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Milking Biosecurity in Dairy Cattle Farming East Java Indonesia

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Abstract. *This study aims to determine the quality of microorganisms and the chemical quality of milk before and after counseling, as well as farmers' attitudes regarding biosecurity in dairy farming businesses in East Java, Indonesia. Milk samples were collected from 30 dairy farmers to determine microbial and chemical quality. Paired samples T test and Wilcoxon test were used to assess attitudes after counseling. The milk tested for reductase is grade 2 milk with microorganism contamination of 500,000 – 4,000,000 cells/ml. Test results using lactoscan contained FAT 1.03%, SNF 9.47%, Density 30.06 g/ml Lactose 5.23%, Salt 0.72%, Protein 3.35%, Temperature 28.32º F and pH 5.27. The content of microorganisms decreased after the counseling was carried out. Farmers' attitudes regarding the implementation of milking biosecurity in dairy farming businesses received a T score of >50, which means that 19 people or 63% of the total respondents had a positive attitude tendency.*

Keywords: *Biosecurity, Lactoscan, Reductase*

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INTRODUCTION

Dairy cattle business is one of the promising businesses in the field of animal husbandry. Currently in Indonesia, the need for milk is still very lacking where currently the need for milk in Indonesia reaches 4.3 million tons per year and the contribution of domestic milk is only 22.7% so that the rest is met from BPS 2022 imports. So that with these circumstances the contribution of milk still cannot meet the national milk needs. According to the Directorate General of Animal Husbandry and Animal Health (2021), household protein consumption per capita per day for the milk group in 2021 increased by 0.58% compared to 2020, while milk production in 2021 decreased by 0.06% compared to 2020. This tells us that there are opportunities to develop the dairy cattle business.

The quality of milk has a very important role, because if the quality of milk contained is not good, it will have a huge impact on consumer health. Therefore, hygiene and sanitation assurance is an effort and conditioning to create a healthy environment for humans, animals and animal products (Yusuf et al., 2021). In supporting the improvement of milk quality, it is necessary to implement biosecurity and sanitary hygiene in milking dairy cattle. With the application of good biosecurity and hygiene sanitation, the quality of milk produced by farmers will also have good quality.

Batu City, East Java, is a center for dairy farming and a producer of fresh cow's milk with milk production of 25,258 liters per day. However, farmers still face challenges in milking management practices, including biosecurity measures. Poor milking biosecurity has an impact on the total number of microorganisms and the quality of fresh cow's milk produced by farmers in Batu City. This can be seen from the results of identifying potential areas in dairy cooperatives with the average reductase test results being grade 2. The implementation of biosecurity is very important because effective milking biosecurity greatly influences the quality of the milk produced. Therefore, it is important to conduct a study on MILKING BIOSECURITY IN DAIRY CATTLE FARMING BUSINESSES IN Malang Regency, East Java, to determine the quality of microorganisms and chemical quality of milk before and after counseling, as well as farmers' attitudes regarding biosecurity in dairy farming businesses in East Java, Indonesia.

LITERATURE REVIEW

Prabowo et al.'s research (2021) states that milk is a food ingredient that is a source of nutrition with very good value. The complete nutritional content consists of protein, carbohydrates, fat, and minerals so that it is one of the important food ingredients in meeting people's nutritional needs (Wijiyanti, 2017). milk is an excellent medium for bacterial growth and can be a means for the spread of bacteria that endanger human health. Therefore, milk will be easily contaminated because it does not pay attention to hygiene aspects (N. Wiranti, V. Wanniatie, 2022). Therefore, to maintain the quality of milk produced, it is necessary to implement milking biosecurity management in farmers so that the quality of milk produced is good and does not have an impact on consumers.

To improve milk quality, it is necessary to apply good biosecurity also by farmers because according to Febriano et al., (2022) states that Biosecurity is the basic prevention of the entry of a disease in this case farmers focus more on cleanliness, especially the cleanliness of the jug. The role of biosecurity is very large terhahap milk quality things that affect the quality of milk, namely milking biosecurity, because with the biosecurity of milking can make or produce good milk quality in a farm. (Mashur, 2022).

In testing the quality of milk produced, the reductase test and lactoscan test are required. Where the reductase test is a test to predict the number of bacteria in milk by using the Methylen Blue (MB) substance which will give a blue color to the milk which will be reduced by the bacteria in the milk, the faster the reduction time, the more the number of bacteria in the milk (Arjadi et al., 2017). With the provisions according to Utami et al., (2011) Grade 1 is determined if the reduction time is more than 5 hours with an estimated 500,000 cells / ml. Grade 2 is determined if the reduction time is >2-5 hours with an estimated 500,000-4,000,000 cells/ml. While Grade 3 is determined if the reduction time is <2 hours, with an estimate of 4,000,000-20,000,000 cells/ml. Meanwhile, the lactoscan test is a rapid test to analyze chemical content such as fat content, lean dry matter, protein, lactosan and percentage of moisture content, temperature, freezing point, salt, total solid and also the milk type period of freshly milked samples, at the time of collection and during processing (Sigit et al., 2021).

