Pseudomonas aeruginosa mastitis in goats was also isolated from an essential oil-based teat dip

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Introduction

Pseudomonas aeruginosa is an opportunistic pathogen that has been associated with mastitis in dairy animals, including goats (Yuan et al, 2017). An outbreak of mastitis in dairy goats was investigated at the Utah Veterinary Diagnostic Laboratory (UVDL). Identification of the etiologic agent(s) and source of infection was the primary objective.

Materials and Methods

The previous fall, 2 Nubian goats from a herd of 6 hand-milked does had clinical mastitis (CM) with blood and clots in milk. Milk was not cultured. Both goats were treated IM with ceftiofur sodium for 3 days and oxytetracycline and florfenicol for 2 days, along with ceftiofur hydrochloride intramammary infusion (IMM) at 2 milkings 24 h apart. A mastitis homeopathic treatment of *Bryonia alba*, carbo vegetabilis, echinacea, lachesis, laccaninum, *Phytolacca decandra*, *Ruta graveolens*, silica, sulfur, alcohol was added at 1mL in drinking water at each milking. The doses of each substance and treatment duration (a few days) were not recorded. The owner stated that both does recovered from CM, but after kidding in April, the somatic cell count (SCC) was tested at 1 and 6 DIM, respectively, with a goat SCC kit (Porta SCC goat milk test®); SCC was 3,000,000 cells/mL for both does. The owner then submitted 1 milk sample from each doe to the UVDL for culture. Teat dip mixed by the owner contained 350 mL tap water, 3 drops soap, and 1 drop each of tea tree oil, peppermint oil, lavender oil, and grape seed extract; other samples including teat dip were requested for culture by UVDL. Culture used National Mastitis Council methods on 5% sheep blood agar and MacConkey agars.

Results

For samples of both goat milks, the teat dip, and a swab of the teat dip container, preliminary biochemical tests and colony morphology were typical of *P. aeruginosa*, also identified by API 20 NE® testing. Milks from the other 4 does, drinking water, feed, wood shavings bedding, and a swab of the water hose for drinking and udder wash water were all culture-negative for *P. aeruginosa*. The owner began using a commercial teat dip and culled the 2 positive does. No more mastitis was observed in the herd for the next 2 years.

Significance

Because no milk or teat dip cultures were done the previous fall, it is unclear whether the clinical mastitis at that time was caused by *P. aeruginosa*. It is likely that *P. aeruginosa* in 1 or more components of the teat dip caused the outbreak. Sometimes, use of alternative medicine products is driven by a scarcity of approved products for goats or because many commercially available iodine and chlorine-based teat dips are not suitable for organic farming. However, commercial teat dip products are preferable.

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ZACTRAN®
(gamithromycin)

150 mg/mL ANTIMICROBIAL

NADA 141-328, Approved by FDA

For subcutaneous injection in beef and non-lactating dairy cattle only. Not for use in female dairy cattle 20 months of age or older or in calves to be processed for veal.

Caution: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

READ ENTIRE BROCHURE CAREFULLY BEFORE USING THIS PRODUCT.

INDICATIONS

ZACTRAN is indicated for the treatment of bovine respiratory disease (BRD) associated with *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni* and *Mycoplasma bovis* in beef and non-lactating dairy cattle. ZACTRAN is also indicated for the control of respiratory disease in beef and non-lactating dairy cattle at high risk of developing BRD associated with *Mannheimia haemolytica* and *Pasteurella multocida*.

CONTRAINDICATIONS

As with all drugs, the use of ZACTRAN is contraindicated in animals previously found to be hypersensitive to this drug.

WARNING: FOR USE IN CATTLE ONLY. NOT FOR USE IN HUMANS. KEEP THIS AND ALL DRUGS OUT OF REACH OF CHILDREN. NOT FOR USE IN CHICKENS OR TURKEYS.

The material safety data sheet (MSDS) contains more detailed occupational safety information. To report adverse effects, obtain an MSDS or for assistance, contact Merial at 1-888-637-4251.

RESIDUE WARNINGS: Do not treat cattle within 35 days of slaughter. Because a discard time in milk has not been established, do not use in female dairy cattle 20 months of age or older. A withdrawal period has not been established for this product in pre-ruminating calves. Do not use in calves to be processed for veal.

PRECAUTIONS

The effects of ZACTRAN on bovine reproductive performance, pregnancy, and lactation have not been determined. Subcutaneous injection of ZACTRAN may cause a transient local tissue reaction in some cattle that may result in trim loss of edible tissues at slaughter.

ADVERSE REACTIONS

Transient animal discomfort and mild to moderate injection site swelling may be seen in cattle treated with ZACTRAN.

EFFECTIVENESS

The effectiveness of ZACTRAN for the treatment of BRD associated with *Mannheimia haemolytica*, *Pasteurella multocida* and *Histophilus somni* was demonstrated in a field study conducted at four geographic locations in the United States. A total of 497 cattle exhibiting clinical signs of BRD were enrolled in the study. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10. The percentage of successes in cattle treated with ZACTRAN (58%) was statistically significantly higher ($p<0.05$) than the percentage of successes in the cattle treated with saline (19%).

The effectiveness of ZACTRAN for the treatment of BRD associated with *M. bovis* was demonstrated independently at two U.S. study sites. A total of 502 cattle exhibiting clinical signs of BRD were enrolled in the studies. Cattle were administered ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline as a subcutaneous injection once on Day 0. At each site, the percentage of successes in cattle treated with ZACTRAN on Day 10 was statistically significantly higher than the percentage of successes in the cattle treated with saline (74.4% vs. 24% [$p <0.001$], and 67.4% vs. 46.2% [$p = 0.002$]). In addition, in the group of calves treated with gamithromycin that were confirmed positive for *M. bovis* (pre-treatment nasopharyngeal swabs), there were more calves at each site (45 of 57 calves, and 5 of 6 calves) classified as successes than as failures.

The effectiveness of ZACTRAN for the control of respiratory disease in cattle at high risk of developing BRD associated with Mannheim*ia haemolytica* and *Pasteurella multocida* was demonstrated in two independent studies conducted in the United States. A total of 467 crossbred beef cattle at high risk of developing BRD were enrolled in the study. ZACTRAN (6 mg/kg BW) or an equivalent volume of sterile saline was administered as a single subcutaneous injection within one day after arrival. Cattle were observed daily for clinical signs of BRD and were evaluated for clinical success on Day 10 post-treatment. In each of the two studies, the percentage of successes in the cattle treated with ZACTRAN (86% and 78%) was statistically significantly higher ($p = 0.0019$ and $p = 0.0016$) than the percentage of successes in the cattle treated with saline (36% and 58%).

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IMPORTANT SAFETY INFORMATION: Do not treat cattle within 35 days of slaughter. Do not use in female dairy cattle 20 months of age or older, or in calves to be processed for veal. Subcutaneous injection may cause a transient local tissue reaction in some cattle that may result in trim loss of edible tissues at slaughter. NOT FOR USE IN HUMANS.

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[1] Sifferman RL, Wolff WA, Holste JE, et al. Field efficacy evaluation of gamithromycin for treatment of bovine respiratory disease in cattle at feedlots. Intern J Appl Res Vet Med. 2011;9(2):171-180.
[2] ZACTRAN product label.