Antimicrobial usage for the treatment on respiratory diseases in calves: a systematic review

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Introduction

Bovine respiratory disease (BRD) is a major concern on calf health. In the USA, BRD explains 24% and 59% of pre-weaned and weaned calf mortality, respectively. This important disease results in over 91% of affected calves being treated with antimicrobials. Our objective was to conduct a systematic review of the quality of published peer-review studies evaluating the efficacy of antimicrobials for the treatment of BRD in calves.

Materials and Methods

The literature search strategy was based on population, intervention, and outcome. Studies written in English (n = 2,058) were retrieved on December 2018 from CabDirect, PubMed, Web of Science and Scopus. Publications were downloaded into Endnote X9 (Clarivate Analytics, Philadelphia, PA) and duplicates were eliminated. Publications that were classified as "gray" literature and reviews were excluded from the study. Two consecutive screenings (title and abstract) were performed using a systematic review software, DistillerSR (Evidence Partners Incorporated, Ottowa, Canada), by 2 independent reviewers. Full manuscripts were screened by a single reviewer to identify the final relevant manuscripts. Publications of interest included clinical trials and experimental challenges using antimicrobials for BRD treatment in calves aged less than 6 months.

Results

A total of 34 manuscripts, containing 37 trials, were retained after screening of titles (n = 901), abstracts (n = 308) and full papers. The selected studies included clinical (n = 22) and challenge (n = 15) trials that dated back from 1979. Animals enrolled per study ranged from 11 to 696 with a median value of 49. Seventeen manuscripts were either funded by a pharmaceutical company or had one or more authors affiliated with a pharmaceutical company or both. A total of 29 trials were randomized but only 14 of those were blinded. Fifteen trials included a negative control treatment; but only 6 were randomized and blinded. Trials with negative control evaluated the efficacy of: one (n = 3) or more (n = 2) antimicrobials, anti-inflammatories combined with antimicrobials (n = 2), various dosages or timing of treatments (n = 7), or combination of antimicrobial treatments (n = 1). Macrolides were the most common antimicrobial class evaluated (n = 14). The length of the observational period for health outcomes ranged from 3 d to 8 wks. Fever was the most frequent clinical sign of BRD evaluated (n = 26). Only 8 trials evaluated clinical signs of respiratory disease using a scoring tool. On 13 trials subject calves were euthanized for pathological examination.

Significance

Although considerable numbers of studies have been conducted on antimicrobial use for BRD in calves, very few studies were controlled and randomized. Moreover, future research on BRD should follow standardized methods for the evaluation of clinical outcomes. Funding provided by CDFA – AUS project.