Effective treatment of uterine disease in certified organic dairy herds
Gustavo M. Schuenemann,a Troy A. Brick,b Santiago Basa

aDepartment of Veterinary Preventive Medicine and bDepartment of Veterinary Clinical Sciences, College of Veterinary Medicine, The Ohio State University, Columbus, OH

Abstract
Postpartum metritis and clinical endometritis are common uterine disorders in lactating dairy cows that negatively impact reproductive performance. For certified organic herds, implementation of preventive management practices such as proper nutrition and calving management are critical to prevent uterine diseases from occurring. Several alternative therapies such as garlic tincture, aloe vera, vitamins, and vegetable oils have been used by organic dairy producers. Despite the use of these alternative therapies to treat postpartum metritis, there is no scientific evidence available in the literature that can promote or discourage these practices. For organic (and conventional) herds, the implementation of proactive management strategies that control the risk factors for uterine diseases should be a top priority.

Keywords: Certified organic, dairy cattle, uterine diseases

Introduction
Organic food in the US, primarily produce and dairy products, reached retail sales over $21.1 billion in 2008 and for several years, organic farmers struggled to produce enough supply to meet the growing domestic demand.1 The organic dairy industry has been growing steadily since 1990 not only in the US, but also in Europe. The dairy sector has been one of the fastest growing segments of the organic commodities, almost doubling the number of certified milk cows every year between 1997 and 2005 in the US.1 Additionally, the retail demand for organic milk doubled and the retail milk prices were roughly double the conventional prices between 2004 and 2006.1 The 2005 US dairy survey showed that the size (small dairy operations) and location of the farm (Northeast and Upper Midwest) increased the likelihood of organic practices as an alternative to improve farm income.2,3 Environmental stewardship and milk price along with long term production contracts between the processors and producers have been the top reasons for converting to organic or adding a new organic dairy operation.

Management practices for certified organic dairies
Organic dairy production has gained increasing attention because of consumer concerns about food safety, animal welfare, and environmental impacts of intensive livestock operations.4 The National Organic Program (NOP) standards for dairy and livestock require that cattle are actively grazing and at least 30% of the total dry matter intake (on a daily basis) be provided from grazing pasture for a minimum of 120 days during the growing season (NOP access to pasture [livestock], February 12, 2010). Although well managed pastures provide plentiful high quality forage, harvesting through grazing and balancing dairy rations present challenges. Additionally, the US standard prohibits the use of antibiotic drugs and synthetic hormones in certified organic dairies. If a lactating dairy cow is treated with prohibited substances (e.g., antibiotics), the organic status of the animal is lost. It is important to note that from an animal welfare point of view, no animal must suffer and veterinary care should not be withheld to preserve the organic status of an animal. The whole certified organic process relies on a number of preventive management practices such as nutrition management that ultimately assures cows’ health. Postpartum uterine diseases (e.g., retained fetal membranes, metritis), respiratory diseases, and mastitis require special attention. An observational field study in Wisconsin revealed that the overall prevalence of mastitis, metritis, foot infections, and respiratory diseases was greater for conventional than organic dairy herds.5,6

Risk factors for metritis and endometritis
Postpartum metritis and clinical endometritis (CE) are common uterine disorders in lactating dairy cows that negatively impact reproductive performance; thus, diminishing profitability and
sustainability of dairy operations. Metritis (puerperal; usually within 14 days postpartum) is defined as
the inflammation of all layers of the uterus and characterized by fetid uterine discharge with fever,
anorexia, and/or decreased milk production (systemically ill). Clinical endometritis is defined as the
inflammation of the endometrial lining of the uterus characterized within 21-40 days in milk (DIM) by
mucopurulent or more significant vaginal discharge (clinical diagnosis) or the presence of
polymorphonuclear cells (≥5%, cytology diagnosis); usually without systemic signs of illness. Lactating
dairy cows subjected to poor nutrition management (body condition score at calving of <2.75; scale 1-5)
increased the risk for uterine diseases with increased levels of non-esterified fatty acids and beta-
hydroxybutyrate in early postpartum cows. Furthermore, retained fetal membranes, stillbirths,
abortions, dystocic births and twins as well as hygiene of the perineum region at calving (presence of
manure and dirt around the birth canal) increased the likelihood of postpartum metritis and clinical
endometritis.

Management and treatment options for clinical endometritis

Endometritis is an inflammation of the endometrial lining of the uterus without systemic signs of
illness. Clinical endometritis negatively impacts reproductive performance (delays time to conception
and increases the risk for culling after calving) in dairy cattle; thus, diminishing profitability and
sustainability. A recent study in three herds showed that 18% of lactating dairy cows suffer from CE at
35 DIM. Proactive management that targets the risk factors should be a top priority to prevent both
puerperal metritis and CE. For instance, cow comfort (e.g., 30 inches of feed bunk space and 80%
stocking density in relation to stalls) during the pre- and postpartum period reduced the risk for uterine
diseases such as metritis and CE.

