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Demand Analysis Of Beef In Indonesia

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ABSTRACT

This study aims to analyze the influence of beef prices, substitute goods prices (mutton and chicken meat), complementary goods prices (chicken eggs and rice), and per capita income on the demand for beef in Indonesia. Additionally, it seeks to assess the elasticity of beef demand within the country. Employing multiple linear regression analysis on secondary data collected over a 30-year period (1990-2022), the results reveal that: (1) The variables—beef price, mutton price, chicken meat price, chicken egg price, rice price, and per capita income—significantly affect the demand for beef in Indonesia. Specifically, the price of chicken eggs exhibits a significant negative effect, while per capita income shows a significant positive effect on beef demand. (2) The cross-price elasticity of demand between beef and chicken meat is -0.09, indicating inelasticity, and the income elasticity of demand is 0.52, also indicating inelasticity.

Keywords: demand of beef; price of beef; price of goat meat; price of chicken meat; price of chicken egg; price of rice; income per capita.

INTRODUCTION

The livestock subsector is a part of the agricultural sector that can support a country's economic growth. Empirical experience shows that no country can achieve sustainable development without establishing a resilient agricultural sector. The agricultural sector and its subsectors play a crucial role in increasing Gross Domestic Product (GDP), boosting foreign exchange, absorbing labor, improving farmers' welfare, promoting regional development, and ensuring national food security.

In 2022, the contribution of the hunting, livestock, agriculture, and agricultural services sectors to GDP was 9.22% with a growth rate of 2.33%. The livestock subsector contributed 1.52% to GDP with a growth rate of 6.24% (Badan Pusat Statistik, 2023). The livestock subsector plays an important role as a supplier of primary animal food ingredients, one of which is protein. Protein sources are broadly classified into two categories: those derived from plants and those obtained from animals. Vegetables such as spinach, broccoli, and potatoes are notable sources of plant-based proteins. Animal-based proteins, on the other hand, are obtained from animal products including beef, fish, chicken, eggs, and milk (Azhar, 2016). One source of animal-based protein is red meat or beef.

Red meat or beef is an excellent source of animal-based protein and is rich in nutrients, making it necessary to consume to meet the body's protein requirements. In 85 grams of beef, there are 25 grams of protein and other nutrients like B3, B6, B12, zinc, and iron, providing the nutrition needed for human health and growth (Arifin et al., 2008). Beef is a type of red meat commonly consumed by the Indonesian population. Urban Indonesians consume beef daily, either at home or in restaurants. In contrast, rural residents typically consume beef only on special occasions, such as celebrations or religious holidays (Kementerian Pertanian, 2022a).

According to the 2022 National Socioeconomic Survey (SUSENAS), the level of beef consumption among Indonesians shows fluctuations and tends to increase. Figure 1 depicts the trend in per capita beef consumption in Indonesia.

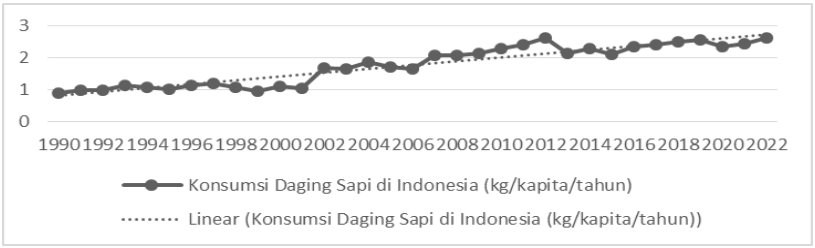

Figure 1
Per Capita Beef Consumption in Indonesia
Source: Kementerian Pertanian, 2022a

The period from 1990 to 2022 has seen fluctuations in per capita beef consumption in Indonesia, but overall, there has been an upward trend, with an average annual consumption of 1.78 kg per capita. Despite this upward trend, beef consumption in

Indonesia is notably lower than the Ministry of Health's recommended range of 70-140 grams per day, which corresponds to 25.2-50.4 kg per year, or 2.52-5.04 kg per capita annually (Kementerian Kesehatan, 2014). The Organization for Economic Co-operation and Development (OECD) indicates that Indonesia's per capita beef consumption falls below the global average of 6.4 kg per capita annually.

