PREVALENCE AND RISK FACTORS OF POSTPARTUM ANESTRUS IN HOLSTEIN x LAI SIND CROSSBRED DAIRY COWS IN SMALL FARMERS OF HO CHI MINH CITY

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Abstract

The aim of the study was to assess the prevalence of postpartum (PP) anestrus and the effect of factors on this prevalence in small dairy farmers. The data of 419 calvings and PP periods from 35 small dairy farms was collected during two years 2013 and 2014. Cows which failed to express estrus signs by day 60th after calving were submitted for manual palpation and transrectal ultrasonography to evaluate ovarian state. About 49.9% of observed cows were not detected in estrus by the stockman during the first 60 days PP. The prevalence of type I, type II, cystic, pyometral and detective anestrus (or subestrus) was 27.0, 6.7, 0.5, 0.7 and 15.0%, respectively. The presence of dystocia or uterine infection was accompanied by an increase in occurrence of the type I anestrus (36.7% vs 23.1%, P = 0.005; 41.4% vs 21.5%, P < 0.001, respectively). Cows with a low BCS at calving (< 3) or at the 30th day PP (< 2.5) showed more significant association to the type I anestrus than cows with a medium or high BCS at the same periods. In conclusion, the anestrus type I and subestrus were main types of PP anestrus in small dairy farms in HCMC. The dystocia, uterine infection, low BCS at calving and at day 30th PP constituted major risks of the type I anestrus.

Keywords: Postpartum anestrus, Holstein x Lai Sind crossbred, small farmers, Ho Chi Minh City (HCMC)

Introduction

The breeding of dairy cattle in Vietnam generally and in HCMC particularly is characterized by smallholders. In 2013, the number of dairy farms in Vietnam was approximately 17,828 farms of which 46.4% was distributed in HCMC. The dairy herd of city has reached 103,600 heads in 2015, and represents 37.6% of the national herd (Department of Agriculture and Rural Development – DARD HCMC, 2015). The number of farms with less than 20 animals counted 7,318 (88.5%), and the number of animals of these farms represents approximately 64.7% of municipal herd (DARD - HCMC, 2015). The small dairy farms have been faced with a lot of difficulties such as poor management (Loan *et al.*, 2004), high prevalence of mastitis (Ostensson *et al.*, 2013) and high prevalence of lameness (Nguyen-Kien and Tien, 2014). A recent study (Nguyen-Kien *et al.*, in press) registered a poor reproductive performance in cows raised on these farms in HCMC and the postpartum (PP) anestrus and the infertility are the major risk factors for this poor performance.

Anestrus is a broad term that indicates the lack of expression of estrus (or absence of estrous signs), despite efficient estrus detection (Peter *et al.*, 2009). It is one of the major causes of economic losses in both the dairy and beef industries because it results in an increase in waiting period, calving – conception

interval (days open) and calving interval of cows. This disorder occurs due to hormonal imbalance, nutritional deficiency and disease conditions (Islam *et al.*, 2013). The aim of the study was to determine prevalence of PP anestrus and to evaluate the effect of factors on this prevalence in small dairy farmers of HCMC.

Materials and Methods

Study area

The study was conducted in Cu Chi district, HCMC, located at latitude of 10°53' to 10°10' north and longitude 106°22' to 106°40' east. The studied area is characterized by a monsoon tropical climate with two seasons, a rainy season (RS) (May to Oct) and a dry season (DS) (Nov to Apr). The mean annual rainfall of this location is 1949 mm, with average of temperatures ranging between 26°C and 31°C and an average humidity of 62% in DS and 82% in RS.

Study population

A total of 419 calvings and PP periods from 35 small farmers was observed during two years 2013 and 2014. Cows are always kept in housing. They are fed twice a day. Their diet consists of forages (elephant grass or *Pennisetum purpureum*, natural grass and rice straw), concentrates and industrial byproducts (brewer's grain and cassava waste).

The PP anestrus was defined as the lack of expression of estrus after 50 - 60 days PP (Hanzen *et al.*, 2013). Cows which failed to express estrus signs by day 60th after calving were submitted for transrectal ultrasonography (KX5200 with 7.5 MHz linear-arry transducer, Echomedic) to evaluate ovarian state, and the types of anestrus were classified according to definitions (Table 1) proposed by Peter *et al.*, (2009).

Body condition scoring (BCS) was conducted at calving (±5 days) and day 30th (±5 days) PP according to the method described by Ferguson *et al.*, (1994) using a scale of 1 to 5 with 0.25 unit increments. Dystocia was defined when a cow calved with hard or light assistance. When a cow calved without separation of placenta within 24h, retained placenta (RP) was identified. Uterine infection was usually determined by identifying the contents in vaginal lumen (mucopurulent, purulent) with a speculum between the 7th and 60th day postpartum.

