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FACTORS AFFECTING MILK PRICE IN GETASAN DISTRICT, SEMARANG REGENCY, CENTRAL JAVA PROVINCE, INDONESIA (NUMBER OF CATTLES, COST OF PRODUCTION, QUALITY OF MILK) AT THE FARMER LEVEL

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ABSTRACT

This research was done in(October-September) 2012 at Kopeng and Tekelang village, District of Getasan. The method used in this research was survey which interviews to 60 farmers. Questionnaiers are in Appendics I. The studys primary objective was to examine the factors {No. Of cattle (X1), cost of feed (X2), Quality of Milk (X3)} that affects over the price of the milk (Y). The (independent) variables observed had significant effects over the (dependent) price of the milk.

The research results have indicated that the constant (milk price) 65.863 sig. $P \leq 0.000$ (99.99%). Which gives the linear equation $Y = 3.082 + 0.042$ (X1) – 2.9E10 (X2) + 0.003 (X3). The feed cost almost exceeds the income for some of the farmers. It did affects the price of the milk by increasing also the milk price. Analysis tools used in this study is quantitative discriptive (Multiple Linear Regression) with F-test ($F=9.843$ $p \leq 0.0001$) R Square (R^2) = 0.345 $p \leq 0.05$), t-Test (X1 = 2.469 $p \leq 0.05$, X2 = 2.797 $p \leq 0.05$, X3 = 4.268 $P \leq 0.05$. The model of the study is being matched 35 % for the price of the milk but 65 % depends on other factors, such as education, farmers strength, motivational attitude, labor force, time figured, level of education, farmers age, animal hausbandry management practices, and government policies et. cetera.

The study explored also the role of cooperativism in dairy cattle farming in those Getasan villages (Kopeng and Tekelang),Semarang Regency, Central Java Province.. There were significant relationships among sharing of knowledge and information, sharing of resources, and participation in decision making and milk production in Getasan Village. Interestingly noted that the milk is paid for on the basis of compositional and hygienic quality, assessed according to the fat, protein, lactose, total bacterial count (TBC), somatic cell count (SCC) content of milk. Improving milk compositonal quality will generate additional income. Under tropical conditions the lactating animals maintain higher body condition which results in lower feed intake and milk yield. In nutshell, the suggestion for milk of desirable composition may be produced for special purposes through selection of appropriate physiological states coupled with special feed ingredients, in the dairy production system.

Key words: multiple linear regression, dairy cooporatives, husbandry management

INTRODUCTION

Background

Under the national government the first level of sub-national administrative unit is the province level. Currently Indonesia has 33 provinces (*propinsi*), five of which have special status. The provinces are then subdivided into the second level of sub-national administrative unit called district/regency (*kabupaten*) and municipality (*kota*), which are further subdivided into subdistricts – the third level of sub-national administrative unit – (*kecamatan*), and again into the smallest administrative unit, namely village (*desa*) or commune (*kelurahan*).

Based on International Monetary Fund (2009), with a nominal Gross Domestic Product(GDP) of US$ 512 billion in 2008 Indonesia ranks 19th in the world economy. The nominal GDP per capita amounts to US$ 2,246 and thus ranks 116th most affluent of 170 countries in the world. According to Indonesian Central Bank the economic growth rate for 2008 was 6.1% (GDP) and during the last 5 years 5-6% (Bank Indonesia 2009). Although agriculture sector only accounts for 13.5% of the total GDP, 42.1% of the total labour force are employed in agriculture sector (Central Intelligence Agency 2009).

Now a days people are thinking not only about the future for better life, meet the millennium goals in integrated fashion and reducing environment pollution but also incorporating mainly livestock and their products supported with research and development tools. Dairy sector is a major contributor to economic development, especially among the developing countries, both driving economic growth and benefiting from it. As an engine of growth, it provides increased income, employment, food and foreign exchange earnings as well as better nutrition. As income increases with economic development, the share of animal products in total food budget increases faster than that of cereals. This occurs because of the relatively high-income elasticity of demand for animal products *(*Ehui S. 2008).The dairy industry may be viewed as a distinct sector of the livestock economy.