The beef consumption indicator can be seen from the demand for beef. Several factors can influence beef of demand. According to microeconomic theory by Mankiw (2019), consumer demand for a good is influenced by a range of factors including the price of the good, the prices of related goods, consumer income, the number of consumers, preferences, and anticipated future market conditions. In accordance with this theory, beef demand is affected by the price of beef itself, the prices of substitute goods (such as goat and chicken meat), the prices of complementary goods (such as chicken eggs and rice), and levels of per capita income. According to the law of demand, changes in the price of beef affect its demand; specifically, a reduction in beef prices typically results in increased demand, while an increase in price generally leads to a decrease in demand (Sukirno, 2016). According to research by Saragih et al., (2023), price of beefs do not significantly affect beef of demand. This contrasts with the results reported by Khotimah et al., (2022), which indicate that the price of beef has a substantial impact on beef demand.

In addition to the price of beef, demand for beef may also be influenced by the prices of related goods, such as those that are complementary or serve as substitutes. In this study, price of goat and chicken meat are considered factors influencing beef of demand as substitute goods. According to Hidayatullah et al., (2023), the prices of substitute goods individually do not significantly affect beef of demand. This contrasts with Khotimah et al., (2022), which found that substitute goods prices individually significantly impact beef of demand.

Meanwhile, the price of chicken egg and rice are considered factors influencing beef of demand as complementary goods. According to Widayati et al., (2011), an increase in complementary goods prices will decrease beef of demand. This differs from Puradireja et al., (2021), which found that an increase in complementary goods prices would increase beef of demand. Income per capitals also a key factor influencing beef of demand. According to Asminar et al., (2021), an increase in income per capitawill increase beef of demand. This contrasts with Khotimah et al., (2022), which found that income per capital does not increase beef of demand.

Previous studies have shown varying results, indicating the need for further research on beef of demand in Indonesia. Considering the gap in consumption, where Indonesia's beef consumption level is still low compared to the consumption standard recommended by the Ministry of Health, 2.52-5.04 kg per capita per year, and the inconsistencies in the impact of influencing factors reported in existing studies, further research is warranted to investigate the determinants of beef demand and the elasticity of beef demand in Indonesia.

THEORETICAL FRAMEWORK AND EMPIRICAL STUDIES

1) Theory of Demand

Demand refers to the volume of goods that consumers seek to purchase at different price points over a specified period to fulfill their needs (Mankiw, 2019). Provided that all other factors remain unchanged (ceteris paribus), the law of demand indicates that as the price of a good increases, the quantity demanded decreases, whereas a reduction in price results in an increase in the quantity demanded (Sukirno, 2016). The demand curve demonstrates the relationship between the price of a good and the quantity demanded, while assuming that all other variables remain constant (ceteris paribus). The demand curve is structured with the price of the good displayed on the vertical axis and the quantity demanded shown on the horizontal axis (Suparmoko, 2011). According to microeconomic theory by (Mankiw, 2019), consumer demand for a good can be shaped by a range of factors, including the price of the good, the prices of related goods, levels of income, the number of consumers, consumer preferences, and anticipated future market conditions.

2) Price

According to Kotler & Amstrong (2019), price is the amount of money consumers must pay to acquire a service or product, or the value perceived by consumers as equivalent to the benefits derived from the service or product. Consumers evaluate the price as a key factor in their purchasing decisions (Nirma, 2019). The theory connecting demand to price indicates that an increase in the price of a good or service generally results in a decrease in demand, while a reduction in price typically leads to an increase in demand. Additionally, a higher price may prompt consumers to seek more affordable alternatives (Sukirno, 2016).

3) Income

Per capita income denotes the average income of individuals in a country or region within a specific time frame. Income per capitals calculated annually and is derived by dividing the national or regional income by the total population of that country or region (Suparmono, 2018). Income is crucial in determining the demand for a product or service. As income increases, purchasing power increases. Income also affects the demand for goods or services, with higher income levels generally leading to increased demand for such items. This aligns with demand theory, which suggests that as individuals' income available for consumption increases, the quantity of goods demanded also increases.

