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A R Siregar[1], P Astaman[2] and M Darwis[3]

[1]Department of Socio-Economics, Faculty of Animal Husbandry, Hasanuddin University, Perintis Kemerdekaan KM 10 Makassar 90245, South Sulawesi – Indonesia
[2]Doctor Candidate on Agriculture Science Study Program, Graduate School, Hasanuddin University, Perintis Kemerdekaan KM 10 Makassar 90245, South Sulawesi – Indonesia
[3]Research and Development Centre of Dynamics Community, Culture and Humanities, Institute for Research and Community Services, Hasanuddin University, Perintis Kemerdekaan KM 10 Makassar 90245, South Sulawesi – Indonesia

E-mail: aramadhan@unhas.ac.id

Abstract. Chicken eggs have a role as a source of animal protein and have a complete amino acid structure. Income has a direct effect on the amount of demand for goods and services and is closely related to income per capita in an area. The availability of a goods are not always stable so that substitute products are needed to meet the demand of the community. This study aims to analyze the effect of consumer income and substitute products (tempeh, tofu, and chicken meat) on chicken eggs demand. The research was conducted from September to October 2019. The population of households in the research sites was the highest in Makassar City, then sampling is done to determine the sample size needed by using the Multistage Random Sampling technique; respondents in this study were 60 people, primary data were using a survey method with a series of observations, interviews, and questionnaires, then the data obtained will be processed using Statistical Solution of Products and Services with multiple linear regression analysis models. The results showed that tempeh, tofu and chicken meat effect significantly on chicken eggs demand. Partially, tempeh and tofu have a significant effect on chicken eggs demand, but chicken meat has no significant effect.

1. Introduction

Animal husbandry has a good development prospects because people's consumption of livestock products is very high to support daily nutritional needs. One of the poultry products that has great potential is chicken eggs. Chicken eggs have a role as a source of animal protein and have a complete amino acid structure. Apart from having high protein, purebred chicken eggs are in great demand by the public because the population in the community continues, and the price is relatively cheap and affordable to all levels of society. Laying poultry products have the potential to be developed optimally because besides the price is relatively cheap compared to protein exploitation of other animals, is relatively easy, although cultivated on a small scale can increase income and expand employment opportunities [1].

Consumption of household chicken eggs tends to vary to avoid boredom for certain types of food if consumed every day so that a variety of food consumption is needed by presenting substitute products and eggs of purebred chickens. On the momentum of national days and religious holidays, the price of

eggs tends to increase in price which causes consumers to reduce their household consumption. Characteristic factors of poultry products that are affordable to the wider community, good nutritional quality, preferred by consumers of all ages, are available in sufficient quantities and can be processed into various types of food. Their distribution can reach all regions in Indonesia which causes the consumption of chicken eggs to increase.

Community income reflects the purchasing power of household needs, both basic needs, and complementary needs. Income has a direct effect on the amount of demand for goods and services and is closely related to income per capita in an area.

Table 1. Per capita income in Makassar city.

Years	Income per capita
2013	IDR 54,620,000
2014	IDR 57,790,000
2015	IDR 61,280,000
2016	IDR 65,300,000
2017	IDR 69,750,000
2018	IDR 74,647,000

Source: BPS, 2018 [1].

The level of income tends to increase which should affect the level of public consumption. The relationship between income and consumption is very important in various economic problems. The fact shows that consumption expenditure increases with increasing income, and vice versa if income decreases, consumption expenditure also decreases. The level of expenditure really depends on the ability of the family to manage their income or income [2]. On the other hand, the level of income per capita greatly determines the purchasing power of the community, both basic needs and other necessities in a household. The increase in per capita income was not accompanied by an increase in the consumption of eggs which fluctuated and caused the people's protein consumption to be far below the standard protein adequacy rate [3].

Biringkanaya sub-district is one of the sub-districts in Makassar City which has the largest population, with a population of 208,436 people [4]. The population that is widely reflected has a high demand, including the demand for eggs. The development of the population that increases from year to year continues to be balanced with the awareness of the importance of improving nutrition in life, and it has implications for food consumption patterns that will also continue to increase. Besides the main purpose of using food as a nutrient for the body that is useful for sustaining life, humans also use it for social values [10]. Per capita income and population in Makassar city tend to increase, however, people's consumption of eggs has fluctuated. This study aims to analyze the effect of consumer income and substitute products (tempeh, tofu, and chicken meat) on chicken eggs demand.