Table 1. Types of postpartum anestrus in dairy cows

Types of anestrus	Definition
Type I	Absence of follicles with diameter ≥ 10 mm, of corpus luteum (CL) and cysts in the ovary
Type II	Presence of follicles with diameter ≥ 10 mm, but absence of CL and cysts on the ovary
Cystic anestrus	Presence of a follicular or luteal structures with diameter ≥ 25 mm and absence of a CL in the ovary
Pyometral anestrus	Accumulation of a large amount of pus in the uterus and a persistent CL in the ovary
Detective anestrus (subestrus)	Presence of a functional or haemorrhagic CL and presence or absence of follicles with diameter ≥ 10 mm in the ovary

Statistical analysis

The effect of the independent variables (parity, season of calving, type of calving, RP, BCS at calving and at the day 30th PP) on the prevalence of anestrus type I was assessed using the Chi-square test in the MINITAB version 17.0.

Result

Prevalence and types of PP anestrus

The number of primiparous and multiparous cows is 168 and 251 lactations, respectively. The average of parity is 2.4 with a variation between 1 and 12. The prevalence and types of PP anestrus are presented in Table 2.

Table 2. Prevalence and types of PP anestrus in Holstein x Lai Sind crossbred dairy cows

Types of anoestrus	No. of anestrus	(%)
Type I	113	27.0
Type II	28	6.7
Cystic anestrus	2	0.5
Pyometral anestrus	3	0.7
Detective anestrus	63	15.0
Total	**209**	**49,9**

A half of observed cows (49.9%) were not detected in estrus by the farmers during the first 60 days in lactation. The examination of genital tract and ovaries by transrectal palpation and using ultrasound has revealed that the prevalence of type I, type II, cystic, pyometral and detective anestrus (or subestrus) was 27.0, 6.7, 0.5, 0.7 and 15.0%, respectively (Table 2).

Factors affecting the prevalence of type I anestrus

The result presented in Table 3 revealed that no signicant effect of partiy, season of calving, RP and change in BCS from calving to the day 30th PP on the prevalence of type I anestrus was observed. Conversely, other factors such as type of calving, uterine infection, BCSC and BCS30 have exercised a significant effect on this prevalence.

Table 3. Factors associated to the prevalence of type I anestrus

Factors	No. of cows	No. of anestrus	%	*P value*
Total	419	113	27.0	
Parity				
1	168	44	26.2	0.902
2	112	32	28.6	
≥3	139	37	26.6	
SC				
Rainy	236	68	28.8	0.334
Dry	183	45	24.6	
TC				
Normal	299	69	23.1	0.005
Dystocia	120	44	36.7	
RP				
No	346	91	26.3	0.502
Yes	73	22	30.1	
UI				
No	303	65	21.5	< 0.001
Yes	116	48	41.4	
BCSC				
< 3	111	40	36.0^{a}	(a) vs (b1): 0.038
3 – 3.5	223	56	25.1^{b1}	(a) vs (b2): 0.002
> 3.5	85	17	20.0^{b2}	
BCS30				
< 2.5	117	48	41.0^{a}	(a) vs (b1): 0.004
2.5–2.75	169	42	24.9^{b1}	(a) vs (b2): 0.000
> 2.75	133	23	17.3^{b2}	
CH				
> 0.5	141	46	32.6	0.063
≤ 0.5	278	67	24.1	

SC = season of calving, TC= type of calving, RP = retained placenta, UI= uterine infection, BCSC = body condition score at calving, BCS30 = body condition score at the day 30th PP, CH = change (decrease) in BCS from calving to day 30th in lactation.

Cows that showed a dystocia had a higher prevalence of type I anestrus than cows with normal calving (36.7% vs 23.1%, P = 0.005). The prevalence of this anestrus was higher in cows with uterine infection (41.4% vs 21.5%, P < 0.001) than that in cows without this disorder. Cows with a low BCSC (< 3) significantly showed a higher prevalence of the type I anestrus than cows with a medium (36.0% vs 25.1%, P = 0.038) or high BCSC (36.0% vs 20.0%, P = 0.002). Similarly, a high prevalence (41.0%) was observed in cows with a low BCS30 (< 2.5) compared with cows that presented a BCS between 2.5 – 2.75 (24.9%, P = 0.004) or higher than 2.75 (17.3%, P < 0.001).