4) Elasticity

Demand elasticity measures the relative change in the quantity of a good purchased due to changes in one of the determinants of demand. According to Sukirno (2016), demand elasticity can be divided into three categories: (1) Price elasticity of demand gauges the effect of price fluctuations on the quantity demanded of a good. (2) Cross-price

elasticity of demand assesses the influence of price changes in related goods on the quantity demanded of a particular good. (3) Income elasticity of demand analyzes how shifts in income levels affect the quantity demanded of a good.

5) Hypothesis Development

The law of demand asserts that a reduction in the price of a good leads to an increase in the quantity demanded, whereas an increase in the price results in a decrease in the quantity demanded. In this context, if the price of beef decreases, the demand for beef will increase. According to Syihabuddin et al., (2019), the price of beef has a negative and significant impact on beef of demand.

H1: The price of beef has a negative impact on beef of demand in Indonesia.

Substitute goods can affect demand because they replace other goods. A decline in the price of a substitute for beef is anticipated to result in a decrease in the demand for beef. This occurs because substitute goods appear cheaper and more affordable compared to beef. However, if the price of a substitute increases, beef demand will increase. Goat meat as a substitute for beef, if the price of goat meat rises, beef of demand will increase. According to Sitinjak et al., (2020), the price of goat meat positively affects the demand for beef.

H2: The price of goat meat has a positive impact on beef of demand in Indonesia.

Substitute goods can affect demand because they replace other goods. A decrease in the price of a substitute good is likely to result in a reduction in the demand for beef. This occurs because substitute goods appear cheaper and more affordable compared to beef. Conversely, if the price of a substitute rises, the demand for beef is projected to increase. Since chicken meat functions as a substitute for beef, a higher price for chicken meat is anticipated to elevate the demand for beef. According to Khotimah et al., (2022), the price of chicken meat has a positive and significant impact on beef of demand.

H3: The price of chicken meat has a positive impact on beef of demand in Indonesia.

Complementary goods can influence demand because they are complementary to other goods. A higher price for complementary goods is likely to cause a decline in the demand for beef. For instance, given that chicken eggs are a complement to beef, an increase in the price of chicken eggs is expected to result in a lower demand for beef. According to Puradireja et al., (2021), the price of chicken eggs significantly affects beef of demand.

H4: The price of chicken eggs has a negative impact on beef of demand in Indonesia.

Complementary goods can influence demand because they are complementary to other goods. An increase in the price of complementary goods is anticipated to decrease the demand for beef. Rice is a complementary good for beef, if the price of rice rises, beef of demand will decrease. Rice can be consumed together with beef. When the price of rice increases, beef demand decreases. Research by Widayati et al., (2011) the examination of

beef demand in West Papua demonstrates that a rise in the price of rice results in a reduction in the demand for beef.

H5: The price of rice has a negative impact on beef of demand in Indonesia.

As income increases, purchasing power for goods increases, and conversely, when income is small, demand for goods will decrease. Together with income increases, it causes purchasing power for basic needs including increasing animal protein requirements every year, including meeting beef consumption. Thus, increasing income can influence beef of demand. According to Asminar et al., (2021), the findings of this study reveal that income positively and significantly influences the demand for beef.

H6: Income per capita has a positive impact on beef of demand in Indonesia

RESEARCH METHODS

1) *Research Design*
   a. *Type of Research*
      This study employs descriptive analysis with a quantitative approach.
      1. *Object of Research*
         The object of this study includes beef of demand in Indonesia, price of beefs, prices of substitute goods (goat meat and chicken meat), prices of complementary goods (chicken eggs and rice), and income per capita.
      2. *Data Sources*
         This study utilizes secondary time series data spanning 33 years (1990-2022). The data were acquired from the Central Statistics Agency, the Data and Information Center of the Ministry of Agriculture, and the World Bank.

2) *Data Analysis Techniques*
   a. *Stationarity Test*
      According to Gujarati & Porter (2012), stationarity test is the initial step in time series analysis to observe the condition of data, whether it is stationary or non-stationary. Stationarity tests in this study are conducted on each dataset to avoid spurious regression. Unit root tests are conducted to assess the stationarity of the data.

