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Efficacy of herbal tincture as treatment option for retained placenta in dairy cows

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ABSTRACT

Retained placenta remains therapeutic challenge in cattle. Certain traditional medicines are believed to be able to alleviate retained placenta condition and improve overall fertility in cows. The aim of the present study was to evaluate the efficacy of an herbal tincture for treatment of retained placenta. The herbal tincture was extracted from a combination of *Herba Leonuri*, *Angelicae Sinensis Radix*, *Flos Carthami*, *Myrrha* and *Rhizoma Cyperi* by percolation with 70% ethanol to a concentration of 0.5 g crude herb/ml. Cows diagnosed with retained placenta ($n = 48$) were randomly divided into one of two treatment groups (A and B), with animals in group A ($n = 26$) receiving herbal tincture orally, and cows in group B ($n = 22$) receiving oxytetracycline infusion into the uterus. Eighty six cows with no clinically visible pathological conditions, given birth alone and with no retained placenta diagnosis were included into control group (C). Retained placenta was expelled within 72 h following initial treatment in 19 cows in group A, yet no cows in group B were recorded to expel placenta in the same time. The median number of days to first service (70.0 vs. 102.5 days; $P < 0.05$) and median number of days open (76.0 vs. 134.0 days; $P < 0.01$) were lower in group A than in group B. Percentage of cows pregnant within 100 days postpartum was the highest for animals in group A compared to controls (61.5% vs. 39.5%, $P < 0.05$), and for animals in group B (61.5% vs. 22.7%; $P < 0.01$). Herbal tincture used in the present study might facilitate expulsion of retained placenta and improve subsequent fertility, thus could present effective treatment option for retained placenta in cows.

1. Introduction

Retained placenta is one of the most common puerperal disorders affecting the reproductive performance of dairy cows (LeBlanc, 2008). According to Paisley et al. (1986), Fourichon et al. (2000), and Drillich et al. (2003), retained placenta is defined as placenta that has not been expelled within 12–24 h postpartum. The incidence of retained placenta varies from 3% to 18% overall (Paisley et al., 1986; Markusfeld, 1987; Eiler, 1997; Kimura et al., 2002; Han and Kim, 2005) and from 16% to 29.1% for cows in China (Cao and Qi, 2007; Guan and Gu, 2009). The negative effects of retained placenta include reduced milk yield, increased incidence of metritis and impaired subsequent fertility (Curtis et al., 1985; Holt et al., 1989; Laven and Peters, 1996; Stevens and Dinsmore, 1997). Therefore, effective treatments for retained placenta are crucial for improve puerperal healthy care in cows.

Many broad-spectrum antibiotic and hormonal therapies have been used to treat retained placenta in dairy cattle. However, the efficacy of these approaches

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is controversial, and some treatments might negatively affect subsequent reproductive performance (Stocker and Waelchli, 1993; Stevens and Dinsmore, 1997; Risco and Hernandez, 2003; Drillich et al., 2006, 2007; Goshen and Shpigel, 2006). Consequently, alternative treatments have been considered. Collagenase therapy is one candidate approach (Eiler and Hopkins, 1993), although it is considered too costly for widespread use. In addition, Djuricic et al. (2012), and Zobel and Tkalčić (2013) reported that ozonated foam administered into the uterus is useful in treating retained placenta in cows resulting in beneficial effect on puerperal health and fertility. However, retained placenta may have several different etiologies, including abortion, dystocia, hypocalcemia, twin birth, induction of parturition, placentitis, nutritional disturbance and immunosuppression (Beagley et al., 2010); thus, retained placenta remains therapeutic challenge in cattle, and alternative options should be considered. One well-known advantage of traditional medicine in particular is that it provides holistic therapy for interrelated diseases (Jiang, 2005; Grayson, 2011).

