



# Update about ECDC-EFSA-EMA JIACRA II

on **J**oint **I**ntegrated **A**nalysis of  
the **C**onsumption of and  
**R**esistance to **A**ntimicrobial  
agents in bacteria from humans  
and food-producing animals

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on behalf of the JIACRA II Working Group

Joint meeting FWD-Network and EURL-AR  
network - 11th EURL-AR Workshop 2017

Thursday, 6<sup>th</sup> April 2017  
Statens Serum Institut, Denmark

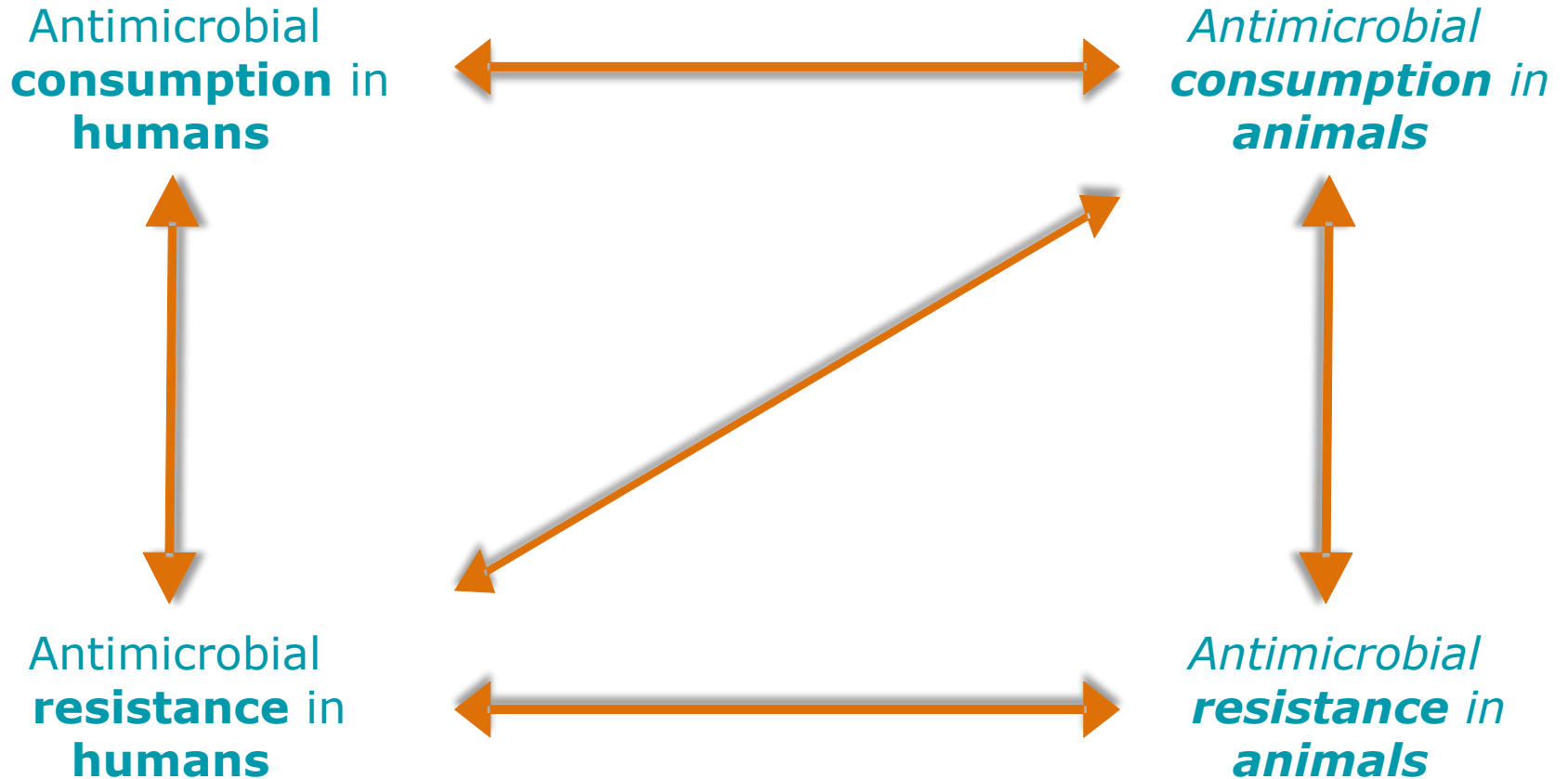


# ANALYSIS OF ANTIMICROBIAL USE AND RESISTANCE

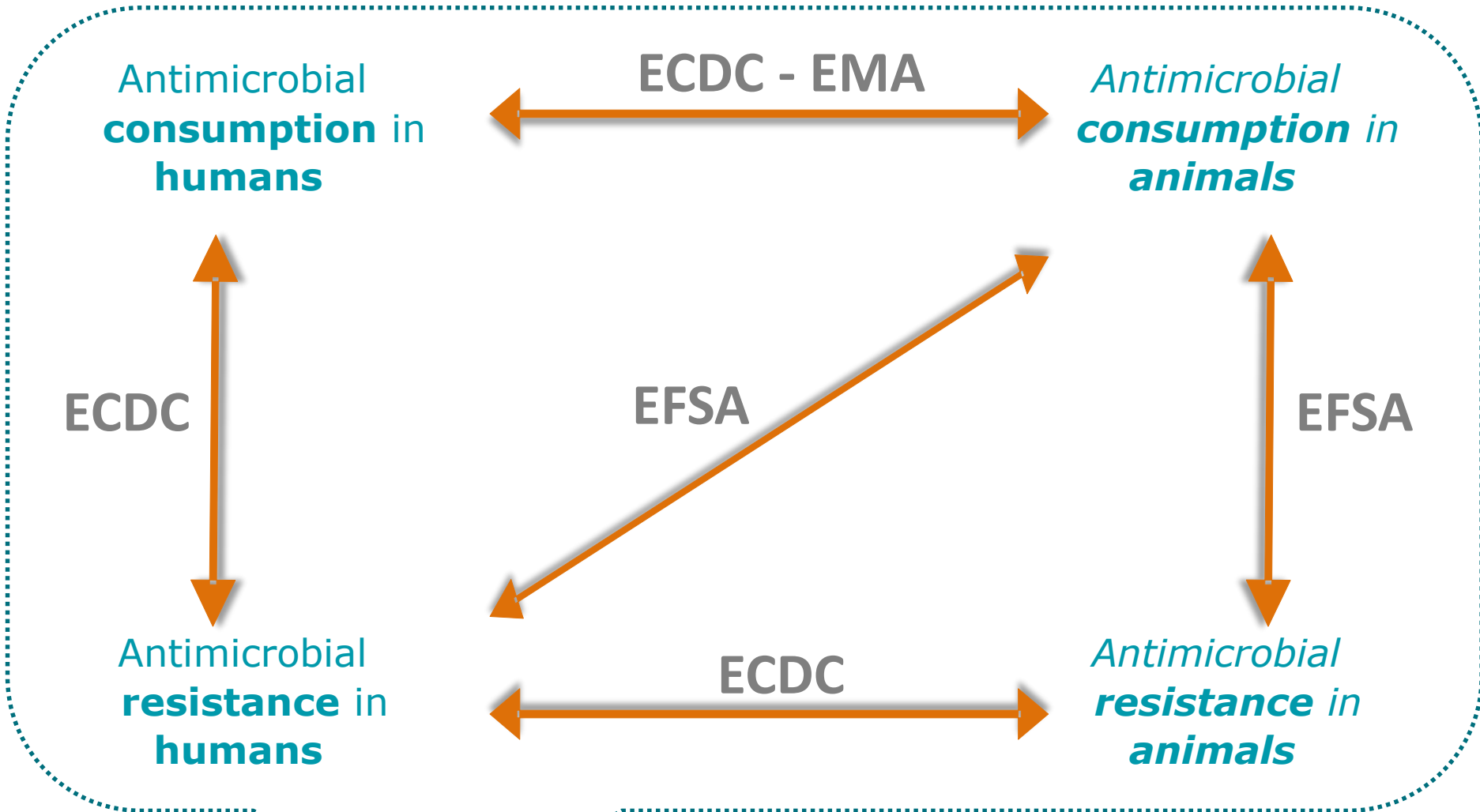
- Interagency Collaboration
- Analysis of the relationships, in humans/animals, between:
  - Antimicrobial Consumption (AMC)
  - Antimicrobial Resistance (AMR)
- To cover the years 2013, 2014 and 2015



