

Risk factors of postpartum genital diseases in Holstein x Lai Sind crossbred cows in smallholdings, Ho Chi Minh City, Vietnam

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Keywords

Cattle, Holstein x Lai Sind cow, dystocia, retained placenta, endometritis, Viet Nam

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Summary

A total of 353 calvings and postpartum periods of 302 Holstein x Lai Sind (HxLS) crossbred cows kept in 35 family farms in Cu Chi district, Ho Chi Minh City, Vietnam were observed to analyze the risk factors of retained placenta, dystocia and clinical endometritis. The cows were examined between day 21 postpartum and first service (109 days on average) by ultrasound and vaginoscopy. Dystocia prevalence was 1.7 higher in primiparous (29.9%) than in multiparous cows (20.4%) ($p < 0.05$). It was also six times higher in 2014 (40.6%) than in 2013 (10.1%) (odds ratio [OR] = 6.08; $p < 0.001$). Dystocia frequency was higher in the rainy season (30.4%) than in the dry season (17.0%) (OR = 2.14; $p < 0.01$). Prevalence of retained placenta was higher in 2014 (21.8%) than in 2013 (11.7%) ($p < 0.01$). Postpartum clinical endometritis was significantly higher in 2014 (28.6%) than in 2013 (11.7%) (OR = 3.03; $p = 0.001$), and in the rainy season (28.8%) than in the dry season (9.7%) (OR = 3.78; $p < 0.001$). Dystocia and retained placenta multiplied by 2.8 ($p = 0.003$) and 4.7 ($p = 0.001$), respectively, the risk of clinical endometritis.

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■ INTRODUCTION

Dairy cattle in Vietnam in general and particularly in Ho Chi Minh City (HCMC) are mainly bred on family farms (Loan et al., 2004). In 2013, HCMC had approximately 8266 farms (46.4% of the total number of farms in Vietnam), covering more than 95% of the municipal dairy herd (Department of Agriculture and Rural Development, HCMC, 2015). These dairy farms have limited access to quality veterinary and technical services in the fields of animal nutrition, genetics and health (Loan et al., 2004). A recent study (Nguyen-Kien et al., 2017), conducted in 35 smallholdings with 244 dairy Holstein x Lai Sind (HxLS) crossbred cows producing 11.6 liters of milk per day, shows that the reproductive performance is far from optimal (calving

to first service interval: 109 days; calving to conception interval: 242 days; and number of services per conception: 4.3). Moreover, the same study characterized the prevalence of the main conditions appearing during postpartum such as dystocia (24.4%), retained placenta (RP; 16.4%), clinical endometritis (CE; 19.2%), urovagina (5.6%), postpartum anestrus (54.6%), and ovarian cyst (6.3%).

Multiple factors affect these complications. The frequency of dystocia decreases with the increase in the age and parity of the cows (Gaafar et al., 2011). Calving in winter (Gaafar et al., 2011; Rashad, 2011) or in spring (Atashi et al., 2012), a low body condition score (BCS) (< 3) (Hoedemaker et al., 2009) or a high BCS (> 3.5) at calving (Averdano-Reyes et al., 2010), and primiparous cows (Atashi et al., 2012; Rashad, 2011) are also risk factors for dystocia. Similarly, RP risk is correlated with dystocia (Grohn and Rajala-Schultz, 2000; Gunduz et al., 2010; Kumari et al., 2015), twin births (Sandals et al., 1979), abortion (Joosten et al., 1987; Grohn and Rajala-Schultz, 2000; Kumari et al., 2015), a short gestation period (< 270 days) (Joosten et al., 1987; Kumari et al., 2015), parity (primiparous cows or those under the age of three are more exposed to risk) (Islam et al., 2012), BCS lower than three at calving (Hoedemaker et al., 2009), and calf weight lower than 37 kilograms (Joosten et al., 1987). Dystocia (Gautam et al.,

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2010; Potter et al., 2010; Salasel et al., 2010) and RP (Kim et Kang, 2003; Potter et al., 2010; Salasel et al., 2010) are major risk factors for endometritis. The objective of this study was to evaluate the factors affecting the frequency of postpartum disorders of the genital tract in HxLS crossbred cows in family farms in HCMC.