Indonesia produces less and imports more from overseas; Australia and New Zealand have been the major supplier of diary products (Sulastri and Mahargan, 2002). Additional imports of dairy cattles to improve the milk Industry, poverty alleviation, increased manpower and employment opportunities were considered by the government of the day since 1981 in accordance with the Third Five Years Development Plan. Which actually was spear-headed with Union of Indonesian Diary Coopearatives in 1962. According to Sulastri and Maharjan (2002), Indonesia imported 36 200 diary cows from Australia and New Zealand in 1981.

In 1982 the diary Technical Team was established to increase the price from 300-328 rupiahs per liter. Dairy Technical Team which consist of Minister of Industry Affairs, Ministry of Trade and Cooperatives and Ministry of Agriculture was established in order to; determine the milk price purchasing price agreement between the milk processing industry and the diary cooperatives.

The determine ratio between domestic milk production absorption and the volume of powered milk, which could be imported. Supply of dairy products from

abroad into the country has enormouse impact on the locally produced. Most of the milk are imported cheaply and have been competitive with locally produced milk in securing a better price. Local farmers in Indonesia realised the significant of meeting the consumers demand and organised to form a group. According to Industry sources, 12 percent of farmers meet Milk Quality Standard (SNI) set by the government. While 75 percent of Nestles farmers meet the standard. The main problem with milk quality is very high TPC (Total Plate Count) above the SNI level of one million (Morey, 2011).

Important efficiency of milk production, cost price, farm management, chain of production between farmers and processors were high lighted to improve the service and input (feed) supply. Also the small and medium scale farmers organised themselves into cooperatives (Suzuki, 2005). This paved a way for diary farmers that have three to less than five milking cows to form cooperatives. Initial establishment of Indonesian Dairy Industry (IDI) on small holder farms grouped into cooperatives was formed in Pujang, Malang, East Java in 1962 (Sulastri and Maharjan, 2002). Holistic approach to purposely deal with farmers. Primarily purpose of the cooperative establishment was to eliminate the problems of unfair competitions among diary farmers in pricing of milk and to improve the quality of milk production to meet the Milk Quality Standard (SNI).

The dairy industry in Indonesia is concentrated in only three of the 33 provinces, East Java, Central Java and West Java. Dairy Report on Cooperatives (2012), indicated that, in 2010, these 3 provinces produces 97 percent of Indonesian Milk (57 % diary cows and 50 % milk production) in only 5 regencies: According to the Ministry of Agriculture (2010), milk production has increased steadly from 535,962 tonnes in 2005 to 927,838 tonnes in 2010 (14.6 percent average annual increase). The largest dairy production province of East Java, accounted for 57 percent of the total national milk production, followed by West Java with 29 percent contribution and Central Java with 11 percent (Morey 2011).

There is also a belief that total consumption of milk in the developing countries is projected to increase from 64 million metric tones in 1993 to 391 million metric tones by the year 2020, which is 138 percent increase. In the same token, per capita consumption is expected to increase from 38 kg to 62 kg /person. Much of this increased demand will be in urban centers in which population is to grow at a rate of 5-6 between 1990-2025 (Mihre, 2006)

Objectives and Benefits of The Research

The primary objective of this research conducted for a period of one months as of September to October 2012 studied the factors that affects the milk price from the input by the farmers. Least producing dairy milking cow farmers to the highest litres per annum. How the Semarang Regencys, contibutes to the Indonesian milk production and in the S. E. Asian Region that compete at the global scale, see if the farmers meet the SNI. The study aims to examine throughly the factors (independent variables) that affects the milk price (dependent variable). There are number of factors associates with the farmers in Semarang Regency. Factors such as depreciation in the quality of milk, expensive exercise in the cost of milk production, farmers general attitude, interest in dairy

farming, scarcity of land with suitable elevation for dairy cattle farming, scarcity of forage, small farm size, limited farmer education, limited access to bank loans, lack of technology for milking and processing and limited high quality genetics of dairy cattle.