1. *Multiple Linear Regression Analysis*

   To evaluate the factors influencing beef demand in Indonesia, this study applies multiple linear regression analysis. The type of multiple linear regression model utilized in this research is:

$$LnY_t = \beta o + \beta_1 LnX_{1t} + \beta_2 LnX_{2t} + \beta_3 LnX_{3t} + \beta_4 LnX_{4t} + \beta_5 LnX_{5t} + \beta_6 LnX_{6t} + et$$

Where:

Y_t: Beef of demand

β_o: Constant

β : Regression coefficient (1….6)

LnX_1: price of beef

LnX_2: price of goat meat

LnX_3: price of chicken meat

LnX_4: price of chicken egg

LnX_5: price of rice

LnX_6: income per capita

e : error term

t : time series

3) Classical Assumption Tests

Gujarati & Porter (2012), Gujarati and Porter (2012) explain that classical assumption tests are conducted to verify that research findings are theoretically robust, unbiased, and that the coefficient estimates are efficient. These tests evaluate the bias, consistency, and efficiency of the regression model.

a. *Normality Test*

   Ghozali (2021), states that the normality test determines if the data conform to a normal distribution. In this research, the Kolmogorov-Smirnov test is employed to evaluate the data's adherence to normality.

b. *Multicollinearity Test*

   Gujarati & Porter (2012) ulticollinearity refers to the existence of linear relationships among independent variables. The objective of the multicollinearity test is to assess whether there are significant interrelationships among the independent variables within the regression model. This condition can be evaluated using measures such as tolerance values or the Variance Inflation Factor (VIF).

c. *Heteroskedasticity Test*

The heteroskedasticity test is performed to evaluate whether the regression model displays varying levels of residual variance across different observations. Heteroskedasticity issues arise when error term variances are not constant (Gujarati & Porter, 2012). Heteroskedasticity can be observed using various tests, including Breusch-Pagan-Godfrey test.

d. Autocorrelation

The autocorrelation test examines whether there is a correlation between the error terms in the current period (t) and those in the previous period (t-1) within the regression model. A well-specified regression model should ideally be devoid of autocorrelation (Ghozali, 2021). The Breusch-Godfrey test can be utilized to detect the presence of autocorrelation in the data.

4) Statistical Tests

a. F-test

According to Ghozali (2021), the F-test is employed to determine whether the independent variables collectively exert a significant impact on the dependent variable. This assessment is carried out by examining the F-statistic or by comparing the computed F-statistic with the values in the F-table.

b. T-test

According to Ghozali (2021), the t-test is utilized to evaluate the impact of each independent variable on the dependent variable by comparing the calculated t-statistic with the values in the t-table.

c. R^2

Ghozali (2021), defines the coefficient of determination as a statistical measure that evaluates the proportion of variability in the dependent variable explained by the independent variables. The R^2 value ranges from 0 to 1. A higher R-squared value indicates a more suitable model for use, whereas a lower R-squared value suggests that independent variables overall cannot explain the dependent variable.

d. Elasticity Analysis

To understand the elasticity of beef of demand in Indonesia, elasticity analysis is used. Elasticity analysis is employed to understand the percentage change in beef of demand in Indonesia due to changes in price and income. The formula for elasticity (Gujarati & Porter, 2012) :

$$e_i = \beta_i(\frac{\bar{x}_i}{\bar{y}})$$

Where:

e_i = Elasticity of demand for i

β_i = Regression coefficient for i

$\bar{x}_i$ = Mean value of independent variable i

$\bar{y}$ = Mean value of dependent variable

RESULTS AND DISCUSSIONS

1) Data Analysis

a. Stationarity Test

In this research, stationarity is tested using unit root tests. The results of stationarity testing can be seen in Table 1.

Table 1
Stationarity Test Results

Variable	Prob.	Remarks
Ln demand of beef (LnY)	0.0000	Stationary
Ln price of beef (LnX_1)	0.0026	Stationary
Ln price of goat meat (LnX_2)	0.0003	Stationary
Ln price of chicken meat (LnX_3)	0.0021	Stationary
Ln price of chicken egg (LnX_4)	0.0000	Stationary
Ln price of rice (LnX_5)	0.0066	Stationary
Ln income per capita (LnX_6)	0.0298	Stationary

Source: processed data

According to Table 1, the results of the unit root test indicate that the probability values for all data points are below 0.05, signifying that the data are stationary.

b. Multiple Linear Regression Analysis

Multiple linear regression analysis is used to identify the relationships between independent and dependent variables. The estimation results conducted in this study are shown below.

