Comparison of Two Strategies for Systemic Antibiotic Treatment of Dairy Cows with Retained Fetal Membranes: Preventive vs. Selective Treatment

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ABSTRACT

The objective of this study was to evaluate the efficacy of a blanket systemic preventive treatment (PT) of cows having retained fetal membranes (RFM) with 1 mg/ kg of ceftiofur administered the first day after calving regardless of their body temperature. This strategy was compared with a selective treatment (ST) strategy in which only cows having RFM and a rectal temperature \geq 39.5°C within 10 d postpartum received ceftiofur. Cows that retained their fetal membranes for at least 24 h after calving were allocated to 2 groups. Rectal temperature was measured daily for 10 d postpartum. Sixty PT cows having RFM received a daily ceftiofur (1 mg/kg of body weight) treatment, administered subcutaneously during the first 3 d after diagnosis of RFM. If rectal temperature was $\geq 39.5^{\circ}$ C after 3 daily treatments, cows received ceftiofur for 2 more days. Therapy in 53 ST cows was based on selective administration of ceftiofur to cows having fever during the first 10 d postpartum. Treatment was conducted for 3 to 5 consecutive days as described for PT cows, beginning on the first day of fever. In both groups, manual removal of the placenta was not attempted and antibiotic drugs were not administered into the uterus. For every cow having RFM enrolled in PT or ST, 1 cow without RFM that had calved on the same day was enrolled in a healthy control group (n = 113). All cows received two 25-mg doses of $PGF_{2\alpha}$: 1 dose between 18 and 24 d and 1 dose between 32 and 38 d postpartum. The PT did not reduce the proportion of cows experiencing fever during 10 d postpartum compared with ST cows (71.7 vs. 69.8%). Results were compared using logistic regression models and survival analyses. The artificial insemination submission rate between 42 and 62 d postpartum was greater in PT (41.2 vs. 20.8 vs. 24.5%), but total conception rate was less in ST and control cows, respectively (25.0 vs. 38.9 vs. 36.2%). In this trial, a preventive systemic antibiotic treatment of all cows having RFM was not superior to a selective antibiotic treatment of cows only in case of fever.

Key words: retained fetal membrane, ceftiofur, reproductive performance, dairy cow

INTRODUCTION

Retained fetal membranes (**RFM**) in dairy cows is defined as the failure to expel the fetal membranes by 12 to 24 h after calving (Fourichon et al., 2000). Average incidence of RFM ranges from 3 to 12% of normal calvings (Paisley et al., 1986; Esslemont and Kossaibati, 1996; Eiler, 1997). A meta-analysis of publications on reproductive disorders by Fourichon et al. (2000) revealed a negative impact of RFM on reproductive performance during the current lactation. Frequent occurrence of metritis after RFM was identified as the main reason for reduced fertility of cows having RFM (Laven and Peters, 1996; Gröhn and Rajala-Schultz, 2000). Postpartum metritis can be characterized by pyrexia up to 10 d postpartum with a fetid, purulent vulvar discharge, often associated with delayed involution of the uterus (Sheldon and Dobson, 2004). Between 35 and 95% of cows with RFM have an elevated temperature (Stevens et al. 1995; Overton et al., 2003; Drillich et al., 2003, 2006).

In Europe (Laven, 1995), and to some extent in the United States and Canada, a common treatment of RFM in veterinary practice is based on the manual removal of the placenta and local antibiotic therapy (Peters and Laven, 1996). Convincing evidence, however, exists for a systemic antibiotic treatment with ceftiofur as an efficacious treatment of RFM (Drillich et al., 2003; Risco and Hernandez, 2003) without manual removal of RFM (Bolinder et al., 1988) or intrauterine administration of antibiotics (Drillich et al., 2006). Elevated body temperature was a criterion for the administration of systemic antibiotics in numerous studies on metritis (Smith et al., 1998; Drillich et al., 2001; Chenault et al., 2004) or RFM (Stevens et al., 1995; Drillich et al., 2003, 2005, 2006; Overton et al., 2003; Risco and Hernandez, 2003). Because of the potentially lifethreatening character of acute metritis (Eiler, 1997), it

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is a questionable practice to leave feverish RFM cows untreated. Efficacy of a treatment of acute metritis, often associated with RFM, with a systemic administration of penicillin, oxytetracycline, or ceftiofur has been demonstrated (Smith et al., 1998; Drillich et al., 2001; Chenault et al., 2004). A significant decrease in rectal temperature after treatment with 1 mg/kg of ceftiofur has been demonstrated compared with untreated postpartum feverish cows (Zhou et al., 2001). Risco and Hernandez (2003) demonstrated that the administration of 2.2 mg/kg of ceftiofur to cows having RFM for 5 d after calving reduced the risk for metritis. Subcutaneous administration of 1 mg of ceftiofur/kg of BW produced concentrations of ceftiofur derivates in uterine tissues (Okker et al., 2002) that exceeded the reported minimum inhibitory concentrations for intrauterine Escherichia coli, Fusobacterium necrophorum, and Arcanobacterium pyogenes (Sheldon et al., 2004a).

