Salmonella control: the EU experience

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Member of EFSA Biohaz Panel
Regulation EC 2160/ 2003 - objectives

The purpose of this Regulation is to ensure that proper and effective measures are taken to detect and to control Salmonella and other zoonotic bacteria at all relevant stages of the production chain, mainly at the level of primary production, in order to reduce their prevalence and the risk they pose to public health.
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Regulation EC 2160/2003 - objectives

• Member States have to prepare compulsory control programmes for *Salmonella serovars with public health relevance* (prevalence, rapid or recent diffusion, virulence)

• Such programmes must be aimed at reaching precise and measurable targets of prevalence reduction, defined by the Commission

• Different animal species or categories have been involved at different times
### Salmonella control: the EU experience

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Istanbul, 19 April 2013

<table>
<thead>
<tr>
<th>Zoonosis or zoonotic agent</th>
<th>Animal population</th>
<th>Stage of food chain</th>
<th>Targets must be established by:</th>
<th>Control programmes compulsory from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Breeding flocks of <em>Gallus gallus</em></td>
<td>Primary production</td>
<td>12.12. 2004</td>
<td>12.06.2006</td>
</tr>
<tr>
<td>Salmonella serotypes</td>
<td>Laying hens</td>
<td>Primary production</td>
<td>12.12. 2005</td>
<td>12.06.2007</td>
</tr>
<tr>
<td>With public health relevance</td>
<td>Broilers</td>
<td>Primary production</td>
<td>12.12. 2006</td>
<td>12.06.2008</td>
</tr>
<tr>
<td></td>
<td>Turkeys</td>
<td>Primary production</td>
<td>12.12. 2007</td>
<td>12.06.2009</td>
</tr>
<tr>
<td></td>
<td>Slaughter pigs</td>
<td>Primary production</td>
<td></td>
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<tr>
<td></td>
<td>Breeding herds of pigs</td>
<td></td>
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</tbody>
</table>

**ANNEX 1** Regulation EC 2160/2003
EU-wide BS analyses

- *Salmonella* in laying hen holdings
  1 October 2004 – 30 September 2005
- *Salmonella* in broiler flocks
  1 October 2005 – 30 September 2006
- *Salmonella* in slaughter pigs
  1 October 2006 – 30 September 2007
- *Salmonella* in turkey flocks
  1 October 2006 – 30 September 2007
- *Campylobacter* in broiler flocks and *Campylobacter* and *Salmonella* in broiler meat
  1 January 2008 – 31 December 2008
- *Salmonella* (+ MRSA) in holdings with breeding pigs
  1 January 2008 – 31 December 2008
Regulation EU n. 200/2010

Sets the permanent target for prevalence reduction in *Gallus gallus* breeding flocks

✓ (6) According to EFSA Opinion (The EFSA Journal 2009 1036): *Salmonella Enteritidis* and *Typhimurium* are the serovars showing a higher probability of diffusion from breeding to fattening flocks. The benefits of controlling other serovars at the EU level are marginal.

✓ (7) Taking into account the EFSA opinion, it is considered opportune to keep a EU target similar to the one fixed by Regulation EC 1003/2005.

✓ Art. 1 (1) starting from the first of January 2010 the EU target is the reduction to 1% or less of adult flocks positive for *SE/ST/SV/SI/SH*
Sampling scheme

**Gallus gallus breeders**

**Own checks**

- **At farm**
  - Every two weeks during the laying phase
  - 1-day-old chicks
  - At 4 weeks of age
    - Two weeks before the starting of the laying phase

- **At the hatchery**
  - The hatchery must have an approved own-checks programme, the frequency of sampling depends on the risk assessment

**Official control**

- **At farm**
  - 3 checks/cycle at the farm:
    - within 4 weeks from the beginning of the laying phase
    - within 8 weeks from the slaughtering date
    - during the laying phase, between the previous checks

- **At the hatchery, 2 checks/year**
**Definitive target:** Regulation EU 517/2011

Serovars with public health relevance:
- *S. Enteritidis*, *S. Typhimurium* (also monophasic variant)

Target: minimum percentage of positive adult flocks:

- 10% if the prevalence in the previous year was < 10%;
- 20% if the prevalence in the previous year was between 10 and 19%;
- 30% if the prevalence in the previous year was between 20 and 39%;
- 40% if the prevalence in the previous year was ≥ 40%;

The target must be reached every year, with reference to the prevalence in the previous year.
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Sampling scheme

Laying hens

OWN CHECKS

ALL FLOCKS

Every 15 weeks starting from 24 ± 2 weeks of age
Moreover:
1-day-old chicks
Two weeks before the starting of the laying phase

OFFICIAL CONTROLS

In one flock per year per holding with more than 1000 heads, within 9 weeks from the end of the production period
**BROILER FLOCKS**

**Definitive target:** Regulation EU 200/2012

- Serovars with PH relevance: S. Enteritidis, Typhimurium (also monophasic variant)
- Target: maximum 1% of positive flocks
Sampling scheme

**Broiler flocks**

<table>
<thead>
<tr>
<th><strong>Own checks</strong></th>
<th><strong>Official controls</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL FLOCKS</td>
<td>At least one flock/year</td>
</tr>
<tr>
<td>✓ Within 3 weeks before slaughter</td>
<td>✓ Once per year in 10% of holdings with more than 5000 heads, within 3 weeks before slaughter*</td>
</tr>
<tr>
<td>✓ -within 6 weeks if the cycle is &gt;81 days</td>
<td></td>
</tr>
<tr>
<td>✓ - organic production (Reg. CE 889/2008)</td>
<td></td>
</tr>
</tbody>
</table>
Swabs are moistened just before their use…
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..or they can be moistened at the lab
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Dust sampling in layers farm
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SALMONELLA DETECTION

FAECES AND PRIMARY PRODUCTION SAMPLES
(Annex D-ISO 6579)

Pre-enrichment in Buffered Peptone Water

Selective enrichment on MSRV

Positive plates show a halo of growth originating from the inoculation spot.

