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Management practices related to the incidence of sub clinical mastitis (SCM) in lactating dairy cow in Banyuwangi, Indonesia

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Abstract. Mastitis is one of the overwhelming diseases in the dairy cow industry and it has reduced milk yield, quality and increased cow's culling rate. This study was carried out to establish the prevalence of subclinical mastitis in the lactating dairy cow in Banyuwangi regency, East Java, Indonesia. Forty-nine milk samples from 13 head dairy cows were tested for subclinical mastitis using the California Mastitis Test (CMT). The descriptive statistics were performed, and the association between the management practice and incidence of subclinical mastitis was also analyzed using GLM. The result shows that subclinical mastitis was associated with milking type, washing before milking, pre-dipping with warm water and post dipping with iodine. Based on this result, we conclude that mastitis in Banyuwangi is relatively high and need more corcern related to management practice to prevent and reduce SCM incident in lactating dairy cow.

1. Introduction

Dairy farming is a source of animal protein for the community. East Java is the largest milk-producing province in Indonesia. Although there is an increase in production, it has not been able to keep up with the increasing demand for milk, so it is still being done [1]. One of the determinants factors that caused the downturn in milk production in Indonesia is due to mastitis. Mastitis is a condition that often influences lactating dairy cattle and can reduce milk production by 2.6-43.1% [2].Moreover, this infection is a problem in the world dairy industry and can potentially zoonosis to humans from bacterial contamination in milk [3]. Mastitis is caused by various microbes, both pathogenic as a result of infection (contagious) and bacteria from the environment (environmental mastitis) [4]. Mastitis is categorized as subclinical mastitis and clinical mastitis. Clinical mastitis is indicated by unexpected onset, changes in the composition and form of milk, decreased milk yield, and significant signs of inflammation of the infected udder from the environment. Clinical mastitis is very visible and easy to detect.

In contrast, subclinical mastitis showed no apparent signs unless in the udder or milk, but milk production declined, and the number of somatic cells increased. It is more common and has profound implications for older dairy cattle than in the first nursing calves [5]. Mastitis spread from livestock to livestock most commonly occurs during milking and can cause sub-clinical mastitis and even clinical mastitis [6]. The farmer can identify the SCM occurrence using the California Mastitis Test (CMT) to control livestock health, especially from mastitis attacks [7]. The incidence of sub clinical mastitis in

Banyuwangi is unknown, so this study aims to analyze association of magamenet practice with subclinical mastitis in dairy farms in Banyuwangi.

2. Material and Methods

2.1 Sample collection and CMT identification.

The study was conducted in Banyuwangi Regency, East Java province, Indonesia. Forty-nine milk samples were collected from 13 lactating dairy cattle selected by a purposive sampling method from Kaligondo Dairy Farmer Group and Ijen Makmur dairy farmer Group. The breed of cattle was Frisian Holstein (FH), and the milk samples were collected using a 15 mL conical tube. The milk stored at the cooler box was then tested by California Mastitis Test immediately to establish Subclinical Mastitis (SCM) [8]. A five mL of milk from the quarter teat and CMT reagent were poured into a CMT paddle and twisted in an annular movement to mix the milk and CMT reagent. The gel configuration was identified within 20 sec. The occurrence of SCM determines by gel formation and divided into four categories. The score is negative showed by the appearance of the mixture remains liquid and no evidence of precipitate. Trace one if there are slight precipitate and disappear with continued movement. The CMT score one if the discrete mixture precipitate but no tendency toward gel structure. The CMT score is two if the mixture solidifies immediately and goes toward the center of the paddle. The worst SCM showed by CMT scores three presented by the gel structure, and the mixture's surface becomes curved [9].

2.2. Data analysis.

The management and characteristics of the farm was ascertainment by questionnaire and interview with farmers. Descriptive statistics and analysis of variance using oneway anova performed to establish the relation of management practice and incident of SCM.

3. Results and Discussion

3.1. Prevalence of SCM.

CMT test showed that the prevalence of SCM in Banyuwangi was 69.39% (34/49). With this positive CMT result, it identified that dairy cows had mastitis that varied from CMT 1 to CMT 3. Various kinds of bacteria caused mastitis, and the one that often encountered was *Staphylococcus spp*. *Coliforms* and fungi [10,11]. *Staphylococcus aureus* is the most common strain found in mastitis infections. Followed by *Enterococcus spp, staphylococcus agalacticae,* and *Steptocuccos dysgalaciae* [12,13]. Mastitis infection can cause a decrease in milk production by 0.7 Kg/quarter to 1.4 Kg/quaternary udder and can cause a decrease in milk quality such as decreased protein, lactose, and fat [12,13]. *E. Coli* bacteria were detected to cause the greatest loss of 10.6% (3.5 Kg/day) of the total production for 305 days on dairy farms in Finland [14].

