Food borne diseases: the focus on Salmonella

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Outline

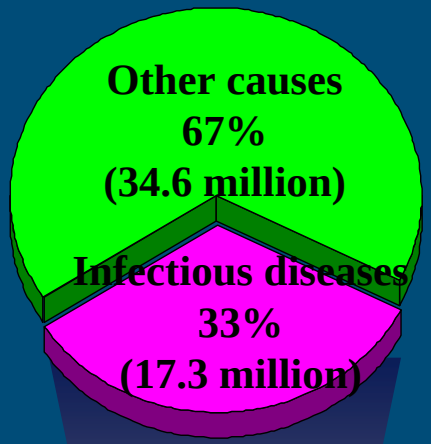
- Zoonoses and food borne diseases
- Current trends
- Salmonella control
- What is possible in the regions?

Importance of zoonoses

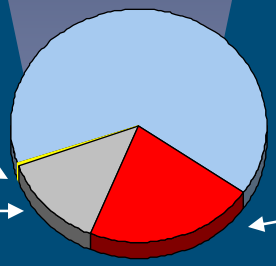
- More than 200 infectious diseases can be transmitted from animals to humans
- The last 20 years, 73% of all emerging human infections are zoonotic
- Many zoonoses are (potentially) food borne

Deaths Due to Selected Infectious Diseases

Total deaths (51.9 million)



By main mode of transmission



Animal-borne 0.3%

(0.06 million)

Person-to-person

65% (11.2 million)

Insect-borne 13%

(2.3 million)

Food, water- and soil-borne
22% (3.7 million)

Old `fellows`…..

- Non typhoid Salmonella (*S*. Enteritidis, *S*. Typhimurium)
- Brucella
- Anthrax

New age….

- Campylobacter
- *E. coli* O157
- Norwalk/Noro virus
- Transmissible Spongiform Encephalopathies
- Antimicrobial resistance

The good news….. (US)

- The 5 major pathogens <1900:
  - Brucella
  - *Clostridium botulinum*
  - *Salmonella* Typhi
  - Trichinella
  - *Vibrio cholerae*

Account for 0.01% of the cases in 1999

The bad news….

- Cholera: 111,575 cases with 1894 deaths annually (officially reported in 2003…….)
- Shigellosis: 164 million of cases annually with 1.1 million deaths
- *Salmonella* Typhi: 17 million cases with 600,000 deaths in 2000
- Antimicrobial resistance is increasing

Top 10 of food borne pathogens (US)

1. Norwalk like viruses	9,200,000
2. Campylobacter	1,963,000
3. Salmonella (non-typhoid)	1,342,000
4. *Clostridium perfringens*	249,000
5. Giardia lamblia	200,000
6. Staphylococcus	185,000
7. Toxoplasma gondii	112,000
8. VTEC (E. coli)	92,000
9. Shigella	90,000
10. Enterotoxigenic E. coli	56,000

Increase in zoonoses, including Food Borne Infections?

(emerging infections)

Changing microbes in a changing world….(1)

- Open borders: trade of food and travelling to exotic regions (vector, immunity)
- Changing consumer lifestyles, habits and demands (ready to eat foods, fresh food, minimal processed food)
- Susceptibility of hosts
  - Immunocompromised (children, elderly people, chronic diseases)

Herb Butter:

- Salted butter - Ireland
- Garlic puree - China, USA, Spain
- Garlic salt - China, USA, Spain
- Lemon - USA
- Parsley - France, UK
- Pepper - Indonesia
- Water - Ireland

Chicken Breast: Chicken - Ireland, Belgium UK, France etc.

