

The Impact of Increased Prices of Eggs on Consumer Purchases in Klaten Regency, Central Java, Indonesia

Retno Lantarsih

Faculty of Agriculture
Janabadra University
Yogyakarta, Indonesia
retno@janabadra.ac.id

Tri Anggraeni Kusumastuti

Faculty of Animal Science
Gadjah Mada University
Yogyakarta, Indonesia
trianggraeni@ugm.ac.id

Abstract—In July 2018, the price of eggs in Klaten Regency experienced a sharp increase. The purpose of this study was to determine: (1) the effect of the increase in the eggs price on the decision to buy eggs by consumers, (2) the impact of the increased in the eggs price on the number of eggs purchased by consumers and, (3) find out the function of demand for eggs in the event of an increase in egg prices. This research is descriptive research. Determination of research location using the purposive method. Based on the sub-district area which has the most population, the researcher determined one selected sub-district as research location, namely Trucuk Sub-district. This study uses a double logarithm multiple linear regression analysis. The results showed that: (1) There were 57.5 percent of consumers decided to reduce the number of eggs when there was an increase in the price of eggs, and the remaining 52.5% decided to purchase a fixed number of eggs; (2) The increased in the eggs price has an impact on the number of purchases of eggs by consumers. The average purchased of eggs by consumers in the event of a significant increase in prices when compared to the purchase of eggs during normal conditions; (3) Factors that influence the demand for eggs in the event of an increase in egg prices include the price of eggs, the tilapia price, the number of family members, and wife's education. Meanwhile, the rice price, the chicken meat price, the price of tofu, the Tempe price, income, and the age of the wife did not influence the demand for eggs.

Keywords—price increases; Klaten Regency; demand, eggs

I. INTRODUCTION

The main obstacle in the development of laying hens is the lack of information, lack of capital and fluctuating feed prices [1,2]. Pure eggs are an essential commodity to meet the nutritional and protein needs of the community. Therefore, the government must maintain stock in the market, also to increase and sustain the quantity and quality of commodities. Related official institutions need to minimize the spread of endemic chickens locally and between regions [3]. Chicken egg production centers are only concentrated in several areas while consumers are spread throughout Indonesia. This condition has an impact not only on fluctuations at all times but also on price disparities between regions [4].

Eggs price at the beginning of July 2018 experienced price increases in several places in Indonesia, including in Central Java, especially in Klaten district. Central Java is the largest production center for the development of broiler chickens in

Indonesia. In normal conditions, the average price of eggs is IDR. 24,000 per kilogram. In the event of a price increase, the average price of eggs reaches IDR. 30,000 per kilogram or increases by 25% from the regular price in just 15 days.

The cause of the increase in eggs is due to a decrease in the availability of eggs as a result of rising prices of feed and diseases on livestock. The increase in feed prices has caused small-scale laying farmers with a small business scale to be increasingly difficult to maintain their business so that the number of farmers becomes reduced. Diseases that cause decreased egg production are Newcastle disease, Avian influenza, Avian Encephalomyelitis, and Mycoplasma Gallisepticum [5]. Besides, at the same time, there were an attack of H9N2 avian influenza (AI) sub-type diseases that were low pathogenic (not transmitted to humans). As a result of this disease, the production of eggs has decreased by 50-60 percent.

Traders in the market also felt the increase in the price of eggs as a form of adjustment in purchase prices from suppliers. This condition caused an increased in eggs price at the consumer level. Consumers must pay a higher price. From the supply side, the increase in the eggs price was triggered by a decrease in the production of eggs, while the demand for eggs was constant. Eggs are one of the most popular sources of animal protein sources in Indonesia because the price of eggs is relatively lower compared to other sources of animal protein such as chicken or beef. There are several types of eggs in the market, namely eggs, layer eggs, duck eggs, quail eggs, and organic eggs. Consumption of eggs increased by 32.9%, organic eggs increased by 11.93%, and layer eggs by 7.6%. Fewer egg consumers come from families with higher income and education. In determining the choice of types of eggs consumed, consumers based on health factors, nutritional value, environmental issues, and animal welfare. Most consumers base on the nutritional content of consuming eggs, however, they use prices as the most critical variable in consuming eggs [6].

