



Lessons from Sweden's Control of Salmonella and Campylobacter in Broilers

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The Swedish Poultry Meat Association

Background to the Swedish Salmonella Control Programme(1)

- 1941 Voluntary programme to control S.Gallinarium/Pullorum.
- 1953 The Alvesta Epidemic – involved 9000, of whom 90 died.
- 1961 Governmental regulation, to combat S. infections in livestock.
- 1970 Governmental approved, voluntary programme regarding production of meat fowl.



Background to the Swedish Salmonella Control Programme(2)

- 1984 Mandatory S. control of meat fowl before slaughter.
- 1994 Mandatory S. control of layers
- 1995 Additional guarantee concerning Salmonella, accepted as Sweden entered the EU
- *If salmonella regardless of serotype, is found in any foodstuffs – the lot is considered to be unfit for human consumption according to the § 16 of the Food Act, which implies that the product is under prohibition to market.*



The Swedish Salmonella Controlprogram

The objective for the Control is to supply food of animal origin free from salmonella.



The *concept* is that all food-producing animals, shall be free from salmonella

by applying the following *strategies*:

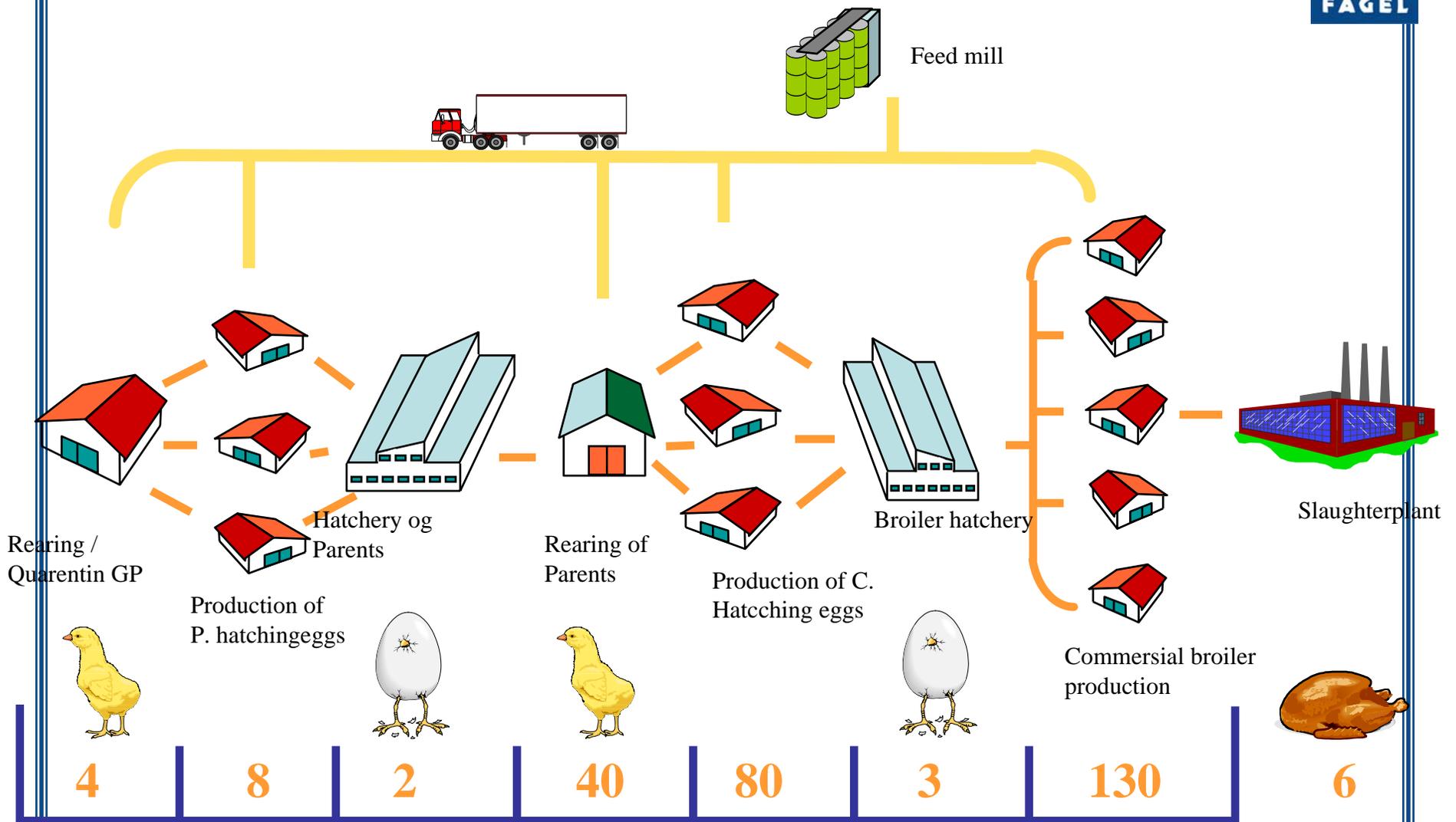
- ***Prevent*** Salmonella contamination regarding all links of the production chain.
- ***Monitore*** the whole production chain at critical controlpoints.
- ***Actions*** necessary to fulfil the objective whenever Salmonella is detected



