Comparative efficacy of chlortetracycline and oxytetracycline administered in feed against experimental pleuropneumonia in pigs.

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Introduction  Chlortetracycline (CTC) and oxytetracycline (OTC) are thought to be clinically equivalent when orally administered. A recent meta-analysis of pharmacokinetic literature revealed that the oral bioavailability CTC in pigs is significantly greater than that of OTC. In consequence, their clinical efficacy could be different. We used an Actinobacillus pleuropneumoniae (APP) experimental disease model to compare the prophylactic efficacy of varying feed dosages of CTC and OTC in pigs.

Experimental design  Barrows of 10.5 kg of bodyweight were given a drug-free diet (n=36) or diets providing 22, 44, 66 or 88 mg/kg/day of Aureomycin® granular CTC or OTC (n=8 pigs per dosage per drug). Medicated meals (2% BW) were given at 12-h intervals for 7 consecutive days. Prior to the multiple dose regimen, drugs were given intravenously and in-feed to determine their bioavailabilities. On Day-6 of treatment, pigs were challenged with an APP serotype-1 isolate whose MIC was 2 μg/ml for both drugs. A blood sample was taken 1 h before challenge. Clinical signs were recorded 4 and 16 h after challenge, and the type and extent of lung lesions was recorded at necropsy, 22 h after challenge. Concentrations of CTC and OTC in plasma were determined with a validated HPLC technique. A Kruskal-Wallis test was used at the 0.05 α-level to compare the proportion of damaged lung between groups.

Results and discussion  Plasma kinetic profiles of feed-administered CTC and OTC were different and their oral bioavailabilities were 28±9% and 5±2% respectively (p<.0001), which is higher than in previous reports. Ranges of plasma concentrations of CTC and OTC prior to challenge were respectively [0.63—4.44] and [0.14—0.80] μg/mL and linearly increased with dose.

A significant difference (p=.0001) was found for the median extent of lung lesions in the CTC, OTC and control groups (Figure 1: 1%, 11% and 21% respectively). Clinical signs and lesions were almost completely prevented with the CTC 44 mg/kg/day feed dosage. In pigs dosed with OTC, clinical signs were evident even at the highest dosage level. However, they experienced a less severe form of the disease as compared to control pigs.

These results show that feed-administered CTC and OTC are not equally bioavailable and do not offer similar degrees of protection against systemic bacterial diseases.

References:

Figure 1. Distribution of the extent of lung lesions (%) in pigs challenged with APP as a function of treatment