Chemical compositions of layer egg the same with eggs consist of carbohydrate 5,96 %, calories 112.5 Kcal/100 gram, fat 4,37 %, and protein 12,4 %. Chemical compositions of quail eggs consist of carbohydrate 4,01 %, calories 156.5 Kcal/100 gram, fat 9.89 %, and protein 12,7 % [7]. Other chemical content int layer eggs mineral 0.91% [8]. Duck eggs has

protein 11.8 % and lipid 13.52 % [9]. Designer eggs provide vegetarian, safe, immune powered, specialty or organic food stuffs which can have improved vitamins, minerals, balanced ratio of omega-6 to omega-3 fatty acids, lowered total cholesterol, additional boost of antibodies and essential pigments such as carotenoids. From the relevant scientific literature, functional eggs can be considered as human designer food. This review describes the concepts of designer eggs and their health benefits and nutritional values [10].

Provision of food requirements in general, including eggs requires information about the factors that affect egg demand. Increasing population and income of people in a region can bring changes to the need for eggs. The people in Klaten Regency in 2016 was recorded at 1,163,218 people. This number increased by 4,423 people or 0.38% when compared to 2015 [11]. The increase in community income also has an impact on changes in people's consumption patterns in meeting family nutrition. With the increasing income of the people, the purchasing power and choice of meeting food needs are also increasingly diverse. Besides, the prices of substituted and compliant goods, as well as consumer characteristics also contribute to influencing consumer demand for eggs.

The staple food of the people in Klaten Regency is rice, and instant noodles are an alternative to fulfilling carbohydrates. Meanwhile, there are many choices available for the community to meet the needs of animal and vegetable protein including tilapia, chicken meat, tofu, and tempe. Tofu and tempe are a source of vegetable protein made from soybeans. In addition to the prices of substituted and compliant items, the characteristics of consumers also contribute to influencing consumer demand for eggs. These characteristics include education and age of wife.

Previous researchers researched the demand for eggs in normal conditions, while the authors are currently researching the event of a significant price increase caused by a decrease in the availability of eggs as a result of rising feed prices and the presence of disease attacks on chickens. This research emphasizes the response of consumers in buying eggs when there is an increase in egg prices. This study aims to determine: the impact of the increased in the eggs price that occurred in early July 2018 (1) the effect of the increase in the eggs price that happened in early July 2018 on the decision to purchase eggs by consumers, (2) the impact the increased in the eggs price on the number of purchases of eggs by consumers and, (3) find out the function of demand for eggs in the event of an increase in egg prices.

II. METHODS

This research uses a descriptive, analytical base method. This research focuses on problems that occur in the present. The next step is to collect, compile, explain, and analyze data [12].

A. Determination of Research Sites

Determination of the location of the study using a purposive method, namely the technique of determining the area that is done intentionally based on specific considerations. In this study, the determination of district and sub-district

locations based on the highest number of people who were expected to represent the highest number of consumers. The researcher determined that Klaten Regency was a research area because Klaten District had the largest population in the Surakarta Residency area. The community of Klaten Regency is 1,167,401 people or 16.68% of the total population in the Surakarta Residency. Furthermore, the researchers determined Trucuk Sub-district as a sub-district sample because Trucuk District had a population of 70,831 people or 6.10% of the total population in Klaten District [11].

B. Types of Data and Data Collection Techniques

This study uses primary data and secondary data. Primary data is data obtained directly from respondents using interview techniques based on prepared questionnaires. Primary data includes wife's education data, wife's age, number of family members, number of egg consumption, and price data. Secondary data is data obtained from the Central Bureau of Statistics of Klaten Regency, and the Agriculture Service of Klaten Regency. To get secondary data, researchers used recording techniques. Secondary data includes general conditions of Klaten Regency, population, and food prices.

