EFSA’s activities on antimicrobial resistance in the food chain: risk assessment, data collection and risk communication.

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EFSA... and AMR

The EFSA is the EU agency responsible for risk assessment on food and feed safety.

EFSA provides:

- Independent **scientific advice**
  Scientific Opinions on AMR

- **Scientific and technical support**
  Technical specifications on AMR monitoring
  Data collection on AMR at EU-level
  Baseline surveys (e.g. MRSA in pig production)

- Clear **communication**
  on existing and emerging risks
Some history of key mandates over the last 10 years

Ongoing mandates:

- Joint EFSA and EMA scientific opinion on measures to reduce the need to use antimicrobial agents in animal husbandry in the EU and the resulting impacts on food safety. **RONAFA**.

- The risk for the development of AMR due to feeding calves with **milk containing residues of antibiotics**.
• The exposure to AMR bacteria via food is difficult to determine quantitatively.

• The role of food in the transfer of R genes is insufficiently studied.

• Foodborne bacteria (pathogens and commensals) display an increasing and diverse range of resistance to CIA.

• Any further spread of resistance among bacteria in foods is likely to have an influence on human exposure.
AMR focused on zoonotic infections. Joint Opinion (2009)

- AMR increased in recent years: more difficult to treat infections
- Combinations regarded as of major concern for public health in the EU
  - *Salmonella*: (fluoro-)quinolone and cephalosporins
  - *Campylobacter*: (fluoro-)quinolone, and macrolides
- Use of antimicrobials considered the main factor in the emergence of AMR
- Disparity in AMR levels in the MSs makes difficult to have a single strategy to fight the problem. There are needs:
  - to strengthen monitoring activities
  - to develop new antimicrobials
  - to develop new strategies to combat the spread of AMR
  - to promote prudent use
HOT ISSUES IN AMR: EFSA’S RISK ASSESSMENTS

- MRSA
- ESBLs/AMPCs
- Carbapenemases
- Colistin
PH significance of MRSA in animals and food: Mitigation measures (2009)

- Primary reservoirs: pigs, veal calves, and broilers.
- Most important transmission route: contact with live animals and their environments.
- Animal movement and contacts are important factors for transmission.
- General control options (GHP, HACCP, GMP) on farms, slaughterhouses, and food production areas.
- MRSA in healthcare settings can be managed by screening and infection control measures.
- Transfer of MRSA from pets to humans is difficult to control. Basic hygiene measures are key.
The public health risks of bacterial strains producing ESBLs/AmpC b-lactamases in food and FP-animals.

Identification and ranking of possible control options

Measures to control emergence in food animals:
- to stop all uses of 3rd-4th gen. cephalosporins,
- or to restrict their use (only allowed under specific circumstances),
- to control off-label usage of cephalosporins
- to decrease total antimicrobial use (due to co-resistance)

Measures to control dissemination:
- Increased farm biosecurity
- Controls on animal trade (of carriers)
- Improving hygiene throughout the food chain

It is of high priority...:
- To reduce the selection pressure (use of Ab)
- To prevent vertical transmission from the top of the production pyramid.
- To prevent local recirculation within subsequent flocks

Adopted in 2011
Emerging and **highly sensitive** public health issue (last resort antimicrobials)

Only a **few studies** have reported carbapenem-R bacteria in FP-animals, and **none** in food.

Transmission through the food chain **not reported yet**, but is considered likely if these emerge.

Specific **targeted surveys** needed at EU level.

**Measures** to prevent emergence and minimising further spread need to be taken now.
COLISTIN

- Last resort drug in human medicine for treatment of infections caused by MDR *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Enterobacteriaceae* (*Escherichia coli*, *Klebsiella pneumoniae*), for which mortality can be extremely high.

- Used regularly in veterinary medicine for decades, both as curative treatment and for prevention of disease.
‘Detailed monitoring of colistin-resistant bacteria is required to confirm horizontal gene transfer not involved and overall prevalence remains low’

‘As soon as colistin resistance determinants are found on mobile genetic elements in the bacteria of concern as well as from human or animal origin, or a clonal explosion of virulent bacteria takes place, a new risk assessment would be required’

