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Differences of Colostrum Production in Fore and Rear Teat of FHC Dairy Cows

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ABSTRACT

This research aims to comprehend the different colostrum production between the fore and rear teats of FHC dairy cows. The method used was a case study by observing and collecting data at a farm by purposive sampling. The materials used in this study were 41 postpartum FHC dairy cows that produce colostrum on days 1-4 with a lactation period of 1-5. The data were tabulated and analyzed using paired t-test. The results showed that the average production of colostrum on the fore teats were 6.40 ± 5.39 kg/cow/day and the production of colostrum rear the teats were 7.03 ± 5.92 kg/cow/day and the highest average production of colostrum was on 3rd lactation period. The conclusion of the analysis showed that the production of colostrum in the fore and rear teats were highly different because the rear teats are larger than the fore teats.

1. Introduction

Friesian Holstein Crossbreed (FHC) dairy cows are one of the livestock commodities that produce milk. FHC is one of the dairy cattle breeds that is developed in Indonesia. FHC dairy cows which are currently being developed in Indonesia inherit several superior characteristics such as a fairly tall body, being well adapted to tropical environments, and having high milk production, although not as high as pure FHC cows. According to [1] in 1955, 200.000 FHC dairy cows were crossed with local cattle, resulting in FHC cows that were more resistant and could adapt better.

According to [2] the factors that influence milk production are the breed, age, lust, pregnancy, lactation period, feed, season, dairying and disease. Ako [3] states that there are several factors affecting milk production which can be grouped into external factors and internal factors. External factors that can affect milk production are season/climate, milking interval, length of dry period, setting of calving intervals, administration of drugs, hormone administration, disease, milking change, and feed. Meanwhile, the internal factors consist of the nation/clump/breed, heredity, lactation period, age, condition of livestock and udder, estrus cycle, and pregnancy.

Colostrum is secreted from the udder glands of mammals that are produced no later than 96 hours after giving birth [4]. Thapa [5] stated that colostrum contains carbohydrates in the form of lactose, protein, fat, vitamins, and minerals. In addition, colostrum also contains immunoglobulins which function as antibodies in calves. Colostrum is formed at 3-4 weeks before the cow gives birth

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and is stored for 2-7 days before the FHC cow gives birth in the udder gland, colostrum begins to be secreted about the first 2-3 days after the FHC cow gives birth.

The udder is one of the internal factors that affect the amount of colostrum production. According to [6], the number and activity of secretory cells during lactation are influenced by the growth and development of the udder gland. Solechah., et al. [7] stated that the length, width, and depth of the udder are factors that can affect cattle's milk production because in the udder there are secretory cells that are the site of milk biosynthesis. This study aims to determine the amount of colostrum production at different teat locations.

FHC dairy cows have very high colostrum production. Suryowardojo., et al. [8] The rear udder has a larger volume than the front, and secretes an average of 60% of the amount of milk produced every day. Therefore, by doing this research, it is hoped that it will be known how to milk the right way in order to obtain higher colostrum production and find out whether there are differences in colostrum production on the front and rear teat of PFH dairy cows.

2. Material and Method

This research was carried out for 2 months, from August 24, 2021, to October 24, 2021, on smallholder farms located in the Setia Kawan Nongkojajar Dairy Farming Cooperative (KPSP) area, Tutur District, Pasuruan Regency, East Java Province. The research material was colostrum from 41 postpartum FHC dairy cows at different lactation periods. The tools and materials used in this study are colostrum, hanging scales, and buckets. The method used in this research was a case study by observing and collecting field data on smallholder farms at KPSP Setia Kawan Nongkojajar. The selection of FHC dairy cattle samples was carried out by purposive sampling. The research's variables are total colostrum production of fore and rear teats, and total colostrum production based on lactation period. Colostrum production data was obtained from the amount, average, and standard deviation using MS. Excel. Data for the colostrum production variable were analyzed using paired t-test.

3. Results and Discussion

The results of the analysis of the average production of colostrum in FHC dairy cows at different teats and colostrum production based on teat's location and lactation period are shown in Table 1. and Table 2.

