

Research Summaries IV

Antimicrobial Activity of Gallium Nitrate against *Mycobacterium avium* subsp *paratuberculosis* in Neonatal Calves

M.E. Fecteau, DVM, DACVIM; R.H. Whitlock, DVM, PhD, DACVIM; T.L. Fyock; S.C. McAdams; R.C. Boston, MSc, PhD; R.W. Sweeney, DMV, DACVIM

Department of Clinical Studies-New Bolton Center, School of Veterinary Medicine, University of Pennsylvania, Kennett Square, PA 19104

Introduction

Mycobacterium avium subsp *paratuberculosis* (MAP), the agent of Johne's disease in cattle, is a facultative intracellular bacterium that is dependent on ferric iron for its survival and replication. Gallium (Ga), a trivalent semi-metal that shares many similarities with ferric iron and functions as an iron mimic, has been shown to have *in vitro* antimicrobial activity against several microorganisms, including MAP. The objectives of this study were: 1) to investigate the antimicrobial activity of Ga in calves experimentally infected with MAP; and 2) to monitor for potential adverse effects of Ga on calf health.

Materials and Methods

This was a randomized blind controlled experiment using 12 neonatal Holstein bull calves. Beginning at 10 days of age (study day 1), the experimental group calves (n = 6) were treated with 9.1 mg/lb (20 mg/kg) of Ga daily for 45 days. On study days 4 and 5, all calves

were challenged with an oral dose of a live field strain MAP. Treated calves were monitored daily for any possible adverse effects. Calves were euthanized on study day 100, and 29 tissue samples and one fecal sample were collected from each calf. Samples were cultured for MAP by way of MGIT liquid culture system and/or HEYM culture.

Results

No adverse effects were recorded on the treated calves. Treatment was associated with a significant reduction in MAP tissue burden when compared to control calves ($P = 0.017$).

Significance

Chemoprophylactic treatment of calves with Ga before and during the period of high susceptibility reduced MAP tissue colonization in experimentally infected neonatal calves.