Batter:

- Flour - Belgium, France
- Water - Ireland

Bread Crumb:

- Bread crumb - Ireland, UK
- Rape-seed oil - EU, Australia Eastern Europe

Courtesy A. Reilly, FSAI, Ireland

Changing microbes in a changing world….(2)

- Animal production systems (focus on animal welfare and extensive farming, organic production)
- Improved diagnostics
- Changing microbes (resistance!!!!!, virulence factors, adaptation to new processing techniques)
- Climate change (floodings, spread of vectors)


BONUS
Kip ovenschotel
4.99
Poulet de Paysanne
Hele kip
6.05
Scharrelkip
10.17
Poulet de Paysanne
Scharrelkip
9.99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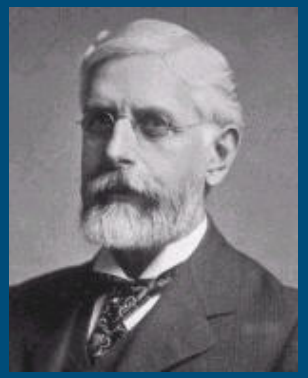
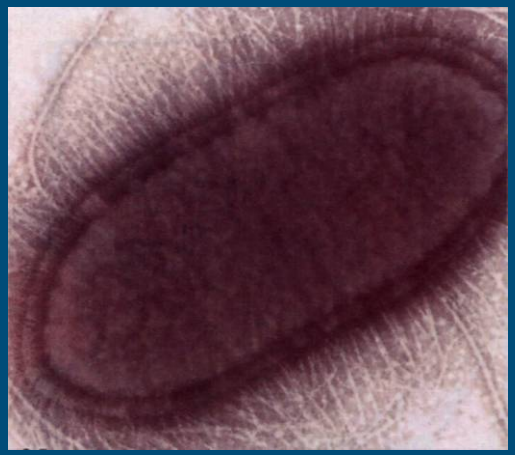
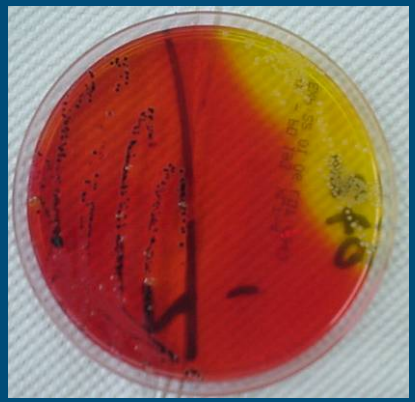
Bushmeat……



Salmonella





Worries about *Salmonella*?

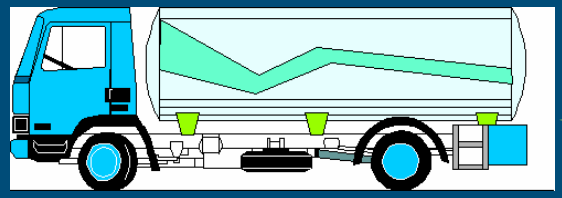
In humans

- Less prevalent than many other disease
- Usually sub clinical
- Low attack rate
- Low case mortality rate
- Easy to prevent
- Usually easy to treat

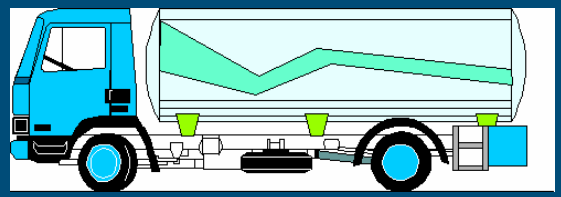
Worries about *Salmonella*?

In modern food production one day's production in a plant can be consumed by thousands of consumers nationally

A national outbreak of *Salmonella* Enteritidis infection from ice cream



ice cream concentrate



non-pasteurised liquid eggs

224,000 with *Salmonella* gastroenteritis
Attack rate 6.6%
Ice cream consumed by 3½ million people

Hennessy et al

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500,000,000 eggs

Worries about *Salmonella*?