3.1 FHC Dairy Cows Colostrum Production Based on Teat's Location

Colostrum production is milk production that is produced after a cow experiences parturition or birth, this phase is included in the early phase of lactation. Colostrum is one of the perfect nutrients. Colostrum is the milk produced by the udder secretion that comes out up to 96 hours after parturition. Based on the results of measurements of colostrum production that have been carried out on 41 FHC cows, the average obtained is as follows

Table 1. Average production of fore and rear teats colostrum

Variable	Average
Colostrum Production on Fore Teats (kg)	6.40 ± 5.39^{b}
Colostrum Production on Rear Teats (kg)	7.03 ± 5.92^{a}

Note: Different notations showed that there was a very significant difference ($p<0.01$) in the colostrum production of fore and rear teats.

Table 1. shows that the average production of fore teat colostrum in FHC dairy cows was 6,40 ± 5,39 kg/cow/day and rear teat colostrum production of 7,03 ± 5,92 kg/cow/day. The results of the analysis showed that the production of colostrum in the fore and back teats were significantly different ($p < 0.01$). Manalu et al. [9] stated that the hind udder has a larger volume than the fore and secretes an average of 60% of the amount of milk produced each day. Ako [3] stated that one of the factors that influence the production of colostrum is the udder. This statement is also supported by the

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statement of [4] that the number and activity of secretory cells during lactation are influenced by the growth and development of the udder gland. The more secretory cells there are in the udder, the more colostrum is produced. The graph of the average of colostrum production based on the location of the teats can be seen in Figure 1.

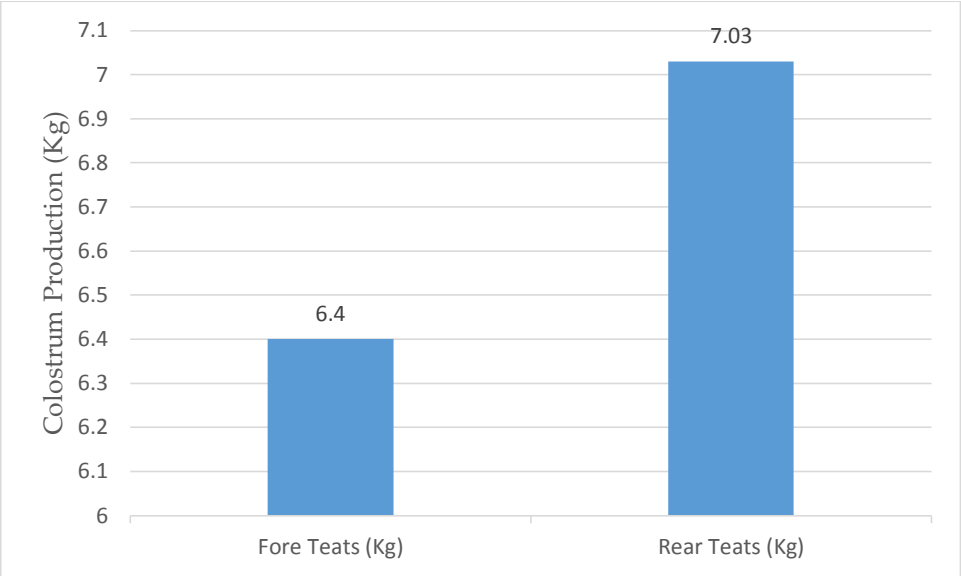

Figure 1. Average colostrum production of fore and rear teats

Colostrum is very important for calves because colostrum contains immunoglobulins which contribute to the formation of the calf's immune system, besides that there are also several vitamins, minerals, carbohydrates, fats and proteins. Based on Figure 1, there are several factors that affect the amount of colostrum production, one of which is the shape of the udder. The shape of the udder greatly affects the amount of colostrum production, the larger the volume of the udder, the more colostrum that can be secreted. Solechah et al. [7] stated that the length, width and depth of the udder are factors that can affect cow's milk production because in the udder there are secretory cells that allow milk biosynthesis to occur.

Pregnancy hormones can affect the growth of the udder. Manalu et al. [9] state that the hormones of estradiol, progesterone, relaxin, and placental lactogen can stimulate the growth of the udder and epithelial cells in the udder. The concentration of progesterone affects the development of the alveoli in the udder. [10] That there are striking mechanical changes in pregnant cows, one of which is swelling of the udder. The influence of mammogenic hormones is very dominant in controlling the growth and development of the udder glands, especially during the estrus cycle until early lactation.

