Food and Agriculture Organization of the United Nations

Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

GLOBAL PERSPECTIVES ON ANTIMICROBIAL RESISTANCE IN THE FOOD CHAIN

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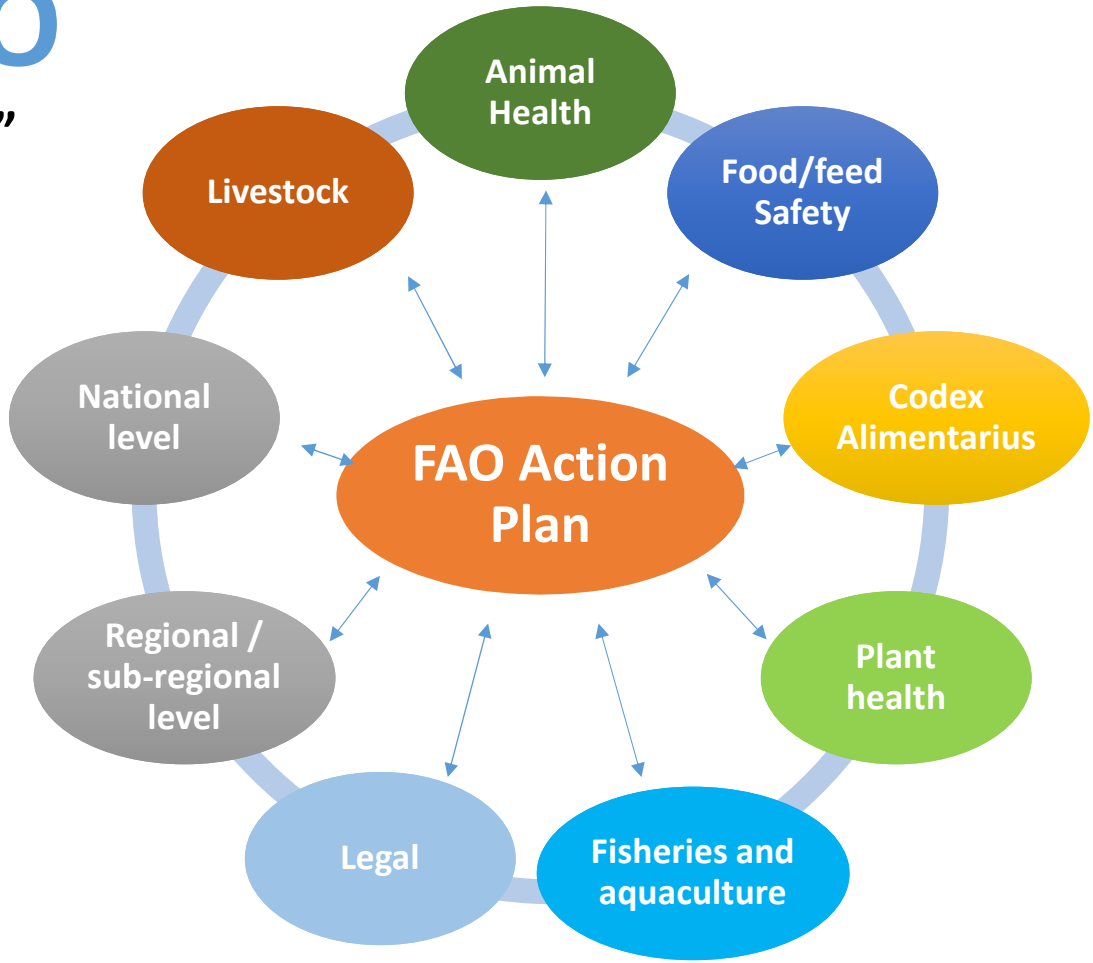
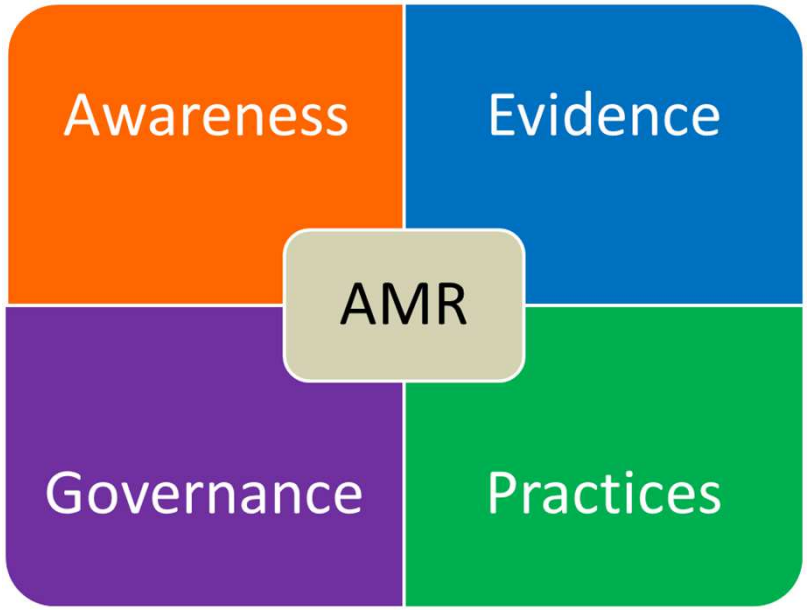
One Health and AMR at FAO