According to traditional Chinese veterinary medicine (TCVM) theory, retained placenta falls within blood stasis syndrome category and Chinese herbal medicine is able to alleviate this condition in cows. A meta-analysis investigating the common characteristics of herbal formulas used to treat retained placenta showed that these formulas are typically associated with the therapeutic principle of "promoting blood circulation and removing blood stasis" (Yang et al., 2006). The herbal tincture used in the present study was designed according to this therapeutic principle and has been applied to treat retained placenta by experienced traditional veterinary medicine practitioners for decades. This herbal tincture consists of *Herba Leonuri*, *Angelicae Sinensis Radix*, *Flos Carthami*, *Myrrha* and *Rhizoma Cyperi* (Table A1 of Appendix A). According to TCVM theory, these herbs mixed as presented could resolve blood stasis syndrome caused by retained placenta. Previously described herbal tincture has been demonstrated not to be toxic if administered orally, according to Hodge and Sterner scale (CCOHS, 2005), in acute toxicity tests (maximum daily dose = 40 g/kg BW) in mice (Wang et al., 2011).

The aim of the present study was to evaluate the efficacy of the herbal tincture for the treatment of retained placenta and to assess subsequent fertility in cows.

2. Materials and methods

2.1. Herbal tincture preparation

The herbal tincture in this study was composed of five herbs – *Herba Leonuri*, 120 g; *Angelicae Sinensis Radix*, 30 g; *Flos Carthami*, 20 g; *Myrrha*, 25 g; and *Rhizoma Cyperi*, 30 g – that were administered as a single dose for a cow weighing 500 kg (equal to 0.45 g crude herb/kg BW). Herb quality criteria were congruent to the Veterinary Pharmacopoeia of the People's Republic of China (Chinese Veterinary Pharmacopoeia Commission, 2010). The herbs were pre-treated by washing, drying, chopping, pulverizing and screening with a 3-mm mesh. Following that, herbs were mixed as previously described. The mixture was percolated with 70% ethanol at room temperature until colorless, and the extracted hydroalcoholic liquid were evaporated under reduced pressure at 40 °C. The condensed extract was adjusted with 60% ethanol to obtain an herbal tincture with a final concentration of 0.5 g crude herb/ml and 40% ethanol.

2.2. Animals

The trial was conducted from March 2011 to September 2012 in a commercial dairy farm of 1480 Holstein cows in Lanzhou city, China. Cows were housed in free-stall barns. At least 1 week before the expected calving, cows were moved into a free-stall barn with straw bedding. After parturition, cows were switched to a fresh lactation total mixed ration (TMR) over the course of 2 weeks. The TMR consisted of corn silage and hay as forage, with a corn gluten-cottonseed meal-based concentrate and minerals and vitamins and formulated to meet or exceed the nutritional requirements of early lactating dairy cows according to NRC (2001). Cows were fed TMR *ad libitum* during the study period. Cows were milked three times daily. The average milk yield varied between 5800 and 7012 kg (fat: $3.9 \pm 0.4\%$; protein: $3.2 \pm 0.3\%$).

2.3. Enrollment criteria

In the present study, retained placenta is defined as placenta that has not been expelled within 12 h postpartum. Treatment groups included cows given birth from March 2011 till March 2012, with retained placenta diagnosis. The enrolled cows were 2 to 7 years old (1–5 lactations) and diagnosed with dystocia, given twins or having pathogenic cold. For the purpose of presented study, dystocia diagnosis was established according to the protocol described by Schuenemann et al. (2011) with assistance score between 1 and 2. Pathogenic cold is defined as pathogenic factor in traditional Chinese medicine that results in a syndrome characterized by poor appetite, prickling pain in the lower abdominal region, bluish-purple lips and cold limbs (Editorial Committee of Encyclopedia of China's Agricultural, 1991). In the present study, pathogenic cold could lead to blood stasis syndrome, which might block the cotyledon–caruncule attachment, resulting in Qi (a term in traditional Chinese medicine referring to the energy flow or life force that is said to pervade all living things) and blood disorders that might interfere with the normal separation and release of the placenta (Yang et al., 2006; Lü et al., 1992). In addition, cows with no clinically visible pathological conditions, given birth alone and with no retained placenta diagnosis were included into control group (C). All enrolled cows had a body condition score between 2 and 4.5 at the time of calving according to the criteria of Edmonson et al. (1989).

2.4. Experimental protocol

Out of 620 cows given birth during the study period, retained placenta was diagnosed in 126. Eighty six cows having placenta expelled within 8 h following the birth and with no clinically visible puerperal disorders were included