Moreover, *Staphylococcus aureus* diagnosed at the age of 54-120 days of lactation and its causes a decrease of 4.3% (1.4 kg/day), while mastitis caused by *Staphylococcus uberis* and *Staphylococcus dysgalactiae* can reduce milk production by 3.7% (1.2 kg/day) to 6.6% (2.1 Kg/day) [14]. Mastitis trend is straightforward to spread, especially on farms that do milking by hand. This evidence is due to cross-contamination from infected animals to healthy animals. The summary of SCM analysis results for the dairy cow group in Banyuwangi is presented in Table 1.

Table 1. Prevalence of SCM in Banyuwangi Regency

CMT Score	Cow number	Prevalence
Negative	15	30,615
Trace	0	00,00%
CMT 1	13	26,53%
CMT 2	18	36,73%
CMT 2	3	6,12%

3.2. The Management and Characteristic of Dairy Farm

The dairy farmer in Banyuwangi raised FH cattle and managed intensively. The cattle keep in the house and fed by forage, crop residues (rice straw, corns stalks), and tofu waste (*ampas tahu*) as a concentrate. All cows were milked twice a day in the morning and evening, the milk yield of a cow range from 10 to 15 L per day. Sometimes the cow from Kaligondo dairy farm produces milk until 20 L per day. During the study, data on various management and hygienic practices were implemented by the dairy farms. A summary of data on the practices assessed was presented in Table 2.

Table 2. Management practice in Banyuwangi dairy farm

Variable	Category
Housing	Group
Management type	Intensive
Bedding material	Rubber base
Culling the infected cow	No
Hand prewashing	Yes, with soap
Farm hygien	Good, daily cleaning
Lactation stage	Early (1 to 2 months) and mid (3 to 6 months)
Parity	2 - 5
Age	3 to 7 years

Table 3. Association of management practice with incident of SCM in dairy cow

Factors		F *value*	p-value
Age	3 years	3,291	0,076
	7 years		
Milking type	Machine	7,165	0,011
	Hands		
Lactation stage	Early (1-2 months)	3,501	0,067
	Mid (3-6months)		
Washing	Yes	7,165	0,011
	No		
Parity	2	1,486	0,229
	5		
	No		
Pre dipping	Yes	7,165	0,011
	No		
Post-dipping	Yes	7,165	0,011
	No		

Note: p-value <0,05 show significant at α 5%

This study shows that milking type, washing before milking, pre dip with warm water before milking and post dip with iodine after milking have significant association with incident of SCM in lactating dairy cow at the level of α 5%. Farmers do teat pre-dipping with warm water before milking

to stimulate the oxytocin in the release of milk. However, at Ijen Makmur, pre-dipping with warm water is not done. After washing, they immediately milked the cow. Post-dipping with iodine was carried out at both farms in Banyuwngi. This treatment is one way to prevent bacteria from entering the udder. The milking process is also different between farmers in Kaligondo using machines for milking, while breeder Ijen Makmur does milk utilizing the milking machine.

The risk factor of mastitis was reported by [15, 16] that older cattle age, history of mastitis, and dead nipples have a more significant risk factor for developing SCM. The incidence of mastitis is also associated with udder health and can be managed with routine animal health control, feeding as needed, and using calve to suckle after milking [3]. The milking sequence is also essential to avoid mastitis. Healthy cows are milked first and then cows with mastitis sign. This treatment is preventing mastitis transmission [17]. The level of udder inflammation is also related to the production and quality of milk. The higher the level of udder inflammation, the lower the production and quality of milk. [18]. Mastitis is strongly influenced by the cleanliness of the drum, breeders, and cattle. Management-related to cage hygiene needs to be considered to avoid transmission of mastitis either from bacteria in the environment to cows or from sick cows to healthy cows. Treatment can be done using antibiotics at the appropriate dose and type [19]. A report from [20] explains that *Staphylococcus aureus* from Central Java has shown resistance to several antibiotics, namely Oxacillin (5 µg), Tetracycline (30 µg), Gentamicin (10 µg), Ampicillin (10 µg), Erythromycin (15 µg). Therapy using natural ingredients such as virgin coconut oil, flavonoid extract from the medical plant, plant antimicrobial peptide can increase the immune system and prevent livestock from developing mastitis [21]. Another problem regarding livestock practical management in Indonesia is the lack of production recording system's so that the accuracy in management improvement and breeding is low [22]. In the dairy farming business, some aspects significantly affect the vulnerability of the business, namely from economic and environmental aspects, including management practices applied in the farm [23].