FAO calls for a "One Health" and "food chain" approach when addressing AMR as it is a cross-sectoral issue:

- November 2014: **Rome Declaration on Nutrition (ICN2)**: Food systems recognized as important contributors when addressing AMR
- June 2015: **FAO Resolution on AMR** adopted (http://www.fao.org/antimicrobial-resistance/en/)
- November 2015: **FAO Action Plan**, in line with the Global Action Plan, presented to the FAO council



FAO Action Plan on AMR – supporting implementation of the FAO Resolution on AMR and the Global Action Plan in the food and agriculture sectors



1. Improve awareness and advocacy on AMR and related threats
2. Develop capacity for surveillance and monitoring of AMR and AMU in food and agriculture
3. Strengthen governance related to AMU in food and agriculture
4. Promote good practices in food and agricultural systems and the prudent use of antimicrobials

Prudent use of antimicrobials in agriculture production systems

in terrestrial animal production systems and health and animal feed	• Good husbandry and Good hygiene practices • Improved biosecurity • Animal welfare • Infection control • Vaccinations
In aquatic animal production systems and health	• AMR as one of 3 topics to be a research priority • Good practices • Biosecurity • Infection control • Vaccination
in crop production and health	• Good Agriculture Practice • Regulation of antimicrobials used for crop production • Integrated Pest Management (IPM) for reducing use of antimicrobials • Management and use of microbial pesticides (pesticide life-circle management) • Management and use of pesticides including microbial pesticides • Registration of pesticides including assessment of microbial pesticides

FAO works at country level to incorporate AMR and AMUs-related obligations in legislation

Legal

The work of the Development Law Service (LEGN)

www.fao.org/legal

Identification of regulatory elements relevant for AMR and AMU

Recommendations to incorporate AMU-related obligations in legislation

Support to participatory processes for legal reform

LEGAL INFORMATION – FAOLEX (faolex.fao.org/faolex)

AMR and Food
Known Foodborne AMR Pathogens

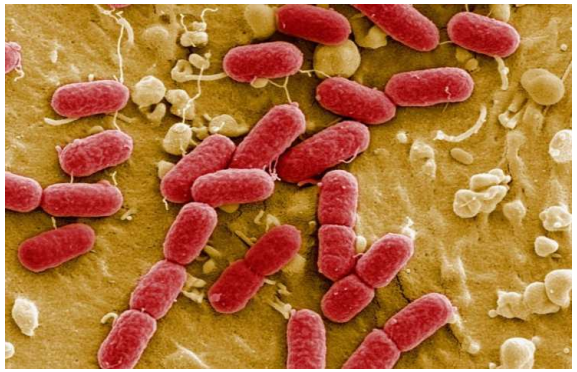
- *Salmonella*
- *Escherichia coli*
- *Campylobacter*
- *Staphylococcus* spp.
- *Enterococcus* spp.
- Extending-Spectrum beta-lactamase (ESBL) – producing Gram negative bacteria
  - These are
    - Common causes of foodborne disease globally
    - Many have been involved in serious food poisoning outbreaks
    - Increasing trend of AMR over the past 30 years

Example: Salmonella DT104

- Typically resistant to five types of antibiotic [ampicillin, chloramphenicol, streptomycin, sulfonamides, and tetracycline].
- First isolated in the UK in the 1980s and was later discovered to be endemic in cattle, which acted as a reservoir for contamination of meat.
- It then spread worldwide with alarming speed during the 1990s and is now common, especially in Europe and North America.
- Concern: shown an ability to acquire resistance to other types of antibiotic, including the clinically important fluoroquinolones and cephalosporins

- New genomics studies expanding our understanding of this

Example: E. coli O104:H4



- Major outbreak in Germany in 2011 (sprouting seeds)
- Resistant to a number of antibiotics [ampicillin, trimethoprim, cephalosporins and tetracycline].
- Possesses a plasmid-borne gene for extended-spectrum beta-lactamase (ESBL) production. [ESBL gene can mean resistance to a wide range of important therapeutic antibiotics].

