DIAGNOSIS AND THERAPEUTIC CONSIDERATIONS OF UTERINE INFECTIONS IN DAIRY CATTLE

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ABSTRACT

From an animal health-well being, welfare, and performance perspective, the postpartum period is comprised of an early window where acute health and cow survival is an issue with the development of septic metritis. Subsequently, sustained presence of endometritis is likely to be contributing to sub-fertility in lactating dairy cows with an overall herd pregnancy rate of approximately 16%. The challenge is to integrate on commercial dairies preventive medicine programs with reproductive management to improve herd fertility. Cows affected by periparturient disorders such as hypocalcemia, dystocia, and retained fetal membranes are more likely to contract uterine infections than cows that calve normally are. Thus, appropriate management of the transition period is critical in the prevention of uterine infections at the herd level. In addition, a postpartum program to monitor health to provide treatment to cows in the early stages of disease should be implemented.

Key words: bovine endometritis, herd health, transition period

CONSIDERACIONES DIAGNÓSTICAS Y TERAPÉUTICAS PARA INFECCIONES UTERINAS EN VACAS LECHERAS

RESUMEN

Desde el punto de vista del bienestar animal y de la perspectiva de productividad, el periodo postparto puede estar comprometido por una pequeña ventana durante el postparto temprano, en la cual la salud y supervivencia de las vacas es un problemática, debido a la presentación de metritis séptica. Esta se perpetuán subsecuentemente con la presentación de endometritis, la cual muy posiblemente contribuye con los patrones de sub-fertilidad en vacas lactantes, generando en general bajas tasas de preñez del 16 %. El reto es entonces integrar en las explotaciones comerciales un programa de medicina veterinaria preventiva con el manejo reproductivo, con el fin de mejorar la fertilidad del hato. Se ha descrito que las vacas que sufren problemas durante el periparto tales como hipocalcemia y retención de las membranas fetales son más susceptibles de contraer infecciones uterinas, comparadas con aquellas vacas que tienen un parto normal. Por ello un manejo apropiado del periodo de transición es crítico en la prevención de infecciones uterinas a nivel del hato. Así mismo, es necesario implementar un programa adecuado de monitoreo postparto con el fin de proveer tratamiento oportuno a las vacas durante los estados iniciales de enfermedad..

Palabras clave: Endometritis bovina, salud de hato, periodo de transición

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INTRODUCTION

The stresses of negative energy balance and altered metabolism in postpartum dairy cows suppress immune function which compromises uterine health causing uterine infections (1). The veterinary literature contains numerous reports and studies suggesting that uterine infections decrease milk yield and subsequent reproductive performance. However, in these reports type of uterine infections were not distinguished, and were classified as a disease complex ranging from cows that appeared normal to those affected by life-threatening sepsis. Further, when describing uterine infections, the terms metritis and endometritis have been inexplicably used without considering clinical findings and effect on fertility. These inconsistencies in definitions have contributed to uncertainty among veterinarians in the definition used to diagnose and treat uterine infections. This paper outlines clinical features and therapy of common uterine infections of lactating dairy cows.

DEFINITION AND CLINICAL FEATURES

Metritis: This condition is a result of a severe inflammation of the endometrial mucosa and submucosa, muscularis, and serosa (2). It generally occurs during the first week to 21 days after calving and is associated with dystocia, retained fetal membranes and calving trauma. Affected cows may be septic and present with fever, depression, anorexia and reduced milk yield. In addition, a copious fetid vaginal discharge may be present. Another term used to describe metritis is puerperal metritis (3).

Clinical endometritis. This condition is caused by inflammation of the endometrium, extending no deeper than the stratum spongiosum (2) and is characterize by the presence of purulent (>50% pus) or mucopurulent (approximately 50% pus, 50% mucus) uterine exudates in the vagina, 21 day or more post partum (3). The criteria to diagnosed clinical endometritis have been validated by correlating clinical findings with an increase interval from calving to conception (4). The clinical findings were the presence of purulent vaginal mucus or a cervical diameter >7,5 cm, 21 days or more post partum; or 26 days post partum, the presence of a mucopurulent material in the vagina. The sequential differences in the significant factors reelect the progress of uterine involution and immune defense mechanisms. The authors concluded that classifying as having clinical endometritis >21 days post partum includes a large proportion of animals that are in the process of resolving bacterial contamination, and so reflect the presence of disease less accurately. In agreement with a previously published report (5), in the study cited above (4), the evaluation of the uterus per rectal palpation to diagnose clinical endometritis lacked diagnostic accuracy in predicting subsequent reproductive performance. In the review by Sheldon et ál (3), the authors propose that the definition of clinical endometriis in a cow is the presence of purulent uterine discharge detectable in the vagina 21 days or more post partum, or mucopurulent discharge 26 days post partum.

Subclinical Endometritis: This condition has been described as inflammation of the uterus determined by cytology, in the absence of purulent material present in the vagina (3). Neutrophils are the primary response against pathogenic bacteria of the postpartum uterus, resulting in an increase in polymorphonuclear (PMN) cells within the uterine lumen. A cytological evaluation measures the proportion of PMN cells present in a sample collected by flushing the uterine lumen or using a cytobrush. The presence of >18% neutrophils in uterine cytology samples collected 20 to 30 days post

partum or >10% neutrophils at 34 to 47 days post partum in the absence of clinical endometritis is suggestive of subclinical endometriis. Cows with subclinical endometritis diagnosed by uterine cytology methodology were less likely to become pregnant when compared to cows without subclinical endometritis (6, 7).