Table 2: Multiple Linear Regression

Variabel	Koefisien	Prob.
Constant (C)	13.41534	0.0000
Ln demand of beef (LnX_1)	- 0.081	0.72
Ln price of goat meat (LnX_2)	-0.151	0.634
Ln price of chicken meat (LnX_3)	-0.01	0.939
Ln price of chicken egg (LnX_4)	-0.214	0.018
Ln price of rice (LnX_5)	0.055	0.862
Ln income per capita (LnX_6)	0.636	0.014

Source: processed data

According to the regression analysis results in Table 2, the regression equation obtained is:

$\widehat{LnY} = 13{,}415 - 0{,}081\ LnX_1 - 0{,}151\ LnX_2 - 0{,}01\ LnX_3 - 0{,}214\ LnX_4 + 0{,}055\ LnX_5 + 0{,}636\ LnX_6$

c. Classical Assumption Tests

1. Normality Test

   Normality in this study is tested using the Kolmogorov-Smirnov test method. The results of normality testing can be seen in Table 3.

Table 3
Normality Test Results

Asymp Sig. (2-tailed)	***0.152***

Source: processed data

According to Table 3, the normality test results show that the asymptotic significance value (2-tailed) of 0.152 is greater than 0.05, indicating that the residual data used are normally distributed.

2. Multicollinearity Test

   Multicollinearity is observed through the Variance Inflation Factor (VIF). The results of multicollinearity testing can be seen in Table 4.

Table 4
Multicollinearity Test Results

Variable	VIF
Ln price of beef (LnX_1)	0.718
Ln price of goat meat (LnX_2)	0.521
Ln price of chicken meat (LnX_3)	2.169
Ln price of chicken egg (LnX_4)	2.485
Ln price of rice (LnX_5)	0.439
Ln income per capita (LnX_6)	0.900

Source: processed data

According to Table 4, the multicollinearity test results show that all independent variables have VIF values less than 10, indicating that the independent variables influencing beef of demand in Indonesia do not exhibit multicollinearity.

3. Heteroskedasticity Test

   In this study, heteroskedasticity is tested using the Breusch-Pagan-Godfrey test. The results of heteroskedasticity testing can be seen in Table 5.

Table 5
Heteroskedasticity Test Results

Obs*R-squared	8.066395
Prob. Chi-Square	0.23

Source: processed data

Table 5 shows that the heteroskedasticity test results, with a Chi-Square probability value of 0.23, are above the 0.05 significance level, suggesting that the regression model does not exhibit signs of heteroskedasticity.

4. Autocorrelation Test

   To understand the presence of autocorrelation in this data, the Breusch-Pagan-Godfrey test is used. The results of autocorrelation testing can be seen in Table 6.

Table 6
Autocorrelation Test Results

Obs*R-squared	0.090517
Prob. Chi-Square	0.955

Source: processed data

Table 6 reveals that the autocorrelation test results, with a Chi-Square probability value of 0.955, exceed the 0.05 threshold, suggesting that the regression model does not exhibit evidence of autocorrelation.

d. Statistical Tests

1. F-test

The F-test is a statistical test conducted to understand whether there is a significant collective influence of independent variables on the dependent variable. The results of the F-test can be seen in Table 7.

Table 7
F-Test Results

F-statistik	127.3765
Prob (F-statistik)	0.000

Source: processed data

According to the data processing results in Table 7, the calculated F-value of 127.37 is greater than the critical F-value of 2.47. From these results, it can be concluded that price of beef, goat meat price, chicken meat price, chicken egg price, price of rice, and income per capitacollectively have a significant influence on beef of demand in Indonesia.

2. *T*-test

The t-test is a statistical test conducted to understand the individual impact of independent variables on the dependent variable by comparing the calculated t-value with the critical t-value. The results of the t-test can be seen in Table 8.

Table 8
T-test Results

Variable	Coefficient	T	Prob
Ln price of beef (LnX_1)	-0.081	-0.361	0.720
Ln price of goat meat (LnX_2)	-0.151	-0.480	0.634
Ln price of chicken meat (LnX_3)	-0.010	-0.077	0.939
Ln price of chicken egg (LnX_4)	-0.214	-2.522	0.018
Ln price of rice (LnX_5)	0.055	0.174	0.862
Ln income per capita (LnX_6)	0.636	2.609	0.014

Source: processed data

Based on Table 8, it can be observed that the variables significantly influencing beef of demand are chicken egg price (X4) and income per capita(X6).