Emerging concerns

- Presence of ESBL in foodborne pathogens
- MRSA turning up occasionally in livestock and foods of animal origin

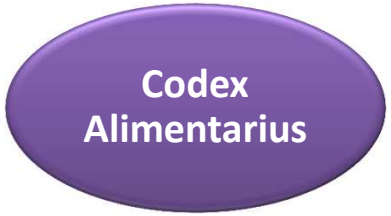
AMR – a food safety challenge

- Food - Potential route of exposure for everyone
- Whole chain approach starting at inputs to primary production critical part of food safety controls to tackle AMR
- Importance of good hygienic practices to minimize spread of microbiological hazards
- Mixed populations – genetic exchange (wash water, waste, environment)

- So what do we have to do to address this challenge?

EG6

Codex Alimentarius



Main texts:

- Code of Practice to Minimize and Contain Antimicrobial Resistance (CAC/RCP 61-2005)
- Guidelines for Risk Analysis of Foodborne Antimicrobial Resistance (CAC/GL 77-2011)

Other Codex texts relevant to AMR includes:

- Code of Practice on Good Animal Feeding (CAC/RCP 54-2004)
- General Principles of Food Hygiene (CAC/RCP 1-1969)
- Several Codes of hygienic practices for different commodities (e.g. milk and milk products, fish and fishery products)

The 39th session of the Codex Alimentarius Commission (June 2016) will consider the need for starting new work on AMR

Slide 11

EG6 Sugestion: slide to be placed between FAO and WHO slides

Esther GarridoGamarro (FIPM), 12-4-2016

Strong food control systems are needed

FAO promotes the prevention and minimization of transmission of antimicrobial resistance through the food chain

Raise awareness

Assessing new and improved technologies e.g. whole genome sequencing

Increasing knowledge – applying new tools

Good hygienic practices and HACCP

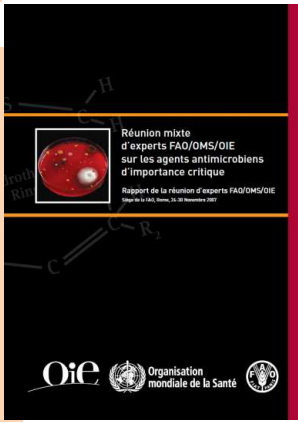
A suite of tools and resources to support improved practices in developing countries*

Food control system assessment tool
Tools to strengthen national capacities

Strengthening food control systems

Scientific advice

JECFA - veterinary drugs
JEMRA – interventions for microbiological hazards
Addressing gaps in understanding of AMR in the food chain
JMPR- Antimicrobials (pesticides) used for crop production



* http://www.sp-lab.net/fao/GHP2014/

Key issues of importance for the Veterinary drug Sector

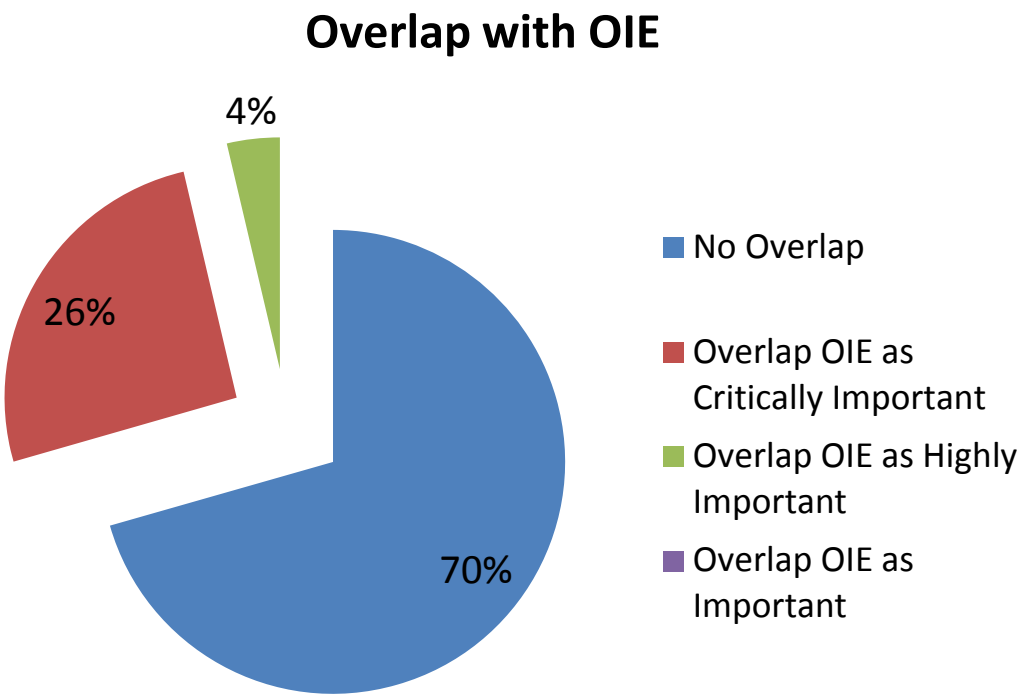
- Overlap between critically important antimicrobials for humans and animals and how many of these we legislate for. (see next 3 slides)