In modern food production one day's production in a plant can be consumed by thousands of consumers nationally

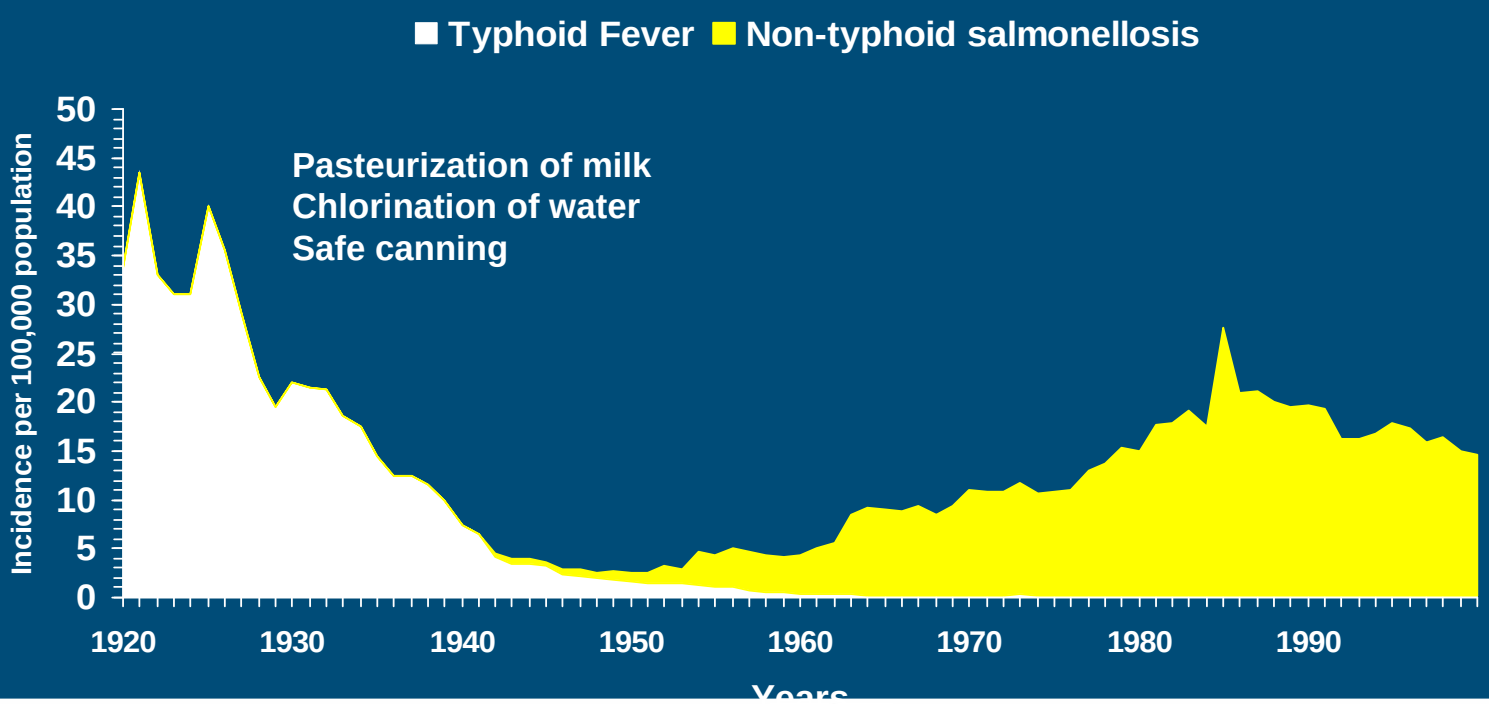
…..and internationally…..