Colostrum is formed at 3-4 weeks before the cow gives birth and is stored for 2-7 days before the PFH cow gives birth in the udder gland, colostrum begins to be secreted about the first 2-3 days after the PFH cow gives birth. The process of colostrum formation is described as lactogenesis I. Lactogenesis I is a phase where growth, differentiation, and colostrum genesis occur [11]. In the process of secretion there are several supporting hormones, one of which is the hormone.

3.2 FHC Dairy Cows Colostrum Production based on Lactation Period

[12] Stated that the lactation period showed several times the cattle experienced parturition. Meanwhile, according to [13], the lactation period has a close relationship with the age of dairy cows because the lactation period increases with increasing age of dairy cows.

Table 2. Average colostrum production based on teat's location and lactation period

Lactation Period	Total Cow	Colostrum Production on Fore Teats (kg/cow/day)	Colostrum Production on Rear Teats (kg/cow/day)

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1	11	6.25	7.02
2	8	6.06	6.71
3	11	7.00	7.71
4	6	6.57	6.78
5	5	5.76	6.34
Total	41		

Based on the opinion of [14] the amount of colostrum production continues to rise and peaks in the 4th lactation period with an average colostrum production of 10.80 liters/cow/day and then steadily decreases in the next lactation period. However, based on Table 2. The highest amount of colostrum production was in the third lactation period at 7 kg/cow/day on the fore teat and 7.71 kg/cow/day on the back teat. Mahmud et al. [13] stated that milk production showed an increase from lactation period 1 to lactation period 2 and then decreased in the following period. On the other hand, based on Figure 2 it can be seen that colostrum production decreased in the 1st lactation period to the 2nd lactation period and experienced a peak in production in the 3rd lactation period after which it decreased in the 4th and 5th lactation periods. This could be caused by feeding management which is not suitable so that it can affect the regulation of the hormone prolactin which functions to induce colostrum genesis. Rahmmawati et al. [15] stated that the hormone prolactin functions to induce lactation or is responsible for the growth of alveolar cells in the udder. Age at first gestation also affects the amount of colostrum production in each lactation period. In addition, the condition of livestock also affects the amount of colostrum production

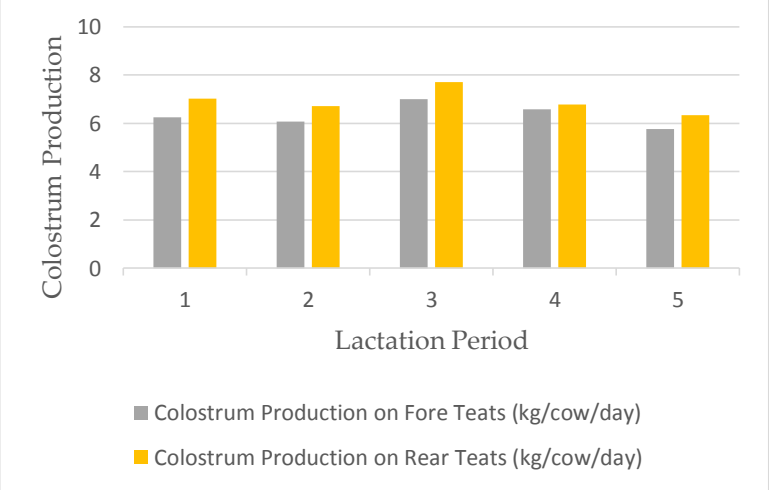

Figure 2. Average production of colostrum based on teats location and lactation period

The longer of the lactation period, the more the number of secretory cells they have will increase. The number of secretory cells you have will affect the colostrum production process. Nevertheless, based on Figure 2 colostrum production has increased and decreased fluctuating with the peak of colostrum production being in the 3rd lactation period. This can be caused by inappropriate feeding management so that it can affect the regulation of the hormone prolactin which functions to induce colostrum genesis. Yekti et al. [16] stated that the hormone prolactin functions to induce lactation or is responsible for the growth of alveolar cells in the udder. Age at first pregnant cows also affects the amount of colostrum production in each lactation period. In addition, the condition of livestock also affects the amount of colostrum production.

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4. Conclusions

Colostrum production in the rear teats were higher than in the fore teats in FHC dairy cows and colostrum production peaked in the 3rd lactation period.

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