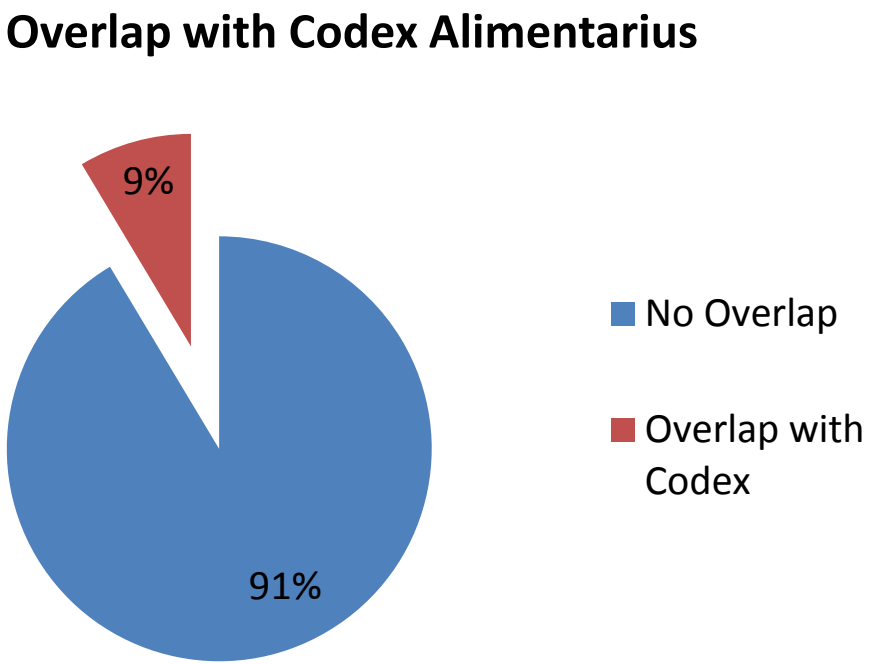
- Legislation
- Residue monitoring
- Enforcement

Antimicrobial Drug Overlap

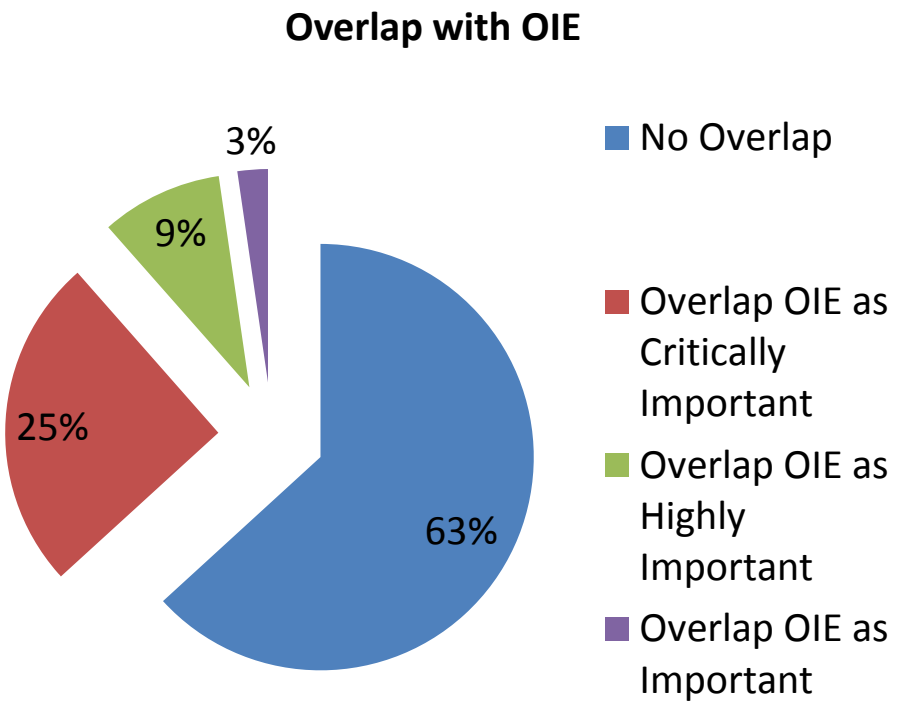
- WHO – Critically Important List
- OIE – Veterinary Importance List
- Codex Alimentarius Maximum Residue Limits and Risk Management Recommendation
- A study was conducted to determine how many antimicrobial drugs overlapped these 3 lists