Salmonellosis

- The consumer does not want to buy pathogens with his food
- Salmonella can cause serious disease in infants, the elderly and those with immunosuppressive diseases

The fall and rise of reported *Salmonella* infections in the United States, 1920-2000

CDC, National surveillance data



Increase of human Salmonellosis at the end of the 20th century

- Intensified poultry production
- In modern food production one source can be consumed by thousands of people
- An increase in dining in restaurants and institutions
- An increase in prepared foods
- Better reporting

% of Salmonella isolations from humans in the USA that were *S.* Enteritidis

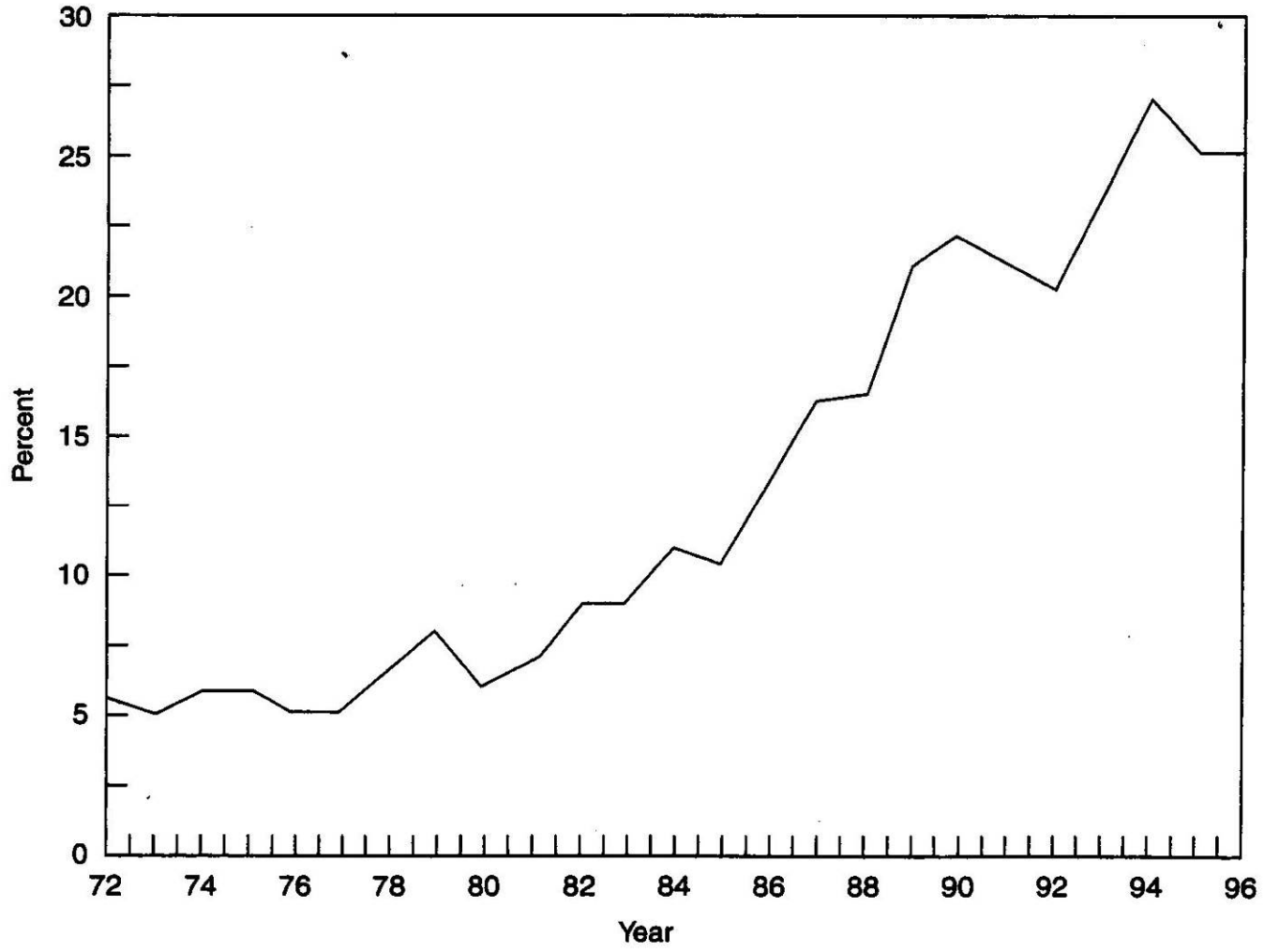


FIGURE 4.4 Proportion of salmonella isolations from human sources reported to the CDC that were *Salmonella* Enteritidis, by year, 1972–96.