C. Sample Determination

Determination of the study sample using a proportional random sampling method that is random sampling from members of the population. The number of samples in this study was 40 respondents. Respondents referred to in this study are housewives who buy eggs to meet family food consumption needs. The researcher chooses a homemaker as a sample because the housewife is responsible for making decisions in fulfilling family food consumption. The researcher interviewed 40 respondents regarding information about the number of eggs purchased, and food prices both during normal conditions and during an increase in egg prices.

D. Analysis Methods

To determine the impact of the increase in the price of eggs that occurred at the beginning of July 2018 on the number of decisions and the number of purchases of eggs by consumers, researchers used descriptive methods and two average difference tests. Furthermore, to determine the demand function of eggs, researchers used a double logarithm multiple regression analysis model. This model can provide information about the effect of independent variables on non-independent variables which also shows its elasticity. The general model of demand for eggs is as follows:

$$\ln Y = \alpha + \beta_1 \ln X_1 + \dots + \beta_{10} \ln X_{10} + u \quad (1)$$

Information:

| | |
|----------|----------------------------------|
| Y | = Amount of demand for eggs (g) |
| α | = Constants |
| X_1 | = Prices of eggs (IDR/kg) |
| X_2 | = Price of rice (IDR/kg) |
| X_3 | = Price of tilapia (IDR/kg) |
| X_4 | = Price of chicken meat (IDR/kg) |
| X_5 | = Price of tempe (IDR/kg) |
| X_6 | = Price of tofu (IDR/kg) |
| X_7 | = Family income (IDR) |

X_8 = Number of family members (people)
 X_9 = Wife education (year)
 X_{10} = Wife's age (year)
 β = Regression coefficient
 u = Error

The use of multiple linear regression models of double logarithms must go through the R^2 test, F test, and t-test [13]. Measurement of the coefficient of determination (R^2) aims to find out how well the regression line is owned. The F test is useful to detect the effect of independent variables on demand for eggs together by observing the significance value of F. If $F \text{ sig} > 0.05$, there is a significant effect of the independent variables together on demand for eggs. If $F \text{ sig} > 0.05$, there is no significant effect of the independent variables together on demand for eggs. Meanwhile, to determine the impact of each independent variable partially on demand for eggs using the t-test. If $t \text{ sig} > 0.05$, there is a significant effect of independent variables on demand for eggs. If $t \text{ sig} > 0.05$, there is no significant effect of independent variables on demand for eggs.

III. RESULTS AND DISCUSSION

A. Characteristics of Sample Households

The research location was centered in Trucuk Sub-district, Klaten Regency, and in this study took 40 household samples as respondents. Observation of household characteristics: household income, number of family members, education of housewives, and age of housewives. Table I shows the components of household samples

Most (35%) of households have an income ranging from IDR 3 million to 4 million. However, there are still households that have income below IDR 2 million, which is ten households (26%). For comparison, based on the Central Java Governor Decree number 560/94 of 2017 concerning Minimum Wages in 35 Regencies / Cities in 2018 in Central Java Province, the amount of the minimum wage in Klaten Regency is IDR 1,661,635.32. Related to the ability/purchasing power of households to meet food needs.

When viewed from the number of family members, 17 households (43%) have 2-3 family members. Related to the amount of demand for chicken eggs as a source of protein for homes. The number of family members, the higher the demand for eggs.

