

Pharmacokinetics of tulathromycin following administration with remote delivery devices

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Introduction

Remote delivery devices (RDD, aka dart guns) are used to administer antimicrobials (AM) to cattle in situations when individual treatment by manual injection is logistically difficult. However, it is not clear whether the pharmacokinetics (PK) of AM administered by remote delivery device is comparable to that for AM administered by injection; thus it is not certain that cattle treated by RDD experience equivalent AM effect.

Materials and Methods

Fifteen crossbred beef steers (BW=667 + 47.8 lb [302.5 + 21.7 kg]) were used in a 3-way crossover design to determine the PK of tulathromycin (Draxxin, Zoetis) following administration with remote delivery devices (RDD). Cattle were weighed, fitted with jugular catheters, and assigned to 1 of 3 administration methods (tulathromycin 1.13 mg/lb [2.5 mg/kg] BW): subcutaneous injection of tulathromycin (SC), injection with an air pump RDD (AIR, Pneudart, Model 178B) at 14.8 ft (4.5 m) distance, and injection with a CO₂ powered RDD at 24.6 ft (7.5 m) (CO, Pneudart, Model

176B). Blood was collected prior to injection and at various time points up to 552 h post administration, and data were analyzed as a mixed model using animal as a random effect and method of administration, order of administration, and their interaction as fixed effects.

Results

Three darts administered by AIR did not discharge (20%; 95% CI=4% to 48%); and results from these steers were excluded from results. Maximum plasma concentration (718, 702.6, and 755.5 µg/mL for SC, AIR, and CO, respectively) or the area under the concentration time curve (17,885, 17,423, and 18,796 µg • h/mL for SC, AIR, and CO, respectively) were similar and not significantly different between methods of administration.

Significance

Results suggest that PK of tulathromycin following RDD are similar to subcutaneous injection; however, failure of RDD darts to discharge can cause a proportion of cattle to fail to receive drug as expected.