

Factors Analysis Affecting Productivity of Dairy Cattle

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Abstract

Dairy farm is how to develop the potential of the animals to be used either as meat, milk and skin. The Central Bureau of Statistics explained that Indonesia has a population of as many as 533 860 head of dairy cattle in 2016 from across the province. One of them is a dairy farm in the area Plaosan Wonoayu subdistrict, Sidoarjo. The problems most frequently encountered is the declining productivity of dairy cows. There are many factors that affect the productivity of dairy cows. Based on research conducted over 3 months of March, April and May. Found several factors that affect the productivity of dairy cows, ie feed, lactation and age. In this study using multiple linear regression method 3 factors. The results showed the feed is the biggest factor with a value of 29.37%, then age with the value of 8.12%, and lactation with a value of 2.34%.

Keywords

Factor Analysis, Productivity, Regression, Dairy Cattle

1. Introduction

Dairy farm is an attempt to develop the potential of the animals to be used either as meat, milk, and skin (Sutama, 2008). The Central Bureau of Statistics explained that Indonesia has a population of as many as 533 860 head of dairy cattle in 2016 from across the province (Statistik, 2015).

Milk as a result of commodity farm is a food which is the source of nutrition or animal protein substances (Setiawan, 2006). Animal protein needs of the people of Indonesia from year to year continues to increase along with the growing population and the level of awareness of the nutritional needs of the community that is supported by science and technology (Rusdiana and Sejati, 2017).

One of the farms in the Sidoarjo region, exactly in the Wonoayu still often experience various constraints in terms of the productivity of dairy cattle. With the size of the enclosure of approximately 15m x 25m and with the number of cows as much as 15 tails. This ranch has been established for 20 years.

Very many constraints faced by the farm in terms of productivity. Lack of information and technology is one of the obstacles (Aisyah, 2012). Some of the factors that influence such as the composition and quantity of feed, cow age, pregnancy, labor skills, temperature, time of milking, weight and others - others. Lack of attention from the government will be the development of the business can also be a constraint (Mukson et al., 2009).

The entire supply of fresh milk produced by these farms is sent to the Village Unit Cooperatives (KUD) and some companies require employees to be consumed. There are also middlemen or agents who came alone to the farm to buy milk is then processed again for sale (Rusdiana and Sejati, 2017). This ranch has only one employee and assisted by the farm owners themselves. Only those who manage these farms.

2. Methods

This study is a correlational study is a study involving data collection measures in order to determine whether there is a relationship and the level of relationship between two variables or more. Their relationships and levels of important variables, because by knowing the level of the relationship, researchers will be able to develop in accordance with the purpose of research (Sukardi, 2003).

Goal of this research is to know what factors are dominant and greatly affect the productivity of dairy cows in the village Plaosan Wonoayu sub-district, Sidoarjo regency, East Java. This research will be limited by the amount of a sample of 15 dairy cows same location.

In this study used multiple linear regression analysis in order to determine the relationship between two or more independent variables (X_1, X_2, \dots, X_n) simultaneously on the dependent variable (Y). Rated R ranged between 0-1, if the value close to 1 means that the link is strong and vice versa if the relationship away from the first means weak (Sugiyono, 2007).

guidelines to provide interpretation of the correlation coefficient (Walpole and Myers, 1995) as follows:

0.00 to 0.199 = very low

0.20 to 0.399 = Low

0.40 to 0.599 = was

0.60 to 0.799 = strong

0.80 to 1.000 = very strong

multiple linear regression equation as shown on equation 1 :

$$Y = a + b_1X_1 + b_2X_2 + \dots + B_nX_n$$

Description:

Y= dependent variable (the predicted value)

A= constant

B= regression coefficient (the value increases or decreases)

X_1, X_2 = independent variable

3. Result And Discussions

In this area there is rarely a farm. And there is one farm that has lasted more than 20 years. This ranch Plaosan his location in the village, district Wonoayu. The farm owners are Mr. Suryadi, 30 years of age. He is the next generation of this business from his father. Has an area of 15m x 25m. Its location right next to the river and rice fields. This ranch has 15 dairy cows that produce milk every day always.

Namely productive cows at age 2 - 10 years. Average - Average daily milk yield is 8 liters / cow / day. Milking is done for 2x is at 04.00 and 15.00. This ranch has only 2 employees and livestock owners themselves who helps manage. Cow's milk is usually sent to the company's employees consumed or sold to cooperatives and middlemen.