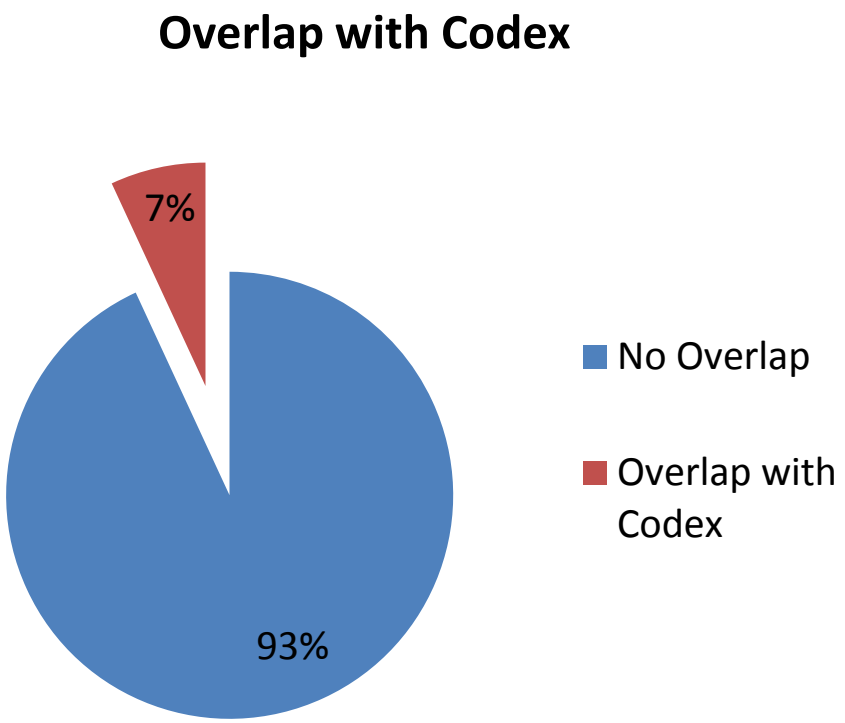
Critically Important Antimicrobial Drugs on WHO List (167)



