Pharmacokinetics of Chlortetracycline in Cattle

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Introduction

Chlortetracycline (CTC) contributes extensively to profitable cattle production as an antimicrobial and growth promoting agent. The NAHMS 1999 Feedlot study reports 51.9% of all feedlots administer CTC as a health or production management tool. However, information regarding the pharmacokinetics and bioavailability of CTC is scarce in the literature. Pharmacokinetic studies were performed using oral and intravenous preparations of CTC to reveal the pharmacokinetic parameters of this drug in cattle.

Materials and Methods

Eight 7-month-old Holstein steers received a 5.0 mg/lb (11 mg/kg) dose of a 5 mg/mL chlortetracycline HCl solution. Plasma samples were harvested at 0, 10, 20, 30, 45, 60, 90, 120, 150, 180, 240, 360, 480, 720, 960, 1,440 and 2,160 minutes. After a washout period, these Holstein steers were fed a 10.0 mg/lb (22 mg/kg) dose of a commercial CTC preparation as a top dress. Plasma samples were harvested at 0, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 29, 33, 37, 41, 45, 49, 53, 57 and 63 hours. Samples were stored at -80 degrees Celsius until preparation for high performance liquid chromatography analysis.

Results

Analysis of intravenous CTC samples revealed a C_{max} = 200.1 µg/ml; CL = 1.8 ml/min/kg [0.8 ml/min/lb]; $t_{½}$ = 172.6 minutes; and V_{SS} = 292.6 ml/kg [132.8 ml/lb]. Sample analysis is in progress for oral CTC samples.

Significance

The elucidation of CTC pharmacokinetic parameters is paramount when considering the widespread use of this drug. These parameters will provide invaluable information for the optimal use and administration of CTC in cattle.