Use of systemic antibiotics with or without topical nasal treatments to clear *Mycoplasma ovipneumoniae* from lambs

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Introduction

Mycoplasma ovipneumoniae (*M. ovipneumoniae*) is often carried asymptomatically in the nasal passages of domestic small ruminants worldwide and is commonly associated with chronic respiratory disease. Currently, no antibiotics are labeled for treatment of this bacterium in domestic sheep in the United States. The efficacy of systemic antibiotics with or without nasal flush treatments to clear *M. ovipneumoniae* in lambs was assessed in this study.

Materials and methods

The study was conducted in 2 parts, Part I in 2021 and Part II in 2022. Yearling Suffolk lambs were identified as positive for *M. ovipneumoniae* via nasal swab PCR, randomly assigned to different treatment groups and a positive control group (n = 6 animals per group). Pens were spaced 2.9 meters apart during the study. Treatments in Part I were as follows: oxytetracycline 20 mg/kg SQ once (OXO); oxytetracycline 10 mg/kg intramuscularly once daily for 5 days (OXD); oxytetracycline 10 mg/kg intramuscularly once daily for 5 days with a dilute betadine nasal flush once daily for 5 days (OXB); oxytetracycline 10 mg/kg intramuscularly once daily for 5 days with a dilute chlorhexidine nasal flush once daily for 5 days (OXC); positive control receiving no treatment (POS). In Part II, treatments were as follows: lincomycin 5 mg/kg intramuscularly every 48 hours for 3 doses (LIN); lincomycin 5 mg/kg intramuscularly every 48 hours for three doses with dilute lincomycin nasal flush once daily for five days (LIF); florfenicol 20mg/kg intramuscularly every 48 hours for 3 doses (FLO); florfenicol 20mg/kg intramuscularly every 48 hours for three doses with dilute florfenicol nasal flush once daily for five days (FLF); oxytetracycline 10 mg/kg intramuscularly once daily for 5 days (OXD); positive control receiving no treatment (POS). Treatment efficacy was evaluated by nasal swab PCR obtained at Day 7, Day 14, Day 21 and Day 28 post treatment. Statistical analysis was performed using generalized linear mixed effects modeling in R.

Results

Response to treatment was evaluated by comparing mean PCR Ct values of each treatment group to the Ct values of the POS groups over time, with Ct values classified as "Detected" (Ct ≤ 36), "Indeterminate" (Ct 36-40), or "Not Detected" (Ct ≥ 40). In comparison to the Ct values of the POS groups, OXD was the only treatment statistically significant in increasing Ct values overall ($P = 0.0031$). OXD compared to POS was statistically significant on Day 7 ($P = 0.0055$), Day 14 ($P = 0.0143$) and Day 21 ($P = 0.0359$), but not on Day 28 ($P = 0.5773$). Mean Ct values of OXD groups were 32.38 (range 21.55-40) over the course of the study, while mean Ct values of POS groups were 27.21 (range 20.55-40). Ct values of the OXD group decreased over time (Day 7 = 35.60, Day 28 = 30.11). The OXB group was statistically significant compared to the POS groups only on Day 7 ($P = 0.0197$). All other groups saw no significant response to treatment in comparison to the POS groups overall, nor at any point in time.

Significance

Although daily oxytetracycline injections was statistically significant in increasing Ct values when compared to the positive control, it did not induce complete response to treatment by achieving Ct values ≥ 40 ("Undetected") in the majority of animals, nor were the Ct values maintained over time. We suspect the decreasing Ct values over the course of the study were due to the animals being re-infected with *M. ovipneumoniae* because of prolonged exposure to positive group cohorts that did not respond to treatment. Complete response to treatment in the majority of the study animals is needed in order to recommend the antibiotic be used to treat animals with clinical disease. Further studies into testing and segregating animals after treatment to prevent re-infection from a positive cohort is warranted.