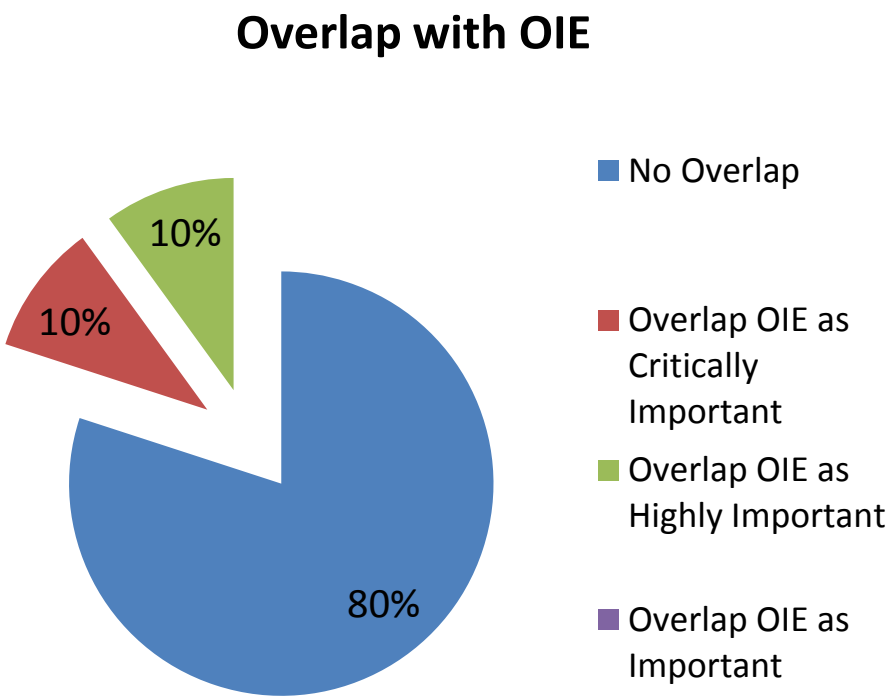


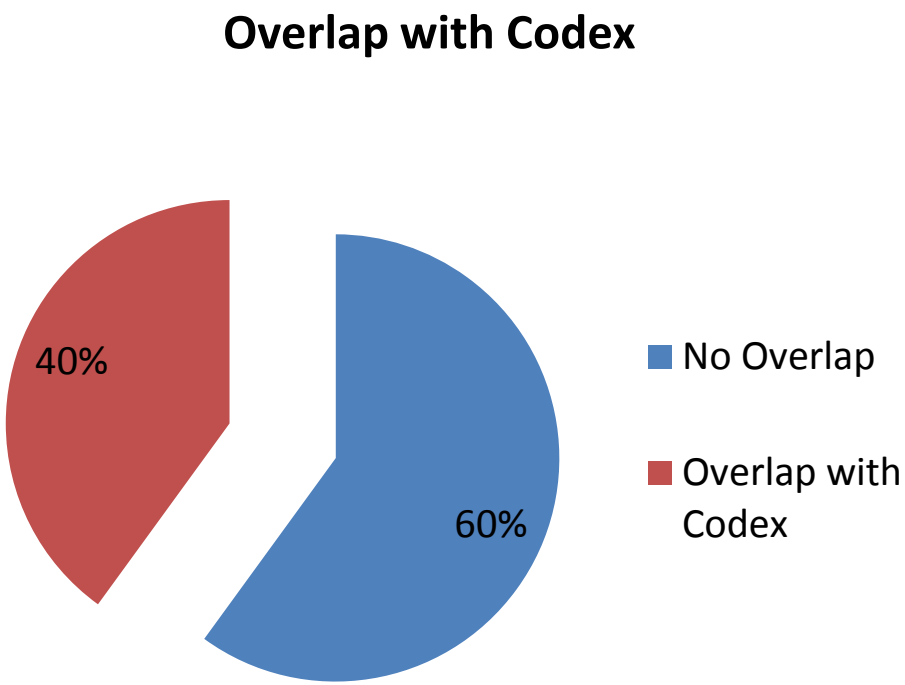
Highly Important Antimicrobial Drugs on WHO List (87)





Important Antimicrobial Drugs on WHO List (10)





Legislation and regulatory framework

- ***Guidelines for the Design and Implementation of National Regulatory Food Safety Assurance Programmes Associated with the Use of Veterinary Drugs in Food Producing Animals*** (CAC/GL 71-2009) http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCAC%2BGL%2B71-2009%252FCXG_071e_2014.pdf

JECFA areas of work

- Risk assessment/safety evaluation of:
  - Food Additives
  - Processing aids (considered as food additives)
  - Flavouring agents (by groups of related compounds)
  - Contaminants
  - Natural toxins
  - Residues of Veterinary Drugs in animal products
- Specifications and analytical methods, Residue definition, MRL proposals (veterinary drugs)
- Development and improvement of general principles

