

(22 cases and 70 controls included)

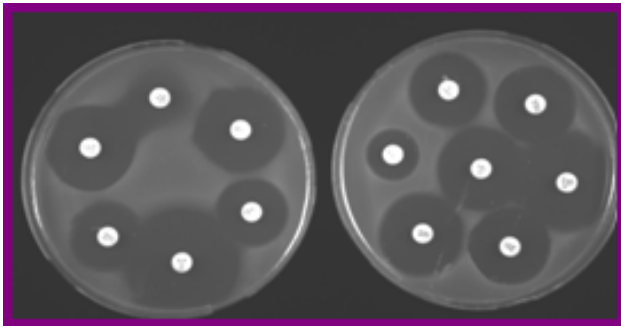
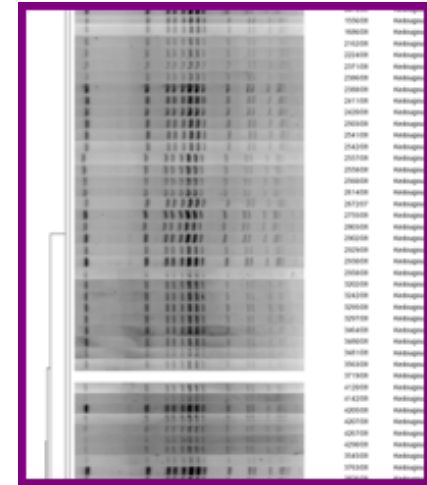
| VARIABLE | OR | CI (95%) |
|--------------------------------------|---------------|------------------|
| Fruit baby puree | 0.8 | 0.08 - 7.51 |
| Vegetables and chicken baby puree | 0.34 | 0.01 - 26.07 |
| Infant Formula Milk "Brand A" | 74.92* | 12.89 - ∞ |
| Animal contact | 0.98 | 0.3 - 3.12 |

* Median unbiased estimates (MUE);
ML estimation= Inf.

Microbiological investigation

- **Pulse Field pattern (PFGE):**

All isolates showed the same pattern



- **Antibiogram:**

The strains were fully sensitive to the standard antimicrobials

Environmental investigation

Milk samples by Food Safety Agency

- Only 3 milk samples from cases were obtained
- No *S. Kedougou* was isolated

Factory Inspection by Regional Services of Public Health

- Not done because production factory was closed on Feb/08
- Records provided by factory quality control service:
 - *No Salmonella* isolated in raw materials or products
 - Other Enterobacteriaceae sp. detected in batches

Control Measures by FSA

| August | | | | | 2008 | |
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The product was only distributed in Spain

- 5 batches of milk "Brand A" **recalled**
- Report to the Rapid Alert System for Food and Feed (RASFF)

Control Measures by FSA

August

2008

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- Press release to inform public
- Information phone number

The collage consists of four overlapping screenshots from Spanish news and consumer websites. The top-left screenshot is from 'el mundo.es SALUD' with the headline 'Sanidad retira cinco lotes de leche infantil de la marca Sanutri contaminados por salmonella'. The top-right screenshot is from 'CONSUMER EROSKI' with the headline 'Sanidad retira cinco lotes de leche infantil que podrían estar contaminados por salmonella'. The bottom-left screenshot is from 'EL PAÍS' with the headline 'retira lotes de leche que causarían problemas a los bebés'. The bottom-right screenshot is from 'CONSUMER EROSKI' with the headline 'Sanidad retira cinco lotes de leche infantil que podrían estar contaminados por salmonella'. Each screenshot includes details about the recall, such as the number of cases (29) and the phone number for information (901 400 100).

Outbreak follow-up

Three cases detected **20 days after** control measures

- All children under 1 year old
- All consumed milk “Brand A”:
 - One batch number: Not related to batches recalled
 - One milk sample provided by a case: (-) *S. Kedougou*

Untill now, no more cases detected

Limitations

Recall Bias:

- Mean of 108 days between symptoms and interview (range: 9 – 222 days)
 - Parents usually remember infant feeding patterns, brands

Batch numbers and milk samples not collected

Overmatching ?

- Medical center: Doctor prescription habits
 - Low number of controls consumed “Brand A” (10%)

Conclusions

- Outbreak of S. Kedougou linked to infant formula milk was confirmed in Spain (Feb-Aug, 2008)
- First outbreak of this serotype associated with infant formula milk
- No more cases detected after 09/15/08

Outbreak Difficulties



- Limited human resources:
 - On vacation
- Communication:
 - Authorities and institutions
 - No Feedback
- Not product information
- Press release not revised:
 - Collaborators not included



That is the outbreak...



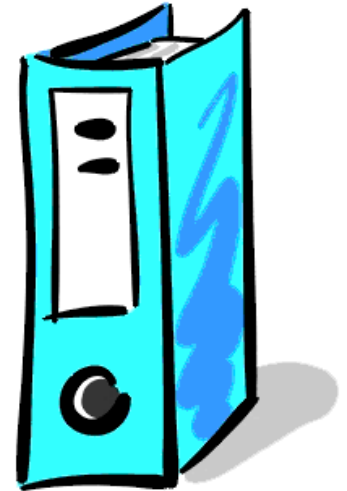
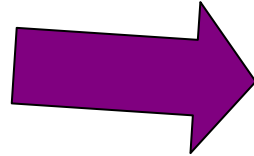
Suggestions



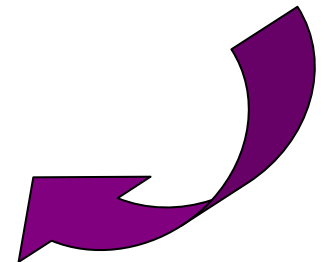
Choose the best communication channel



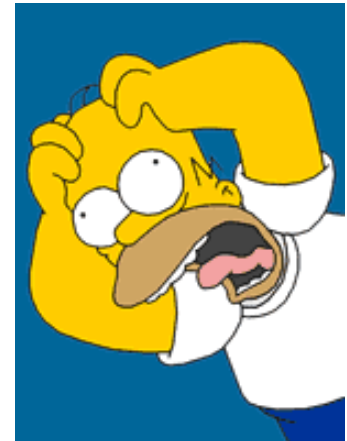
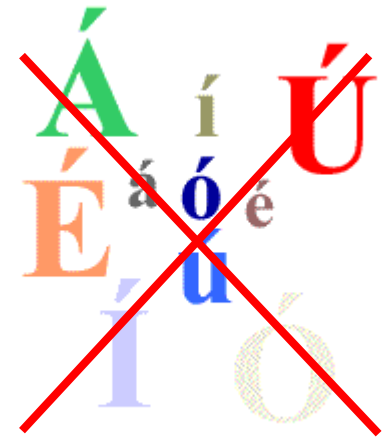
DATA COLLECTED



Order
Movility
Security
Legal implication



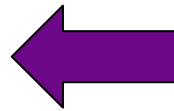
DATA BASES



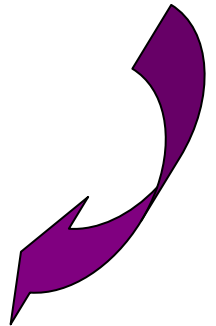


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ANSWERS



**Ministry
Food Safety Agency
Spanish Regions
Press**



Thank you!

