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The Relationship of Lactation Period, BCS and Chest Circumference With Milk Production of FH (Friesian Holstein) Dairy Cows in KPSP Setiakawan Pasuruan District

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Abstract

The purpose of this research was to determine the relationship between lactation period, BCS and chest circumference with milk production of Friesian Holstein dairy cattle. The material used 36 dairy cattle period 3, 4, and 5. This research was conducted in farm KPSP Setia Kawan, Nongkojajar, Pasuruan on 20 July - 20 October 2022. The method used in this research was case study. The data collection technique in this study was purposive sampling. The variables observed were period lactation, BCS, chest circumference and milk production. The data obtained were analyzed using correlation analysis, and simple linear regression analysis. The result showing that the linear regression equation between lactation period and milk production shows Y= 43.82 – 4.72X1 with a correlation coefficient negative is 0.65 and for the coefficient of determination is 42.3%, the meaning that for every increase 1 time of the lactation period , milk production will decrease by 4.72 liters. The linear regression equation between BCS and milk production shows Y= 4.06 + 8.35X2 with a correlation coefficient positive is 0.70 and the coefficient of determination is 49.7%, the meaning is BCS that for every increase of 1 score of the BCS, milk production will increase 8.35 liters. The linear regression equation between chest circumference and milk production shows Y= (-17.57) + 0.22X3 with a correlation coefficient positive is 0.52 and the coefficient of determination is 27.3%, the meaning that for every increase 1 cm of the chest circumference, milk production will decrease 0.22 liters. It can be concluded that the more highly lactation period, milk production will decrease. Then the more highly scored BCS and chest circumference, milk production will follow higher to.

Keywords:BCS; chest circumference; milk production

INTRODUCTION

Dairy farming is already quite developed in Indonesia, interest in raising dairy cows is because it can generate profits. In this way, the dairy cow population and milk production will also increase in each region, this can help the domestic economy. East Java is the national dairy center. It is recorded that the East Java region has the highest number of dairy cows and the highest milk production in Indonesia. According to BPS (2021), the population of dairy cattle in East Java province is 301,780 or 52.16% of the national dairy cattle population of 578,579. East Java is in first position in national milk production, contributing 556.43 tonnes or 57.8% of national milk of 962,676 tonnes. FH cattle are a type of cattle from the Netherlands which has a temperate climate (Ratnasari, Atabany, Purwanto and Salma, 2019). The growing population of dairy cows in Indonesia are imported cows, namely FH cows because they can produce higher and better quality milk, namely around 6000-7000 kg/cow/lactation. Milk is secreted after the colostrum production period ends around 5 days after parturition in the udder

glands of dairy livestock that have been lactating for 305 days. The important role of milk components is that it can protect against disease, besides that milk also has high economic and nutritional value that is needed by the body. According to Putri (2016), the nutritional content in milk is protein (3.5%), fat (3.9%), lactose (4.9%), minerals and vitamins (0.7%), all the ingredients in milk consumed must refer to SNI for fresh milk (SNI 3141.1:2011).

According to Sya'adah and Surjowardojo (2022), the amount of milk production is the total daily production in the morning and evening after colostrum production ends. Milk production in dairy cows can be influenced by 70% from environmental factors and the rest from internal influences such as age, lactation level, lactation age, milking frequency, BCS, environment including climate, temperature, humidity and rainfall as well as from national factors, individual genetics, milk secretion. , heat cycle, dry period, feed quality, and diseases of the cow (Sya'adah and Surjowardojo, 2022; Siska and Anggrayni, 2020). The environmental temperature in Indonesia is included in the tropics which is still quite extreme for FH cows if kept in Indonesia, temperatures that are too high will have an effect on reducing milk production.