Benefits of the research is to provide information to the farmers, government and relevant cooporatives about the the factors that affected the Price of the Milk must throughly be taken into consideration and improved. For other Institutions to further do research also into the other factors that affects the price of the milk.

The Specific Aims of The Research

1. To see if the Number of the cattle (X1), especially the calf and the lactating cow had affected the price of the milk or not. If so which of the above was best used to influence the Milk Price. And the other contributing factors associated with the variable choosen in this research the number of cattles affected the price of the milk.
2. The Cost of Production (X2) is another independent variable in this research, that was predicted to affect the Price of the Milk. Primarly feed type, and cost incurred during the farmers operation in husbandry practices. Differences that were evaluated among stockmanship and their attitude to purchasing feed has been also considered.
3. Another important independent variable studied in this research that affected the Price of the milk is the Milk Quality (X3). The milk quality was observed physically and tested by the tester at the cooperatives agencies in Getasan. The Quality of the Milk was than evaluated with the district and national standard. This put the statue of the farmer in receiving his/her income from the Milk buyer and distributor for downstream processing in the Industries. Therefore the Milk Quality also influenced the price of the Milk.

MATERIALS AND METHODS

Research Material

This research was held on September-October 2012 at the Getasan District (Kopeng and Tekelang village-*desa*). Research materials used in this research during the study are total of 60 dairy cattle farmers from the least to the highest population count of cattle. From this study three independent variables have been chosen; (1) number of cattles ,(2) cost of production-feed (3) quality of milk. The price of the milk has been categorized as dependable variable.

Research Method

A study was conducted using Survey Method. According to Singarimbun and Effendi (1995), survey method is a detailed study or inspection, as by gathering information through observation, questionaries etc and analyzing it. A

way to collect comprehensive information which will then proceed in specializes in certain aspects (Nawawi, 2001). The survey is to describe the nature of the relevant population (Moses and Nurfitri, 1982). In this case the dairy cattle farmers in Getasan District have been choosen for the study. Atleast 60 respondent of the dairy farmers in Getasan District were interviewed during the study and to analysis the hypothesis with regression.

The primary and secondary data has been gathered; primary data through a survey questionnaire by interviewing the (60 respondents) dairy cattle farmers. Secondary data was collected at the Getasan District Agriculture Veterinary Office.

Model based on Linear Regression was used to determine the factors affecting the milk price in Semarang regency. The Model was based on the following formula, (Gujarat, 1997; Ghozali, 2008). Xi is independent variables that determine the factors that affects the Price of the Milk, consisting of:

$$Y = a + b1\ X_1 + b_2\ X_2 + b_3\ X_3 + e$$

Y = price of the milk
a = constant
b = regression coefficient fo x
X_1 = number of cattles
X_2 = cost of production
X_3 = quality of the milk
e = error term

The significance of the independent variables influence was tested by the SPSS Program 16.

RESEARCH HYPOTHESIS

Data analysis is intended to discuss and explain the data obtained in response to the research hypothesis. Analysis tools used in this study is quantitative descriptive analysis with multiple {F test, T test, Correlation, and Multiple Coefficient of Determining R square- (r^2)} linear regression analysis

- No. of Cattles (variable X_1) will affect the price of the milk (variable Y)
- Cost of Prod (variable X_2) will affect the price of the milk (variable Y)
- Quality of Milk (variable X_3 will affect the price of the milk (variable Y)

Statistical Hypothesis Testing Creteria

A statistical hypothesis test is a decision about a statistical hypothesis. The decision is to accept or reject one hypothesis versus another. In order to make a statistical hypothesis test, one needs to specify two hypotheses: the maintained and the alternate. Either or both can be simple or complex. H0: $\beta1=\beta2 = \beta3 = 0$, meaning that the independent variable (X) simultaneously had no effect on the dependent variable (Y). H1: $\beta1 =\beta2 =\beta3 \neq 0$, meaning that the independent variable (X) had effect on the dependent variable (Y).