November 2015: Transferable colistin resistance encoded by the mcr-1 gene reported in human and food animal isolates in China and several south-east Asian countries
<table>
<thead>
<tr>
<th>Country</th>
<th>Found in</th>
<th>Organism</th>
<th>Year(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>Turkey meat</td>
<td><em>E. coli, Salmonella</em></td>
<td>2013</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Turkey meat, poultry</td>
<td><em>E. coli</em></td>
<td>2010-13</td>
</tr>
<tr>
<td>Germany</td>
<td>Turkey, humans</td>
<td><em>E. coli</em></td>
<td>2011-15,</td>
</tr>
<tr>
<td>Belgium</td>
<td>Veal calves</td>
<td><em>E. coli</em></td>
<td>2011-12</td>
</tr>
<tr>
<td>France</td>
<td>Pigs, chickens</td>
<td><em>E. coli, Salmonella</em></td>
<td>2013-14</td>
</tr>
<tr>
<td>Denmark</td>
<td>Chicken meat, Humans</td>
<td><em>E. coli</em></td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Humans</td>
<td><em>Salmonella</em></td>
<td>2014</td>
</tr>
<tr>
<td>UK</td>
<td>Poultry, Pigs, human</td>
<td><em>E. coli, Salmonella</em></td>
<td>2012-15</td>
</tr>
</tbody>
</table>

Adopted from Skov and Monnet, 2016 and AMEG report, 2016
All countries should strive to reduce use in animals to minimum feasible.

For current "high and moderate consumers" target and desirable levels are set at 5 mg/PCU, and 1 or below 1 mg/PCU, respectively.

Above targets for reduction in sales of colistin should be achieved in a period of 3 to 4 years.

Reduction in use of colistin should be achieved without an increase in overall consumption of antimicrobials, particularly fluoroquinolones and 3rd- and 4th-generation cephalosporins.

More information should be gathered to determine minimum level of colistin use that can be achieved while maintaining animal welfare and preventing increased use of other CIAs.
RONAFA-ongoing

- EC mandate for a Joint EFSA-EMA scientific opinion on “measures to reduce the need to use antimicrobial agents in animal husbandry in the EU, and the resulting impacts on food safety”
- Deadline: 20 December 2016

- EFSA:
  - assigned to BIOHAZ Panel
  - involvement of AHAW and FEEDAP Panels

- Ad hoc WG of experts:
  - Co-chaired 1 EFSA and 1 EMA Chair
  - 6 experts EFSA – 6 experts EMA
  - Collaboration EFSA-EMA Secretariat
Impact on:
- use of antimicrobials
- AMR in animals/food
- NOT in humans

**ToR 1**
Review current measures

**ToR 2**
Assess impact current measures

**ToR 3**
Review alternative measures

**ToR 4**
Assess impact alternative measures

**ToR 5**
Recommend options to reduce antimicrobial usage
WASTE MILK MANDATE - ONGOING

- EC Mandate for an EFSA Scientific Opinion on the “Risk for the Development of AMR due to feeding of Calves with Milk containing Residues of Antibiotics”
- Deadline: 31 December 2016

Assessment will focus on:
- Review MS’s answers to the EU Questionnaire provided by the EC.
- **Farming practices**: management of lactating cows and feeding calves
- **Antimicrobial residues** in colostrum and waste milk
- Occurrence and Epidemiology of **antimicrobial resistance** in bacteria isolated from colostrum, waste milk and calves
- **Development** of antimicrobial resistance due to these practices
- Recommend **options** to mitigate the risk
To detect **emergence**, and to understand **dissemination** of AMR.

To provide data relevant for **risk assessment**

To plan **interventions** and measure their effects.
European Union Summary Report on AMR

Human cases of food-borne infection:
- *Salmonella*
- *Campylobacter*

Zoonotic bacteria:
- *Salmonella*
- *Campylobacter*

Indicator bacteria:
- *E. coli (non-pathogenic)*
- *E. faecium, E. faecalis*

Other bacteria:
- *MRSA*

- EU Member States
- Other European countries

New legislation successfully implemented by MSs
  - Enlarged scope of AMR monitoring
  - Specific focus on **poultry populations** in 2014

Frequent resistance to Fluoroquinolones observed

Low resistance to other CIA

Low co-resistance to CIA

Low occurrence of ESBL/AmpC producers

No carbapenemase producers detected

Transferable resistance to colistin recently reported

... in a nutshell!
MARKED VARIATIONS...

... between *Salmonella* serovars

- S. Infantis and S. Kentucky ...
  - ... contribute significantly to the overall numbers of multi-resistant *Salmonella*
  - ... both display high-level resistance to Cip

... between reporting countries

- Higher resistance ... in Eastern and Southern Europe ...
PHENOTYPIC CHARACTERISATION 3RD-GEN CEPHALOSPORIN RESISTANCE

Salmonella spp.