If MSRV plates are negative after 24 h they should be incubated for a further 24 +/- 3 hours.

From positive culture on a MSRV plate inoculation on two selective media
The Salmonella serotyping system is probably the best phenotypic bacterial typing system ever developed. It has a high discriminatory power and provides information that has great epidemiological significance, and allows the identification of serovars with public health significance.

Availability and cost of high quality antisera represent the major disadvantages of this procedure.
Control strategy

- Strict biosecurity measures
- Cleaning and disinfection of farms where positive flocks were housed
- Vaccination in breeders and layers, particularly where the prevalence is high and for restocking positive houses
- Slaughtering of positive flocks (breeders and layers)
RESULTS
EU trend of salmonellosis from 2006 to 2010: n. human confirmed cases/100,000 inhabitants

▼SE in particular
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Salmonella in human cases, eggs and laying hens and the number of Salmonella outbreaks caused by eggs within EU, 2007-2010
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Use of vaccines and antibiotics

COMMISSION REGULATION (EC) No 1177/2006

of 1 August 2006

implementing Regulation (EC) No 2160/2003 of the European Parliament and of the Council as regards requirements for the use of specific control methods in the framework of the national programmes for the control of salmonella in poultry
Repeals Regulation 1091/2005, which is substituted by Regulation 1177/2006 on specific control methods in the framework of the national control programmes for salmonella in poultry:

- the use of antimicrobials as specific method to control Salmonella is forbidden
- the use of live vaccines indistinguishable from wild strains is forbidden (the manufacturer should provide an appropriate method to distinguish bacteriologically wild stains of *Salmonella* from vaccine strains)
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Vaccination is regarded as an additional measure to increase resistance of chicks against *Salmonella*, especially if the flock prevalence is high.

Although such vaccination is not fully protective, especially in the case of laying hens placed in a previously contaminated laying house, it is likely to reduce fecal shedding, ovarian transmission, and the within flock-prevalence, thereby reducing contamination of table eggs and the environment.

Most importantly, the use of vaccination against *S. Enteritidis* and *S. Typhimurium* seems to lower internal-egg contamination levels thereby most directly contributing to public health.

Quantitative estimation of the public health impact of setting a new target for the reduction of *Salmonella in laying hens* EFSA Journal 2010; 8(4):1546
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Figure 2. Observed prevalence of *Salmonella* Enteritidis/Typhimurium-positive holdings of laying hens, with 95% confidence intervals, in the EU, 2004-2005

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• EFSA EU source attribution model (Hald’s model)

• Comparison between the distribution of Salmonella serovars in human cases with the distribution in different animal reservoirs
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- Data from years **2007-2010**
  - Animal sources: turkeys, broilers, laying hens, pigs

<table>
<thead>
<tr>
<th>Table 1: Selection criteria for serovar distribution data</th>
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<tbody>
<tr>
<td>1st choice</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>Turkey flocks</td>
</tr>
<tr>
<td>Broiler flocks</td>
</tr>
<tr>
<td>Laying hens flocks</td>
</tr>
<tr>
<td>Slaughter pig herds</td>
</tr>
</tbody>
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*NRL = National Reference Laboratory

- Human cases: outbreaks + TESSy data
- Adjusted for underreporting
- EUROSTAT data on productions in MS, import and export
## Source attribution results

<table>
<thead>
<tr>
<th>Source</th>
<th>Estimated number of human cases$^a$</th>
<th>Percentage of human cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>median</td>
</tr>
<tr>
<td>Pigs</td>
<td>3,099,000</td>
<td>2,900,000</td>
</tr>
<tr>
<td>Broilers</td>
<td>559,300</td>
<td>515,100</td>
</tr>
<tr>
<td>Laying hens</td>
<td>928,000</td>
<td>847,700</td>
</tr>
<tr>
<td>Turkeys</td>
<td>135,100</td>
<td>121,000</td>
</tr>
<tr>
<td>Unknown/travel</td>
<td>692,600</td>
<td>742,200</td>
</tr>
<tr>
<td>Total cases</td>
<td>5,414,000</td>
<td>5,126,000</td>
</tr>
</tbody>
</table>

Pigs account for more than 50% of human cases in Europe, laying hens for 17% and broilers for 10%
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CONCLUSIONS

- EU operational strategy based on monitoring, risk analysis and control programmes aimed at gradual prevalence reduction
- Importance of biosecurity, vaccination, slaughtering of positive flocks (breeders)
- Need for integration among different information systems on foodborne zoonoses
- Need for collaboration among different operators of production system and public health services
Thank you for your attention

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