MATERIALS AND METHODS

Study area

The study was conducted in Cu Chi district, Ho Chi Minh City, Vietnam, located at 10° 53' – 10° 10' N, and 106° 22' – 106° 40' E. The area is characterized by a tropical monsoon climate with a rainy (May to October) and a dry season (November to April). The average highest (31°C) and lowest (26°C) temperatures of the year are observed in April, and in December and January, respectively. The average annual rainfall is 1949 mm. Average humidity is between 62% in the dry season and 82% in the rainy season (World Weather Online, 2015).

Study population

The study concerned 353 postpartum periods of 302 Holstein x Lai Sind (HxLS) crossbred cows kept in 35 smallholdings from January 2013 to December 2014. The average milk yield was 11.6 (\pm 0.5) kilograms of milk per cow per day and the average duration of lactation was 368 (\pm 100) days. The animals were kept permanently indoors. Their diet consisted of fodder (elephant grass or *Pennisetum purpureum*, natural grass and rice straw), concentrates and industrial by-products (spent grain and cassava waste). All cows were artificially inseminated.

The genital tract of the cows was examined between day 21 postpartum and first service (109 \pm 52 days postpartum) by ultrasound, using a rectal linear probe of 6.5 MHz (ultrasound KX5200) and vaginoscopy with a speculum (42 cm x 5 cm). Vaginal discharge (mucus, flakes of pus, mucopurulent, purulent) was defined according to the criteria proposed by Williams et al. (2005). BCS at calving (\pm 7 days) was assessed on a scale of 1 to 5 (Ferguson et al., 1994). The values were distributed into two groups: $<$ 3.5 or \geq 3.5.

The diagnostic criteria were as follows: dystocia, which refers to calving that requires manual intervention (Mee, 2008); retained placenta, defined as the non-expulsion of fetal membranes 24 hours after calving (Beagley et al., 2010); uterine infection (CE and pyometra), defined according to the criteria proposed by Sheldon et al. (2008). Cows that showed the reproductive disorders were treated by local veterinarians according to the farmers' demand.

Statistical analysis

The effect of the independent variables (parity, dystocia, RP, year of calving, rainy or dry season of calving and BCS at calving) on the frequency of postpartum disorders (dystocia, RP, CE) was assessed using the chi-square test with MINITAB, version 17.0. A binary logistic regression (odds ratio) was used to assess the association between risk factors and the frequency of dystocia, RP and CE. The difference between classifications of dependent variables was considered significant at $p <$ 0.05.

RESULTS

Out of 353 calvings and postpartum periods in 302 cows, the frequency of dystocia, RP and CE was 24.4%, 16.4% and 19.2%, respectively. Parity, year and season of calving had a significant effect on the frequency of dystocia, whereas no significant effect of BCS at

calving was observed. The risk of dystocia was 1.7 higher in primiparous than in multiparous cows (29.9% vs 20.4%; $p <$ 0.05). Cows that calved in 2014 were also six times more at risk of dystocia than cows that calved in 2013 (40.6% vs 10.1%; OR = 6.08; $p <$ 0.001). This frequency was higher in cows that calved in the rainy season (30.4%) than in those that calved in the dry season (17.0%) (OR = 2.14; $p <$ 0.01) (Table I). Like dystocia, the frequency of RP was higher in 2014 (21.8%; OR = 2.11; $p <$ 0.01) than in 2013 (11.7%). RP was more frequently observed after calvings during the rainy season (19.6%) than during the dry season (12.6%), but this difference was not significant ($p =$ 0.074). RP frequency was not significantly influenced by other tested factors (Table I).