# POTENTIAL RELATIONSHIPS INVESTIGATED



# SHARING OF TASKS



■ Multivariate approach: EMA

# COMPARISON OF AMC IN HUMANS AND IN ANIMALS

## ■ Reconducting JIACRA I analysis approach

- **ESAC-Net** and **ESVAC** 2013-2014 data reported by **28 EU/EEA countries**
- ESVAC 2015 data to be published in the ESVAC report in October 2017 (no comparison with 2015 ESAC-Net data)
- Consumption expressed as mg antimicrobial substance per kg of human biomass or kg PCU (population correction unit in animals) and overall consumption in tonnes

## ■ Comparison of AMC in both sectors

- Bar charts for 15 antimicrobial groups/classes separated by year and sector; for the six antimicrobial classes used in the correlation analyses, results are displayed per country
- Five countries (ESAC-Net) provided only community data; to assess potential underreporting, population-weighted proportions of hospital sector data from countries reporting for both sectors are provided.

# COMPARISON OF AMC AND AMR IN ANIMALS

- **Reconducting JIACRA I analysis approach**
  - Summary Indicator of Resistance (all animals) vs. Total AMC
  - Broilers-Pigs-Bovine animals (2013)
  - Poultry-Pigs-Calves (2014-2015)
  
- **AMR vs. AMC at animal species level**
  - Poultry: Broilers and Turkeys (2014) vs. AMC in poultry
  - Pigs (2013, 2015) vs. AMC in pigs
  
- **Accounting for co-selection phenomenon**
  - Søgaard et al., 1989
  - 'Complete susceptibility' rate (all animals) vs. Total AMC

## COMPARISON OF AMC AND AMR IN HUMANS

- **Analysis of AMC in humans** (cephalosporins, fluoroquinolones, carbapenems, tetracyclines, polymyxins and macrolides) **versus AMR in humans** (resistance to these antimicrobials in *E. coli*, *K. pneumoniae*, *Salmonella* spp. and *Campylobacter* spp.).
- **Sensitivity analysis** performed to assess the effect of including community and hospital consumption, or only community consumption, or only hospital consumption.
- Data from **ESAC-Net**, **EARS-Net** and **FWD-Net** 2013-2015

## COMPARISON OF AMR IN HUMANS AND IN ANIMALS

- **AMR data from humans and animals** were included based on the availability of data for the relevant antimicrobial/bacteria combinations:
  - **Antimicrobial groups:** cephalosporins, fluoroquinolones, carbapenems, tetracyclines, polymyxins and macrolides
  - **Bacteria:** *E. coli*, *K. pneumoniae*, *Salmonella* spp. and *Campylobacter* spp.
- Data from **EARS-Net, FWD-Net** and **EFSA monitoring, 2013-2015**
- **Data from AMR in bacteria from animals** were included depending on availability by year and animal species