The coefficient of Multiple Determination {R square (r^2)}

$$R^2 = \frac{TSS - SSE}{TSS} = \frac{\sum (\hat{y}-y)^2 - \sum(y-y)^2}{\sum (y-y)^2}$$

TSS = Total Sum of Squares
SSE = Sum of Square Error
SST $\sum y-y)^2$ = Total variation in y. Deviation of y scores from the mean of y.
SSE $\sum y-y)^2$ = Variation in the y variable not explained by the regression equation. Deviation of y scores from the predicted y scores. Error variation.

With R^2 (R Square) if F test accepted H1 we can make the model of multiple regression ($y = a+\beta 1\ X1 + \beta 2\ X2 + \beta 3\ X3$) with R^2. Therefore F test is consider the factors that have been affected together. whereas the individual T test is for the variables that has not affected the dependent variable (Y).

Formular for F test

F-test, allow us to test the overall statistical significance of the regression equation. F test is a test used to determine if all independent variables have effects similar to dependent variable.

$$F = \frac{R^2 / k}{(1-R^2) / (n-k-1)}$$

Where R^2 = sum of squares regression
k = number of variable
n = number of dataTesting Creteria:

If F calculated is < F table then H0 is accepted, meaning that the X variables together have an influence on the Y variables. If F calculated is >.F table then H0 is rejected, meaning that the X variables together have an influence on Y variable.

Formular for T Test

Test of Significance for individual parameters (T-test), determines if the individual right-hand variables have explanatory power. T test is used to determine the effect of each independent variable, the formula is:

$$t = \frac{b_i}{Sb_i}$$

b = regression coefficient
t = statistical test
sb = standard deviation

H_0: Regression Coefficient is not significant H_1: Regression Coefficient significant. Testing Creteria: If probabilities (p) ≥ 0.05 (t calculated is < t table) that mean H_0 is accepted. However, if probalities (p) ≤ 0.05 (t calculated > t table) that mean H_0 is rejected.

Model Summary

The SPSS Regression module also calculate R (R) =.588. According to this statistic for the data, 60% of the variation in the respondents; Milk Price (Y) is accounted for by the respondents number of cattle (X1) and the cost of feed (X2). The coeffiecient of multiple determination (R^2) is 0.345. Therefore, about 35% of the varieties in milk Price is explained by quality of milk (X3), number of cattle (X1) and the cost of feed (X2). The regression equation appears to be very useful for making predictions since the value of R^2 is close to 1. However, in this case due to other factors (65%) from outside have influenced the price of the milk very much. The basic dairy cows feeding system is grass with concentrate supplement. Concentrates are essential part of rations in addition to dry matter roughess to increase the capacity of milk production per cow (Edeng Sulastri and Keshav L.H, 2002).

Table 1. Model Summary for R, R Square, Adjusted R Square and Std. Error of the Estimate.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimates
1	.588	.345	.310	.09085

ANALYSIS OF VARIANCE (ANOVA)

At the 5% significant level to determine if the model was useful for predicting the response the following steps are given:

Step 1. Hypothesis H0: B1 = B2 = B3 = 0**,** Ha: at least one B1 $\neq$ 0

Step 2. Significant Level α= 0.005 , Rejection Region

Step 3. Reject the null hypothesis if p-value $\leq$ 0.005

Step 4. ANOVA Table (test statistic and p-value)

F = 9.843, p-value ($\leq$ 0.0001)

Table 2: ANOVA (Analysis of Variance)

Model	SS	df	MS	F	Sig
1Regression .	.244	3	.081	9.843	.000
Residual	.462	56	.008		
Total	.706	59			

Predictors: (constant), Quality of Milk1 (Score %), Number of Cattle (herd), Cost of feed (Rp/000).