BCS is a method of assessing the body condition of livestock visually and by touch regarding fat deposition in certain parts, the aim is to determine the standard of adequacy of body fat reserves, the efficiency of body fat in dairy cows will influence the amount of milk produced (Surjowardojo and Sarwiyono, 2013). According to Klopcic, Hamoen and Bewley (2011), the BCS score at the beginning of lactation has a score of 2.5 - 3.00, the ideal BCS score at peak lactation and mid-lactation is 3.00 and for cows during the dry period of the stall is 3.25 - 3.75. According to Sinta, Siska and Anggrayni (2021), livestock body size including height, chest circumference and body length can also provide an idea or clue regarding the milk production that can be achieved by livestock during maintenance. The use of the BCS assessment method and measuring body size in the chest circumference of cattle is the most practical indicator to see the ability of individual cattle to meet nutritional needs and produce milk. The more ideal the body size of the cattle, the more indicators the cow will produce high milk production and have fat reserves. enough during the lactation period (Bahri, Salman and Christi, 2022). According to Mõtus, Rilanto, Dagni-Alice, Orro, and Viltrop (2021) in Surjowardojo, Susilorini and Rifa'I (2021) the productive range of dairy cows develops only from the first calving time of 2.5 to 5 years and the profits that can be taken are only until peak production during the 4th lactation period, the rest is inefficient. Therefore, to maximize this, appropriate management is needed in maximizing milk production through factors such as animal body size, animal body condition and animal lactation status. It is hoped that this can provide an overview of the performance of milk production per day, Pasuruan Regency. In this regard, the author is interested in research regarding the relationship between lactation period, BCS and chest circumference with the performance of milk production in lactating dairy cows at KPSP Setia Kawan, Pasuruan Regency.

MATERIALS AND METHODS

The research was conducted for 4 months at the KPSP Setia Kawan dairy farm, Jl. Raya Nongkojajar, Wonosari Village, Tutur District, Pasuruan Regency, East Java in the last month of July 20 to October 20 2022. Wonorejo Village, Lawang District, Malang Regency. Research data collection was carried out for 1 month, starting from 19 October to 17 November 2022.

The research material used in the study were 36 FH dairy cows from the KPSP Setia Kawan dairy farm which were in the 3 to 5 lactation period. Milk production with the frequency of morning and evening milking was measured every day for 7 days, then the total yield was added up. measurement of morning and evening milk production. The tools used are a measuring tape and a bucket.

The method used is a case study by collecting primary data by assessing the BCS score, measuring chest circumference with one measurement, while secondary data is obtained from the number of cows giving birth to determine the lactation period of the animal by looking at the number of grazes on the horns, the number of grazes follows a lot. number of children born. Samples were taken by purposive sampling or livestock were chosen deliberately through certain considerations. The consideration in this research is FH cows that are in their 3rd to 5th lactation.

Research variable

The independent variables used are lactation period (x1), BCS (x2), and chest circumference (x3). The fixed variable is milk production (y1).

Data analysis

The analysis used is correlation and simple linear regression to determine the correlation coefficient (r) and determination coefficient (R^2). then analyzed using the SPSS application. With the correlation formula:

Research Stages

The sample was determined using purposive sampling, namely by specifically determining samples of FH postpartum dairy cows in the 3rd to 5th lactation. The next stage is

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{n(\sum X^2) - (\sum X)^2}\sqrt{n(\sum Y^2) - (\sum Y)^2}}$$

to prepare the equipment that will be used to help collect data, then install the ear tag code on the livestock to make the next stage easier.

1) Assess the BCS score of FH cattle based on the following methods:
   a. Observe the vulva and tail head (base of the tail) (whether there is a depression or is it filled)
   b. Palpate the pelvis (rump) (is it filled with fat or not?)
   c. Palpation of the hip (hook bone) (are the boundaries clear or not?)
   d. Palpate the sitting bones (pin bones) (are the boundaries clear or not?)
   e. Observe and palpate the back bones (are they clearly visible and palpable or not?)
   f. Observe and palpate the rib bone (does it look real or not? protected by fat?)
2) Measuring chest circumference is measured in a circle around the chest cavity (rib) behind the shoulder joint (Os scapula) using a measuring tape in cm (Nurfaridah, et al., 2013).