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Challenges in writing the chapter on “Prevention, Detection and Control of *Salmonella* in Poultry”

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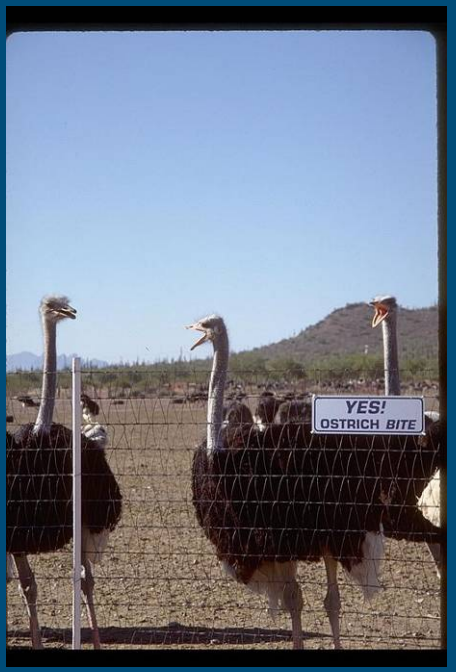
3. The chapter has to be appropriate for all poultry species and types.


YES!
OSTRICH BITE

Prevention, Detection and Control of *Salmonella* in Poultry

Sections of Chapter

- Introduction
- Purpose and scope
- Definitions
- Surveillance
- Prevention and control measures
- Prevention of spread from infected flocks

"*Salmonella* serotypes and prevalence may vary considerably between localities, districts, regions and countries and therefore, surveillance and identification of the prevalent *Salmonella* serotypes in humans and poultry should be carried out in order to develop a control programme for the area"

Prevention and control measures

- Good Agricultural Practices
- Hazard Analysis Critical Control Point (HACCP)
- Hygiene and Biosecurity Procedures in Poultry Production
- Specific *Salmonella* practices

Specific Salmonella practices

- ~~Antimicrobials~~
- “Clean” sources of chicks and pullets
- Control of Salmonella contamination of feed
- Competitive exclusion
- Vaccination
- Culling

Salmonella control: practical aspects

The epidemiology of *Salmonella* Enteritidis in table egg layers

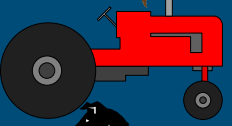
Breeding flock(s)