TABLE I. CHARACTERISTICS OF HOUSEHOLD SAMPLE

| No | Identity Element | Amount (household) | Percentage (%) |
|----|---------------------------|--------------------|----------------|
| 1 | Income (IDR) | | |
| | < 1 million | 3 | 8 |
| | 1 million - < 2 million | 7 | 18 |
| | 2 million - < 3million | 8 | 20 |
| | 3 million - < 4million | 14 | 35 |
| | ≥ 4 million | 8 | 20 |
| 2 | Number of family (person) | | |
| a | 2 - 3 | 17 | 43 |
| b | 4 - 5 | 15 | 38 |
| c | 6 - 7 | 7 | 18 |
| d | 8 - 9 | 1 | 3 |

Table 1. Cont.

| | | | |
|---|--------------------|----|------|
| 3 | Wife education | | |
| a | Primary School | 15 | 37,5 |
| b | Junior High School | 6 | 15 |
| c | Senior High School | 11 | 27,5 |
| d | Bachelor | 8 | 20 |
| 4 | Wife age (year) | | |
| a | 20 - < 30 | 5 | 13 |
| b | 30 - < 40 | 12 | 30 |
| c | 40 - < 50 | 9 | 23 |
| d | 50 - < 60 | 11 | 28 |
| e | ≥ 60 | 3 | 8 |

When viewed from the number of family members, 17 households (43%) have 2-3 family members. Related to the amount of demand for chicken eggs as a source of protein for homes. The number of family members, the higher the demand for eggs.

Table I also shows that most wives (37.5%) or 15 people have an elementary school education. Related to the insight and ability of the wife to fulfill family nutritional needs, including the consumption of animal protein sources (eggs). The low level of wife's education has an impact on the low level of nutrition knowledge.

Most of the wives are 30-40 years old, 12 as many (30%). At that age is a productive period, so that food needs (eggs) are also higher.

B. Impact on Consumer Purchasing Decisions

The results showed that of the 40 respondents, 23 respondents (57.5%) reduced the number of purchases of eggs, and the remaining 17 respondents (52.5%) purchased eggs in a fixed amount despite price increases. The average obtained of eggs at normal price conditions is 2225 grams per month while the purchased of eggs at the time of price increase is 1674 grams. In absolute terms, it is clear that the bought of eggs in the event of a price increase is higher or different compared to the purchase of eggs at regular prices. To see whether this difference is statistically real, it must go through a separate t-test.

C. Impact on Average Purchase by Consumers

Table II shows the results of different tests of t-test for the number of eggs bought by consumers at the regular price and when the eggs price increases.

TABLE II. INDEPENDENT SAMPLES TEST

| | | Levene's Test for Equality of Variance | | t-test for Equality of Means | | |
|----------------------------|----------------------------|--|-------|------------------------------|--------|----------------|
| | | F | Sig | t | df | Sig (2-tailed) |
| Amount of purchase of eggs | Equal variances assumed | 0.270 | 0.605 | 2.520 | 75 | 0.000 |
| | Equal variance not assumed | | | 2.520 | 74,554 | 0.000 |

Based on Table II, the calculated F value of the test is 0.270 with a probability of 0.605. Probability > 0.05 which means that the population has the same variance. Thus the analysis of different tests of t-test uses equal variance assumed. The value of t at equal variance assumed is 2.520 with a significant probability of 0.000 (two tail). Shows that the average purchase of eggs by consumers at normal price conditions and in the event of an increase in the price of eggs is significantly different. The amount of eggs purchased in the fact of an increase in the eggs price is higher than the normal. This condition is in line with the results of previous research which shows that prices become essential variables for consumers in consuming eggs [14].

D. The Functions of Demand for Eggs

The analysis of the demand function of eggs in Klaten Regency uses double logarithmic multiple linear regression equations. By using Eviews version 5.1 software R² or Determination coefficient value is 0.7012 means that the independent variables have the same effect at 70.12% and 29.88% are influenced by other independent variables not included in the model. The explanatory variables cover price of eggs, the rice price, the price of tilapia, the price of chicken meat, the price of Tempe, the tofu price, income, number of family members, wife's education, and wife's ages.