- ESBL: 0.8%
- ESBL+AmpC: 1.3%
- AmpC: 0.2%

E. coli

- ESBL: 3.6%
- ESBL+AmpC: 1.7%
- AmpC: 0.5%

Low occurrence of ESBL/AmpC producers!
**COLISTIN RESISTANCE OCCURRENCE**

### E. coli

<table>
<thead>
<tr>
<th>Animal</th>
<th>Resistance (%)</th>
<th>(found in MS, total tested)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broilers</td>
<td>0.9 %</td>
<td>(24, 4037)</td>
</tr>
<tr>
<td>Fattening turkeys</td>
<td>7.4 %</td>
<td>(11, 1663)</td>
</tr>
</tbody>
</table>

### Salmonella

<table>
<thead>
<tr>
<th>Animal</th>
<th>Resistance (%)</th>
<th>(found in MS, total tested)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broilers*</td>
<td>8.3 %</td>
<td>(10, 1683)</td>
</tr>
<tr>
<td>Fattening turkeys</td>
<td>2 %</td>
<td>(6, 757)</td>
</tr>
<tr>
<td>Laying hens*</td>
<td>14.1 %</td>
<td>(13, 822)</td>
</tr>
<tr>
<td>Turkey meat</td>
<td>24.7 %</td>
<td>(2, 279)</td>
</tr>
<tr>
<td>Broiler meat</td>
<td>4.4 %</td>
<td>(9, 911)</td>
</tr>
</tbody>
</table>

*A large proportion were S. Enteritidis*
Focus of the year: pigs and veal calves
Occurrence of resistance
Temporal trends
Multi-drug resistance
Co-resistance to CIAs
Routine monitoring of ESBL/AmpC/CP producers
Specific monitoring of ESBL/AmpC producers
Analysis of antimicrobial use and resistance (JIACRA)


- Analysis of the relationship between **consumption of antimicrobials** and the occurrence of R in humans, animals in the EU

**Networks and Reports**
- **European Antimicrobial Resistance Surveillance Network (EARS-Net)**
- **European Surveillance of Antimicrobial Consumption Network (ESAC-Net)**
- **European Food and Waterborne Disease Network (FWD-Net)**
- **European Summary Report on AMR** in zoonotic and indicator bacteria from humans, animals and food
## SELECTED RESULTS

<table>
<thead>
<tr>
<th></th>
<th>Total consumption (mg/kg of estimated biomass)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Humans</strong></td>
<td>116.4 mg/kg (range: 56.7 – 175.8 mg/kg)</td>
</tr>
<tr>
<td><strong>Animals</strong></td>
<td>144.0 mg/kg (range: 3.8 – 396.5 mg/kg)</td>
</tr>
</tbody>
</table>

15/26 countries: consumption for animals < consumption for humans  
3/26 countries: consumptions were similar for animals and humans  
8/26 countries: consumption for animals > consumption for humans

### CONSUMPTION AND RESISTANCE (FP- ANIMALS) (HUMAN BACTERIA)

- **Cephs**: no association.
- **Fluoroquinolones**: positive association for *E. coli* (but not for *Salmonella* and *Campylobacter*).
- **Macrolides**: positive association for *Campylobacter*.
- **Tetracyclines**: positive association for *Salmonella* and *Campylobacter*. 
TIMETABLE FOR SECOND JIACRA REPORT

- Setting up of a **Joint expert WG** ✓
- Setting up of an **Interagency Steering Group** ✓
- Drafting the **plan of analysis** ✓
- **Data analysis** and drafting of the report (ongoing)
- **Consultation** of the Networks (April 2017)
- **Review** and **approval** by each agency of the draft report (May 2017)
- **Communication** and **Publication** (end of June 2017)
WP OUTREACH

Communication tools to reach target audiences

- Press releases/news
- Media relations activities, e.g. pitching interviews, placing opinion pieces in selected publications.
- Joint media relations activities with EC and sister agencies
- EU insight survey on antimicrobial resistance
- Possible interviews (or feature stories) with experts
- Videos
- Twitter chats and overall social media promotion
- New infographics to present the results of the AMR report
THANKS FOR YOUR ATTENTION!

EFSA’s commitment

- Detecting emerging risks on AMR and to give prompt advice to the EC
- Interagency collaboration: Importance of integrated approach with all players in the food chain
- Supporting risk managers to decide on best strategies to apply and on possible control options.
- Importance of good and harmonised data monitoring systems both for resistance and consumption of antimicrobials