3. R2

The coefficient of determination is used to understand how much independent variables influence the dependent variable. The coefficient of determination values can be seen in Table 9.

Table 9
Coefficient of Determination

R-Square	0.967099
Adjusted R-squared	0.959507

Source: processed data

Based on Table 9, the adjusted R-squared value is 0.959507. From these results, it can be concluded that price of beef, goat meat price, chicken meat price, chicken egg price, price of rice, and income per capita explain beef of demand in Indonesia by 95.95%, with the remaining 4.05% explained by other variables not covered in this study.

e. Elasticity Analysis

Demand elasticity quantifies the percentage variation in the quantity demanded of a good resulting from changes in price and income, with other influencing factors held constant. The results of elasticity testing for beef of demand in Indonesia can be seen in Table 10 below.

Table 10: Elasticity of Beef of demand in Indonesia

Variable	Elasticity Value	
	Price of Chicken Egg	Income Per Capita
Ln price of chicken egg (LnX_4)	-0,09	
Ln income per capita (LnX_5)		0.52

Source: processed data

Cross price elasticity is the percentage change in beef of demand due to a percentage change in prices of related goods. Based on Table 10, chicken egg price has a cross-elasticity value of -0.09. The negative sign indicates that chicken eggs are complementary goods to beef. Therefore, it can be concluded that a 1% decrease in chicken egg price leads to a 0.09% increase in beef of demand.

Income elasticity measures the impact of income changes on the quantity demanded of a good. Based on Table 10, income per capita has an income elasticity value of 0.52. The positive sign in income elasticity indicates that beef is a normal good. Thus, it can be concluded that a 1% increase in income per capita leads to a 0.52% increase in beef of demand in Indonesia.

f. Discussion

1. Influence Price of Beef of Beef of demand in Indonesia

The price of beef from 1990 to 2022 did not significantly influence beef of demand in Indonesia. This phenomenon occurs because, according to the Kementerian Pertanian (2022a), beef is a favored source of animal protein among Indonesians. Based on data from the Ministry of

Agriculture's publication on the outlook for beef in Indonesia, the demand for beef fluctuates but tends to increase, with an average annual growth rate of 5.52%. Additionally, beef is valued for its high protein content and nutritional benefits.

Therefore, beef is difficult to substitute with other protein sources in Indonesia, resulting in price of beef having no significant effect on beef of demand. This study's findings align with research conducted by Saragih et al., (2023) on factors influencing beef of demand in the DKI Jakarta Province, which concluded that price of beefs do not significantly affect beef of demand.

2. Influence Price of Goat Meat on Beef of Demand in Indonesia

The price of goat meat from 1990 to 2022 did not significantly affect beef of demand in Indonesia. This is because, according to data from the Ministry of Agriculture's outlook on goat meat, more Indonesians prefer beef over goat meat. This preference is supported by lower per capita consumption of goat meat compared to beef in Indonesia, as indicated by Kementerian Pertanian (2022b). Goat meat's specific consumer base is due to its distinct characteristics and prevailing health concerns suggesting that goat meat consumption may elevate blood pressure and cholesterol levels (Hardiansyah, 2024).

Moreover, beef and goat meat differ in taste, texture, and nutritional content, leading consumers who prefer beef to perceive goat meat as an inadequate substitute, and vice versa. Thus, the limited substitution relationship between goat meat and beef prevents goat meat price changes from significantly affecting beef of demand in Indonesia. This study's findings are consistent with Sitinjak et al., (2020) research on factors influencing beef of demand in the city of Pematangsiantar, which concluded that price of goat meat do not significantly affect beef of demand.

3. Influence Price of Chicken Meat on Beef of Demand in Indonesia

The price of chicken meat from 1990 to 2022 did not significantly affect beef of demand in Indonesia. This is because chicken and beef differ in taste, texture, and nutritional content. Chicken meat tends to be softer with a lighter flavor, whereas beef has a richer, more savory taste and denser texture (Hoshino, 2023). Nutritionally, chicken meat contains less fat and fewer minerals compared to beef but higher levels of vitamins A, B1, B5, and K. However, beef is richer in vitamin B12, with 2.64 micrograms per 100 grams compared to chicken's 0.3 micrograms. Vitamin B12 is crucial for protein synthesis, red blood cell production, and tissue repair (Pramesvari, 2020).