2. Method

This study used a survey method and was classified as an explanatory quantitative study, where this research has a causal relationship between the research variables that influence each other. The survey method was research conducted using a questionnaire as a research tool carried out in large and small populations, but the data studied were data from samples taken from that population, so that the relative incidence, distribution, and relationships between variables, sociological and psychological were found [6].

The research location was determined based on the basic criteria, namely the sub-district in Makassar city with the largest population, so the research location chosen was the Biringkanaya sub-district of Makassar City which has the potential to support economic activities in a sustainable manner, with one of the largest traditional markets in the district which is used by the community for shopping and other economic activities to generate income for traders in the market and meet household consumption needs for consumers.

The population in the study was 44,584 households living in the Biringkanaya sub-district, Makassar city [4]. The population in the research location is fairly high, so it is necessary to draw a sample that can represent the population to produce valid data. The sampling method used was the Multistage Cluster Random Sampling method to determine a representative sample of a large population. Multistage cluster random sampling is the use of various random sampling methods together as efficiently and effectively as possible [7]. Research respondents were 60 households who could represent the population. Primary data will be taken through a series of observation activities, filling out questionnaires and direct interviews with household consumers to measure the magnitude of the influence of consumer income and substitute products on the demand for eggs at the research location. The product of substitution in this research is the average price of tempeh, tofu, and chicken meat from consumer purchases in one month for household consumption needs.

Data analysis used parametric statistics with a variety of interval data and assumption tests. The induction statistic in question is multiple linear regression, which is a model in which the variable is not free of charge in two or more independent variables. Data analysis uses the SPSS (Statistical Solution of Products and Services) computer program, the mathematical formula is as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

Where:

Y	= Demand for pure chicken eggs (tray/month)
a	= Constant
b_1, b_2, b_3, b_4	= Regression coefficients for X_1, X_2, X_3 and X_4
X_1	= Income (IDR/month)
X_2	= Average price of tempeh (IDR/piece)
X_3	= Average price of tofu (IDR/piece)
X_4	= Average price of chicken meat (IDR/kg)
e	= Error (allowance of 5%)

3. Results and Discussion

The research data collected by survey method with household respondents as the unit of analysis in the Biringkanaya sub-district, Makassar city. Data were analyzed using Multiple Linear Regression Analysis.

Table 2. Output of multiple analysis regression.

Variables	Coefficient of regression	T count	Significant
Income (X_1)	7.208	6.047	0.000
Price of Tempeh (X_2)	3.267	5.434	0.000
Price of Tofu (X_3)	2.449	2.089	0.029
Price of Chicken Meat (X_4)	-6.782	-0.309	0.758
F count : 11.266		*Adjusted* R^2 :	0.410
R : 0.671		*Standard error* :	0.708
R^2 : 0.450		Significant :	0.000
Constant : 0.615		DW :	1.990

Source: Primary Data After Processing, 2019.

Table 2 showed that Multiple linear regression analysis of income and substitute products (tempeh, tofu, and chicken meat) have a significant effect on the demand for eggs. The results of the analysis showed that the calculated F value obtained was 11.266 greater than the F table value of 2.77, which means that together the independent variables have a significant effect on egg demand at the 0.05 level. While the value of R square (R^2) of 0.450 means that 45.0% has a major effect on the influence of consumers income and substitute products (tempeh, tofu, chicken meat) on the fluctuation of demand

for eggs, the other influence of 55.0% was at variables outside of the model used. The results of the analysis were shown in table 2 can be written the following multiple linear regression equation:

$$Y = 0.615 + 7.208X_1 + 3.267X_2 + 2.449X_3 - 6.782X_4$$

From the equation it can be interpreted a constant value of 0.615, which means that if income (X_1), substitute products for tempeh (X_2), tofu (X_3), and chicken meat (X_4) = 0 (constant), then the value of the dependent variable will be 0.615. In other words, if the income and substitute products did not affect, so that the demand for chicken eggs will be worth 0.615.
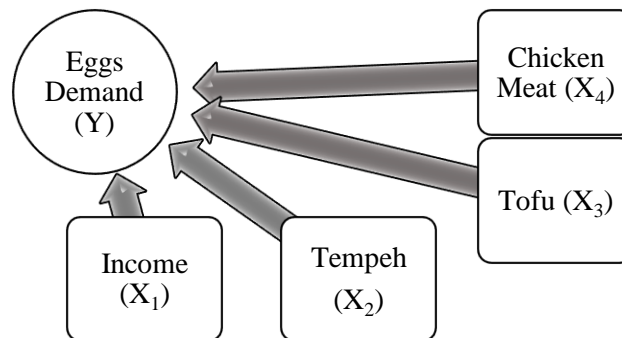

Figure 1. Income and product substitution effect on eggs demand.