Dependent Variable: Milk Price (Rp/000)

Step 5. Conclusion
Since p-value < 0.001 ≤ reject the null hypothesis
Step 6. Continuation of the conclusion

At the α = 0.005 level of significant, there exsist enough evidence to conclude that at least one of the predictors is useful for predicting the Price of the Milk, especially the Quality of the milk (X3), therefore the model is useful.

The Table Variables Entered/Removed tells us the predictor variables and the method used. Can see that all of the predictor variables were entered simultaneously because Method Enter has been selected. Here we see that the model 1 which include only standardised Milk Quality accounted for 35% of the variance (Adjusted R^2 = .345).

The Adjusted R Square value tells us that our model accounts for 31% of the variance in the milk price. A very good model. A difference of 4% and the rest 65% have been other various contributing factors to the 60 farmers performance. R and R2 change are same, not much variance in change scores with the number of cattle (X1) and cost of feed (X2). Very little impact on the Quality of Milk.

The confidence intervals provides a range of values within which we can assert with 95% level of confidence that the estimated coefficient in "B" lies. However here confidence interval is not provided for the p-value 0.001. Sig. Is above ≥ 0.001 the estimate in B is unreliable and is said to not be statistically significant. Here SPSS reports the Beta + and sig (p) values for each of the models. These were explained in the output from the Enter Method.

The Individual t-test, number of cattle (X1) 2.469, Cost of feed (Rp/000)-2.797 (X2), values are greater than significant values (X1 = .017), (X2 = .007), but for the Quality of Milk1 (score %) 4.268 is less than the p-value (X3 = .0001). Therefore, the assert the veracity of the value in Beta (B) with a 90% - 95% level of significant.

Table 3. (Coefficients) models, standard coefficients, collinearity statistics

Model	Standard Coefficient Beta	t	Sig	Collinearity Statistics Tolerance	VIF
1 (constant)		68.910	.000		
N.of Cattle (Herd)	.293	2.469	.017	.833	1.201
Cost of Feed (Rp/000)	.-332	2.797	.007	829	1.206
Quality of Milk1 (Score %)	.463	4.268	. 000	.994	1.006

So far in reporting the significant of the model by citing the F and the associated p-value, along with the adjusted R square, which indicates the strength of the model.

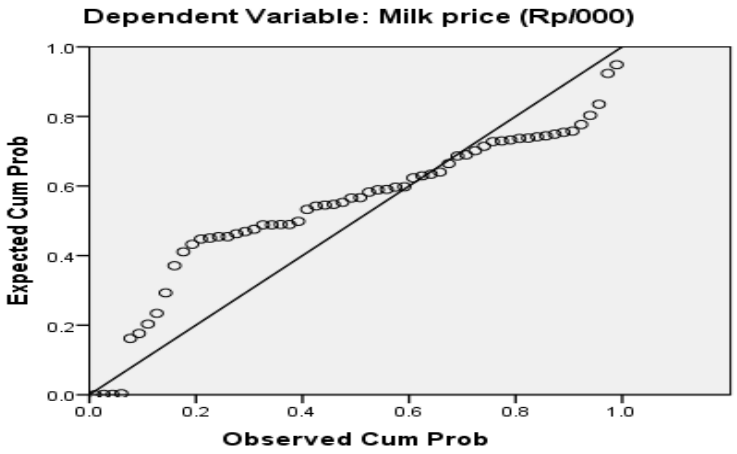
Adjusted R Square (R^2) = .310;
F = 3.56 = 9.843, p ≤ 0.0005

Table 4. The Model 4., Significant variables.

Predicted Value	Beta (B)	Probability
Dairy Cow	.400	.002
Cost of feed	-.373	.003
Quality of Milk (Scores %)	.599	.0001

As seen here the cost of feed was very expensive exercise. The cost almost exceeds the income for some of the farmers back in the Kopeng and Tekelang village. It did affect the price of milk by increasing also the Milk Price.The Normal P-P Plot of Regression Standardized Residual also shows that there is much variation in the Expected Cumulative Probability and Observed Probability.the spaces further apart from the linear straight line indicate lack of normality. Therefore no $P \leq 0.0001$ and no sign of Heteroscedasticity.