Neither parity nor BCS at calving influenced CE frequency. Conversely, postpartum CE was significantly higher ($p =$ 0.001) in 2014 than in 2013 (28.6% vs 11.7%, respectively; OR = 3.03), and in the rainy season than in the dry season (28.8% vs 9.7%, respectively; OR = 3.78; $p <$ 0.001). Dystocia multiplied CE risk by 2.8 compared with calving without intervention (39.2% vs 14.1%; OR = 2.77; $p =$ 0.003). Finally, CE frequency was significantly higher after RP (64.3% vs 13.6%; OR = 15; $p <$ 0.001) (Table II).

DISCUSSION

The higher risk of dystocia observed in primiparous than in multiparous cows confirms the results of other studies (Rashad, 2011 ; Atashi et al., 2012). The effect of the year of calving on the frequency of dystocia in this study may result from our intervention. Indeed, cows that calved in 2014 were pregnant since 2013 when our monitoring began. Our monthly visits helped the farmers keep track of the dates of insemination and gestation and were thus able to predict the calving date, sometimes intervening even more than necessary. Conversely, cows that calved in 2013 were pregnant since 2012, when monitoring had not yet begun, the farmers had not recorded information, thus the calving date had not been predicted and intervention was not frequent. The frequency of dystocia differed depending on whether it was the rainy or the dry season. Other authors also observed this seasonal effect (Gaafar et al., 2011; Rashad, 2011; Atashi et al., 2012). Environmental heat stress due to a high temperature and humidity index could cause an increase in dystocia frequency. Like the results of Yildiz et al. (2011), our observations showed that BCS at calving did not have a significant effect on the frequency of dystocia. However, they conflict with that of other studies, which report that pure Holstein cows with a low ($<$ 3) (Hoedemaker et al., 2009) or a high ($>$ 3.5) (Avendano-Reyes et al., 2010) BCS at calving were more frequently affected by dystocia.

The increase in the frequency of RP in 2014 and during the rainy season was probably caused by the increase in the risk of dystocia that year and in that season. Dystocia is a major risk factor for retained placenta (Grohn and Rajala-Schultz, 2000; Gunduz et al., 2010; Kumari et al., 2015). Dystocia was more frequently observed in primiparous cows in this study. Other factors not assessed here may have an effect. Among them are cow genetics, the herd size (Islam et al., 2013), BCS (Hoedemaker et al., 2009; Islam et al., 2012), a short gestation period ($<$ 270 days) (Joosten et al., 1987; Kumari et al., 2015), the calf sex (Joosten et al., 1987), and calf stillbirth (Kumari et al., 2015).

The frequency of clinical endometritis recorded in our study was similar to that of 20% reported by Sheldon et al. (2008). It was higher than those of 9.4%–16.9% observed in Canada (LeBlanc et al., 2002; Dubuc et al., 2010), but lower than those of 23.6%–36.6% reported in other studies (Kim et Kang, 2003; Williams et al., 2005; Goshen et Shpigel, 2006; Gautam et al., 2010; Potter et al., 2010). The high frequency of endometritis in 2014 and during the rainy season resulted from an increase in the risk of dystocia and retained placenta during

Table I

Factors affecting the prevalence of dystocia and retained placenta in Holstein x Lai Sind cows (n = 302) in smallholdings in Vietnam