The negative value constant means that there is a tendency to decrease egg demand in the long run. The impact of consumer variations on the consumption of animal protein sources. Although egg consumers are not only household consumers, also processed industries made from eggs, product diversification causes consumers to have many choices to reduce egg consumption and switch to other substitute products. From the classic assumption deviation test Ordinary Least Square (OLS) model with the assumption Best Linear Unbiased Estimation shows that the data is free from classical assumptions deviations. Judging from the Multicollinear test, there is no correlation between the independent variables indicated by the serial correlation matrix value with $r < 0.7$. The model is free from heteroscedasticity which is shown from white heteroscedasticity test with Obs value * R – square (for level 5%) > 0.05 which is equal to 20.35 Free from serial correlation indicated by Breusch-Godfrey test Serial Correlation LM with Obs * R-square value (0.40) > 0.05 . The regression model is normally distributed as indicated by the prob Jarque-Bera value (0.17) > 0.05 . The regression model is linearly shown by the Ramsey RESET test where the probability value is F statistic 1.01 > 0.05 . The calculated F-value obtained is 0,70 with a significance level of 0,000. Means that the explanatory variables observed together have a significant effect on the demand for eggs in Klaten Regency.

TABLE III. RESULTS OF REGRESSION ANALYSIS OF FACTORS AFFECTING EGG DEMAND

| Variable | Coefficients | Significance |
|---------------------------|--------------|--------------|
| Constant | -201.984 | 0.088 |
| Price of egg (IDR/kg) | -7.451 | 0.042 |
| Price of rice (IDR/kg) | -3.568 | 0.156 |
| Price of tilapia (IDR/kg) | 132.770 | 0.009 |

Table 3. Cont.

| | | |
|--------------------------------|--------|-------|
| Price of chicken meat (IDR/kg) | -1.924 | 0.536 |
| Price of Tempe (IDR/kg) | 0.866 | 0.278 |
| Price of tofu (IDR/kg) | 0.922 | 0.124 |
| Income (IDR) | 0.342 | 0.257 |
| Number of family (person) | 0.965 | 0.009 |
| Wife's education (year) | 0.367 | 0.001 |
| Wife's age (year) | 0.894 | 0.146 |
| R Squared | | 0.701 |
| Adjusted R Squared | | 0.598 |
| F-statistic | | 0.807 |
| Prob (F-statistic) | | 0.000 |

To determine the effect of individual explanatory variables on demand for eggs using the t-test. From the results of the t-test, the variable price of eggs, tilapia prices, income, number of family members, and wife's education have a significant effect on the demand for eggs. Meanwhile, the variable of rice price, chicken meat prices, Tempe prices, and tofu prices did not have a significant influence on the demand for eggs (Table III).

The results of the regression analysis showed that the magnitude of the regression coefficient variable price of eggs was equal to -7.451 and significant at a 95 percent confidence level. The increase in the egg price by 1 percent will cause a decrease in demand for broiler eggs by 7.451 percent. Following the demand theory that in the event of an increase in prices, consumers will reduce the number of goods consumed. Price is an essential indicator for consumers [6]. The regression coefficient variable of egg price as well as the elasticity of the eggs. The demand elasticity for egg price is elastic. Shows that the amount of demand for eggs in Klaten Regency is negative for price changes. The statement is contrary to [15]. Eggs are found to be price inelastic in the long run while meat and milk are price elastic in the long run. The expenditure elasticities for the egg is increasing.

The variable price of tilapia significantly affected the 99 percent confidence level with a regression coefficient of 132.770. The increase in the price of tilapia by 1 percent will lead to an increase in demand for chicken eggs by 132.770 percent. Regression coefficient variable of tilapia price is positive. Indicates that tilapia is a substitute for eggs. When the price of tilapia is relatively lower, consumers will increase demand for tilapia. This condition causes the demand for eggs to decline. Tilapia is widely cultivated in Klaten Regency so that consumers can easily get tilapia. Tilapia is also a source of animal protein that is in demand by the people of Indonesia and especially the people in Klaten Regency. Tilapia has excellent nutritional content. It tastes savory because it has fat content, is easy to cultivate and easy to adapt to the environment [14]. The average price of tilapia in Klaten District at the time of research ranged from IDR. 33,000 to 37,000 per kilogram.