FOOD safety at FAO

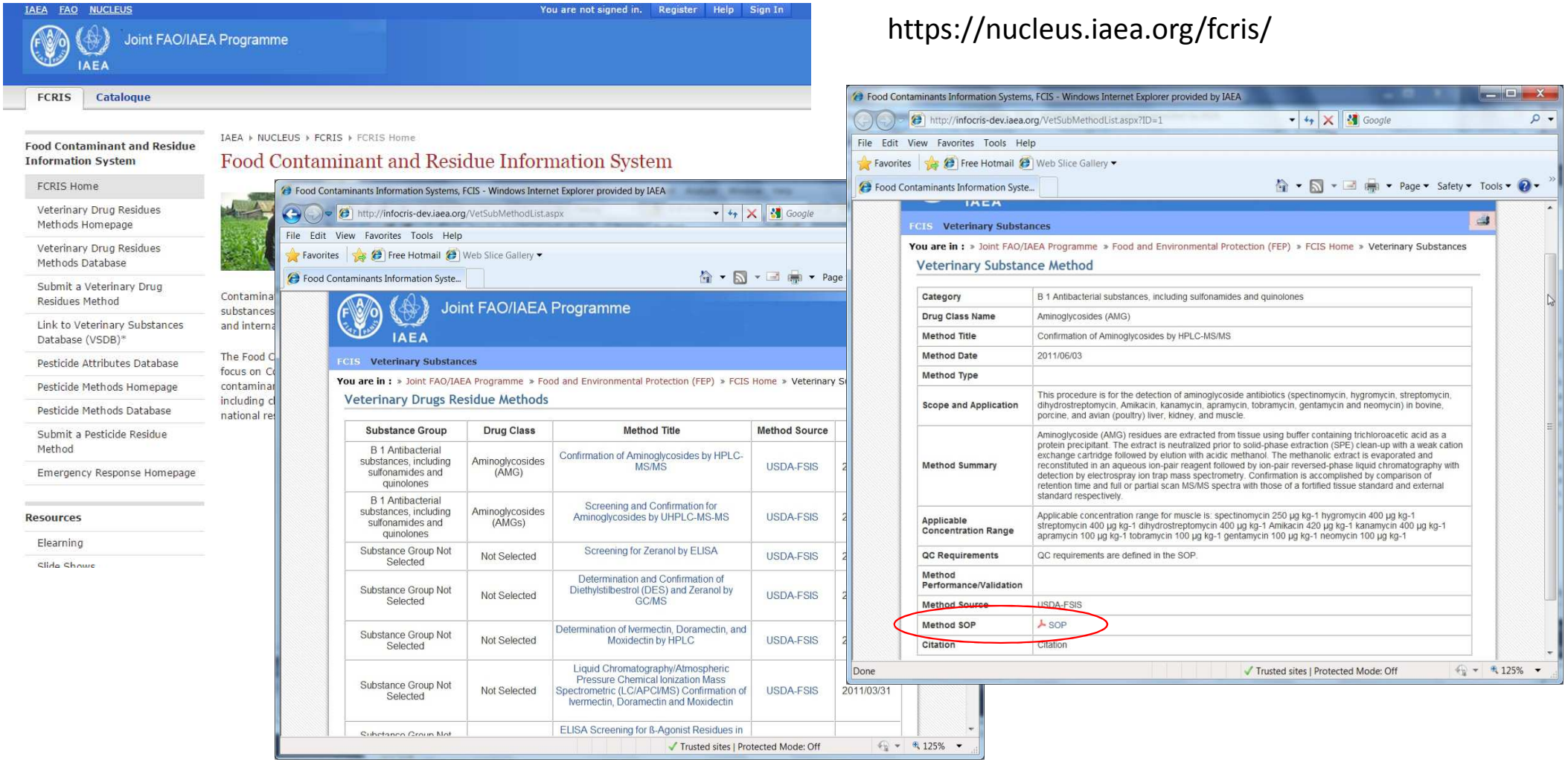
JECFA work on vet drug residues

For residues of veterinary drugs in food, JECFA

- elaborates principles for evaluating their safety and for quantifying their risks;
- establishes ADIs and other guidance values for acute exposure (i.e. ARfD)
- recommends maximum residue limits (MRLs) for target tissues; and
- Contributes to the determination of appropriate criteria for and evaluation of methods of analysis for detecting and/or quantifying residues in food (CCRVDF)

Residue monitoring

https://nucleus.iaea.org/fcris/



Residue monitoring

FAO/IAEA National capacity building projects for control of veterinary drug residues:

- Bangladesh
- Benin
- Botswana
- Central African Republic
- Costa Rica
- Dominica
- Egypt
- Iraq
- Libya
- Mauritius
- Mauritania
- Morocco
- Mozambique
- Niger
- Pakistan
- Paraguay
- Senegal
- Sudan
- Syria
- Uganda

Residue monitoring

FAO/IAEA regional and inter-regional capacity building projects

- Inter-regional: Improving Food Safety through the Creation of an Inter-regional Network
- Africa: Establishing a Food Safety Network through the Application of Nuclear and Related Technologies
- Asia: Enhancing Food Safety Laboratory Capabilities and Establishing a Network in Asia to Control Veterinary Drug Residues and Related Chemical Contaminant

Coordinated Research

- Development and strengthening of Radio-Analytical and Complimentary Techniques to Control Residues of Veterinary Drugs and Related Chemicals in Aquaculture Products

