Differences in the pharmacokinetics of flumequine after single and continuous oral administration in non-fasted broiler chickens

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Abstract

The aim of this study was to determine the influence of feed on the pharmacokinetics of flumequine (FLU) administered to broiler chickens as follows: directly into the crop (10 mg/kg of BW) of fasted (group I/control) and non-fasted chickens (group II), or administered continuously with drinking water (1 g/L for 72 h) and with unlimited access to feed (group III). Plasma concentration of FLU was determined by high-performance liquid chromatography with fluorescence detection. In group II, a significant decrease in the maximum concentration ($C_{\text{max}} = 2.13 \pm 0.7 \mu g/mL$) and the area under the concentration curve from zero to infinity ($\text{AUC}_{0-}\infty = 7.47 \pm 2.41 \mu g \cdot h/mL$) was noted as compared to the control group ($C_{\text{max}} = 4.11 \pm 1.68 \mu g/mL$ and $\text{AUC}_{0-}\infty = 18.17 \pm 6.85 \mu g \cdot h/mL$, respectively). In group III, the decrease in AUC was significant only in the first 3 hours ($\text{AUC}_{0-3} = 5.02 \pm 1.34 \mu g \cdot h/mL$) as compared to the control group ($\text{AUC}_{0-3} = 7.79 \pm 3.29 \mu g \cdot h/mL$). The results indicate that feed reduced the bioavailability of FLU from the gastrointestinal tract by at least 50% after the administration of a single oral dose. However, continuous administration of FLU with drinking water could compensate for the feed-induced decrease in absorption after single oral dose.

Key words: flumequine, HPLC, interactions with feed, broiler chickens

Introduction

Flumequine (FLU), a second-generation fluoroquinolone, is used for the treatment of systemic Escherichia coli infections in poultry and other infections caused mainly by Gram-negative bacteria (Maślanka and Jaroszewski 2009, Ferraresi et al. 2013). Fluoroquinolones, including FLU, are capable of interacting with feed, which decreases their bioavailability and efficacy (Ziółkowski et al. 2014). In poultry farms, FLU is administered continuously with water for several days. In pharmacokinetic (PK) studies, a single oral and/or parenteral dose is generally administered to determine PK parameters. However, this mode of administration