4. Conclusion
Based on this result, we conclude that mastitis in Banyuwangi is relatively high. The overall prevalence of SCM was 69.39%. The milking type, washing before milking, pre dip with warm water before milking and post dip with iodine after milking have significant association with incident of SCM in lactating dairy cow. This report can be used as substantial for management evaluation in the Banyuwangi dairy farm.

5. References
[1]   Statistic Indonesia 2019 *Livestock and Animal Health Statistic* (Jakarta:Directorate General of Animal Husbandry and Animal Health Ministry of Agriculture Indonesia)
[2]   Martí-De Olives A, Peris C, and Molina MP 2020 *Small Ruminant Res* **184** 106044
[3]   Abebe R, Hatiya H, Abera M, Megersa B, and Asmare K 2016 *BMC Vet Res***12** 1 270
[4]   Cervinkova D, Vlkova H, Borodacova I, Makovcova J, Babak V, Lorencova A, Vrtkova I, Marosevic D, and Jaglic Z 2013 *Vet Med* **58** 11 567–75
[5]   Khan MZ, Khan A 2006 *Pakistan Vet J* **26** 204–8
[6]   Radostits OM, Gay CC, Hinchcliff KW, and Constable PD 2007 *Veterinary Medicine: A text book of the disease of cattle, horses, sheep, pigs and goats* 10th ed (London: Elsevier)
[7]   Paterna A, Contreras A, Gómez-Martín A, Amores J, Tatay-Dualde J, Prats-van der Ham M, and De la Fe C 2014 *Small Rumin. Res* **121** 1 36–41
[8]   Adriani 2010 *JIIP* **13** 5 229-34
[9]   Ruegg PL and Reinemann DJ 2002 *The Bovine Pract.* **41** 54
[10]   Manu KR, Tangkonda E, and Gelolodo MA 2019 *J VetNusantara* **2** 2 10-9
[11]   Puspasari ER, Yanuartono Y, Hartati S, Raharjo S, Nururrozi A, and Indarjulianto S 2018. *JIIP* **28** 2 121-8
[12]   Gonçalves JL, Kamphuis C, Martins CMMR, Barreiro JR, Tomazi, T, Gameiro AH, and Dos Santos MV 2018 *Livestock Sci* **210** 25-32

[13]   Bobbo T, Ruegg PL, Stocco G, Fiore E, Gianesella M, Morgante M, and Cecchinato A 2017 *J. Dairy Sci.***100** 6 4868-3

[14]   Heikkilä AM, Liski E, Pyörälä S, and Taponen S 2018 *J. Dairy Sci.***101** 10 9493-504

[15]   Mekonnen SA., Koop G, Melkie ST, Getahun CD, Hogeveen H, and Lam TJ 2017 *Preventive vet medic* **145** 23-31

[16]   Mahlangu P, Maina N and Kagira J 2018 Prevalence, risk factors, and antibiogram of bacteria isolated from milk of goats with subclinical mastitis in Thika East Subcounty, Kenya *J.Vet. Medic.* **2018** 3801479

[17]   Nisa HC, Purnomo B, Sidik R and Harijani N 2019 *Ovozoa: J. Animal Rep.* **8** 1 66-70.

[18]   Fatonah A, Harjanti DW and Wahyono F 2020 *J. Agripet* **20** 1 22-31

[19]   Ruegg PL 2017 *J.Dairy Sci* **100** 12 10381-97

[20]   Gomes F and Henriques M 2016 *Current microbiol* **72** 4 377-82

[21]   Widianingrum DC, Windria S, Salasia SIO 2016 *Asian J. Animal Veterinary Advance* **11** 2 122-129

[22]   Khasanah H, Purnamasari L, and Suciati, L. 2020 *Indonesian J.Com. Engagement* **6** 3

[23]   Amam A, Jadmiko MW, Harsita PA, YuliantoR, Widodo N, Soetriono S and Poerwoko MS 2020 *J. Tropic. Animal Vet. Sci.* **10**1 77-85