Based on interviews, the ranch owner said that the main problem in the enterprise is the problem of animal feed. In the composition of animal feed, pulp is the largest number of compositions are as much as 71%, skin tapioca (cassava) by 23% and the remaining bran and salt. For side dishes were given rambanan (leaf). Tofu is very difficult to get it.

Focus Group Discussion (FGD) (Hennink, 2013), with the farm owners and employees are used to analyze the factors that influence milk productivity in dairy cows. There are 3 of the most dominant factor that greatly affects milk productivity in dairy cows.

Focus Group Discussion is divided into two stages (Prasnowo, Khomaruddin and Hidayat, 2017).

1. The first phase was held on August 2, 2017. Precisely at 13:30 am until 15:00 pm at the Village Plaosan, District Wonoayu. At this stage attended by Adhi Prasnowo as academics, and Suryadi as the owner of the farm, accompanied by 3 employees. At this stage, we did a focus group in order to determine what factors affect the productivity of dairy cows. At this stage appear to many factors including the amount of feed, age, lactation number, health, type of cow, cattle, time and temperature.
2. The second phase was held on Wednesday, August 3, 2017. Exactly at 10.00 am until 11:00 pm at the same location. At this stage of the eight factors that affect the productivity of dairy sapi, determined three factors that greatly affect the productivity in dairy cows. Appropriate discussion, the most influential factor in the productivity of dairy cows are lactating, feed and age

Cycle of farm in the village Plaosan Wonoayu sub district, Sidoarjo. FH initial seedlings of species obtained from Malang, East Java. Then domesticated itself well to mate with the male parent or the mating injection. If the male calves reared and raised themselves in a certain age or when needed can be sold. If the calf is female then it could be cows for the next generation and can be milked.

At over 2.5 years, can already mated cows, cow gestation period is nine months. during pregnancy, can already milked cows but when pregnant about a month to 7 could not be milked. From the time of the first pregnancy, second, third and so the number of liters produced by cows each. Dairy cow productive period when the age of 10 years, if it is assumed pregnant every year and became pregnant at the age of 3 years, the cows are able to produce as much as 7 times during a productive period.

Table 1. Data research productivity, lactation, feed, and age on a dairy farm

Month	Productivity			Lactation			Feeds			Age		
	March (Y1)	April (Y2)	May (Y3)	March (x11)	April (X12)	May (X13)	March (X21)	April (X22)	May (X23)	March (X31)	April (X32)	May (X33)
1	667	667	667	3	3	3	1200	1200	1200	5	5	5
2	671	671	671	6	6	6	1200	1200	1200	9	9	9
3	681	681	681	5	5	5	1200	1200	1200	7	7	7
4	682	697	695	6	6	6	1140	1200	1200	7	7	7
5	681	681	680	3	3	3	1200	1200	1200	6	6	6
6	676	676	676	3	3	3	1200	1200	1200	6	6	6
7	680	680	681	2	2	2	1200	1200	1140	5	5	5
8	673	681	682	4	4	4	1160	1200	1200	7	7	7
9	669	674	676	4	4	4	1140	1200	1200	7	7	7
10	678	677	655	3	3	3	1200	1200	1200	5	5	5
11	659	643	655	6	6	6	1200	1140	1100	9	9	9
12	670	664	672	2	2	2	1200	1160	1160	5	5	5

Identification variables of each factor

X1	= Lactation
X2	= Total feed
X3	= Minimum
Y	= productivity of dairy cows

Hypothesis of this study are as follows:

H_0 '**received**: sig lactation > value of $\alpha = 0.05$, then lactation no significant effect

of H_0 '**rejected**: sig lactation < value $\alpha = 0.05$, then lactation significant effect

of H_0 '**isreceived**: sig feed > value of $\alpha = 0.05$, then the feed had no effect significant

H_0 '**rejected**: sig feed < value $\alpha = 0.05$, then feed a significant effect

of H_0 '**accepted**: sig age > value of $\alpha = 0.05$, then age does not significantly

H_0 '**wasrejected**: sig age < value $\alpha = 0.05$, then aged significant effect

Test 1 Test T Partial based on the value t and t table then:

If the value of $t > t$ table then independent variables affect the dependent variable. If the value of $t < t$ table then the independent variable has no effect on the dependent variable. Based on the significant value of the SPSS output if sig < 0.05 then the independent variables significantly influence the dependent variable. If sig > 0.05 then the independent variable has no significant effect on the dependent variable.