The objective of our study was to test whether a preventive treatment of cows having RFM with ceftiofur beginning on d 1 after calving, regardless of an elevated body temperature, would reduce occurrence of fever and improve reproductive performance of cows compared with a selective treatment of RFM cows with ceftiofur only in the case of fever. Furthermore, the hypothesis was tested that a preventive treatment would result in reproductive performance that does not differ from that of control cows without RFM.

MATERIALS AND METHODS

The study was conducted between June 2002 and November 2003 on a commercial dairy farm in Germany. The participating farmer and the local veterinarian were informed about all relevant characteristics of the study and agreed with the study design. A total of 1,150 cows were housed in freestall barns with sand bedding. One week before expected calving, cows were moved into a freestall barn with straw bedding. Herd average milk yield was 10,700 kg per lactation (4.0%) fat, 3.6% protein). Cows were fed a TMR consisting of corn silage, grass silage, hay, and concentrates. The voluntary waiting period (VWP) was set at 42 d postpartum. Cows observed in estrus were inseminated artificially. Pregnancy diagnosis was performed by ultrasound between 32 and 38 d after AI. Cows not inseminated by 83 d postpartum or identified as not pregnant were treated with the Ovsynch protocol (Pursley et al., 1997).

Cows that retained their fetal membranes for at least 24 h after calving were included in the study. Cows having a caesarean section and those identified to be culled (not to be inseminated) after calving were not enrolled. All cows that received antiinflammatory or systemic antibiotic drugs during 10 d postpartum for purposes unrelated to the study (e.g., acute mastitis) were excluded retrospectively from the trial. During the first 10 d postpartum, rectal body temperature was measured daily in all RFM cows. A body temperature \geq 39.5°C was regarded as a fever.

Cows with RFM were assigned to receive 1 of 2 treatments according to their ear tag identification. Cows with uneven ear tag numbers were enrolled in the preventive treatment (PT) group, and cows with even ear tag numbers were enrolled in the selective treatment (ST) group. All PT cows received the systemic antibiotic treatment of 1 mg/kg of ceftiofur (Excenel RTU, Pfizer Animal Health, Karlsruhe, Germany), administered subcutaneously on the day of enrollment (d 1). The treatment was repeated once daily for 3 consecutive days. Cows with fever on d 4 received 1 mg/kg of ceftiofur for an additional 2 d. In the case of fever after 5 d of treatment with ceftiofur, cows received an escape therapy (i.e., a different systemic antibiotic chosen by the local veterinarian). The ST cows were administered ceftiofur only when feverish during 10 d postpartum. Treatment was conducted for 3 to 5 consecutive days as described for PT cows, beginning on the first day of fever. In both groups of treated cows, fetal membranes were not removed manually and antibiotics were not administered in the uterus. Considering the potentially life-threatening character of toxic puerperal metritis following RFM (Eiler, 1997), an untreated control group was not included. After enrollment of a cow into PT or ST, the next cow to calve without RFM was enrolled into a healthy control group.

In Europe, ceftiofur is approved for acute postpartum metritis during the first 10 d postpartum at a dosage of 1 mg/kg of BW. However, in the United States, ceftiofur is approved for a dosage of 2.2 mg/kg of BW. Administration of 1 mg/kg of ceftiofur in RFM cows would be considered an extra-label use in the United States.

All cows were treated with 25 mg of $PGF_{2\alpha}$ intramuscularly (Dinolytic, Pfizer Animal Health) between 18 and 24 d postpartum and again between 32 and 38 d postpartum to support the involution of the uterus. This was a standard operating procedure established on this dairy farm for many years.

All treatments were documented on case report forms, which remained on farm to ensure that all cows received the correct treatments each day. At the end of the study, case report forms were checked for compliance and plausibility of the data. Cows with incomplete treatments or other deviations from the treatment protocol were retrospectively deleted from the study. Cows were monitored daily and data were documented for a period of 200 d postpartum. Reproductive performance was characterized by AI submission rate during 42 to Download English Version:

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