RESULTS AND DISCUSSION

Relationship between Lactation Period and Milk Production

The amount of daily milk production is the total milk production in one day from the results of morning and evening milking after colostrum production ends, while the lactation period is the process where the cow is producing milk over a period of 10 months or 305 days plus a 60 day dry period (Rachman and Surjowardojo, 2021). From the average milk production of 36 FH cattle for 7 days in the 3rd to 5th lactation period at KPSP Setia Kawan, it is 6546 - 9455 liters/cow/lactation or 21.64 liters/cow/day - 30.9 liters/cow /day. According to Nanda, Anang and Indrijani (2017), high milk production is influenced by the selection of superior livestock and improved maintenance management. Based on these average results, it can be said that it has met the milk production standards for female cows from BPS data (2021), namely approximately 6810 liters/cow/lactation for FH cows in Indonesia or 22 liters/cow/day.

Table 1. Average Lactation Period with Milk Production

Period	Number (Tail)	Milk Production (liter/head/day)
3	12	30.90 ± 6.07
4	12	22.46 ± 3.44
5	12	21.46 ± 2.72
Total	36	

Source: Field Results Data

The highest milk production occurs when it reaches the 3rd period or at the age of 4.5 years, producing 30.90 ± 6.07 liters/cow/day, higher than the 4th lactation period which only produces 22.46 ± 3.44 liters/head/day and there was a decrease in the 5th lactation, namely 21.46 ± 2.72 liters/head/day. This is comparable to the opinion of Mahmud, et al., (2020) that milk production will continue to increase at the age of 2 years to 7 years due to the increase in cow size due to tissue growth in the udder, achieving maximum milk production in the 3rd or 4th lactation. . In the opinion of Vijayakumar, Park, Kim and Lim (2017), high production is obtained due to cow parity and good control in management, while a decrease in production can occur due to increasing age which causes damage to cells in the mammary glands and inadequate nutritional requirements. for preparation of milk production. The equation Y = 43.82 – 4.72 A picture of the relationship between the lactation period and milk production can be seen in Figure 1. This is in accordance with the opinion of Damayanti, et al., (2020), one of the factors that causes a high level of correlation in milk production is the influence of the size of the udder that the animal has, the larger the size of the udder. the level of milk production will be higher, this is because the number of secretory cells in the udder tissue increases.

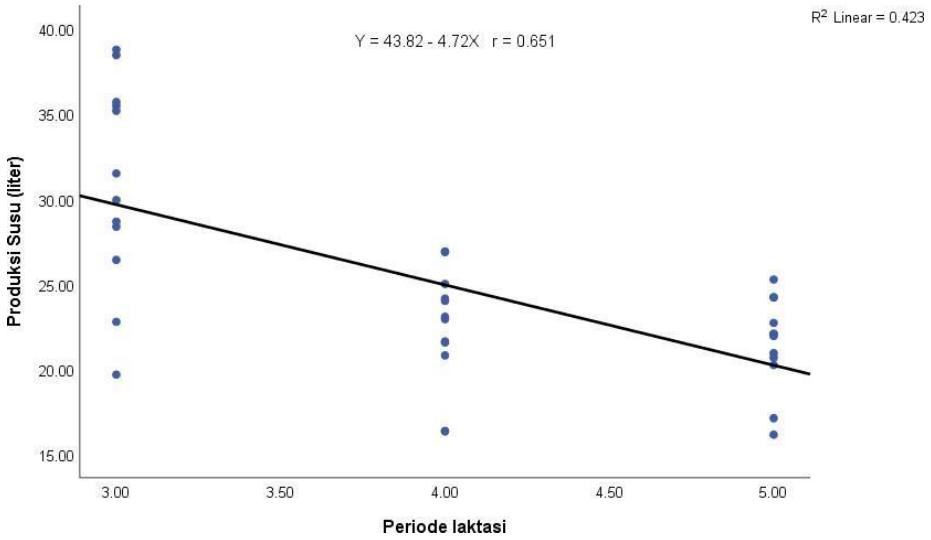

Figure 1. Relationship between lactation period and milk production

Relationship between BCS and Milk Production

BCS is a method of assessing livestock condition by observing and touching to determine nutritional status seen in body fat deposits in certain parts of dairy cows during the lactation period or dry period (Sya'adah and Surjowardojo, 2022).