Hatching eggs and the hatchery

Vertical transmission

Pullets

Layers



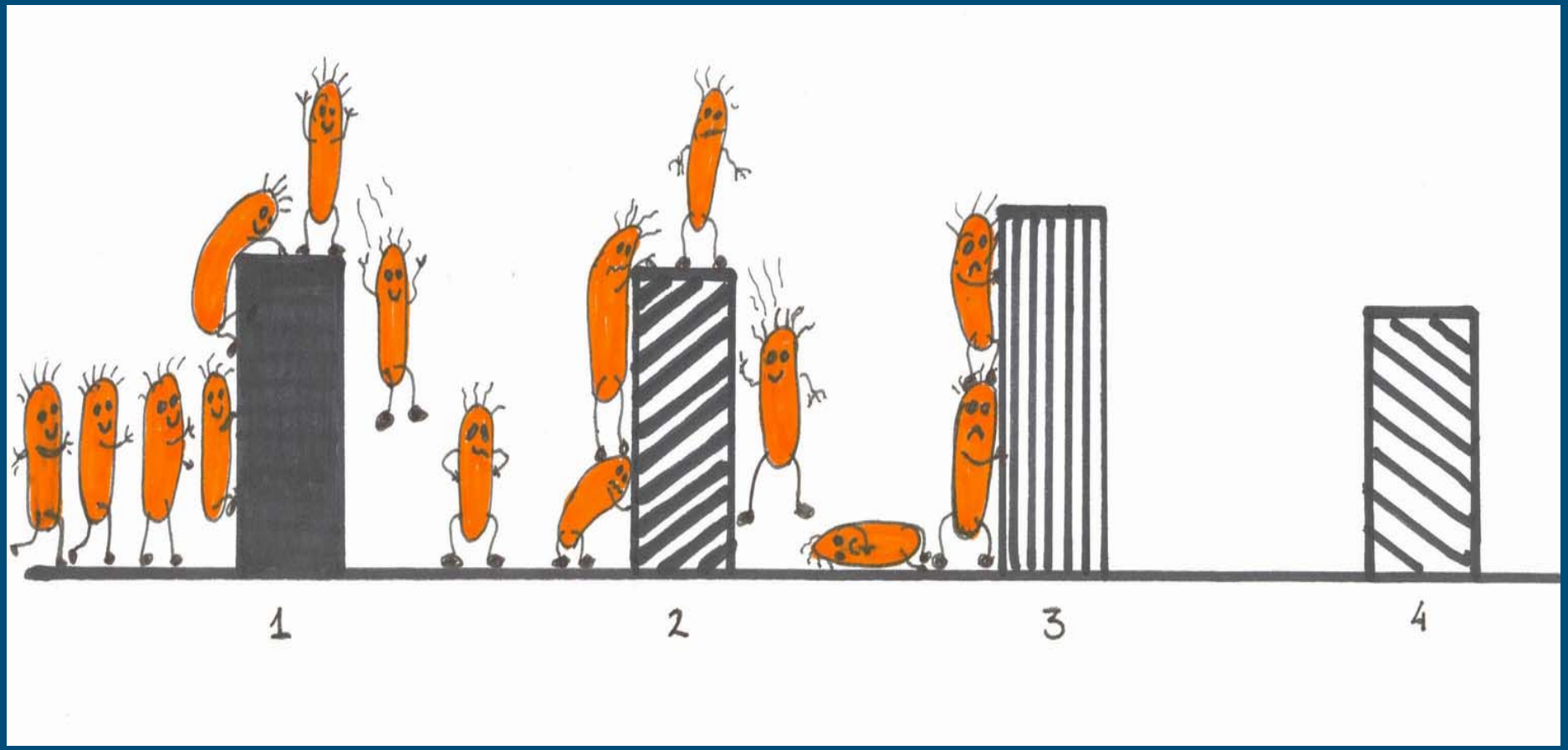
Horizontal transmission

Table eggs

Many threats

- The control should cover several precautions and/or interventions at the same time
- May look complicated
- Factors complement or stimulate each other:
  - HURDLES