| Factors | Num. calvings | Num. observed cases | | Prevalence (%) | OR* | P |
|---------------------------------|---------------|---------------------|-------------|----------------|---------|---|
| | | Dystocia | | | | |
| | 353 | 86 | 24.4 | | | |
| Parity | | | | | | |
| Primiparous | 147 | 44 | 29.9 | 1.67 | < 0.05 | |
| Multiparous | 206 | 42 | 20.4 | | | |
| Year of calving | | | | | | |
| 2013 | 188 | 19 | 10.1 | 6.08 | < 0.001 | |
| 2014 | 165 | 67 | 40.6 | | | |
| Season of calving | | | | | | |
| Rainy | 194 | 59 | 30.4 | 2.14 | < 0.01 | |
| Dry | 159 | 27 | 17.0 | | | |
| Body condition score at calving | | | | | | |
| < 3.5 | 209 | 53 | 25.4 | 1.14 | > 0.05 | |
| ≥ 3.5 | 144 | 33 | 22.9 | | | |
| | | | | | | |
| | 353 | 58 | 16.4 | | | |
| Parity | | | | | | |
| Primiparous | 147 | 22 | 15.0 | 0.83 | > 0.05 | |
| Multiparous | 206 | 36 | 17.5 | | | |
| Year of calving | | | | | | |
| 2013 | 188 | 22 | 11.7 | 2.11 | < 0.01 | |
| 2014 | 165 | 36 | 21.8 | | | |
| Season of calving | | | | | | |
| Rainy | 194 | 38 | 19.6 | 1.69 | = 0.074 | |
| Dry | 159 | 20 | 12.6 | | | |
| Body condition score at calving | | | | | | |
| < 3.5 | 209 | 32 | 15.3 | 1.22 | > 0.05 | |
| ≥ 3.5 | 144 | 26 | 18.1 | | | |
| Dystocia | | | | | | |
| Yes | 86 | 19 | 22.1 | 1.66 | > 0.05 | |
| No | 267 | 39 | 14.6 | | | |

* Odds ratio

Table II

Risk factors for clinical endometritis in Holstein x Lai Sind cows in smallholdings in Vietnam

| Factors | Num. cows | Clinical endometritis | | OR* | P |
|---------------------------------|------------|-----------------------|-------------|------|---------|
| | | Num. cases | % | | |
| Total | 249 | 48 | 19.3 | | |
| Parity | | | | | |
| Primiparous | 103 | 22 | 21.4 | 1.25 | = 0.486 |
| Multiparous | 146 | 26 | 17.8 | | |
| Year of calving | | | | | |
| 2013 | 137 | 16 | 11.7 | 3.03 | = 0.001 |
| 2014 | 112 | 32 | 28.6 | | |
| Season of calving | | | | | |
| Rainy | 125 | 36 | 28.8 | 3.78 | < 0.001 |
| Dry | 124 | 12 | 9.7 | | |
| Body condition score at calving | | | | | |
| < 3.5 | 147 | 25 | 17.0 | 1.33 | = 0.374 |
| ≥ 3.5 | 102 | 23 | 22.5 | | |
| Dystocia | | | | | |
| Yes | 51 | 20 | 39.2 | 2.77 | = 0.003 |
| No | 198 | 28 | 14.1 | | |
| Retained placenta | | | | | |
| Yes | 28 | 18 | 64.3 | 4.74 | = 0.001 |
| No | 221 | 30 | 13.6 | | |

* Odds ratio

the same periods. Moreover, the frequent and unhygienic intervention of farmers during calving in 2014 might have led to an increase in the risk of uterine infections. These two disorders are major risk factors for clinical endometritis (Potter et al., 2010; Salasel et al., 2010; Giuliadori et al., 2013; Kadivar et al., 2014). The absence of effect of parity on the frequency of clinical endometritis in this study confirms other observations (Gilbert et al., 2005; Bacha et Regassa, 2010). However, our study did not confirm the negative effect of a low body condition score at calving reported by other authors (OR = 2.95) (Hoedemaker et al., 2009; Kadivar et al., 2014).

CONCLUSION

Our study showed the effects of the calving year and season on the risk of dystocia, retained placenta and clinical endometritis, and confirmed that dystocia and retained placenta are major causes of clinical endometritis. A decrease in the frequency of these three diseases and their potential effect on fertility can be obtained through i) better management of parturition especially in primiparous cows, by increasing hygiene or by selecting a bull adapted to the size of the heifer, and ii) a systematic examination of the cow by manual palpation of the genital tract and vaginoscopy to detect and treat as early as possible clinical endometritis.

The development of uterine diseases such as placental retention and clinical endometritis depends on the immune response of the cow, the species, and the number of bacteria. Many interactions between metabolism, inflammation and immune function have been described. Their understanding and therefore a better control of nutrition may lead to better approaches to prevent such reproductive diseases and to adapt more targeted treatments.

