

Milk residue depletion of two dry-cow intramammary antimicrobials in dairy goats

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Introduction

There are currently no intramammary antimicrobial products labeled for use in goats in the United States. However, both clinical and subclinical mastitis impart heavy production losses to this growing sector of American agriculture annually. Subclinical mastitis can be particularly insidious by causing unrealized production losses and dry off is an ideal time to detect and manage cases using long-acting intramammary antimicrobial therapy. The goal of this study was to determine milk residue depletion times for 2 such antimicrobials in dairy goats in the immediate post-fresh period.

Materials and methods

To evaluate milk residue depletion, 22 does had each half treated with 300 mg cephapirin benzathine (ToMORROW[®], Boehringer Ingelheim Vetmedica, Duluth, GA) after their final milking before dry off, while an additional 21 does were treated with 500 mg cloxacillin benzathine (Orbenin[™] DC, Merck & Co., Rahway, NJ) in each half. Starting at the first milking after kidding, quadruplicate composite foremilk samples were collected from each doe for evaluation of antimicrobial residues. Two samples were utilized immediately after milking for goat-side evaluation of drug residue while 2 were stored at -20°F for later analysis by LC-MS-MS. Does treated with cephapirin were screened using the Charm SLBL assay (Charm Sciences Inc., Lawrence, MA) which has been validated for this use in goat milk. Does treated with cloxacillin were evaluated using the Charm SL3 Beta-lactam assay (Charm Sciences Inc., Lawrence, MA), which was validated for use in goat milk by the ISU research group before initiation of this project. Does were sampled at each milking until they tested negative on the goat-side tests for 2 consecutive milkings via the goat-side assay.

Results

On LC-MS-MS, 18 of 22 cephapirin-treated does (81.8%) tested below the level of quantification (5 ppb) at the first milking. Three does had quantifiable residues at the first milking, with no residues were detectable after 72 hours. Cloxacillin-treated does had a less uniform response with 12 out of 21 does (57%) having no quantifiable residue by 24 hours post-kidding while the remaining 9 does (43%) had residues for 36 hours or more with a mean of 84 hours required to clear detectable residues. One doe was unenrolled from the study at 144 hours post-kidding for prolonged residue production with a final reading of 57.3 ppb on LC-MS-MS.

Significance

This study provides novel insights into the milk residue depletion of 2 long-acting intramammary antimicrobial products in dairy goats. The data obtained in this study aligns with the pharmacokinetic data also produced by this group in dairy goats indicating that cephapirin has significantly shorter plasma persistence time than cloxacillin despite both drugs being formulated with a long-acting benzathine salt.