Salmonella-free poultry production is based on five basic principles:

- 1 Each day-old chick has to be free from salmonella,
- 2 the birds have to be provided with feed and water that is free from salmonella,
- 3 the birds have to be kept in a salmonella-free environment,
- 4 the whole production chain has to be regularly monitored,
- 5 Immediate action must be undertaken to fulfil the objective when ever salmonella is detected.

Swedish broiler production



GP=Grand parents stock P=Parents stock C= Commerial broilers



Salmonella-free day-old chick

- **Breeding stock has to be salmonella free**
- All breeding stock imported, as Grand Parents
- 8 week Quarantine – salmonella testing
 - 1982-89 S.pos flocks 12/39 (30.8%)
 - 1989-92 3/47 (6.4 %)
 - 1995-2006 0/132 (0%)
 - S.Enteritidis is never isolated from breeders or commercial broilers
- Since 1970, salmonella has been introduced to:
 - 1 GP-flock after transfer, before start of production
 - 1 GP- flock in production (45 w.)
 - 2 P-flocks at start of production

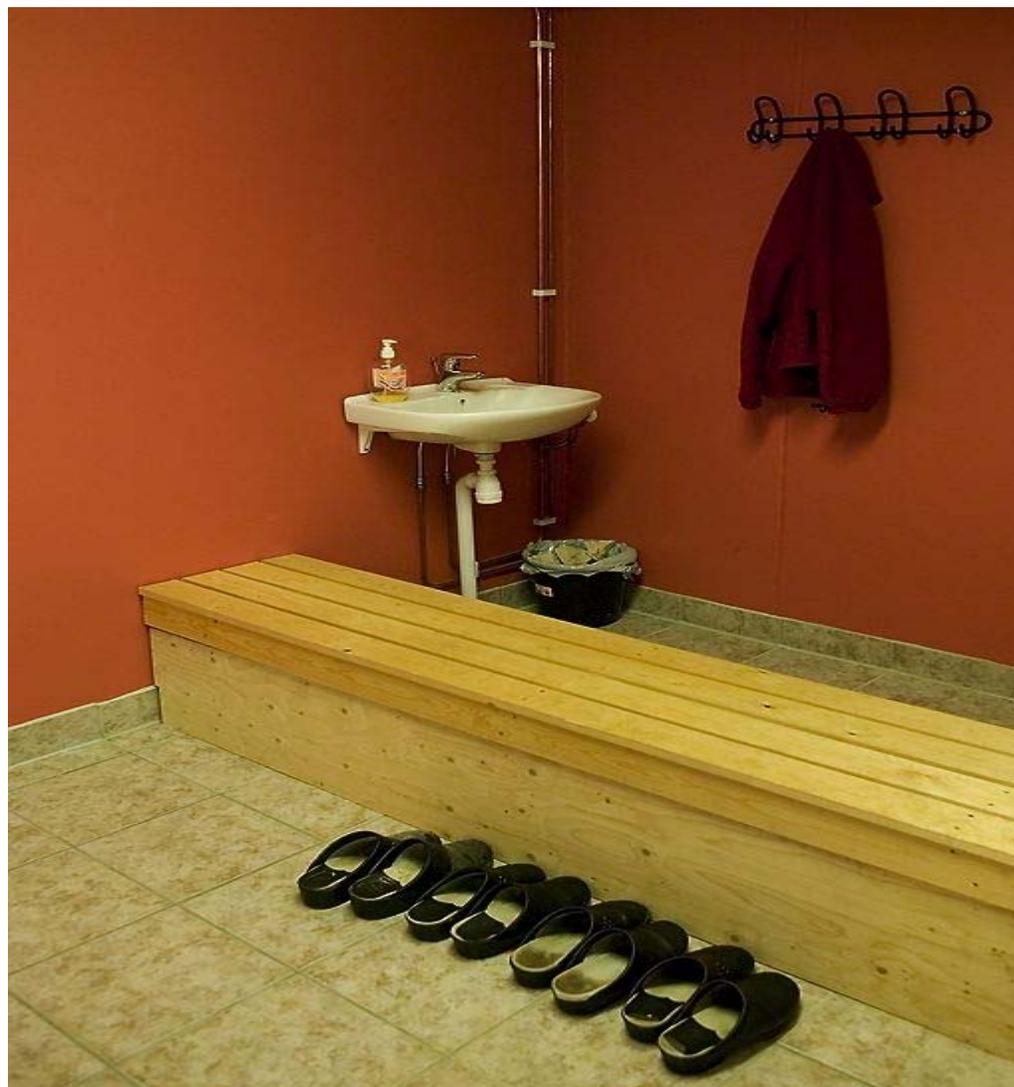
Salmonella-free feed and water

- Only factory produced feed allowed.
- All feed has to be sufficiently heat treated
 - Temperature / time
 - Monitoring of salmonella in feed mills
- Exception – Whole grain
 - Control program from harvest – storage - feeding
- Water
 - Community or deep wells