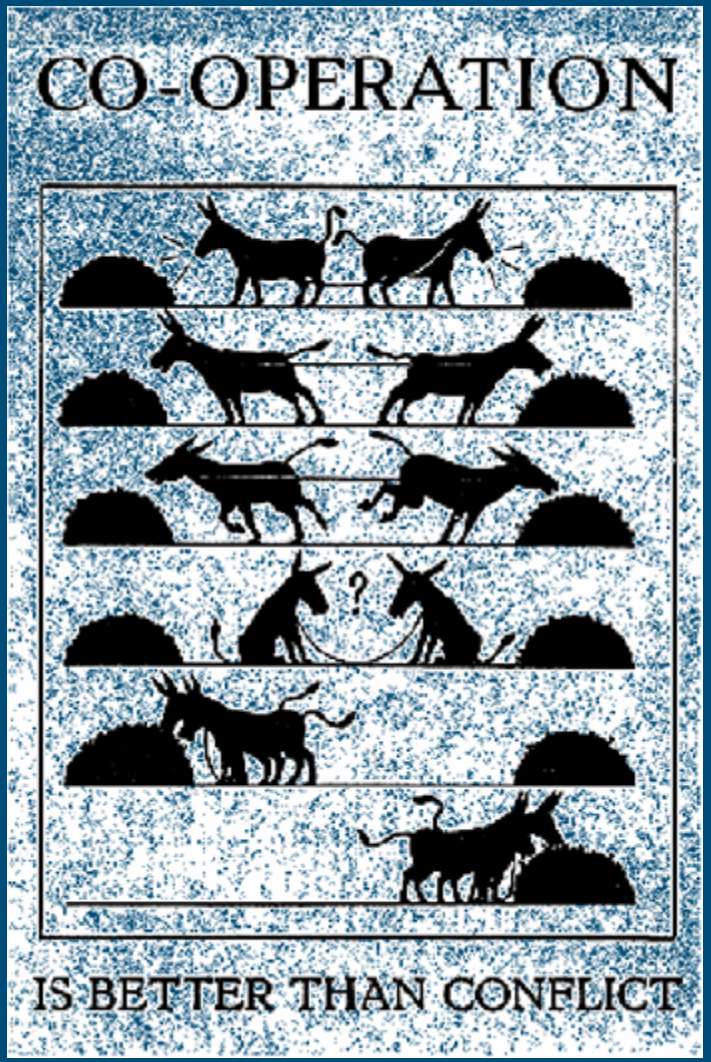
Hurdle principle



Conclusions

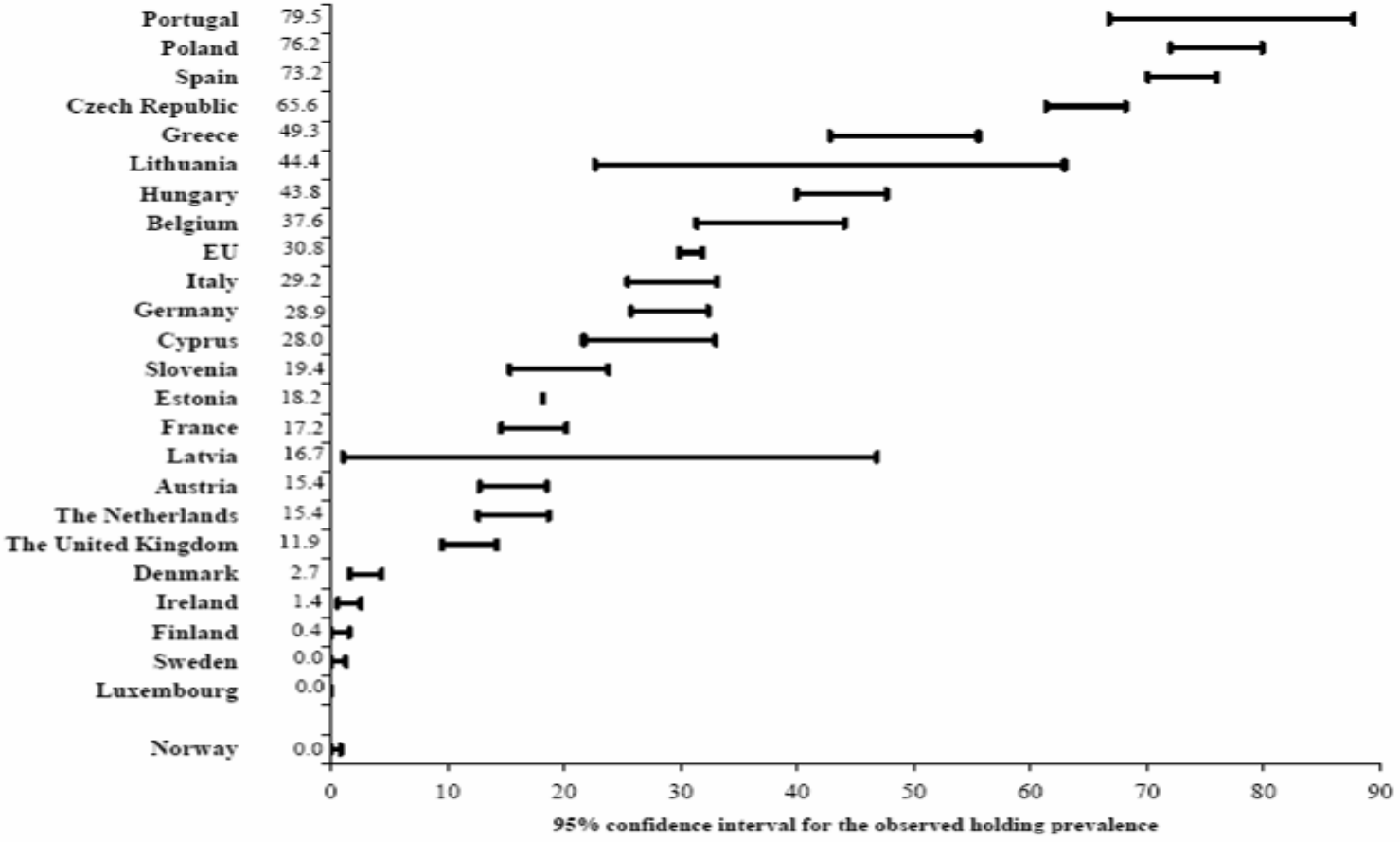
- Salmonella is one of the most important causes of bacterial food borne disease in humans
- Salmonella is preventable
- In the poultry sector top-down strategy is essential
- Communication within and between production sectors is important
- *ad hoc* approach (not well structured) does not work