RESEARCH METHODS

This research was conducted at Batu City East Java Indonesia. The sample taken from this study used the purposive sampling technique and obtained a total sample of 30 breeders. The research method used is descriptive quantitative. The data used are primary data and secondary data. Primary data collection is done by observation. Secondary data obtained from literature study sources, previous research, and books.

The data analysis method used is descriptive analysis on the observed variables using the Paired sample T test and Wilcoxon test. This descriptive analysis includes the results of the reductase test and lactoscan test which includes fat, SNF, lactose, density, salt, protein, temperature and pH.

RESULTS AND DISCUSSION

Sample Before Implementation of Milking Biosecurity

1. Reductase

Reductase test is a test conducted to predict the amount of bacterial content contained in milk. In the reductase test conducted before the implementation of milking biosecurity, the following results were obtained:

Table 1. Reductase Test Before Milking Biosecurity

Quality	Number (people)	Percentages (%)
Grade 1	6	20%
Grade 2	18	60%
Grade 3	6	20%
Jumlah	30	100%

In the table above, it can be seen that the content of milk microorganisms on dairy farms in Gapoktan Sumber Bumi Makmur is on average at Grade 2 with a percentage of 60% and a microorganism content of 500,000-4,000,000 cells / ml.

2. Lactoscan

Lactoscan test is a milk test using portable ultrasonic to analyze the chemical quality of milk. The task of lactoscan is to quickly analyze the fat content, fat-free solids, protein, lactose, moisture content, temperature, freezing point, salt content, total dry matter and also the specific gravity of milk (Hidayat & Anggraeni, 2023). The following are the results of the lactoscan test that has been carried out at the beginning of sampling cow's milk with the following results:

a) Fat

Table 2. Fat Test Result

Quality	Number (people)	Percentages (%)	Average (%)
0,31 - 1,57	14	47%	1,03
1,58 - 2,84	11	37%	2,11
2,85 - 4,1	5	16%	3,58
Jumlah	30	100%	6,72

In the table above, it is conveyed about the condition of fat or fat tested using lactoscan on milk samples before the application of milking biosecurity. There are 14 people in the range 0.31 - 1.57% with an average of 1.03%, this is still fairly low because in SNI 3141.1: 2011 fresh milk the minimum limit of fat content reaches 3%.

b) SNF

Table 3. SNF Test Result

Quality	Number (people)	Percentages (%)	Average (%)
7,68 – 8,44	6	20%	8,15
8,45 – 9,21	11	37%	8,91
9,22 – 9,97	13	43%	9,47
Jumlah	30	100%	26,53

In the table above, it is conveyed about the condition of SNF or lean dry matter in milk samples before the application of milking biosecurity using lactoscan. There are 13 people in the range of 9.22 - 9.97% with an average of 9.47 which is a good condition because SNI 3141.1: 2011 explains that the SNF drinking content contained in fresh cow's milk is 7.8%.

c) Density

Table 4. Density Test Result

Quality (grm/ml)	Number (people)	Percentages (%)	Average (grm/ml)
25,05 – 29,38	8	27%	27,86
29,39 – 33,72	19	63%	30,06
33,73 – 38,06	3	10%	34,15
Jumlah	30	100%	92,07

Specific gravity is part of the nutrient component elements in determining milk quality. The higher the BJ content, the higher the dry matter value (Christi, Salman, et al., 2022). In the table above, it is conveyed about the condition of density or specific gravity in milk samples before the application of milking biosecurity tested using lactoscan. There are 19 people in the range of 29.39 - 33.72% with an average of 30.06 g / ml which

explains that the condition of fresh cow's milk is quite good. This is in accordance with the SNI 3141.1: 2011 standard which states that the specific gravity of milk is at a minimum weight of 1.0270 g/ml which condition has met the SNI standard.

d) Lactose

Table 5. Lactose Test Result

Quality	Number (people)	Percentages (%)	Average (%)
4,47 – 4,94	10	34%	4,75
4,95 – 5,42	16	53%	5,23
5,43 – 5,88	4	13%	5,72
Jumlah	30	100%	15,7

Lactose is a natural sugar contained in drinks and food (Rahmawati et al., 2021). The table above presents the condition of lactose in milk samples before the application of milking biosecurity tested using lactoscan. There are 16 people in the range of 4.95 - 5.42% with an average of 5.23%, this is a good condition because according to Christi and Sudrajat (2022) good cow's milk lactose has an average value of 3.98%.

