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Center of Expertise on
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in Animals, Brussels, Belgium

Curriculum Vitae

Ilias Chantziaras was born on October 21 1982 in Kozani, Greece. He is a veterinarian who graduated at the Faculty of Veterinary Medicine, University of Thessaly, Greece. In 2008, he successfully finished a post-graduate training in the Laboratory of Foods of Animal Origin and Public Hygiene in the same faculty.

He has worked for the Greek Organization of Milk and Meat, the Greek Payment Authority of Common Agricultural Policy (C.A.P.) Aid Schemes, the Greek Army Forces and as a private veterinarian. Since October 2012, he is a member of the Epidemiology Unit, Department of Reproduction, Obstetrics and Herd Health, Ghent University. Since April 2013, and in collaboration with the Department of Pathology, Bacteriology and Avian Diseases, Faculty of Veterinary Medicine, Ghent University, he has been working on a PhD project focusing on the epidemiology of antimicrobial resistance in commensal *E. coli* in farm animals. This four year research project was funded by the Belgian Federal Public Service of Health, Food Chain Safety and Environment. Furthermore, he is a resident for the European College of Veterinary Public Health (ECVPH). During his PhD he has presented the results of his research in various national and international scientific conferences. He is an author and co-author of several studies published in international peer reviewed journals.

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Invitation

Public defense of the doctoral dissertation of

Ilias Chantziaras

3 July 2017

Department of Reproduction, Obstetrics and Herd Health
Faculty of Veterinary Medicine, UGent

You are kindly invited to the public defense of the PhD thesis of

Ilias Chantziaras

titled:

Epidemiology of antimicrobial resistance in commensal *E. coli*. Focus on selection and spread of fluoroquinolone resistance in broilers

Monday 3 July 2017 at 17h00

Auditorium D, Faculty of Veterinary Medicine, UGent

Salisburylaan 133, Merelbeke

After the defense, a reception will follow to which you are kindly invited. If you want to attend the reception, please confirm this by email before June 27, 2017

Ilias.Chantziaras@Ugent.be

Summary of thesis

The alarmingly increasing resistance prevalences to antimicrobial agents (especially to critically important antimicrobials, *e.g.* fluoroquinolones) have urged both science and public health agencies to respond by acquiring knowledge on the origins and mechanisms of antimicrobial resistance and by monitoring antimicrobial use and antimicrobial resistance prevalence in pathogenic and commensal bacteria. However, there is still a lack of knowledge on the epidemiology of antimicrobial resistance and the factors contributing to the spread and selection of antimicrobial resistance at animal and population level.

The general introduction of **Chapter 1.1.** reviews key aspects of selection, spread and persistence of AR (phases 2 and 3) through antimicrobial use in farm animals. However, besides the use of antimicrobials, other factors can be involved in the selection and spread of antimicrobial resistance determinants as reviewed in **Chapter 1.2.**.

Based on data from publicly available national and international monitoring reports of seven European countries, correlations between antimicrobial use in food-producing animals and resistance prevalence for commensal *Escherichia coli* isolates originating from pigs, poultry and cattle, for eight antimicrobial agents were evaluated in **Chapter 3**. For all antimicrobial classes studied, remarkably high correlation coefficients were obtained, indicating that, at a national level, the level of use of specific antimicrobials strongly correlates to the level of resistance towards these agents in commensal *E. coli* isolates in pigs, poultry and cattle.

In **Chapter 4**, detailed studies on antimicrobial resistance for commensal *E. coli* and pathogenic *E. coli* in farm animals in Belgium are presented for the year 2011. The results from the national monitoring report on commensal *E. coli* of pigs and broilers were highly comparable with the results from previously presented field studies. Pathogenic *E. coli* strains both from bovines and pigs were more multi-resistant than the respective *E. coli* commensal strains.

Factors potentially contributing to fluoroquinolone resistance selection in commensal *E. coli* strains in poultry were studied through a series of *in vivo* experiments (**Chapter 5**). The effect of the initial prevalence of enrofloxacin resistance in the *E. coli* gut microbiota, the effect of the bacterial fitness of the enrofloxacin-resistant strain and the effect of treatment with enrofloxacin (effect of dose and effect of route of administration) were assessed. The results showed that fluoroquinolone resistance selection was influenced by treatment ($p<0.01$), bacterial fitness of the inoculation strain ($p<0.01$), administration route ($p=0.05$) and the interactions between bacterial fitness and administration route ($p<0.01$). The use of oral treatment seems to select more for fluoroquinolone resistance, especially in the model where a non-fit strain was used. The effect of a competitive exclusion product (Aviguard®) on the spread of fluoroquinolone resistance in poultry was assessed *in vivo* in the absence or presence of fluoroquinolone treatment (**Chapter 6**). A controlled seeder-sentinel animal model with one-day-old chicks was used. The use of Aviguard® significantly ($p<0.01$) reduced the spread of enrofloxacin-resistant *E. coli* when no enrofloxacin treatment was administered. However, this beneficial effect disappeared ($p=0.37$) when the animals were treated with enrofloxacin. Similarly, bacterial fitness of the enrofloxacin-resistant *E. coli* strain used for inoculation had an effect ($p<0.01$) on the spread of enrofloxacin resistance when no treatment was administered. Whereas this effect was no longer present when enrofloxacin was administered ($p = 0.70$).