- *Feed has been related to some exotic salmonella findings in commercial broilers*

Salmonella-free environment.

- Housing:
 - Hygiene regimes
 - Concrete floors
 - Solid walls
 - Rodent and bird proof
- All in all out
- Cleaning and disinfection
- Litter material
 - GP/P – wood shavings,
 - broilers – wood shavings or straw

Entrance



Production unit



Hygien barier



Passing hygien barrier



Clean area



Hand hygien



Monitoring GP and P

- Arrival (GP) 1x10 caeca + 1x10 liners
- 2v. (GP/P) 5 pair of sock samples
- 4v. (GP) 5 pair of sock samples
- 10v. (GP) 5 pair of sock samples
- 17v. (GP/P) 5 pair of sock samples

- 24v+ every 2v. (GP/P) 5 pair of sock samples



Monitoring hatchery:

All GP flocks are monitored at every hatch – 250 meconium samples per flock

Monitoring feed mill

- Risk raw materials – S. controlled.
 - Decontamination if S. contaminated
 - Heat
 - Acid
- Weekly samples are taken as dust samples:
 - Unloading pit for raw materials
 - Aspiration filter
 - Top of pellet cooler
 - Processing area, pellet cooler
 - Top of bin, finished feed

Monitoring of commercials

- 10-14 days before slaughter, 2 pair of sock samples
- When there is more than 2 weeks in between slaughter – retesting.
- Every farm has an appointed salmonella control veterinarian (Board of Agriculture)
- Once a year the sampling is performed by the appointed veterinarian