Formula to find the value of t table is as shown on equation 2 :

$$t_{table} = (\alpha / 2; n - k - 1)$$

Where:

α = the confidence level (0.05)

n = number of data

k = number of independent variables

So look at the distribution of t table then discovered the value of 2.306. The results of the decision-making is based on the results of regression analysis lactation t value of 0.630 < t table 2.306 and 0.546 significance value > 0.05. So we can conclude that H_0 is received, which means lactation no significant effect on productivity. Based on the results of the regression analysis of the feed value of 1,480 t < t table 2.306 and 0.177 significance value > 0.05. So we can conclude that H_0 is accepted which means that the feed had no significant effect on productivity. Based on the results of the regression analysis age t value of -0.839 < t table 2.306 and 0.426 significance value > 0.05.

So we can conclude that H_0 is received, which means age had no significant effect on productivity.

Testing 2 ANOVA, gained significance level of 0.271 worth more than alpha = 0.05 so the regression model can't be used to predict the productivity of lactation or in other words, feed and age had no effect on the productivity significantly. The regression equation obtained are as follows:

$$Y = 1198.323 + 21,170X1 + 0,261X2 - 25,387X3$$

where:

Y = Productivitycows

X1 = lactation

X2 = Feed

X3 = Minimum

For ANOVA testing with software is shown on table 2.

Table 2. Processed ANOVA test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1198.323	696.934		1.719	.124
	Laktasi	21.170	14.064	.918	1.505	.171
	Pakan	.261	.186	.381	1.406	.197
	Usia	-25.387	14.775	-1.058	-1.718	.124

a. Dependent Variable: Produktivitas

Table 2 show the significant out-put value as follow:

Constant= 0.124
 Lactation = 0.171
 feed = 0.197
 age = 0.124

Values above more than the value of alpha is 0.05 so it can be said that lactation, feed, and age did not significantly affect the productivity of cows. Thus the hypothesis that in the can is: H_0 is accepted as a sig lactation $> \alpha = 0.05$ or lactation no significant effect on productivity. H_0 is accepted as a sig. feed $> \alpha = 0.05$ or feed not significantly affect productivity. H_0 is accepted as a sig age $> \alpha = 0.05$ or age does not significantly affect productivity.

Test 3 Test Normal Probability Plot, hypothesis of normality test is:

H_0 : normal spread data
 H_1 : Data is not a normal distribution.

And then to find out the type of distribution is shown on figure 1 :

Normal P-P Plot of Regression Standardized Residual

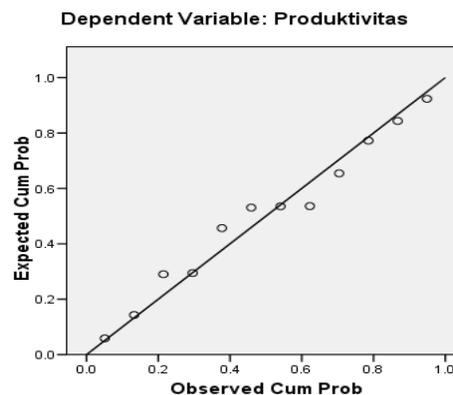


Figure 1. Distribution of PP plot productivity

Figure 1, based on the plot picture above. The point follows the diagonal line it can be said that the normal distribution of the residual value. To show partial regression between lactation with productivity is shown on plot diagram in figure 2.

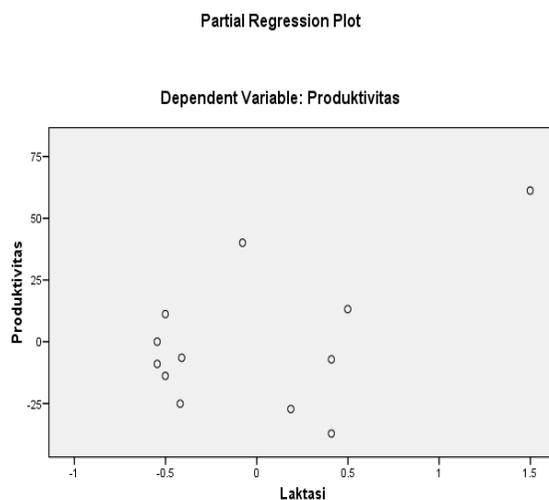


Figure 2. Partial regression between lactation with productivity

Figure 2, from the plot picture above. Data spread but leads to the lower left. This means that the smaller the level of productivity lactation cows too small, then H_0 accepted.