Residue monitoring

- Monitoring of VDR and monitoring of targeted food borne pathogens in food animals are both important for the provision of information and evidence of AMR.
- The possibility to provide both types of monitoring on the same samples (e.g. Codex VDR sampling plan) would provide useful information on direct linkages
- Basis for more integrated surveillance systems
- FAO/IAEA projects can potentially provide this opportunity in many different countries, with different current levels of control, as well as:
  - Information on antimicrobial usage
  - Information on the effectiveness of interventions

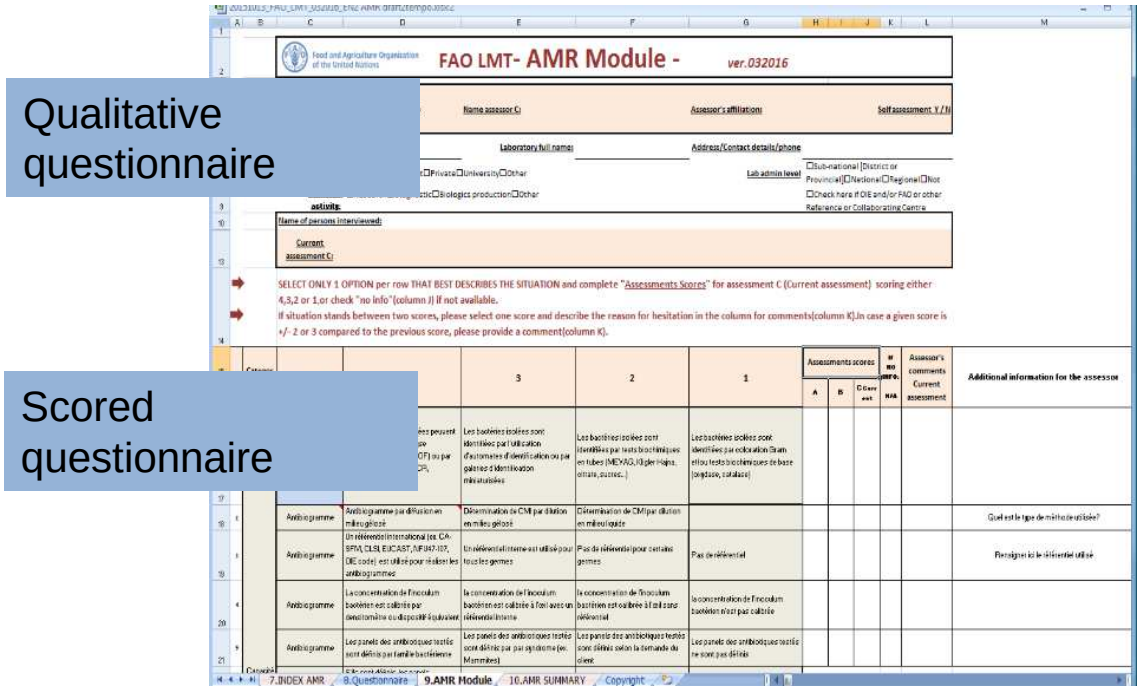
AMR module in Laboratory Mapping Tool

To (auto-)assess individual laboratories on their capacity of:

- ✓ pathogen isolation & identification
- ✓ antimicrobial resistance testing

Focusing on 6 major categories:

- Technical capacities
- Data and biological material management activities
- Quality Assessment
- Governance
- Prospective



The information sheet is available at http://www.fao.org/3/a-i5439e.pdf and on FCC website www.fao.org/food-chain-crisis

Related issues of concern - Is There a Link between Biocide Use and Antimicrobial Resistance?

- Encompassed animal health, food production and processing, human health and households

- Various mechanisms of resistance where found
  - Most common: Active Efflux Pump

- More research is needed to fully understand the co- or cross-resistance to biocides and antimicrobials.

Conclusions

- Food is an important potential exposure route to antimicrobial resistant organisms
- A food chain approach is needed
  - Recognizes hazards/risks
  - Emphasizes need for prevention
  - Good practices at primary production and processing levels (VDR control systems!)
- Monitoring and investigation
- Antimicrobials are powerful tools for management of infectious diseases
- Some advances in risk-based approaches
- Internationally accepted guidelines need to be translated into appropriate actions to detect. Monitor and control AMR

- ***Remove*** the need for antimicrobials
- ***Reduce*** the amount of antimicrobials
- ***Restrain*** and control transmission of resistance through the food chain