

Original article

INCIDENCE AND PREVALENCE OF SUBCLINICAL MASTITIS IN SMALL HOLDER DAIRY FARMS OF CHIANG MAI PROVINCE, THAILAND

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Abstract Four smallholder dairy farms in Mae-On subdistrict, Chiang Mai Province were selected in order to determine the prevalence of subclinical mastitis and pathogens associated with intramammary infection in lactating cows during October 2002 to September 2003. The results indicated that the incidence of subclinical mastitis were 2.90, 2.15, 3.88 and 4.80 cases per cow-years at risk for farm 1, 2, 3 and 4, respectively. The overall incidence rate was 3.37 cases per cow-years at risk. The prevalence of subclinical mastitis in farm 1, 2, 3 and 4 were ranged 0-33.3%, 14.3-50.0%, 36.4-71.4%, and 36.4-83.3%, respectively. The most prevalent bacterial pathogens associated with intramammary infection were Coagulase-negative staphylococci (13.1-27.0%), Environmental Streptococci (0-49.5%) and Yeast (2.7-29.4%). The incidence and prevalence of subclinical mastitis in these selected farms is quite high. Subclinical mastitis still is an important problem in this area.

Keywords: Incidence, Prevalence, Subclinical mastitis, Smallholder dairy farms

Introduction

Smallholder dairy farms are important contributors to the dairy marketing in Chiang Mai Province. More than 95% of dairy farms in this area are smallholder dairy farms which have less than 25 cows in the farm.⁽¹⁸⁾ Most farmers have mismanaged in mastitis control tech-

niques and do not have proper knowledge of subclinical mastitis.⁽¹⁴⁾ Moreover, many farms has the bulk tank somatic cell count in the high level.⁽¹⁵⁾ Therefore, subclinical mastitis is one of the major causes of low quality milk in this area.

Mastitis, especially subclinical mastitis, is a major impediment to increased

milk production and has been identified as a very costly disease.⁽³⁾ Mastitis is usually associated with microbial infection.^(12,16) Staphylococcal and Streptococcal species^(4,12) are the most-frequent microbes with Staphylococcal species being the most common.^(2,7,9,13) Previous study in Chiang Mai⁽¹⁵⁾ indicated that mastitis is also an important problem here. Work in many countries has shown that, besides cow-level factors, specific management and disease-control practices influence the occurrence of subclinical mastitis.^(9,16) Moreover, a study in 2002⁽¹⁷⁾ showed that the most evidence bacteria from subclinical mastitic cow in Chiang Mai and Lamphun Province were *Staphylococcus spp.* and *Streptococcus spp.*, respectively. Epidemiology of subclinical mastitis is an important part in developing an appropriate strategy for prevention and controlling of the disease in this area. This study aimed to determine the prevalence of subclinical mastitis and pathogens associated with intramammary infection in lactating cows of smallholder farms in Chiang Mai Province, Thailand over a one-year period.

Materials and methods

Study herds

Four smallholder dairy farms in Mae-On Subdistrict, Chiang Mai Province were selected in order to investigate the subclinical mastitis problem during October 2002-September 2003. These herds had 5-10 milking cows and had bulk milk production about 60-140 kilo-

grams/day. They used bucket type milking machine and milked twice a day. A regular monthly farm visit by veterinarians for 8-9 times during this period was done to examine udder health of lactating cows and to collect the milk sample to the laboratory. The California Mastitis Test (CMT)⁽⁶⁾ was applied to determine subclinical mastitis at cow site in morning milking. Milk from CMT positive cows would be aseptically collected from all quarters before milking.⁽¹¹⁾

Milk cultures

Ten microliters of individual quarter milk sample from subclinical mastitis case was cultured on 5% bovine blood agar plates. Plates were incubated at 37 °C for 24 hours. Bacterial number in a quarter milk culture was defined as colony forming units (CFU) per 0.01 mL. Diagnosis of bacteria as probable significant and highly significant cause of mastitis is based on the National Mastitis Council's guidelines for significance of colony number of specific organism.⁽¹¹⁾ Mastitis causing pathogens are classified into 11 groups including *Staphylococcus aureus*, Coagulase-negative staphylococci, *Streptococcus agalactiae*, Environmental streptococci, *Klebsiella spp.*, *Enterobacter spp.*, *Escherichia coli*, *Pseudomonas spp.*, *Corynebacterium bovis*, Yeast, and No growth.

Incidence of subclinical mastitis

Data collection for all herds began on 1 October 2002 and continued for 12

consecutive months. Each selected farm was visited monthly by veterinarian. Subclinical mastitis was diagnosed by using CMT. A minimum of 1 month had to elapse between two cases of subclinical mastitis in order for them to be considered as separate cases. The incidence of mastitis was calculated for each herd as the number of cases per cow-years at risk.