Discussion

Postpartum anestrus is one of the main factors contributing to the increase in the waiting period and thus days open (Baruselli *et al.*, 2004). The types of PP anestrus in this study are mainly the type I, type II anestrus and detective anestrus (or subestrus). The subestrus is characterized by a normal estral cycle but the behavioral signs of heat are not manifested or are not observed by the famer. Previous studies have reported silent heat or subestrus affecting about 49 – 50% PP periods (Mwaanga and Janowski, 2000). Palmer *et al.*, (2010) also revealed a prevalence of subestrus of 39% in cows kept in housing. The result of our study showed a lower prevalence of subestrus (15.0%) compared with that of these authors. This

difference may be due to herd size (Roelofs *et al.*, 2010). The majority of observed farms were small herd with less than 20 heads, so heat detection may be easier.

In type I anestrus, there is growth of follicles to emergence without further deviation or establishment of a dominant follicle while in type II anestrus, there is deviation and growth, followed by either atresia or regression (Peter *et al.*, 2009). The prevalence of type I anestrus in the present study corresponds to that (10 – 30%) reported by previous studies (Mwaanga and Janowski, 2000). However, this is higher than value (19.1%) in crossbred dairy cows in Thailand reported by Chaidate *et al.*, (2014) and also than that (20.5%) in culled Holstein crossbred cows in HCMC (Nguyen-Kien and Hazen, 2013). The insufficient BCS at calving and early lactation of the observed cows (Nguyen-Kien *et al., in press*) may lead up to high risk of the type I anestrus, because this type of disorder frequently results from the negative energy balance (Peter *et al.*, 2009; Crowe *et al.*, 2014). This observation is again confirmed by a significant effect of BCSC and BCS30 on the prevalence of the type I anestrus (Table 3). This also agrees with observation of Hoedemaker *et al.*, (2009). In our other study, this prevalence increased with decrease in BCS (Nguyen-Kien and Hanzen, 2013). Cows with a low BCS showed in fact fewer follicles in the ovaries than cows with a high BCS (Maina *et al.*, 2008).

A significant effect of dystocia and uterine infection on the prevalence of the type I anestrus was observed in this study. This confirms the observation of Crowe *et al.*, (2014) that reported a delay of resumption of ovarian cyclicity in cows that showed a dystocia or uterine infection. The dystocia is a risk factor of metritis and clinical endometritis (Dubuc *et al.*, 2010). These uterine infections result in perturbation of the hypothalamus, pituitary and ovary; and in addition, absorption of bacterial components from the uterus can prevent the follicular phase LH surge and ovulation (Sheldon and Dobson, 2004). Thus, uterine infection results in a delay of first ovulation in PP (Kadivar *et al.*, 2014; Sheldon *et al.*, 2009).

In conclusion, the type I anestrus and detective anestrus contribute to increase of high prevalence of PP anestrus in small dairy farms in HCMC. The dystocia, uterine infection and low BCS at calving and in early lactation were major risk factors for the type I anestrus.

References

1. Baruselli, P. S. *et al.*, 2004. *Anim. Reprod. Sci.* 82-83: 479.
2. Chaidate, I. *et al.*, 2014. *Anim. Sci. J.* 85: 861.
3. Crowe, M. A. *et al.*, 2014. *Animal.* 8: 40.
4. Dubuc, J. *et al.*, 2010. *J. Dairy Sci.* 93: 5764.
5. Ferguson, J. D. *et al.*, 1994. *J. Dairy Sci.* 77: 2695.
6. Hanzen, Ch. *et al.*, 2013. *Rev. Afric. Santé et Prod. Anim.* 11: 91.
7. Hoedemaker, M. *et al.*, 2009. *Reprod. Domes. Anim.* 44 : 167.
8. Islam, M. *et al.*, 2013. *Vet. World,* 6: 180.
9. Kadivar, A. *et al.*, 2014. *Trop. Anim. Health Prod.* 46: 121.
10. Loan, C. T. K. *et al.*, 2004. *J. Fac. Agri, Kyushu Univ.* 49: 497.
11. Maina, V. A. *et al.*, 2008. *Asian J. Sci. Res.* 1: 421.
12. Mwaanga, E. S. and Janowski, J. 2000. *Reprod. Dom. Anim.* 35: 193.
13. Nguyen-Kien, C. and Hanzen, Ch. 2013. *Rev. Elev. Med. Vet. Pays Tropic.* 66: 85.
14. Nguyen-Kien, C. and Tien, N. V. 2014. *Vet. Sci. Tech.* 21: 43.
15. Ostensson, K. *et al.*, 2013. *Trop. Anim. Health Prod.* 45: 979.
16. Palmer, M. A. *et al.*, 2010. *Theriogenology.* 74: 255.
17. Peter, A. T. *et al.*, 2009. *Theriogenology.* 71: 1333.
18. Roelofs, J. *et al.*, 2010. *Theriogenology.* 74: 327.
19. Sheldon, I. M and Dobson, H. 2004. *Anim. Reprod. Sci.* 82-83: 295.
20. Sheldon, I. M. *et al.*, 2009. *Reprod. Domest. Anim.* 44: 1.