## COMPARISON: AMC IN ANIMALS AND AMR IN BACTERIA FROM HUMANS

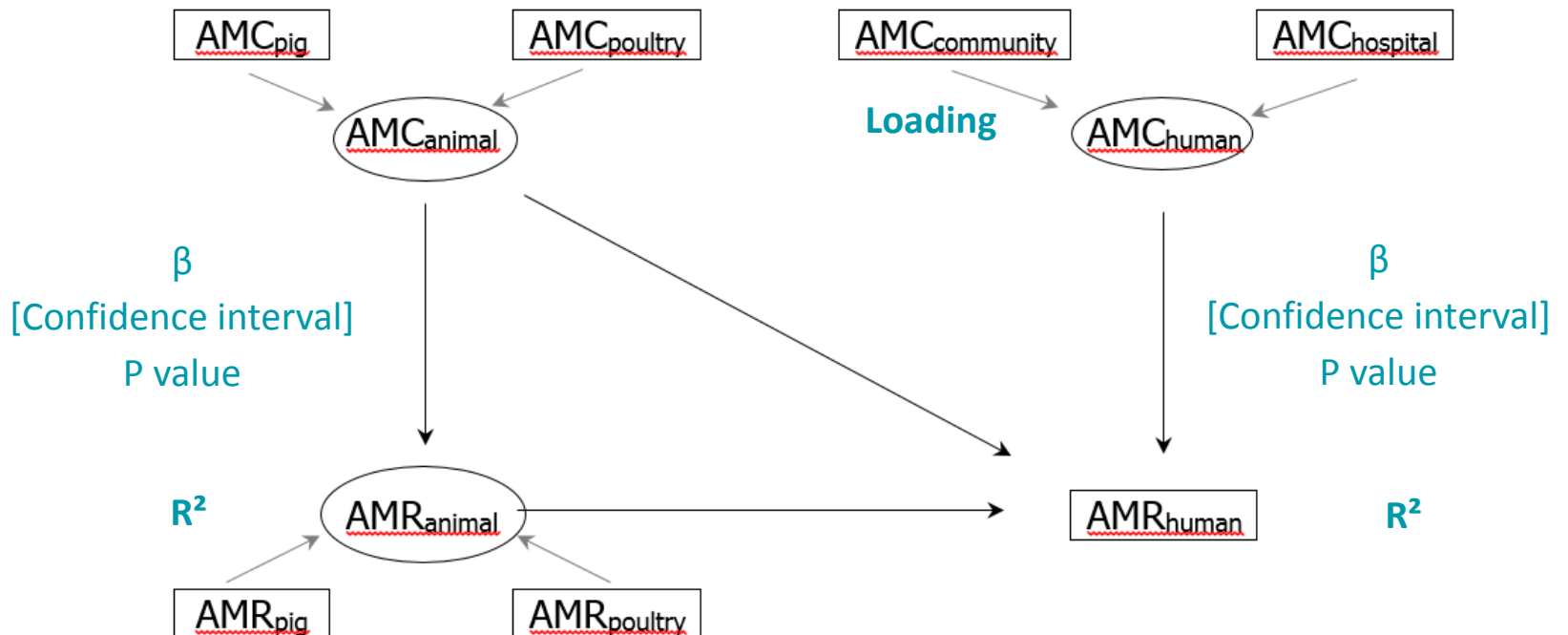
- **Analysis of AMC in animals** (cephalosporins, fluoroquinolones, tetracyclines, polymyxins and macrolides)

**VS.**

- **AMR in bacteria from humans** (resistance to these antimicrobials in *E. coli* BSI, *Salmonella* spp. and *Campylobacter* spp.).
- Data from **ESVAC (EMA)**, **EARS-Net** and **FWD-Net 2013-2015**

# MULTIVARIATE APPROACH (example of one antimicrobial group)

- Partial Least Squares Path Modelling (PLS-PM)**
  - convenient tool to analyse multiple relationships between blocks of variables without required assumption on data distributions
- Relationship between **AMR in bacteria from humans** and AMC in humans and in food animals, and AMR in bacteria from food animals



# UPDATE ON THE REPORT PRODUCTION PROCESS

## Very tight schedule!

- Some 2015 data were not available by mid-February 2107
- Analyses are still on-going
- Next physical meeting
  - 25 April 2017 in Brussels
- Consultation of the Agencies' Networks planned
  - 3-16 May 2017
- Final report to European Commission in June 2017

**THANK YOU FOR YOUR ATTENTION !**

- Any questions?