Prevalence of subclinical udder infections

In addition to the monthly visit to each participating farm by the veterinarian, the prevalence of subclinical mastitis was determined for each month, and it was presented in the range of minimum and maximum percentage of each farm. Moreover, the prevalence of major patho-

gens associated with subclinical mastitis was determined by using the milk culture data. The prevalence of each pathogen was presented in percentage of all subclinical mastitic milk samples from each farm.

Results

Our selected smallholder dairy farms had an average milking cow ranged 6.4 to 9.5 (Table 1). The incidence of subclinical mastitis expressed as the number of subclinical mastitis cases per cow-years at risk were ranged 2.15-4.80 cases per cow-years at risk (Table 1). The overall population estimate was 3.37 cases per cow-years at risk. The prevalence of subclinical mastitis in these selected farms were ranged 0-83.3% (Table 1). However, levels of subclinical

Table 1. Subclinical investigation in smallholder dairy farms of Chiang Mai Province during 2002-2003

Herd	1	2	3	4
Average daily milking cows (mean±SD)	6.4±0.5	9.5±3.0	8.4±2.4	9.0±2.5
Incidence of subclinical mastitis (cases per cow-years at risk)	2.90	2.15	3.88	4.80
Prevalence of subclinical mastitis(%)	0-33.3	14.3-50.0	36.4-71.4	36.4-83.3
Intramammary Infection Pathogens (%)*				
<i>Staphylococcus aureus</i>	0	5.4	0	0
Coagulase-negative Staphylococci	17.7	27.0	18.8	13.1
<i>Streptococcus agalactiae</i>	0	0	0	0
Environmental streptococci	0	32.4	11.3	49.5
<i>Klebsiella spp.</i>	0	0	1.25	0
<i>Enterobacter spp.</i>	0	2.7	5.0	3.0
<i>Escherichia coli</i>	0	0	0	0
<i>Pseudomonas spp.</i>	0	0	2.5	2.0
<i>Corynebacterium bovis</i>	5.9	0	6.3	5.1
Yeast	29.4	2.7	0	0
No growth	47.1	29.7	55.0	27.3

* Percentage of pathogens isolated from all subclinical mastitic milk samples from each farm

mastitic cow seemed to be high in all farms and could reach 75 percent of milking cow (farm 3 and 4). There was no mastitis due to *Streptococcus agalactiae* intramammary infection in our selected farms. *Staphylococcus aureus* could be isolated only from farm 2. Environmental Streptococci was major responsible pathogen for subclinical mastitis in 3 from 4 farms, while coagulase-negative staphylococci were major pathogen in all farms. Yeast was also high responsible for mastitis in one farm (farm 1).

Discussion

Many studies have measured the occurrence of bovine udder infection. Most researchers have measured either incidence of clinical cases of mastitis or prevalence of intramammary infection as determined by microbiological culture. There are undoubtedly true geographical differences in mastitis occurrence around the world. These differences could be associated with factors such as climate, breed of cattle, level of production, and management. Comparisons among different geographical locations should be made with care because of the large number of important methodological and epidemiological factors that vary among the different studies. However, in present study, the incidence and prevalence of subclinical mastitis in these selected farms was quite high. A cow in these selected farms could be suffered from subclinical mastitis more

than two times in a year. This result indicated that subclinical mastitis still is an important problem in this area.

In this study, we found that the majority of pathogens associated with intramammary infection were Coagulase-negative staphylococci (CNS), Environmental streptococci and Yeast. CNS are opportunistic microorganisms which are normally found on teat skin and on the hands of milkers. In this study, CNS are the major responsibility for subclinical mastitis in one farm (farm 3). This group of bacteria is the most common pathogen for mastitis and intramammary infection around the world.^(1,2,9,17) Environmental streptococci can be found in the environment surrounding the cow including bedding, stall, fences, cow skin and feces. Environmental streptococci can be responsible for clinical and subclinical mastitis with the vary proportion.⁽⁵⁾ Management of exposure to environmental streptococci is essential and requires assessment of the risk of exposure (especially in bedding and other lying areas), reduction of teat-end contamination, and good hygienic milking practices. Yeast is the other less common form of mastitis. Quarter infection with *Candida spp.* (yeasts) may also occur.^(8,10) Yeast mastitis should be suspected in cows with a history of unsuccessful antibiotic therapy and intensification of clinical symptoms after antibiotic infusion. The mastitis control program particular in milking hygiene and farm management need to be re-

assessed. Additional mastitis preventive program has to be immediately applied to these farms. The management style and milking procedure associated with subclinical mastitis and intramammary infection should be investigated in further studies.

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