Antibiotic Resistance from a One Health perspective

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Antibiotic use in food animals

- For therapeutic purposes
- For prophylaxis
- For growth promotion
  - Banned in the EU since 2006
- Use in food animals is substantial
  - Same antibiotic classes as in human medicine
  - Seems to outweigh use in humans in some countries
  - Nordic countries relatively low usage owing to prudent use policies
- Globalization of food trade - need for international action

Promiscuity of Antimicrobial resistance

- Any kind of antibiotic use, be it for human, animal or plant health purposes, can select for emergence of resistance and further promote the dissemination of resistant bacteria and resistance genes
- Antibiotic resistance does not respect phylogenetical, geographical or ecological borders
  - Antibiotic use in one ecological compartment, such as food animal production, can have consequences for the resistance situation in another ecological compartment, such as public health
Food as a source of antibiotic resistance

- Antibiotic resistant bacteria: *direct hazard*
  - Humans can be infected after food ingestion or handling
    - Zoonotic bacteria e.g. *Salmonella*, *Campylobacter*, *E. coli*
- Antibiotic resistance genes: *indirect hazard*
  - Transfer of resistance genes from a resistant bacterium to a pathogenic bacterium, directly, or via another commensal
  - Mobile genetic elements harboring resistance determinants can readily be transferred horizontally between bacteria from terrestrial animals, fish and humans
    - Can also take place in natural environments e.g. the kitchen
    - *E. coli* and *Enterococcus* spp.
WHO/FAO/OIE work on AMR since 1997

- International collaboration established
  - Codex Alimentarius, FAO, OIE, WHO
- More than 20 expert meetings and consultations
- Roles
  - Codex and OIE: normative work
  - FAO and OIE: practical guidance and capacity building
  - WHO: raise public awareness, monitoring, leading the debate
- Key publications

Codex ad Hoc Intergovernmental Task Force on AMR, 2007-2010

Objectives
1. To assess the risks to human health associated with the presence in food and feed of antimicrobial resistant organisms, antimicrobial resistant genes or residues of antimicrobials
2. To develop risk management advice based on that assessment to reduce such a risk

Outcome
Guidelines for the Risk Analysis of Foodborne Antimicrobial Resistance
WHO European Strategic Action Plan

Seven action areas:
1. Promote national coordination
2. Strengthen surveillance
3. Promote rational use of antibiotics, including surveillance of antibiotic consumption
4. Improve infection control and stewardship of antibiotic use in health care settings
5. Promote surveillance, prevention and control of antibiotic resistance in the food chain
6. Promote research and innovation on new antibiotics
7. Improve awareness on antibiotic use and risk of increasing resistance

Antibiotic resistance is also a food safety issue

- Publication issued on occasion of the World health Day 2011 suggests actions for tackling antibiotic resistance from a food safety perspective
Key Messages for Countries

1. Improve overall coordination
2. Improve regulatory framework
3. Reduce the need for and promote prudent use of antibiotics
4. Improve surveillance
5. Advocate and communicate
6. Build capacity and provide training
7. Address knowledge gaps and research needs

Intersectoral Coordination

- National and international interdisciplinary cooperation
- National intersectoral holistic strategy and action plan with an intergovernmental steering committee.
- Formal mechanism between health authorities and food safety/veterinary authorities
Improved Regulatory Framework

• Eliminating the use of antibiotics as growth promoters
• Requiring that antibiotics be administered to animals only when prescribed by a veterinarian
• Requiring that antibiotics identified as critically important in human medicine - especially fluoroquinolones and third/fourth generation cephalosporins - only be used in food animals when their use is justified

Reduce Usage and Promote Prudent Use

• Reducing the need for antibiotics in animal husbandry, by improving animal health through biosecurity measures, disease prevention (including vaccine use), and good hygienic and management practices
• Eliminating economic incentives that facilitate the inappropriate prescription of antibiotics
Lessons Learned: The Experience from Norway

- Establishing a surveillance system for the use of antibiotics in food animals
- Establishing an integrated (among public health, food and veterinary sectors) surveillance system to monitor antibiotic resistance in selected food-borne bacteria
FQ resistant *Campylobacter* in Norway

Source: Norstrom et al 2005
European Surveillance of Veterinary Antimicrobial Consumption (ESVAC)

- Project run by EMA since 2010 upon request from EC to develop a harmonised approach for the collection and reporting of data on the use of antimicrobial agents in animals from EU MSs.

- The population correction unit (PCU) used as a proxy for the animal biomass of food producing species at risk for being treated in the country of question. Takes into account transport of animals for slaughter or fattening in another MS.

ESVAC Data 2012
Sales of antimicrobial agents by antimicrobial class as percentage of the total sales for food-producing species (including horses), in mg/PCU (ESVAC, 2012)

The proportion sold of the critically important antimicrobials (CIAs) with the highest priority in human medicine according to WHO varied substantially between the 26 countries, ranging from 0.01% to 17% (ESVAC, 2012)
ESVAC 2012, conclusions by EMA (26 countries)

• Of total sales, tetracyclines (37%), penicillins (22%), sulfonamides (10%) are the most-selling veterinary antimicrobial agents

• Overall, sales, in mg/PCU, of the most important Critically Important Antimicrobials (CIAs) account for ~10% of total sales
  – 3rd and 4th generation cephalosporins: 0.2%
  – Fluoroquinolones: 1.7%
  – Macrolides: 8%
  – The proportion sold of CIAs varied substantially between the 26 countries, ranging from 0.01% to 17%

• A many-fold difference in the sales, expressed as mg/PCU, is observed between the most- and least-selling countries

• A total of 18 of the 20 countries that reported sales to ESVAC in 2010, 2011 and 2012 reported a decrease in sales (range 0.4%–49%), expressed as mg/PCU.

Advocacy and Communication

• Raise awareness of antibiotic resistance from a food safety / One Health perspective

• Prompt action that prevents the development and spread of antibiotic resistance in the food chain
Training and Capacity Building

• Develop guidelines on the prudent use of antibiotics in food animals, taking a multidisciplinary approach

• Provide the training needed to implement them

Knowledge gaps and research needs

– Support studies that help provide comparable data on antibiotic resistance and usage for risk assessment and risk management

– Strengthen research on the development and spread of resistance and on the development of new antibiotics and alternative approaches to antibiotic therapy
AMR Focused Food Safety Capacity Building

Sub-regional workshops
- Belgrade, Serbia, 2010 (CRO, ROM, SRB)
- Durres, Albania 2012 (ALB, CRO, MNE, ROM, SRB)

Global Foodborne Infections Network (GFN) training focussing on AMR
- St. Petersburg, Russia, 2011 (Russian speaking countries)
- Almaty, Kazakhstan, 2012 (Central Asian Republics)
- Dushanbe, Tajikistan, 2013 (national)
- Ashgabat, Turkmenistan, 2013 (national)
- Tirana, Albania, 2014 (Albania, Kosovo)

Projects on integrated surveillance of antimicrobial resistance
- Kosovo
- Albania
- Tajikistan
- Uzbekistan

Conclusions

- Antibiotic resistance is a major public health challenge
- Spread of antibiotic resistance through the food chain a growing public health problem and concern
- Antibiotic resistance needs an intersectoral multifaceted response, nationally and internationally
- Many actions are necessary at the national level to address antibiotic resistance
  - WHO encourages national authorities in developing and carrying out policies to contain antibiotic resistance and protect public health
  - The booklet serves as a guidance in the food safety area
"Only if we act together can we respond effectively to international food safety problems and ensure safer food for everyone"

Dr Margaret Chan – Director-General