Analysis of two formulations of ceftiofur in the seminal plasma of stallions
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Treating infections within the reproductive tract of stallions presents many challenges. Little is
known regarding which systemic antibiotics successfully enter the reproductive tract or the dosage needed
to achieve effective concentrations within the target tissues. In this experiment, six stallions received two
formulations of injectable ceftiofur, either ceftiofur sodium (CS; Naxcel®, Pfizer Animal Health, New
York, NY) or ceftiofur crystalline-free acid (CCFA; Excede®, Pfizer Animal Health) in a randomized
cross-over design utilizing a 14 d washout period between the two formulations. Both formulations were
administered at the manufacturer’s recommended dose for a 10 d treatment period (CS: 2.2 mg/kg, i.m., q
24 h; CCFA: 6.6 mg/kg, i.m., q 96 h). The ceftiofur concentration in seminal plasma and blood plasma
were determined by HPLC-MS/MS on days one, three, five, seven, nine, and ten. Total sperm number,
total and progressive motility, velocity, and morphology were evaluated both prior to and throughout the
treatment period. We hypothesized that concentrations of both forms of ceftiofur would be detectable in
the seminal plasma of stallions. Results are reported as mean ± SD.

Over the 10-day study period, semen quality either remained constant or improved for all
stallions. The mean blood plasma remained above the Food and Drug Administration’s Center for
Veterinary Medicine clinical breakpoint for ceftiofur activity against Streptococcus equi subsp.
zooepidemicus (200 ng/mL) for the entire study period with both formulations (CS: 469.1 ng/mL ± 122.6
and CCFA: 709.6 ng/mL ± 430.3). The mean seminal plasma concentrations of ceftiofur in stallions
receiving CS and CCFA were 175.0 ng/mL ± 154.2 and 87.9 ng/mL ± 57.9, respectively. The mean
seminal plasma concentration of ceftiofur in stallions receiving CCFA, was highest on days three and
seven (130.9 ng/mL ± 74.5 and 104.2 ng/mL ± 78.1, respectively), while the highest blood plasma
concentrations occurred on days one and five (1230.7 ng/mL ± 340.4 and 880.8 mg/mL ± 642.8,
respectively). The mean seminal plasma concentration of ceftiofur in stallions receiving CS was highest
on days three and five (234.3 ng/mL ± 265.7 and 274.3 ng/mL ± 200.3), while the blood plasma
concentrations on those days reached 488.2 ng/mL ± 81.9 and 500.8 ng/mL ± 139.6, respectively.

Both formulations of ceftiofur administered at the recommended dose resulted in detectable levels
in the seminal plasma but failed to consistently achieve concentrations in the seminal plasma exceeding
the FDA’s clinical breakpoint.

Keywords: Ceftiofur; seminal plasma; stallion; antibiotic