

19-23 August 2013

Nantes – France

Pg 343

Oral:**Effects of *Fusarium* mycotoxins on the pathogenesis of necrotic enteritis in broilers**

Gunther Antonissen^{1,2}, Siska Croubels², Frank Pasmans¹, Richard Ducatelle¹, Freddy Haesebrouck¹, Leen Timbermont¹, Marc Verlinden¹, Geert Janssens³, Mia Eeckhout⁴, Sarah De Saeger⁵, Evelyne Delezie⁶, Sabine Hessenberger⁷, An Martel¹, Filip Van Immerseel¹

1) Department of Pathology, Bacteriology and Poultry Diseases, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium

2) Department of Pharmacology, Toxicology and Biochemistry, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium

3) Department of Nutrition, Genetics, Breeding and Ethology, Faculty of Veterinary Medicine, Ghent University, Heidestraat 19, 9820 Merelbeke, Belgium

4) Department of Food Science and Technology, Faculty of Biosciences and Landscape Architecture, Ghent University, Valentin Vaerwyckweg 1, 9000 Ghent, Belgium

5) Department of Bio-analysis, Faculty of Pharmaceutical Sciences, Ghent University, Harelbekestraat 72, 9000 Ghent, Belgium

6) Institute for Agricultural and Fisheries Research (ILVO), Animal Sciences Unit, Scheldeweg 68, 9090 Melle, Belgium

7) Biomin Research Center, Technopark 1, 3430 Tulln, Austria

E-mail: Gunther.Antonissen@UGent.be

Both *Clostridium perfringens* (as a cause of necrotic enteritis (NE)) and mycotoxins are responsible for important economic losses in the broiler industry. The *Fusarium* mycotoxins deoxynivalenol (DON) and fumonisins are common feed contaminants that affect the intestinal epithelial barrier function, consequently increasing the availability of free amino acids in the intestine, and possibly promoting massive proliferation of *C. perfringens*. The goal of this study was to evaluate the effect of *Fusarium* mycotoxins on the sensitivity of broilers for NE.

Two *in vivo* infection trials mimicking subclinical NE were conducted, comparing the intestinal necrotic lesions of broilers fed with DON contaminated feed (< 5000 µg/kg feed*) , or fumonisin contaminated feed (< 20000 µg/kg feed*) respectively, with broilers receiving non-contaminated feed.

Subsequently, nitrogen analyses were performed on the intestinal content of chickens receiving DON contaminated and blank diet, to investigate the protein concentration and origin. Additionally, an *ex vivo* Ussing chamber experiment was performed to assess the effect of DON on the barrier function of intestinal mucosa. Finally, the influence of different concentrations of DON and fumonisins on the growth of eight *C. perfringens* strains was tested *in vitro* by assessment of the growth curve of *C. perfringens* and by well diffusion growth inhibition tests.

Significantly more chickens showed NE lesions when their diet was contaminated with DON. The fractional nitrogen analyses showed a relative increase in protein amount of animal origin in the intestinal content, possibly indicating intestinal damage. In the Ussing chamber experiments, the chickens which received DON contaminated feed had a significantly lower tissue resistance (Rt or TEER) and shorter villus length on histology in the duodenal segment. This indicates an altered barrier function after exposure to DON. DON did not have an effect on the *in vitro* growth of *C. perfringens* strains. Results about the effect of fumonisins will be presented at the conference.

In conclusion, DON contaminated feed in concentrations below the maximum European guidance contamination level is a predisposing factor for the development of NE in broilers due to its effect on the intestinal barrier function.

* European maximum guidance contamination level

Key words:

Broiler – Mycotoxins – Necrotic enteritis

Reference:

Gholamiandehkordi A.R., Timbermont L., Lanckriet A., Broeck W.V., Pedersen K., Dewulf J., Pasmans F., Haesebrouck F., Ducatelle R., Van Immerseel F. (2007). Quantification of gut lesions in a subclinical necrotic enteritis model. *Avian Pathology*, 36, 375-382.