Table 2. Average BCS with Milk Production

BCS	Number of Samples (tail)	Milk Production (liters/cow/day)

2.00	18	21.09 ± 2.45
3.00	18	29.12 ± 5.48

Source: Field Results Data

Based on the data obtained in Table 2, the maximum average milk production is at a score of 3.00, amounting to 29.12 liters/cow/day, while the lowest average production is at BCS 2.00, amounting to 21.09 liters/cow/day. with body condition assessment standards according to BBPTU Baturaden dairy cattle (2017) where the ideal score for dairy cattle is 3.00. The BCS assessment should be carried out when entering the dry period, it is hoped that when the cage is dry the BCS score will have reached the ideal score, namely 3.25 - 3.75 to achieve optimal milk production. This is in accordance with the opinion of Klopcic, et al. (2011) because every increase in milk production in dairy cows can result in the cow losing 0.5 points of BCS value at the time of the mother after giving birth, this is due to a negative energy balance in the animal's body because most of the fat reserves in the body are used as energy to produce protein. in milk (Widiartika, 2017). The equation Y= 4.06 + 8.35X2 obtained a positive correlation (r) of 0.705 with the high category, coefficient of determination (R2) of 0.497. An image of the relationship between BCS and milk production can be seen in Figure 2.

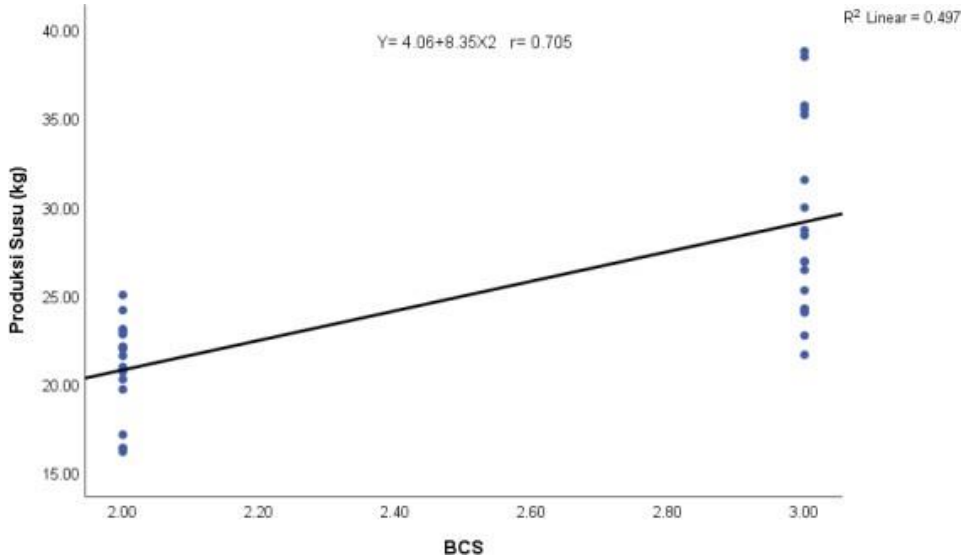

Figure 2. Relationship between lactation period and milk production

Relationship between chest circumference and milk production

Chest circumference measurement is included in the simplest type of measurement of vital statistics which includes height, body length, chest circumference and head size. Chest circumference can also determine the body weight of cattle, where body weight has quite a high influence in determining milk production. In the opinion of Bahari, et al., (2022) that cows that have a large body size will produce higher milk than cows with a small body of the same age and breed, this is because livestock still need energy to produce more milk. moments before parturition occurs. According to Adhani, et al., (2012) factors that can influence the amount of feed consumed in dairy cows are internal factors consisting of body weight, sex of the animal, age of the animal, genetics, feed and the environment which includes temperature, humidity and sunlight. . Based on the results of chest circumference measurements at KPSP Setia Kawan, the minimum chest circumference size is 170.25 cm, in this case it meets the minimum requirements of SNI 3141.1: 2011 for female cattle, which is 155 cm. Excessive body weight can also have a negative effect on the productivity of cattle. Cows that have a body weight that is more than ideal will experience reproductive disorders and metabolic diseases.