Fig.1. Normal P-P Plot



This P-P Plot also indicates the followings: Autocorrelation Multicollinearity, Heterocedasicity, Normality. The linear pattern, of straight line has not been followed very well here .

Table 5. Sample code for the Quality of Milk (Name, Age , Gender, and Worker)

Attribute	Scores				
	1	2	3	4	5
Sweetness	Not Sweet	Less Sweet	Sweetish	Sweet	Very Sweet
Acidity	No acid	Less acid	Sourish	Sweet	High Acidic
Bitterness	Very bitter	Bitter	Rather Bitter	Less bitter	Not bitter
Rancidity	very rancid	rancid	slightly rancid	Less rancid	Not rancid

A specialist milk tester (man) at the cooling machine tasted and recored the amount of milk content with their specifications. Place where this research was conducted had its own Cooporative called "**WAHYU AGUNG"** in the District of Getasan.

Dairy cattle was found to be the important source of income among the group members in Getasan Village (S. Gayatri, et al., March 22nd, 2011).

The Directorate General of Livestock and Animal Health Services (DGLAHS) at the Ministry of Agriculture oversees the national strategy and Government policy issues affecting Indonesia's dairy industry. There are five directorates under DGLAHS covering (1) breeding, (2) livestock production, (3) livestock feed, (4) animal health and (5) veterinary public health and post harvest. The Indonesian Association of Milk Processors (IPS) represents the milk processing sector. IPS members buy milk from GKSI members and direct from some large farmers and import milk powders to supplement their needs. There are six milk processors that are a member of IPS – the five major milk processors are Nestle, Frisian Flag, Sari Husada, Indomilk and Ultra Jaya (Philip Morey 2011).

CONCLUSION

Village Unit Cooperative (VUC) can make a higher return per litre of milk from manufacturing their own branded milk products for local customers rather than selling direct to the major milk processors as raw milk. However, the local market consumes only a small percentage of the local milk collected by Village Unit Cooperative (VUC) and therefore the major milk processors are an important customer for the Village Unit Cooperative (VUC). Moreover, cooperativism allows individuals to manage the foundation of all relationships (Ramos-Pinto, 2006)

Average yield is between 10 and 12 litres per cow per day. Fresh milk quality is measured by the bacteria content (TPC=Total Plate Count), which ranges from 500,000 to 1 million. Indonesian fresh milk production with the lower bacteria content is combined with imported skim milk to produce liquid milk and powdered milk. Fresh milk with higher bacteria content is processed into sweetened condensed milk.

Price incentives are used to encourage better farm management practices and higher quality milk. However, milk quality from local cows is still far below the National Quality Standard (SNI) with only 12 percent of milk production meeting the minimum quality standard for milk as follows:

- Total Plate Count (TPC) = maximum of 1 million
- Total Solids (TS) = minimum of 11 percent
- Milk content = protein (minimum of 2.7 percent),
- fat (minimum of three percent),
- SNF (minimum of eight percent).

There is a better opportunity for animal husbandry practices and prudent management. However during the observation many of the farmers were lacking better expertise , knowledge in understanding the various diseases, feeding composition and nutrient requirement. Understanding the operational cost and living expenses. Forage was very rare and demanding among the farmers as it

took hours to look for and some even shared their portion to other cattle farmers. It would be a matter of collobarative effort worth putting together by the major Milk Industries, Cooporatives, Agriculture Extension Officers, Vetenarians and Farmers to constructively share the burden and ease with better planning, budgeting and prudent management.

Regular training and information on better operational procedures to farmers to improve their herd management skills and hygiene practices. Operational investment and time from farm to cooling unit and this requires that milk cooling units be placed as close as possible to farmers at MCCs(Milk Cooling Chain or Units in the farmer villages.

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