To show partial regression between feed with productivity is shown on plot diagram in figure 3.

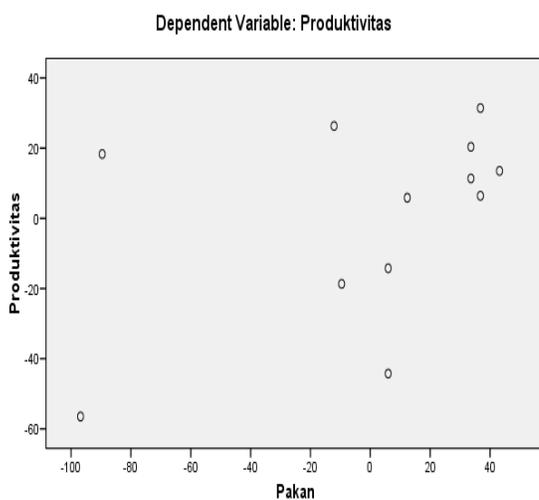


Figure 3. Partial regression between feed with productivity

Figure 3, from the plot picture above. Data spread and tend toward the upper right. This means that the greater the amount of feed that the cow productivity levels too big, then H_0 accepted. To show partial regression between age with productivity is shown on plot diagram in figure 4.

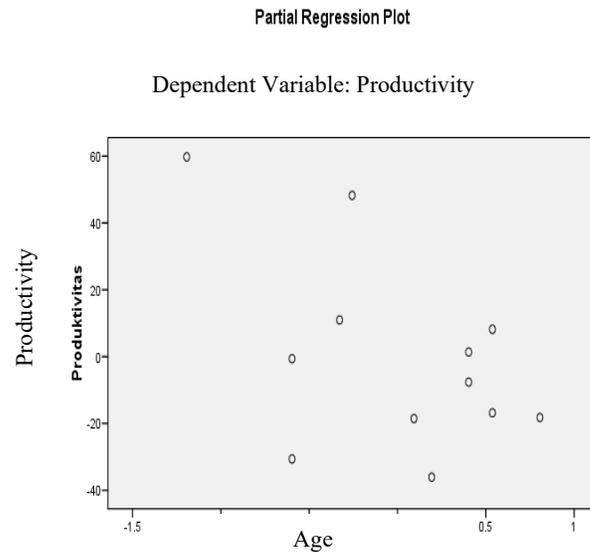


Figure 4. Partial regression between age with productivity

Figure 4, based on the plot picture above. Data is spread evenly. That is the age of the cow is not much affect productivity, then H_0 accepted.

4. Conclusions

Based on the results of this research can be concluded as follows: Factors - factors that affect the productivity of dairy cows is feed, lactation and age. The most dominant factor is the feed, amounting to 29.37%, amounting to 8.12% of age, and lactation amounted to 2.34%. The factors that most influence on productivity is feed amounting to 29.37%. In future research is expected no improvement and it can be suggested is a method in this research is the focus group discussion. The disadvantage is the factor raised by the results of the discussion is not the result of the original data statistics or research. For their next study better using the experimental design methods.

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Biographies

Pujo Kusumo is a student in Department of Industrial Engineering Universitas Maarif Hasyim Latif who intense to reasearch of productivity for dairy cattle.

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M Adhi Prasnowo has been recorded as an associate of open access journal (DOAJ), also as an assessor of the National Certification Body (BNSP) professional certification body, as a reviewer of reputable indexed international journal (SCOPUS). pursue a career as a lecturer in the industrial engineering study program and hold the position of sub-directorate of student affairs, vice chairman of research and community service institutions, and as vice chancellor for student affairs.

Moch. Anshori, Gusti Adriansyah, Ahmad Fatih Fudla, Dini Retnowati, Ika Widhya Anggraini, Asri Dwi Puspita are lecturers in Universitas Maarif Hasyim who collaborating research dan community service has been published in many journal.

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Ahmad Makki is the Chairman of the Maarif Education and Social Foundation which is located in Taman, Sepanjang, East Java, Indonesia, as a religion-based educational institution that promotes moral, ethical and noble moral education.