- …and you play an important role!!!


CO-OPERATION
?
IS BETTER THAN CONFLICT


Diergeneeskunde

Figure 1. Observed prevalence of *Salmonella*-positive holdings of laying hens, with 95% confidence intervals, in the EU, 2004-2005



Global Foodborne Infections Network (GFN)

formerly: WHO Global Salm-Surv (WHO GSS)

Building capacity to detect, control and prevent foodborne and other enteric infections from farm to table

World Health Organization

What is GFN?

A network of professionals working in veterinary, food and public health disciplines committed to enhancing capacity of countries to conduct integrated surveillance of foodborne and other enteric infections




GFN Vision & Mission (2011-2015)

Vision

- A world where all countries prevent and control foodborne and other enteric infections

Mission

- To enable countries to detect, control, and prevent foodborne and other enteric infections by:
  - Building capacity for integrated surveillance
  - Fostering collaboration among human health, veterinary, food and other relevant sectors.

GFN main activities

- (Inter)national Training Activities
- External Quality Assurance System (EQAS
- Country Data Bank (CDB)
- Reference Services
- Focused Regional and National Projects
- Communication

GFN training activities

- 19 Active Sites
- > 1 600 Members
- > 700 Institutions
- 181 Member States

GFN Training activities 2000 - 2011

61. Madagascar-Level II-April 2009
62. China-Focussed Wksp-May 2009
63. Thailand-Adv Wksp-May 2009
64. Thailand - Nat. course-July 2009
65. China-Nat. course-Sept 2009
66. Brazil-Adv Wksp I-Oct 2009
67. Caribbean-Adv Wksp II-Nov 2009
68. United Arab Emirates – Nat. course-Feb 2010
69. Russian Fed./Moscow-Level II-May 2010
70. Argentina-Adv Wksp III-May 2010
71. Thailand GFN/ASIA Foodnet Wksp-July 2010
72. China-Adv Wksp V-Sept 2010
73. Tunisia-Level I-Nov 2010
74. Kenya-Level III-Nov 2010
75. Cameroon-Adv Wksp II-January 2011
76. United Arab Emirates – Nat. course-March 2011

Global Foodborne Infections Network

www.who.int/gfn

Salmonella eradication 5

- Environment
  - Outside facilities: Air inlet
  - Air coolers
  - Silo area
  - Other farm animals (sheep, cattle,
  - Pet animals