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Résumé

Nguyen-Kien Cuong, Hanzen C. Facteurs de risque des pathologies génitales du post-partum chez les vaches de race croisée Holstein x Lai Sind dans les élevages familiaux de Ho Chi Minh Ville au Vietnam

Au total, 353 vêlages et périodes post-partum de 302 vaches de race croisée Holstein x Lai Sind (H x LS), élevées dans 35 élevages familiaux dans le district Cu Chi à Ho Chi Minh Ville au Vietnam, ont été observés pour analyser les facteurs de risque de rétention placentaire, de dystocie et d'endométrite clinique. Les vaches ont été examinées par échographie et par vaginoscopie entre le 21^e jour post-partum et la première insémination (109 jours en moyenne). Les primipares ont eu 1,7 fois plus de risque de dystocie que les multipares (respectivement 29,9 % vs 20,4 % ; $p < 0,05$). La fréquence de dystocie a été six fois plus élevée en 2014 (40,6 %) qu'en 2013 (10,1 %) (*odds ratio* [OR] = 6,08 ; $p < 0,001$). Cette fréquence a également été plus élevée pendant la saison des pluies (30,4 %) que pendant la saison sèche (17,0 %) (OR = 2,14 ; $p < 0,01$). La fréquence de rétention placentaire a été plus élevée ($p < 0,01$) en 2014 (21,8 %) qu'en 2013 (11,7 %). L'endométrite clinique post-partum a été significativement plus présente en 2014 (28,6 %) qu'en 2013 (11,7 %) (OR = 3,03 ; $p = 0,001$), et pendant la saison des pluies (28,8 %) que pendant la saison sèche (9,7 %) (OR = 3,78 ; $p < 0,001$). La dystocie et la rétention placentaire ont multiplié respectivement par 2,8 ($p = 0,003$) et 4,7 ($p = 0,001$) le risque d'endométrite clinique.

Mots-clés : bovin, vache Holstein x Lai Sind, dystocie, rétention placentaire, endométrite, Viêt Nam

Resumen

Nguyen-Kien Cuong, Hanzen C. Factores de riesgo de enfermedades genitales post-parto en vacas de cruces Holstein x Lai Sind en pequeños establecimientos, Ciudad Ho Chi Min, Vietnam

Se observaron un total de 353 partos y periodos post-parto de 302 vacas de cruce Holstein x Lai Sind (HxLS), en 35 fincas familiares en el distrito de Cu Chi, Ciudad Ho Chi Min, Vietnam, con el fin de analizar los factores de riesgo de retención de placenta, distocia y endometritis clínica. Las vacas fueron examinadas entre el día 21 post-parto y el primer servicio (109 días de media) mediante ultrasonido y vaginoscopia. La prevalencia de distocia fue 1,7 veces más elevada en vacas primíparas (29,9%) que en múltiparas (20,4%) ($p < 0,05$). Fue también seis veces más elevada en 2014 (40,6%) que en 2013 (10,1%) (*odds ratio* [OR] = 6,08; $p < 0,001$). La frecuencia de distocia fue mayor durante la época lluviosa (30,4%) que durante la estación seca (17,0%) (OR = 2,14; $p < 0,01$). La prevalencia de retención de placenta fue mayor en 2014 (21,8%) que en 2013 (11,7%) ($p < 0,01$). La endometritis clínica post parto fue significativamente más elevada en 2014 (28,6%) que en 2013 (11,7%) (OR = 3,03; $p = 0,001$), y en la estación lluviosa (28,8%) que en la seca (9,7%) (OR = 3,78; $p < 0,001$). Distocia y retención placentaria multiplicaron por 2,8 ($p = 0,003$) y 4,7 ($p = 0,001$), respectivamente, el riesgo de endometritis clínica.

Palabras clave: ganado bovino, vaca Holstein x Lai Sind, distocia, retención de la placenta, endometritis, Vietnam