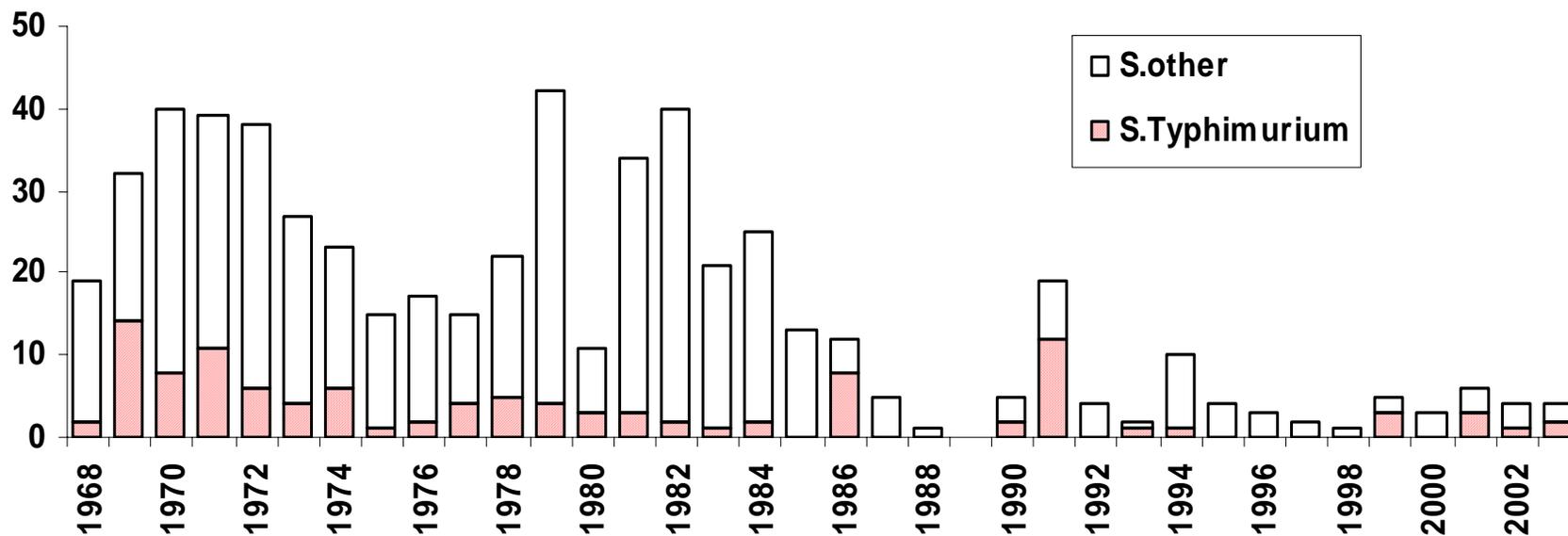
Monitoring of final product:

- To verify that the control program do achieve the objective; neck skin samples are taken 3 times a day at every slaughter plant and cultured for salmonella. During the period 1995-2003, out of 42 349 samples 13 positive has been found.
- S.enteritidis has so far never been isolated
- S.tm. DT 104 has not been isolated

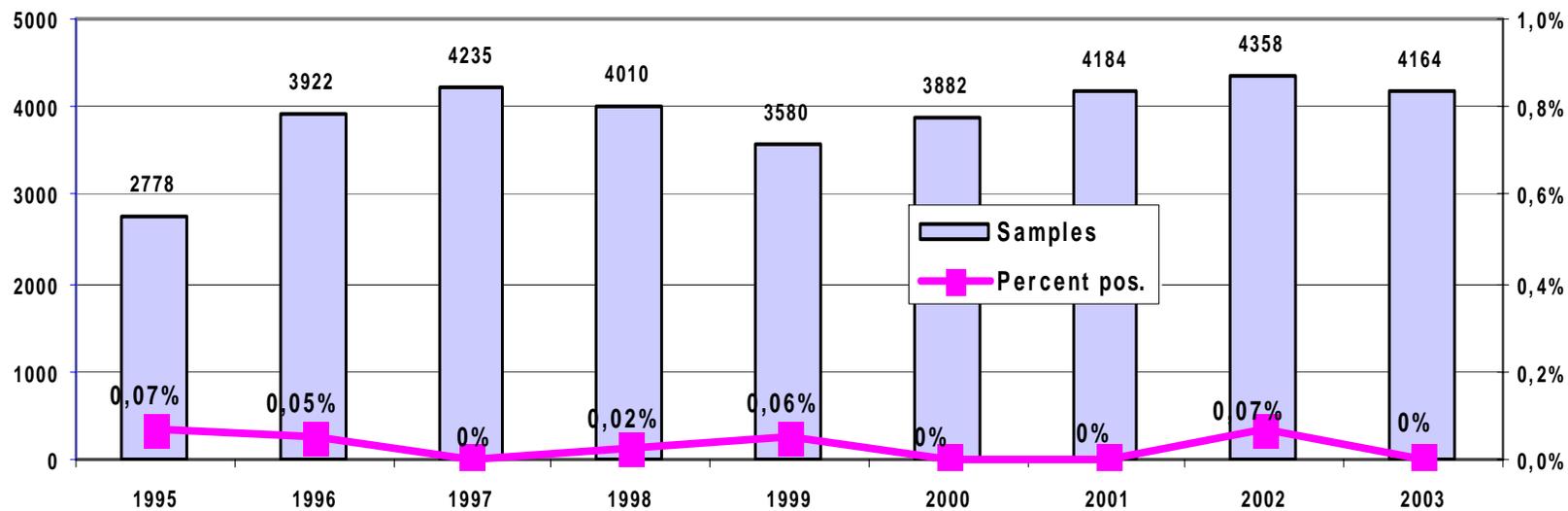
Action when salmonella has been suspected, later verified:

- When for excellent reasons salmonella is suspected, an extended sampling procedure is performed.
- Whenever salmonella is verified regardless of prevalence and serotype the flock is destructed.
- All manure is composted for at least 6 months
- Thoroughly cleaning and disinfection
- Inspection and environmental culturing

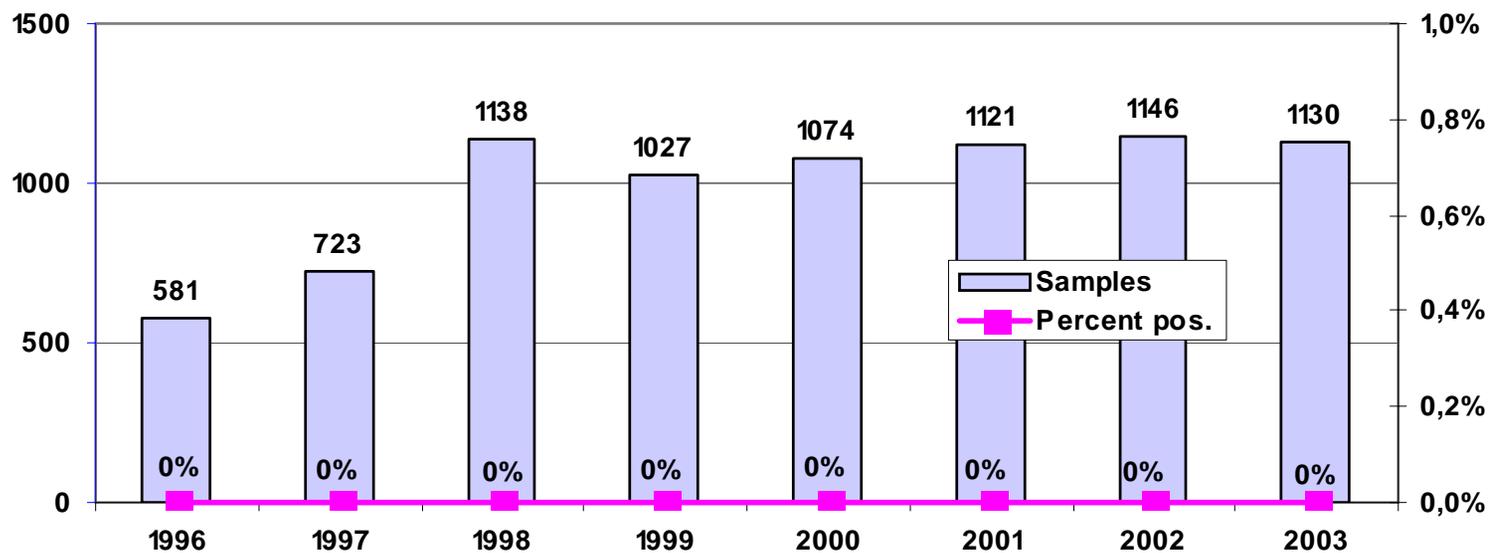
No of notified cases (infected flocks) of Salmonella in broilers during 1968-2003



