

The State of Milk Production from Dairy Cattle Farmers Industry in Supporting Food Security in Central Java Province

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Abstract

The study aimed to analyze the situation of milk production of dairy cattle farmers and the determinant factors of its increased productivity in supporting food security at Central Java. The institutional survey method has been used in this study. The results showed that the value of milk food security was 0.38 and its level increased to 41.18% in 2012. Determinant analysis of the increasing productivity simultaneously highly significant ($p < 0.01$) influenced by all independent factors with $R^2 = 0.954$. The paper suggests giving a focus on the technical and non-technical factors to support the food security.

Keywords = milk production, food security, productivity, increasing factor, dairy cattle farmers

1. Introduction

Milk from dairy cattle is one of food commodities that have a strategic role in supporting human resource quality improvement. The milk consumption nowadays is being estimated continue to increase in line with the better economic recovery and public welfare condition, population growth, and the awareness of nutritious and balanced food. This condition required a consequence the effort to increase the milk supply to fulfill the needs of the population.

The Indonesian milk consumption level is relatively low compared to other South East Asian countries and the world. The milk consumption being recommended as National Consumption target was 7.2 kg/ capita/ year, whereas in South East Asian countries the average number reached 21 liters/ capita/ year. Based on the level of consumption between rural and urban areas, there are inequalities of nutritional problems, over nutrition in urban areas and malnutrition in rural areas [7]. Milk consumption in various countries in South East Asian can be seen in Table 1.

Table 1

Milk consumption in South East Asian countries

No.	Countries	Milk consumption
		----- liter / capita / year -----
1.	India	42.08
2.	Thailand	33.7
3.	Singapore	23.0

4.	Malaysia	22.1
5.	Philipine	22.1
6.	Indonesia	11.9

Source: Yulianto [12]

Milk production from dairy cattle smallholders has not been able to meet the needs of population yet, especially the dairy processing industry. The main problems according to Siregar[8], are caused by: 1) the population of dairy cattle is still relatively small, while the demand for milk continues to rise along with population growth, economic growth and the awareness of the importance of nutritious food, 2) the productivity of dairy cattle is still inadequate; this condition is caused by lack of farm management from food, health, and reproduction and 3) There is limitation in farmers' level of knowledge, especially in aspects related to business management.

Milk production in Central Java up to now reached 100,350 ton or equal as 10.84% from national milk production as much as 925,775 ton; meanwhile West Java as much as 28.95% and East Java 57.94% [4]. This milk production is still relatively small compared to the needs of the Milk Processing Industry (MPI), which reached 6 million liters / day. The gap between supply and demand, made IPS doing import that caused milk ratio reaches 70% of imported milk and 30% from domestic production [6]. The domestic milk production need to be increased in order a continued supply can be improved and then it may encourage food security of the population.

Based on the background and problems above, this paper tries to analyze how the situation of milk production in supporting the food security situation in Central Java. In addition, this study also analyzes the various factors that affect the dairy milk productivity in supporting food security. The result of this study is expected to provide data and information on the milk production situation related with food security and the determinant factors that affect the milk productivity in Central Java.

2. Materials and Methods

This survey was conducted by analyzing secondary data from related institution such as Department of Animal Husbandry and Animal Health of Central Java Province and also BPS-Statistic Indonesia of Central Java Province. Other relevant data sources were also used to complete this study.

Analysis of production situation in relation with food security calculated using equivalent protein in milk production (PSSP) to the adequacy of the population norm (NKP). The formula [1] is stated below:

$$PSSP = \frac{(1-F_i) \times H_i \times T_i \times P_i \times B_i \times 10000}{U \times 365} \quad \dots \dots \dots \quad (1)$$

with :

PSSP = milk production equivalent with proteins

F_i = correction factor of spoilage

H_i = milk production (liter/ year)

T_i = correction factor for calves' consumption

B_i = part of food that can be consumed

P_i = content of protein in milk

U = total population

10000 = conversion from 1 ton to 100 g

365 = total day per year

Production level to the adequacy of the population norm (NKP) can be categorized as less ($PSPP < NKP$), balance ($PSPP = NKP$) and excess ($PSPP > NKP$). Determinant factors that influence milk productivity in Central Java analyzed using multiple regressions according to Ghozali [5] with equation as followed: $Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + e$

With:

Y = milk production (liter/ year)

a = Constanta

b = coefficient of regression

x_1 = dairy cattle population (AU)

x_2 = livestock density (AU/ Km²)

x_3 = total number of Central Java population (person)

x_4 = GDP of Central Java (in a million)

e = stochastic deviation

F test was used to test the linear multiple regression model with significance level of 5 and 1%. T test was used to determine the effect of independent variables on the dependent variable partially.

3. Results and Discussion

Overview of Dairy Cattle Industry in Central Java

The development center of Dairy Cattle Industry in Central Java located in District of Semarang and Boyolali. The population of Dairy cows in Central Java is 154,398 head with milk production reach 105,516,134 liter/ year [1]. The development center of this dairy industry known as "milk pathway" which includes:

1. The Middle path region consists of: Semarang City, Semarang Regency, Salatiga City, Boyolali Regency, Surakarta City, Klaten Regency, Karanganyar Regency and Sukoharjo Regency.
2. The South path region consists of: Semarang City, Semarang Regency, Temanggung Regency, Magelang Regency, Wonosobo Regency and Banyumas Regency.
3. The West path region consists of: Semarang City, Pekalongan City and Tegal City.

The development level of dairy cow population and milk production in Central Java during 5 year period (2008 – 2012) was on Table 2. On Table 2, it can be seen that there was increasing trend of the dairy cow population during the period with an average 7.20% and milk production increased by an average of 4.12%.