e) Salt

Table 6. Salt Test Result

Quality	Number (people)	Percentages (%)	Average (%)
0,62 – 0,68	5	17%	0,66
0,69 – 0,75	20	66%	0,72
0,76 – 0,81	5	17%	0,78
Jumlah	30	100%	2,16

In the table above, it is conveyed about the condition of salt or natural milk salt in milk samples before the application of milking biosecurity tested using lactoscan. There are 20 people in the range of 0.69 - 0.75% with an average of 0.72% where this condition is a normal condition and in accordance with Aulia (2008) normal milk has a salt content of 0.61% which explains that the higher the salt content contained in cow's milk can indicate that the cow has mastitis.

f) Protein

Table 7. Protein Test Result

Quality	Number (people)	Percentages (%)	Average (%)
2,81 – 3,67	26	87%	3,35
3,68 – 4,54	3	10%	3,9
4,46 – 5,39	1	3%	5,39
Jumlah	30	100%	12,64

Proteins are chains of amino acids joined by peptide bonds that play an important role in overcoming various problems in the human body and are the main constituent of all body cells (Wulandari, 2020). In the table above, it is conveyed about the condition of the protein in milk in milk samples before the application of milking biosecurity. which is tested using lactoscan. There are 26 people in the range of 2.81 - 3.67% with an average of 3.35% where this condition is a good condition because the SNI 3141.1: 2011 standard explains that the protein content in fresh milk is at least 2.8%.

g) Temperatur

Table 8. Temperatur Test Result

Quality (F)	Number (people)	Percentages (%)	Average (F)
24,76 – 26,28	7	23%	25,63
26,29 – 27,81	8	27%	27,14
27,82 – 29,34	15	50%	28,32
Jumlah	30	100%	81,09

The table above is a sample of milk before the application of milking biosecurity tested using lactoscan. The results of the table above are conveyed about the state of temperature conditions in the sample test. There are 15 people in the range of 27.82 - 29.34% with an average of 28.32 Fº where the condition is a bad condition because according to (Maulina et al., 2015) the longer the milk is stored at room temperature, the quality of the milk is increasingly unfit for consumption by the public.

h) pH

Table 9. pH Test Result

Quality	Number (people)	Percentages (%)	Average
5,16 – 5,35	18	60%	5,27
5,36 – 5,55	9	30%	5,43
5.56 – 5,75	3	10%	5,64
Jumlah	30	100%	16,34

In the table above, it is conveyed about the state of pH conditions in testing milk samples before the application of milking biosecurity tested using lactoscan. There are 18 people in the range of 5.16 - 5.35% with an average of 5.27 where this condition is a bad condition because it is still below the minimum standard set by SNI 3141.1: 2011 where the minimum pH in milk ranges from 6.3 - 6.8. This can certainly occur due to lack of sanitation of cage cleanliness in accordance with (Pramesthi & Hari, 2015) several

indications for measuring milk quality are total bacteria and pH of fresh milk after milking.

RESULTS

Sample Post Implementation of Milking Biosecurity

Table 10. Comparison of Milk Quality

Milk Quality	Before Implementation of Milking Biosecurity	After Implementation of Milking Biosecurity
Reductase	2	2
Fat	1,03%	4,34%
SNF	9,47%	9,53%
Density	30,06 gr/ml	30,68 gr/ml
Lactosa	5,23 %	5,23%
Salt	0,72%	0,73%
Protein	3,35%	3,34%
Temperatur	28,32 F	27,14 F
pH	5,27	5,44

The table above shows the average difference before the application of biosecurity and after the application of biosecurity. Where the average is taken based on the most categories and obtained differences between before and after the application of biosecurity which is then continued with the paired sample T test and Wilcoxon where it is found that the score of reductase, fat, SNF, densetiy, lactose, salt, protein and pH is sig (2-Tailed) <0.05 which means that there are changes in milk quality after the application of milking biosecurity in dairy farming businesses in Gapoktan Sumber Bumi Makmur. As for the temperature score sig (2-Tailed) > 0.05, which means that there is no change from before the application of milking biosecurity and after the application of milking biosecurity.

CONCLUSION

1. The content of microorganisms in milk through the reductase test in dairy farms on average is at Grade 2 while the lactoscan test obtained an average Fat content of 1.03%, SNF of 9.47%, Density of 30.06 cells/ml, Lactose of 5.23, Salt of 0.72%, Protein of 3.35% temperature of 28.32 F and pH of 5.27 from these results there are still several variables that are still below the SNI standard of fresh cow's milk 3141.1: 2011 such as FAT, salt, temperature and pH.
2. In the content of milk microorganisms after counseling has increased which has been tested using the T test and Wilcoxon test which is characterized by a sig value of 2 tailed <0.05 which means there are changes in milk quality before the application of

milking biosecurity and after the application of milking biosecurity but there is one variable that has no change before and after the application of milking biosecurity, namely temperature.

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