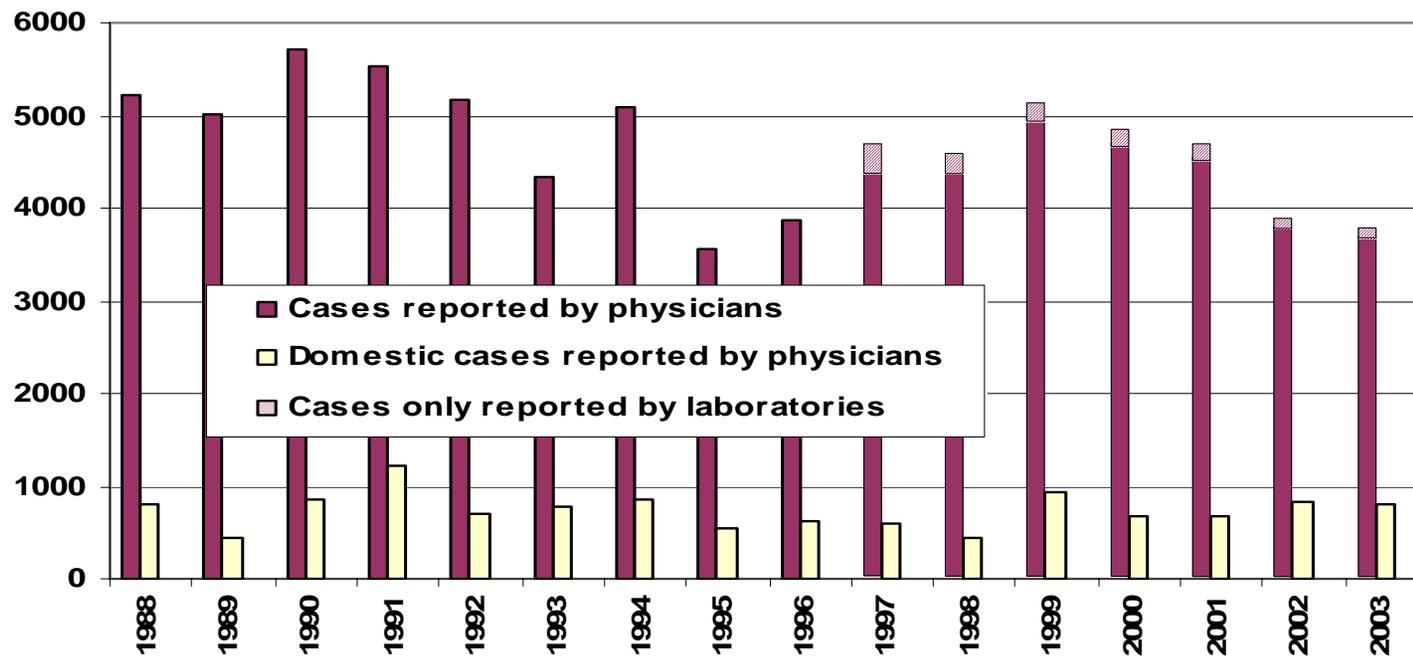
Salmonella control of poultry at major slaughter-houses during 1995-2003



Salmonella control at poultry cutting plants supervised by NFA (1995-2003)



Number of notified human Salmonella infections as reported by physicians.



Conclusions (1)

- The Nordic countries have achieved an effective control of Salmonella
- By prevention/hygiene it is possible to produce broiler meat free from Salmonella
- Salmonella-free foodstuffs have an influence on human health
- Non acceptance of Salmonella contaminated foodstuffs by consumers, physicians and legislators

Conclusions (2)

- Spinoff effects:
 - Improved animal health
 - Improved technical results
 - Less use of antibiotics
 - No antibiotic growth promoters
 - Less human exposure
 - Of antibiotic resistant pathogenes
 - Of Campylobacter
 - Less poluted environment



Campylobacter control

- 1989 Limited study – 60% positive
- Since 1991; Registration of Campylobacter status at slaughter of every single flock (neck skin) – 20% positive
- Information
- Bonus – Campylobacter free flocks
- 2001 Governmental approved and financed project
- 2006 – 10 % positive

Swedish experiences regarding Campylobacter control



- Non Risks:
 - As "all in – all out" is general practice, the day old chick environment.
 - Day old chicks.
 - Feed
- Risks:
 - Outside environment
 - Rodents/wild birds
 - Flies (house and stable fly)
 - Water

Campylobacter challenge

- Seasonal variation
 - Environmental differences
 - Wild birds
 - Insects
- Producer variation
 - Local differences
 - Different ventilation constructions
 - Obeying hygienic rules
 - Thinning
 - Transport crate/container hygiene