

Comparison of Three Tetracycline Antibiotic Treatment Regimens for Carrier Clearance of Persistent *Anaplasma marginale* Infection Derived under Field Conditions

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Introduction

Anaplasmosis, caused by the intracellular red blood cell parasite *Anaplasma marginale*, is the most prevalent tick-transmitted disease of cattle worldwide. Cattle recovering from acute anaplasmosis, including those treated with tetracycline antibiotics, develop lifelong cyclic rickettsemias. Carrier cattle serve as a reservoir of *A. marginale* for the infection of naïve cattle through horizontal, vertical, and iatrogenic transmission. Validated antimicrobial regimens do not exist for eliminating persistent infection; furthermore, anaplasmosis disease control is confounded by the absence of effective vaccines. A diagnostic testing strategy for identification of *A. marginale* infection and determination of chemotherapeutic success is urgently needed. A novel, real time RT-PCR diagnostic assay and oral chlortetracycline (CTC) chemosterilization strategy were developed at Kansas State University under experimental conditions through concurrent RT-PCR results and plasma CTC pharmacokinetic determination. Validation of this diagnostic and treatment strategy utilizing cattle naturally-infected is essential for assembling science-based recommendations for anaplasmosis control, treatment, and eradication.

Materials and Methods

Sixty-two pregnant, commercial cross cows were confirmed positive for *A. marginale* through parallel test evaluation with the novel RT-PCR assay and cELISA. Cows were randomly assigned to treatments of (1) 2.0 mg/lb (4.4 mg/kg) of bodyweight/day of oral chlortetracycline HCl for 45 days, (2) a single subcutaneous injection of 200 mg/mL oxytetracycline at a dosage of 9.1 mg/lb

(20 mg/kg) of bodyweight followed immediately by thirty consecutive days of oral chlortetracycline HCl at 2.0 mg/lb (4.4 mg/kg) of bodyweight /day, and (3) four injections of 200 mg/mL oxytetracycline at a dosage of 9.1 mg/lb (20 mg/kg) of bodyweight administered subcutaneously every seven days for four consecutive weeks. Diagnostic samples were collected immediately prior to initiation and upon completion of the treatment period.

Results

Treatment 3 demonstrated the greatest success of treatment with 12/21 cows (57.1%) cleared of *A. marginale* infection; however, the performance of treatments 2 and 1 were suboptimal at 7/20 (35%) and 2/21 (9.5%), respectively. Parasitemia levels were reduced in treated cattle in spite of persistent *A. marginale* infection at the end of treatment. Furthermore, critical information will be gathered to determine vertical transmission rate and serologic status in calves born to anaplasmosis carriers and chemosterilized dams by the RT-PCR and cELISA, respectively.

Significance

Ultimately, the basis of the best practices for anaplasmosis disease control should remain on the foundation of *A. marginale* disease prevention, not treatment. (This study was supported by the following grants: 2008 American Association of Bovine Practitioners Assistantship, USDA CREES 1433 grant [AES Project Number: 481851], and AI070908 from the National Institute of Allergy and Infectious Diseases, NIH.)