The income variable hasn't a significant effect on the demand for eggs. Increased in income hasn't improved the ability of households to buy or consume more eggs. Indicates that eggs are normal goods. Household income ranges from IDR 600,000.00 to IDR 7,500,000.00 per month. Shows low income because it is below the value of the regional minimum wage standard in Central Java, which is IDR 1,500,000.00.

With increasing household income, households will use most of the additional expenditure including increasing protein consumption other than eggs. This pattern change is evident in low-income families [16].

The number of respondent household members ranged from 2 to 9 people, with an average amount of family members as many as four people. Variables in the number of family members significantly affect the demand for eggs with a 99 percent confidence level. The value of the variable regression coefficient of the number of family members is 0.965. The increase in the number of family members as much as 1 percent will cause an increase in demand for eggs by 0.965 percent. The increase in the number of family members will affect the rise in demand for eggs [17]. The empirical results show that total expenditure, as the proxy of income have a significant effect on expenditure and demand of egg and as household-size increases, the spending and quantity of egg consumed increased [18].

Wife education varies from elementary school to undergraduate. Most (35 percent) of respondents have primary school education. Wife education variables significantly affect the demand for eggs with a 99 percent confidence level. The regression coefficient value is 0.367. Increasing the wife's education by 1 percent will lead to an increase in demand for chicken eggs by 0.367 percent. The higher the wife's education, the better the ability of the household to compile a family menu in fulfilling family nutrition. They were highly correlated with a woman's decision making process in determining the food consumption for the children [19]. Households with high income and higher education levels are more likely to choose healthy foods including quality eggs [20].

Wife's age varies between 26 and 64 years. Most respondents (32.5 percent) are in the productive period, aged between 36 and 45 years. Variable of age wife hasn't significantly affected the demand for eggs. Here it has not included consumer preference variables which also affect egg consumption [21].

Comprehensively shows that prices have an essential role for consumers in making decisions and the number of purchases of eggs. The evidenced by the results of the analysis which showed that when there was an increase in the price of eggs, more consumers decided to reduce the number of eggs. The corroborated by empirical evidence that shows that the average purchase of eggs in the event of an increase in the price of eggs is less than the number of eggs purchased at regular prices. From the demand function analysis, the price also has a significant effect on the demand for eggs in Klaten Regency. From the study of demand theory, if there is an increase in the price of goods, it will affect the decrease in the number of products concerned.

This condition is an indication for relevant agencies in the supply of foodstuffs because the commodities of eggs are very sensitive to changes in prices. The significant increase in the egg price resulted in a decrease in the demand for eggs, so it needs to be balanced with the provision of other foodstuffs, in this case, is tilapia which is the substitution of eggs.

In addition to the price of eggs and the price of tilapia, the characteristics of consumer households turned out to be very influential on demand for eggs. These characteristics include household income, number of family members, and wife education. All these household characteristics have a positive effect on the demand for eggs. The indicates the relevant agencies to manage the availability of foodstuffs including eggs which are adjusted to the rising income and education of the wife.

IV. CONCLUSION

The results showed that: (1) There were 57.5 percent of consumers decided to reduce the amount of purchase of eggs when the price of eggs increased, and the remaining 52.5% chose to purchase a fixed amount of eggs; (2) The increase in the price of eggs has an impact on the number of purchases of eggs by consumers. The average purchased of eggs by consumers in the event of a price increase is less when compared to normal conditions; (3) Factors that influence the demand for eggs in the event of an increase in egg prices include the price of eggs, the tilapia price, the number of family members, and wife's education. Meanwhile, the rice price, the chicken meat price, the price of tofu, the Tempe price, income, and the age of the wife did not influence the demand for eggs.

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