Pyometra. This condition is characterized by a collection of variable amounts of purulent exudate within the endometrial cavity, persistence of a corpus luteum, and suspension of the estrous cycle (8). It is most likely to develop in cows that have their first postpartum ovulation before bacterial contamination of the uterus has been eliminated. The ensuing corpus luteum persists beyond its normal lifespan because intrauterine fluid prevents luteolysis. Progesterone continues to dominate the uterus and suppresses the uterine defense mechanism (9). Pyometra is also an occasional clinical sign of trichomoniasis and *Tritrichomonas fetus* should be suspected as a cause in cases of pyometra that develop during the breeding season.

TREATMENT AND MANAGEMENT

Treatment of uterine infections continues to be a contentious topic among veterinarians, perhaps because of the lack of precise diagnostic criteria and lack of controlled trials in which various therapeutic options have been rigorously compared. Therapy for uterine infection includes intrauterine therapy of antibiotics, systemic antibiotics and supportive therapy, and hormone therapy (10).

Oxytetracycline has been recommended for intrauterine therapy for postpartum cows affected with metritis or clinical endometriis caused by *A. pyogenes*. However, a study that isolated *A. pyogenes* recovered from the uterus of cows, were resistant to oxytetracycline and intrauterine treatment with large doses did not affect the frequency of *A. pyogenes* isolation (11). Furthermore, many preparations of oxytetracycline are irritating and cause chemical endometritis. It should be mentioned that antibiotics are not approved in the United States for intrauterine administration to lactating dairy cows. Intrauterine administration of antibiotics results in contamination of milk and appropriate withdrawal times have not been determined (12).

A variety of broad-spectrum antibiotics has been recommended for parenteral administration to cows with metritis (13). Penicillin or one of its synthetic analogs is most commonly recommended (20,000 to 30,000 U/kg bid). Oxytetracycline is probably not a good choice for systemic administration because of the difficulty in reaching the minimal inhibitory concentration required for *A. pyogenes* in the lumen of the uterus. Ceftiofur is a third generation cephalosporin that has broad spectrum activity against gram-positive and gram-negative bacteria implicated in the cause of metritis (14). Moreover, cefitofur has been reported to reach all layers of the uterus without violative residues in milk. Subcutaneous administration of ceftiofur at a dose of 1 mg/kg in dairy cows after parturition resulted in a concentration of ceftiofur and its active metabolites in plasma, uterine tissues, and lochial fluid that exceeded reported MIC (minimum inhibition concentrations) values for common pathogens involved in metritis (15). Ceftiofur administered at a dosage of 2,2 mg/kg daily for 5 days, is an equally effective treatment for postpartum dairy cows affected with metritis (rectal temperature >102,6° F, flaccid uterus and a fetid vaginal discharge) when compared with procaine penicillin G or procaine penicillin G plus intrauterine infusion of oxytetracycline (16). A multilocation study that involved

406 cows in the first 14 days postpartum, Ceftiofur administered at a dosage of 2,2 mg/kg daily for five days, was efficacious in the treatment of metritis (rectal temperature >103,1° F with a fetid vaginal discharge) (14). Ceftiofur is approved in the United States for systemic administration to lactating dairy cows affected with metritis.

Nonsteroidal anti-inflammatory drugs such as flunixin meglumine are used to combat toxemia and improve appetite. Furthermore, cows with metritis may experience depressed appetite affecting calcium and energy status. Consequently, therapy with calcium and energy supplements may be warranted.

A variety of hormones have been administered to cows in attempts to prevent or treat postpartum metritis (17). Oxytocin causes contraction of the myometrium if the organ is dominated by estrogen. Thus, oxytocin is expected to be effective in aiding uterine evacuation if administered within 48 to 72 hours after calving. Doses of 20 to 40 U repeated every 3 to 6 hours are commonly used.

Prostaglandin F_2 alpha (PGF_{2a}) and its synthetic analogs have been widely used to treat metritis and clinical endometritis (18). During the immediate postpartum period, serum concentrations of PGF_{2a} and its metabolites are elevated and are thought to be related to the process of uterine involution (19). However, administration of exogenous prostaglandin during the postpartum period does not alter the rate of uterine involution, nor is involution retarded when prostaglandin synthesis is inhibited. Several clinical trials have shown that administration of prostaglandin during the postpartum period may enhance the reproductive performance of dairy cows that are otherwise unaffected by periparturient diseases (20, 21). Likewise, cows affected with dystocia, RFM, or both and treated with PGF_{2a} early postpartum, followed by a second treatment of PGF_{2a} 14 days later, experienced a higher conception rate to first service than did untreated cows experiencing a normal or abnormal parturition (22). In primiparous cows treated for puerperal metritis with systemic ceftiofur, the administration of two doses of PGF_{2a} 8 hours apart on day 8 post partum, improved uterine involution, decreased the concentration of inflammatory products and improved first service conception rate (23).

Prostaglandin is the treatment of choice for pyometra. Treatment is followed in 3 to 9 days by evacuation of the uterus in 85 to 90 percent of treated cows. After endometrial lesions are allowed 30 days to heal, fertility is restored in most patients (24).

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