Food borne diseases: the focus on *Salmonella*

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Outline

- Food borne diseases in general
- Why focus on *Salmonella*?
- Some characteristics of salmonellosis
- Two chapters in the Terrestrial Code
A world of hunger amid plenty

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The ONAHA is planning to develop a rice sorter machine which avoids the loss of 10% of production compared to traditional techniques. Farmers working with the traditional method in the Saga paddy field. Julien Goldstein/IFRC

Bekele Geleta is secretary general of the International Federation of Red Cross and Red Crescent Societies, whose World Disasters Report 2011 focuses on the crisis in world food.

Among the ever-widening range of critical issues facing us today, few keep me awake at night more than one of the oldest and most persistent: hunger. As an Ethiopian I saw first-hand my country's terrible famine in the mid-1980s. I know what it means for people to starve.

Now, in 2011, I find it perplexing and dismaying that when there is more food available than ever before, when agricultural yields have increased hugely, when there are 1.5 billion people worldwide classified as obese, 925 million people simply don't have enough to eat.

Fifteen per cent of the world's population goes to bed at night hungry.

International Federation of Red Cross and Red Crescent Societies
Food safety: the continuous challenge…..

- Campylobacter
- E. coli O157 – EHEC O104:H4
- Norwalk/Noro virus
- Transmissible Spongiform Encephalopathies
- Antimicrobial resistance
- Hepatitis E
Importance of zoonoses

- More than 200 infectious diseases can be transmitted from animals to humans
- Many zoonoses are (potentially) food borne
- The last 20 years, 73% of all emerging human infections are zoonotic
What will be the next emerging zoonosis/food safety problem?
If we had to predict in 2002?
Prediction in 2002 for Europe/The Netherlands

- SARS
- Livestock Associated Methicillin Resistant S. aureus
- Q-fever
- EHEC
- Extended Spectrum beta-lactamases – ESBL (AMR)
- Avian influenza

- Bluetongue
- Schmallenberg virus
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Prediction in 2002 for Europe/The Netherlands

Q-fever The Netherlands 2007-2011

- 2007
- 2008
- 2009
- 2010
- 2011
Global distribution of relative risk of an EID event

KE Jones et al., Nature 2008
....if we cannot predict....

- Be prepared:
  - Surveillance systems in place!
  - Collaboration between medical, vet and food

Exchange of information

WHO-INFOSAN
Examples of successful control of enteric pathogens in the industrialized world (US)

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

Account for 0.01% of the cases in 1999
Salmonella
Worries about *Salmonella*?

In humans

- Less prevalent than many other diseases
- Usually subclinical
- Low attack rate
- Low case mortality rate
- 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 and internationally.
A national outbreak of *Salmonella* Enteritidis infection from ice cream in the US

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 1996
500,000,000 eggs
Salmonellosis (reasons to combat…)

- 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
- Increasing antimicrobial resistance (treatment failures)
- Salmonellosis is preventable!
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
The fall and rise of reported *Salmonella* infections in the United States, 1920-2000

CDC, National surveillance data

Pasteurization of milk
Chlorination of water
Safe canning
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
- Better control of S. Pullorum???
3rd OIE Strategic Plan (2001-2005) recommended that:

“OIE should be more active in the area of public health and consumer protection”

“this should include zoonoses and diseases transmissible to humans via food”

whether or not animals are affected by such diseases.

In 2002 the APFSWG was established to coordinate the food safety activities of the OIE.

OIE work to complement work of Codex and together OIE/Codex develop standards that address hazards present in the food chain continuum.

Reviewed by Dr. Slorach
Coordination OIE – Codex

Farm level

Measures relating to animal health +

Special session with CODEX Secretariate

Informal agreement (2002)

Production conditions & quality of
foods & quality of
products during and more especially
after the primary processing stage.
Challenges in writing the chapter on “Prevention, Detection and Control of *Salmonella* in Poultry”

1. The chapter has to be applicable to all members of the OIE, developing and developed countries.
2. The chapter has to be relevant to large industrial production and small family farms.
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Two chapters in Veterinary Public Health Section of the Terrestrial Code

- Prevention, detection and control of Salmonella in poultry
  - Country freedom not feasible in the short term for many OIE Members.
  - To encourage Members to undertake control programmes as appropriate to their circumstances.
  - Ensure that international trade does not pose risks to animal or human health.

- Biosecurity procedures in poultry production (formerly: Hygiene and disease security procedures in poultry breeding flocks and hatcheries)
  - General recommendations (establishment location, construction, operation).
  - Prevention of dissemination of infectious agents.
  - Recommendations for live bird markets.

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CHAPTER 6.5.

PREVENTION, DETECTION AND CONTROL OF SALMONELLA IN POULTRY

CHAPTER 6.4.

BIOSECURITY PROCEDURES IN POULTRY PRODUCTION
Prevention, Detection and Control of *Salmonella* in Poultry

Sections of Chapter

- Introduction
- Purpose and scope
- Definitions
- Surveillance (sampling, sampling size and frequency, lab methods)
- Prevention and control measures (e.g. vaccination, *Salmonella*-free chickens)
- Prevention of spread from infected flocks (trace infections, only for slaughter or destruction, litter treatment)
“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”
Results: country databank (WHO-Global Food-Borne Infections Network)

Human data: Europe, Asia, Latin America, Caribbean, N-America, Africa

CDB Serotype distributions

Distribution of human *Salmonella* serotypes
North America, 2001

- Typhimurium: 29%
- Enteritidis: 19%
- Newport: 12%
- Heidelberg: 10%
- Javiana: 4%
- Thompson: 4%
- Other: 8%

Distribution of *Salmonella* serotypes
South America, 2001

- Enteridids: 41%
- Typhimurium: 16%
- Typhi: 4%
- Agona: 4%
- Infantis: 22%
- Paratyphi B: 4%
- Other: 4%
CDB Serotype distributions

Distribution of human *Salmonella* serotypes

- **Africa, 2001**
  - Typhimurium: 39%
  - Enteritidis: 13%
  - Typhi: 2%
  - Kentucky: 2%
  - Paratyphi B: 3%
  - Hadar: 7%
  - Other: 21%

- **Asia, 2001**
  - Typhimurium: 32%
  - Enteritidis: 5%
  - Weltevreden: 6%
  - Anatum: 6%
  - I 4,5,12:i-: 4%
  - Stanley: 4%
  - Rissen: 4%
  - Other: 3%

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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 **(X)**
- “Clean” sources of chicks and pullets
- Control of *Salmonella* contamination of feed
- Competitive exclusion
- Vaccination
- Culling
Salmonella control: practical aspects
Concluding remarks

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

...and you play an important role!!!