PHARMACOKINETICS AND PHARMACODYNAMICS (PK/PD) OF FLORFENICOL ADMINISTERED ORALLY AGAINST COMMON SWINE PATHOGENS

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Introduction:
Florfenicol has become one of the commonly-used, effective treatments of a variety of porcine pathogens such as Actinobacillus pleuropneumoniae, Pasteurella multocida, Haemophilus parasuis and Streptococcus suis. It is available in a variety of formulations such as an injectable, feed premix and soluble product for inclusion in drinking water.

Objective:
The objective of this review was to compare the pharmacokinetics (PK) of florfenicol (Florvio™ – Novartis Animal Health Inc.) in plasma following administration orally by capsule (Voorspoels et al., 1999; Gutierrez et al., 2003) and via the drinking water with its pharmacodynamics (PD) related to common swine pathogens.

Materials and methods:
Pharmacokinetics:
The PK of florfenicol administered by capsule (Voorspoels et al., 1999) at 15mg/kg bwt showed the product was very well absorbed (see Figure 1) giving a reported concentration maximum (C_{max}) of 14.8µg/ml and area under the curve (AUC 24h) of 100.5µg.h/ml. A predicted absorption curve based on 10mg florfenicol/kg bwt was also included, as this was the recommended dose rate when given in feed with an estimated AUC 24h of 67.3µg.h/ml.

![Figure 1. PK of florfenicol after a single administration at 15mg/kg bwt and predictive curve at 10mg/kg bwt (after Voorspoels et al., 1999)](image1)

This was surprising, as there was comparatively little difference between the 100ppm and 150ppm florfenicol treated pigs AUC24hs (6.2%). The AUCs were far lower than the single oral dose with a mean at 100ppm of 25.2µg.h/ml (37.4%), of a 10mg/kg bwt dose by oral gavage and a mean at 150ppm of 26.8µg.h/ml (26.6%) of the 15mg/kg bwt oral dose. It was associated with a marked drop in water intake. The mean concentration steady state (Css) for 100ppm in drinking water over 3 days was estimated at 1.05µg/ml and at 150ppm 1.12µg/ml.

![Figure 2. Comparison of florfenicol plasma concentrations following oral gavage at 10mg/kg bwt and 100ppm administered in the drinking water (after Voorspoels et al., 1999; Gutierrez et al., 2011).](image2)

Pharmacodynamics:
When florfenicol was administered in drinking water (Gutierrez et al., 2011) at 15mg/kg bwt the MIC50s and MIC90s of 0.25 and 0.5µg/ml, respectively; for P. multocida, the MIC50 and MIC90 was both 0.5µg/ml, and for S. suis and B. bronchiseptica both were 2.0µg/ml, respectively.

![Figure 3. PK/PD relationship of florfenicol administered at 100ppm in water with the MIC90 of various pig pathogens](image3)

Results and conclusions:
Florfenicol administered at 100ppm in the drinking water reached concentrations well in excess of the MIC90 for A. pleuropneumoniae, H. parasuis and P. multocida but not the MIC90 or MIC50 for S. suis or B. bronchiseptica.

References: