

A STUDY ABOUT MASTITIS INFECTION CHARACTERISTICS IN DAIRY COW OF BAVI, HANOI, VIETNAM

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ABSTRACT

Objective: The present research was performed to investigate the prevalence of mastitis infection in Bavi, Hanoi, Vietnam, and also to study the relationship between places, seasons, and cow breeds with the disease occurrence.

Methods: Mastitis infection was diagnosed by clinical symptoms observation and California mastitis test (CMT). The results of these 2 methods were then analyzed to understand the clinical and subclinical infection. The infected cases were also separated to different places and breeds to analyze the relationship with disease prevalence. In the seasonal investigation, the mastitis infection was diagnosed continuously over 1 year with the aid of farm managers and local veterinarians.

Results: Positive infection detected by CMT kits were significantly higher than that of the clinical symptoms diagnose, suggested the involvement of subclinical infection cases, the infection in which no clinical symptoms could be observed. There was no significance difference between places and seasons, however, the occurrence in summer was higher than other seasons. The Holstein Friesian (HF) purebred had significantly higher infection rates compare to crossbreds. In addition, there is a trend of increased percentage of the prevalence of mastitis in higher generations.

Conclusion: The prevalence of mastitis in Bavi is lower than other parts of Hanoi and other places in Vietnam. Crossbreds F1HF and F2HF had significantly low sensitivity to mastitis and were recommended for dairy cow husbandry. Summer is the most risky time for mastitis and, therefore, requires the application of appropriate preventive methods.

Keywords: Clinical mastitis, Subclinical mastitis, Dairy cows, Breed, Season, Prevalence, Bavi.

INTRODUCTION

Mastitis is one of the most common and costly diseases in dairy production worldwide [1,12,14,15]. Mastitis cause losses in the form of costs for veterinarian and treatment, discarded milk due to treatment with antibiotics, decrease in milk production, premature culling, replacement of animals, more work, poor milk quality, and increased risk of infection in the future [40]. Mastitis also affects milk quality and, therefore, human safety [18,39,58]. Many factors influence the incidence of mastitis, such as production stages of a cow [34], [45], lactation number [3,7,45], herb management [2,32,46], husbandry environment [34], temperature, humidity, seasons, breeds, and milking characteristics [8,14,16,17,34,42,44].

According to Vietnam Statistic Institute [55], total dairy cows in Vietnam are more than 137000 cows, in which Hanoi has about more than 8500 cows. In Hanoi, Bavi is the most developed area among 7 areas which have been considered as areas for dairy cow husbandry [54]. In 2011, Bavi had 4826 dairy cows, occupying more than 50% of total dairy cows in Hanoi [55]. Bavi has much potential to develop because it is located near Hanoi center, the big cow milk consumed market. In addition, Bavi also has many other advantages such as large land for graze and glass cultivation, experienced farmers and support strategies from local government. In Vietnam, mastitis has been the disease which caused much of loss in dairy cow husbandry [4,20-23,27,29,35-37,52]. Similar to many other areas in Vietnam, mastitis causes also caused much of a loss on dairy cows in Bavi [4,19,26]. In Vietnam, the relationship between mastitis incidence with environmental factors and cow breeds has been reported in Hochiminh city [25]. However, there is no study about the prevalence and the epidemiological characteristics of mastitis in Bavi

area, such as how the infection distributed over places, seasons, and cow breeds. Therefore, we performed this investigation in Bavi to understand the mastitis prevalence and also the relationship between places, seasons, and cow breeds with the mastitis incidence. Information about these epidemiological characteristics would help the dairy cow farm managers to take preventive measures for effectively avoiding infection, and also for local governors to enforce appropriate strategies in the whole area.

METHODS

The clinical mastitis diagnose

The clinical diagnose was performed based on the clinical symptoms of mastitis, following the guidance written in the animal reproduction text-book [28]. The typical symptoms of mastitis including: The change in udder such as swelling, heat, hardness, redness, or pain; the change in milk such as a watery appearance, flakes, clots or pus. Other symptoms are reduction in milk yield; increment in body temperature, lack of appetite, sunken eyes, signs of diarrhea, and dehydration, reduction in mobility due to the pain of a swollen udder or unwell feeling.

The California mastitis test (CMT) mastitis diagnose

The fresh milk from each quarter of individual dairy cow was used to test with CMT kits [41]. The milk samples were collected by local veterinarians under the supervision and following the guidance from Department of Reproduction, Faculty of Veterinary Medicine, Vietnam National University of Agriculture, Hanoi, Vietnam.

The distribution of the mastitis in different places and cow breeds

The investigation on mastitis was performed on 6 communes in Bavi, including Tan Linh, Van Hoa, Yen Bai, Ba Trai, Tong Bat and Phu Dong.

The results of clinical and subclinical infection incidences were then separated according to different places and different cow breeds in order to analyze the relationship of these 2 factors with the disease infection. In cow breeds, the generation is defined by the level of Holstein Friesian (HF) blood in the cow. The investigated cow breeds included: Purebred HF (HF), F1 generation from purebred HF bulls and local Lai Sin native cows (F1HF), F2 generation from F1HF bulls and local Lai-Sin native cows (F2HF), F3 generation from F2HF bulls and local Lai-Sin native cows (F3HF).

The distribution of the mastitis over the 4 seasons

The seasonal survey was conducted from April 2010 to April 2011. Throughout the year, farmers reported and confirmed the mastitis infection with the aid of local veterinarians. Confirmed infected cases were reported to the local veterinary control officers and the distribution of mastitis over the different seasons was evaluated by using these data. Due to the economic limitation in using CMT kits, only the clinical diagnose was involved in this investigation.

Statistic analyze

Data were analyzed using the Statcel software (Yanai Hisae, laboratory of mathematics, Faculty of Science, Saitama University, 1998). The result was considered significant at $p < 0.05$.

RESULTS

The prevalence of mastitis in dairy cows in Bavi

In order to evaluate the mastitis infection of dairy cows in Bavi, Hanoi, we determined the infection by the 2 methods, including clinical observation and CMT in 6 communes of the area. The results were shown in Table 1.

From Table 1, we see that the prevalence of mastitis is 22.30% in clinical cases and 40.06% in subclinical cases. There was no difference in mastitis incidences between the locations, by both of clinical symptoms and CMT diagnoses methods. In contrast, there was the significant difference in the results of the two diagnose methods. The numbers of infected cows detected by CMT kits were always higher than those detected by clinical symptoms observation in all of 6 locations, and the significant difference was found in 3 cases.

The prevalence of mastitis on different cow breeds

In order to examine the effect of cow breeds on the mastitis infection, we investigated the prevalence of the disease on different breeds. The results were shown in Table 2.

The results showed that the mastitis infection in HF breed was significantly higher than those of the crossbreeds F1HF and F2HF, but was not significantly different with that of F3HF. The Chi-Square test did not show any significant differences between 3 crossbred generations: F1HF, F2HF, F3HF, however there was the tendency in increased subclinical mastitis along with the increasing crossbred generation, in which $F3HF > F2HF > F1HF$, correspondent to $25.33\% > 23.23\% > 21.50\%$.

The prevalence of mastitis over the season

In order to evaluate the effect of the season on mastitis prevalence, we investigated the disease occurrence through different seasons in a year. The results are shown in Table 3.

From Table 3, we see that the prevalence of the disease over a year is from 22.28% to 25.71%, with the average of 22.19%. The highest infection rates belonged to the summer season, at 25.71%.

DISCUSSION

The prevalence of mastitis in dairy cows in Bavi

The prevalence of mastitis in Bavi was 22.30% in clinical cases and 40.06% in subclinical cases. Our results are similar with the results of Nguyen Ngoc Nhien [19], who performed the research in Bavi Dairy Cow and Glass Land Research Center, one place in Bavi, and reported

Table 1: The prevalence of mastitis infection in 6 communes in 2010

Commune	Tested cows (number)	Clinical symptoms observation		CMT kits	
		Infected cows (number)	%	Infected cows (number)	%
Tan Linh	200	47	23.50	74	37.0*
Van Hoa	200	45	22.50	85	42.50**
Yen Bai	200	43	21.50	82	41.00**
Ba Trai	14	3	22.43	6	42.86
Tong Bat	46	10	21.74	18	39.13
Phu Dong	44	9	20.40	17	38.64
Total	704	157	22.30	282	40.06

CMT: California mastitis test, Bold letters indicates the cases in which the number of infected cows detected by CMT kits is significantly higher than that by clinical symptoms observation by Chi-square test. * $p < 0.05$, ** $p < 0.01$

Table 2: The prevalence of mastitis on different cow breeds

	HF	F1HF	F2HF	F3HF	Tổng
Number of cows	50	200	150	150	550
Number of infected cows	19	43	35	38	135
%	38	21.50*	23.33*	25.33	24.55

Bold letters indicates the cases in which the number of infected cows is significantly higher than that of HF breed. * $p < 0.05$ by Chi-Square analyze, HF: Holstein Friesian

Table 3: The clinical mastitis infection rates of dairy cows in Ba Vi district in 4 different seasons

Season	Observed number	Infected number	%
Winter	700	156	22.28
Spring	700	154	23.00
Summer	700	180	25.71
Autumn	700	151	22.57
Average			22.19

that the prevalence of subclinical mastitis was 43.16%. In our results, there was no significant difference in mastitis incidences between the locations, by both of clinical symptoms and CMT kits diagnose methods. Depending on the differences in management practices and animal care, the impact of the disease varies between herds [25]. The similarity in the infection among different places in our study can be explained by the fact that those places are near to each other, and also because that the farm managers and labors in those places have same technical level. In comparison with other areas of Hanoi, the prevalence of mastitis in Bavi is lower. Dung [50] reported that the subclinical mastitis prevalence in Hanoi Cow Breeding Center was 51.92%, higher than the result of our study: 40.06%. The mastitis prevalence in Bavi was also less than other areas of Vietnam, such as 69% in Hochiminh city [25] and 61% in Dong nai province [57]. The situation of less infection rates in Bavi can be explained by the better in hygiene conditions and veterinary management in the area. Bavi has longer history of dairy cow husbandry compare to other areas in Vietnam, and, therefore, the technical levels of farmers are higher. In our observed farms, hygiene and prevention methods such as culling the chronically infected cows, cleaning the teats before milking, dipping the teats after milking were performed, while those methods were not usually applied in other areas [25]. Similar to Norman *et al.* [31], we believed that mastitis control methods play an important role on the disease control.

In our study, we found the significant difference in the results of the two diagnoses methods. The numbers of infected cows detected by CMT

kits were always higher than that numbers detected by CMT kits in all 6 locations, and the significant difference was found in 3 cases. Many researchers reported that cases of subclinical mastitis were usually much higher than those of clinical mastitis [25,53,58]. These results can be explained by the reason that CMT test based on the somatic cell count and, therefore, is able to detect both of clinical and subclinical mastitis. Because subclinical mastitis does not create visible changes in the milk or the udder, it is usually diagnosed as negative by clinical symptoms observation. It is necessary to detect subclinical infection because subclinically infected cows might precede the clinical form, and they also produce less quality milk and become the source of infection to other herb animals [9,48]. In the mastitis control, routine monitoring and detection of both clinical and subclinical infection are key components of a herd health program [6]. Detection of both clinical and subclinical infection provides the farmers with information to take necessary preventive methods for the better control of this important disease.

The prevalence of mastitis on different cow breeds

Our results showed that the mastitis infection in HF breed was significantly higher than those of the crossbreds F1HF and F2HF. These results are similar with the previous study of Dung [51]. It is because that HF purebred was imported from temperate Zone countries with developed husbandry facilities and methods, so their immunological resistance is weaker in the adaptation with tropical climate and different husbandry conditions. However, the advantage of crossbred in less sensitivity to the disease than the purebred was not observed in F3HF. In our study, even though Chi-square test did not show any significant differences between crossbred generations, there was the tendency in increased sub-clinical mastitis along with the increasing crossbred generation. Our results is similar with the results of Thao *et al.* [25], who researched on only crossbred generation from HFF1 to HFF3 and > F3 and reported that even there was no significance difference in the infection prevalence of 3 crossbred generation F1HF, F2HF, and F3HF, the mastitis occurrence was increased along with the generations, in which F3HF > F2HF > F1HF. Our results are also in accordance with the study of Van [38] and of Thanh [57]. The results can explained by the fact that the high inheritance from local native Lai-Sin breeds provided the high ability of adaption to tropical climate and local conditions, which results in higher resistance to all the diseases, including mastitis. F1HF has 50% gene inheritance from the local breed, while it reduces to 25% in F2HF and 12.5% in F3HF. In addition to the decrement in disease resistance, the deterioration in the milk yield and fertility from second half-bred F2 has also been reported worldwide [11,13,33,47]. In Vietnam, Trach [30] and Dat [24] reported that the declines in reproductive performance and even milk productivity were observed as the level of exotic inheritance increased above 75%, and therefore recommended crossbreds with 50-75% HF inheritance, correspondent to F1HF and F2HF crossbreds, for the dairy cow husbandry in Vietnam. Additional to the productivity performance, our study also recommended the F1HF, F2HF crossbreds in dairy cow husbandry because of the significantly lower disease infection.

The prevalence of mastitis over the seasons

The prevalence of the disease over a year is from 22.28% to 25.71%, with the average of 22.19%. Following the standard criteria in Vietnam [56], the mastitis control of a farm is evaluated at a good level when the prevalence of the clinical mastitis ranged from 20% to 30%. From the results, mastitis control in investigated area is considered at a good level throughout of the year. Similarly to the lower prevalence of the disease in Bavi compared with other locations in Vietnam which mentioned in part 1: The prevalence of mastitis infection in 6 communes, this good level in mastitis control can be explained by the good technical levels of farmers in the area. Even though there is no significant difference, we observed the higher trends of infection in summer. Many researchers have reported that there was the relationship between the season and the clinical mastitis infection [10,49]. High prevalence in summer can be explained by the high in temperature and humidity. Smith *et al.* [43] studied rates of infection with environmental pathogens, and concluded

that the stress of high temperatures and humidity could have increased the susceptibility to infection as well as increased the number of pathogens to which cows were exposed. It is also reported that in the country with 4 season climate, the mastitis has trend of higher prevalence in summer due to the preferable temperature, and humidity conditions for the development of insects carrying pathogens and bacteria [5,56]. Our results suggested that in Bavi area, during the year, preventive methods must be focused more on summer because of high risk on mastitis.

CONCLUSIONS

The present study shows that the prevalence of mastitis in Bavi is lower than other parts of Hanoi and other places in Vietnam. The higher in subclinical infection suggested that the routine subclinical diagnose, such as CMT method, should be applied to detect this disease levels for appropriate preventive methods. Crossbreds HF1 and HF2 had significantly low sensitivity to mastitis and were recommended for dairy cow husbandry. During the year, summer is the most risky time, and, therefore, the necessary control methods are required. The information from this study should be referred by the farmers and local governors in Bavi to have appropriate strategies in the control of mastitis disease.

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