This causes fat to build up around the body organs. On the other hand, cattle with a body weight that is less than ideal will have an impact on reproductive system disorders such as milk fever. or a condition where cows lack calcium in the blood (Putra, Mulyati, and Mumpuni, 2019). Obtained the equation Y= (-17.57) + 0.21X3 positive correlation (r) amounting to 0.52 in the medium category, which is included in the medium category with milk production at KPSP Setia Kawan. This is in contrast to research conducted by Saputra, et al., (2013) regarding the relationship between body length, shoulder height and chest circumference on milk production, which states that shoulder height does not have any effect.correlation with milk production because shoulder height and milk production are influenced by other factors such as age, health, number of children born, and environmental factors. This is confirmed by the opinion of Maylinda, et al., (2010) that not all livestock body sizes have a high correlation with milk production. The coefficient of determination (R2) is 0.273, meaning that increasing chest circumference only has a small effect of 27.3% on the amount of milk production and the remaining 72.7% is mostly influenced by other factors such as internal factors of the animal and environmental influences. One of the factors that causes high levels of milk production is the influence of the size of the udder of the animal. According to Damayanti, Hartono, and Sambodho (2020), the larger the udder size, the higher the level of milk production, this is because the number of secretory cells in the udder tissue increases. An image of the relationship between chest circumference and milk production can be seen in Figure 3.

Conclusion should be explained clearly and must answer the goal of the study or hypothesis. Do not repeat the abstract or just show the results of research, but must describe the innovation or improvement of existing science recently. Do not use bullets/numbering. Conclusion must be written using 40 to 80 words. And there are no suggestions if not required. Written in Times New Roman 12 Font Size, and double space lines.

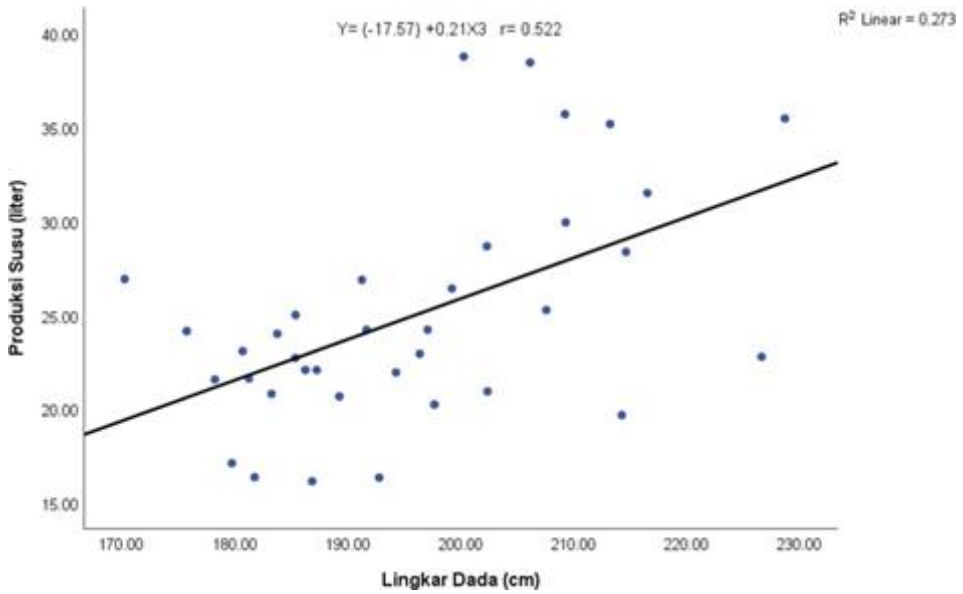

Figure 3. Relationship between chest circumference and milk production

Conclusion

Based on the research results, it can be concluded that there is a negative relationship of 0.65 that as the lactation period increases, milk production will decrease, and there is a positive relationship of 0.70 for BCS and a positive relationship of 0.52 for chest circumference. The larger the chest circumference and BCS score, the higher the milk production.

Thank-you note

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