For clinical cases, administration of prostaglandin F₂α analog (PG) and antimicrobial agents
such as ceftriaxone hydrochloride and penicillin are frequently used to treat these cows in conventional
herds. Antimicrobial therapy for cows with clinical signs of uterine disease is recommended in certified
organic herds, but the organic status is lost and the animal must exit the herd. Therefore, the use of
alternative therapies such as garlic tincture, aloe vera, vitamins, and vegetable oils have been used by
organic dairy producers. Despite the use of these alternative therapies to treat uterine diseases (e.g.,
metritis), there is no scientific evidence available in the literature that can promote or discourage these
practices. Recently, a field trial showed that homeopathic remedies (Lachesis compositum [Lachesis],
Carduus compositum [Carduus], and Traumeel LT [Traumeel]) were not effective to prevent CE (based
on clinical and fertility outcomes). The use of lytic enzyme preparations from Bacillus subtilis
(Lysosubtilin) was assessed as alternative treatment for cows with postpartum endometritis compared to
neofur or uterosan. Lysosubtilin (2 x 10⁶ IU) was dissolved in 100 mL of distilled water and
administered intratuterarily twice per week until recovery in cows with CE as opposed to cows treated
with neofur or uterosan. This field trial showed that cows treated with a lytic enzyme preparation
(Lysosubtilin) had improved therapeutic outcomes (clinical cure), reduced calving-to-conception interval,
and improved conception risk compared to cows treated with neofur or uterosan.

The use of intra-abdominal hypertonic glucose (20%) was previously reported to control acute
peritonitis in rabbits. Furthermore, an in vitro study has shown that mannose (a sugar monomer)
inhibits the adhesion of bacteria to the epithelial cells of the equine endometrium. This suggests that the
use of 50% dextrose in water (a hypertonic solution), that targets the uterine environment rather than the
bacterial pathogen itself, may be a viable and effective strategy for organic lactating dairy cows diagnosed
with CE. Recently, we investigated the use of intratuterine dextrose (200 mL; 50% dextrose in water) in a
randomized clinical trial under field conditions. Lactating dairy cows (n=760) from two conventional
herds were screened using vaginoscopy for CE at 26±3 DIM and scored using a 0-3 scale. Cows
scored as 2 or 3 were stratified by parity and randomly allocated into one of three treatment groups: 1) control (n=83), 2) subcutaneous administration of ceftriaxone crystalline free acid (CCFA, n=75; 6.6 mg/kg; Excede; Pfizer Animal Health, New York, NY), or 3) intratuterine infusion (equine infusion pipettes) of 200 mL 50% dextrose (n=79; Vedco, Saint Joseph, MO). In this study, all cows (with or without CE) were presynchronized with two injections of PG given 14 days apart (starting at 26±3 DIM) followed by
Ovsynch (OV; gonadotropin releasing hormone [GnRH]-7 d-PG-56 h-GnRH 16 h-timed-artificial insemination [AI]) 12 days later. This study showed that cows that received intrauterine dextrose had improved clinical cure compared to control groups. Also, pregnancy per AI (PAI) in dextrose treated cows (29.8%) tended to differ (P=0.1) from cows in the control (21.1%) or CCFA treated groups (19.7%); whereas PAI in dextrose cows was not different from cows without CE (39.1%). It is important to note that intrauterine infusion is a procedure that requires proper training and strict aseptic precautions to prevent further uterine damage.

Final remarks
Postpartum metritis and CE are common uterine disorders in lactating dairy cows that negatively impact reproductive performance; thus, diminishing profitability and sustainability of dairy operations. For certified organic herds (as well as conventional herds), implementation of preventive management practices such as proper nutrition and calving management are key to prevent uterine diseases from occurring. For clinical cases, the use of intrauterine dextrose showed promising clinical and fertility results. However, further investigation is needed with certified organic herds to confirm and determine the underlying mechanisms for these findings.

Acknowledgements
The authors wish to thank the collaborating dairy farms for assisting and providing the animals used in the endometritis study. Also appreciation is extended to Dr. J. Daniels and Dr. C. Pinto (Department of Veterinary Clinical Sciences) for their input and bacteriology analysis. The effectiveness of the intrauterine dextrose administration on cows diagnosed with clinical endometritis was supported in part by the USDA-NIFA Animal Health (formula fund).

References