Table 2

The development level of Dairy Cow population and Milk Production in Central Java 2008 - 2012

No.	Year	Population (head)	Milk Production (liter)
1.	2008	118,424	89,916,250
2.	2009	120,677	91,762,220
3.	2010	122,489	100,149,736
4.	2011	149,931	104,141,255
5.	2012	154,398	105,516,134
Average (%)		7.20	4.12

Source: Agency of Animal Husbandry and Animal Health Central Java Province [1]

The analysis of milk production level to Food Security

Based on 2012 Indonesian Food Law No. 18, food security is the food fulfillment condition of a country to individual level as reflected in the availability of food in adequate quantity and quality, safe, varied, nutritious, affordable and equitable and not contradicts with religion, beliefs and the culture of the community, to live healthy, active and sustainable production. Milk consumption of Indonesian consider relatively low. Based on the result from Widya Karya Nasional Pangan dan Gizi, protein adequacy value is as much as 55 g/ capita/ day, consists of 40 g vegetable protein and 15 g animal protein which 6 g from cattle product and 9 g from fish product. The recommendation of protein contribution from milk was 0.59 g/ capita/ day that equal to 7 liter/capita/ year of milk.

In order to meet the food requirement, it is essential to achieve food security. According to Atmojo [2] and Soetrisno [9], there were several factors need to be considered in related to the food security and food availability. The factors were level of production, the food distribution, diversification of food consumption, the level of food spoilage, the level of imports and exports, and the use of food for other needs (industry, seed, etc.). The production level was mainly influenced by

the availability and quality of seeds, cultivation technology, pricing and marketing mechanisms, and institutional role.

Results showed that the milk production level related to food security in Central Java was considered in the less category position with an average of 0.38 point. It means that milk production can only fulfill the protein from milk by 38.0% (PSSP<NKP). This results showed that the state of milk production equivalent to protein (PSSP) for 5 years, to the adequacy of the population norm (NKP) have not been able to meet the needs of the population. The level of Milk Product Food Security during 5 years (2008 – 2012) can be seen in Table 3.

Table 3

Development level of Food Security related to Milk Production level in Central Java 2008 – 2012

No.	Year	PSSP	Food Security level (PSSP/NKP)	Category
1.	2008	0.211	0.35 (35.76%)	Less
2.	2009	0.213	0.35 (35.76%)	Less
3.	2010	0.237	0.40 (40.16%)	Less
4.	2011	0.241	0.40 (40.16%)	Less
5.	2012	0.243	0.41 (41.18%)	Less
Average		0.229	0.38 (38.60%)	Less

Annotation: NKP = 0.59 g of proteins/ capita/ day

Influence factors of Milk Production related to Food Security in Central Java

Multiple regression analysis was used to determine influence factors of the milk production related to food security in Central Java, with milk production as the dependent variable (Y) and the independent variables were the dairy cattle population (x1), the density of livestock in the region (x2), the total population of Central Java (x3), and the regional gross domestic product/ GDP of Central Java (x4). Results of the analysis showed that the independent variables simultaneously highly significantly ($p < 0.01$) affected milk production. Partially, independent variables that have an effect on milk production were dairy cattle population, total population and GDP.

This result showed that increasing milk production is necessary to fulfill the food supply. The state of food security is a novel topic nowadays. The food security condition is expected to be achieved until household level where people can obtain food fairly, easy and in affordable price. This condition requires a standardized food security system (consist of: production, distribution and consumption system). The result of determinant factors that have effect on milk production system can be seen in Table 4.

Table 4

Factors Affecting Milk Production related to Food Security in Central Java

No.	Production variable	Coefficient of regression	Sig.
1.	Constanta	-2198596.065	0.145

2.	Dairy cattle population (x1)	538.608	0.000**)
3.	Livestock density (x2)	24864.912	0.016*)
4.	Number of Central Java total population (x3)	-0.421	0.704
5.	GDP of Central Java (x4)	0.063	0.125
	F critical	156.957	0.000
	R ²	0.954	

Annotation: **) highly significant (1%), *) significant (5%)

Based on Table 4 a regression equation can be generated as followed:

$$Y = -2198596.065 + 538.608 x_1 + 24864.912 x_2 - 0.421 x_3 + 0.063 x_4 \quad (R^2 = 0.954).$$

The equation showed that 1 unit increasing in dairy cattle population will increase the milk productivity by 538.608 liter of milk and 1 unit increasing in the population density will increase the milk productivity by 24864.912 liter of milk. R² value = 0.954, it means that 95.4% milk productivity level was affected by factor x1 – x4 and 4.6% was affected by other factors. Result of study from Toharmat [10] showed that availability and quality of feed is one of the determinant factors in dairy cattle business. Dairy cattle farmers were still heavily dependent on forage availability and the by-product of the agricultural products, therefore the cattle production was not maximal. Turinawe [11] mentioned that the use of technology in increasing fibrous feed (IFT) highly significantly affected the increasing in profit margin, compare to local feed usage . The use of IFT was influenced by social-economic factors such as the farmer's age and education, the number of family members, agricultural land area, and the amount of dairy cattle.

4. Conclusion

Result of the analysis showed that the milk production level equivalent with protein was 0.229 or the achievement reached 38.60% of the recommended norm and it can be categorized as less adequate. Milk production related to food security need to be increase to fulfill the population' food needs. Multiple regressions model showed that milk productivity high significantly affected by dairy cattle population, livestock density, total population number, and level of GDP. As the demand rate of the population continues to grow, food based milk product considered as an important food needs, therefore the increasing milk productivity is very demanding.

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