3.1. Income (X_1)
The regression coefficient of the income variable (X_1) was 7.208×10^{-7}, which means that household consumer income has a positive effect indicated by the direction of the influence on the positive numbers obtained from the regression results. Meaning that if the income has increased amounting to IDR. 100,000/month, the demand for eggs increased by 0.007208 tray per month.

From the calculation of t-count which was equal to 6.047 > from t table of 1.673, this showed that income has a significant effect on the demand for eggs of purebred chickens ($P < 0.05$). Income per capita in an area was closely related to the demand for goods and services to meet the needs of household life. Income will affect the number of goods consumed, which was often found with an increase in income, then the goods consumed did not increase, but the quality of the goods was also a concern. For example, before the increase in income, it was assumed that it was not good, but after increasing the income, the consumption of rice will be of better quality [5].

3.2. Price of tempeh (X_2)
The regression coefficient of the tempeh substitution product variable (X_2) was 3.267, which means that the tempeh substitution product has a positive effect indicated by the direction of the effect on the positive number obtained from the regression results. Meaning that if tempeh has increased by IDR. 1,000/month, the demand for eggs will increase by 3,267 pieces / month. From the calculation results obtained t-count which was equal to 5,434 > from t table of 1,673, this showed that tempeh has a significant effect on the demand for eggs of purebred chickens ($P < 0.05$). Substitute goods as an alternative if the basic goods have increased to cover needs. Tempeh substitute products will be an escape for consumers if the eggs increased because the price was cheaper. Substitute goods, namely goods that replace other goods, if these goods can replace their function. The price of substitute goods can affect the demand for goods that can be replaced [8].

3.3. Price of tofu (X3)
The regression coefficient of tofu substitute product variable (X_3) was 2.449, which means that the tofu substituted product has a positive effect, indicated by the direction of the effect on the positive number obtained from the regression results, meaning that if tofu has increased by IDR. 1,000/month, the demand for eggs will increase by 2,449 pieces/month. From the results of the calculation, the t count is

2.089> from the t table of 1.673, this shows that income has a significant effect on the demand for eggs of purebred chickens, a significance value of 0.029 <0.05.

Tofu can be used as an alternative for household consumers because if eggs were expensive, tofu replaced them because of lower prices, tofu was also suitable for consumption for toddlers and seniors because of its soft texture like chicken eggs. According to its relationship with other goods, it can be divided into two parts, namely the price of substitute goods (substitutes) and complementary goods (fulfillment). Substitute goods, namely goods that replace other goods, if these goods can replace function. The price of a replacement item affected the demand for good replaceable. Suppose the price replacement goods get cheaper, then the goods it replaces will experience a reduction in demand [9].

3.4. Price of chicken meat (X_4)

The regression coefficient for the cut chicken meat variable (X_4) was -6.782, which means that the meat chicken substitute product has a negative effect, indicated by the direction of the effect on the negative number obtained from the regression results, it means that if the chicken meat decreased the price of IDR 10,000/kg, then the demand for eggs increased by 6,782 kg/month. From the results of the calculation, the t count was equal to -0.039 < from the t table of 1.673. This showed that the price of chicken meat has no significant effect on the number of demands for eggs of purebred chickens ($P > 0.05$).

Chicken meat has a higher price than chicken eggs and also the price elasticity was almost the same as eggs. So that the chicken meat cannot substitute the eggs for household consumption. Changes in the prices of related goods also affected demand. An item was a substitute if one of the goods has an increase in price which will trigger an increase in the demand for other goods [10].

4. Conclusion

The results showed that income and substitute products for tempeh, tofu, and chicken meat price had a significant effect on the demand for eggs simultaneously ($P < 0.05$). Partially, only income, tempeh and tofu had a significant effect on the demand for eggs ($P < 0.05$), but chicken meat had no significant effect. The R^2 values was 0.450, meaning that 45.0% of consumer income and substituted products (tempeh, tofu, chicken meat) influenced on the fluctuation of demand for eggs.

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