Consequently, consumer preferences strongly influence their choice between these meats based on taste and nutritional needs, limiting their

substitutability. Therefore, changes in price of chicken meat do not significantly impact beef of demand in Indonesia. This conclusion is supported by Hidayatullah et al., (2023) study on factors influencing beef of demand in Jember District, which found that price of chicken meat do not significantly affect beef of demand.

4. Influence Price of Chicken Egg on Beef of Demand in Indonesia

   From 1990 to 2022, the price of chicken eggs had a substantial negative influence on the demand for beef in Indonesia. This relationship is attributed to the fact that both chicken eggs and beef are rich sources of protein and calories (Fahlevi, 2023). According to Festy (2018), chicken eggs and beef are essential for High-Calorie High-Protein (HCHP) diets, aimed at meeting protein and energy needs, aiding tissue repair, weight gain, and postoperative recovery.

   Thus, chicken eggs and beef complement each other in HCHP diets. It can be concluded that the price of chicken egg and beef of demand are negatively related. Therefore, when the price of chicken egg rise, beef of demand decreases, and vice versa. This assertion is supported by Sukirno (2016) that an increase in the price of complementary goods reduces demand for the main goods and vice versa. This study's findings are consistent with Puradireja et al., (2021) research on factors influencing beef of demand in Lampung Province, which concluded that price of chicken egg significantly affect beef of demand.

5. Influence Price of Rice on Beef of Demand in Indonesia

   The price of rice from 1990 to 2022 did not significantly affect beef of demand in Indonesia. According to the Kementerian Kesehatan (2014) balanced nutrition guidelines, carbohydrates and animal protein sources complement each other. Therefore, rice can be categorized as a complementary good to animal protein, including beef. However, this study's results indicate that price of rice do not significantly affect beef of demand in Indonesia.

   This occurs because rice and beef are different foodstuffs: rice is a carbohydrate source, while beef is an animal protein source. Rice is a staple food in Indonesian daily life, valued for its high nutritional content and easy digestibility (Apriyanto, 2022). Thus, price of rice is not a significant consideration in determining beef of demand levels in Indonesia. Therefore, price of rice does not significantly affect beef of demand in Indonesia. This conclusion is consistent with Puradireja et al., (2021) research on factors influencing beef of demand in Lampung Province, which concluded that price of rice do not significantly affect beef of demand.

6. Influence of Income Per Capita on Beef of Demand in Indonesia

From 1990 to 2022, per capita income had a significant positive effect on beef demand in Indonesia. This impact arises because higher income enhances purchasing power, thereby increasing consumer demand for goods. This statement aligns with Mankiw (2019) that higher consumer incomes increase demand for goods, and vice versa.

Higher incomes are often associated with greater awareness of nutritional needs and health benefits (Rahmi & Fadjar, 2022). In this study, beef serves as a preferred animal protein source for consumers seeking high-quality nutrition. Therefore, income per capitasignificantly influences beef of demand in Indonesia. This conclusion is consistent with Asminar et al., (2021) research on factors influencing beef of demand in Tebo District, Jambi Province, which concluded that income per capita significantly influences beef of demand.

7. Elasticity Beef of Demand in Indonesia

According to the elasticity analysis in this study, the cross-price elasticity of beef demand with respect to the price of chicken eggs is -0.09. The negative sign indicates that chicken eggs are complementary goods to beef. This means that when the price of chicken egg increase, beef of demand decreases. The elasticity value of -0.09 is less than 1, indicating that beef of demand is inelastic in response to chicken egg price changes, meaning that changes in price of chicken egg have a minor effect on beef of demand. Thus, while beef and chicken eggs are complementary goods, their relationship is not strong, as changes in price of chicken egg only slightly affect beef of demand.

Meanwhile, income elasticity is 0.52, with a positive sign indicating that beef is a normal good. In other words, when consumer income increases, demand for beef also increases. The elasticity value of 0.52 is less than 1, indicating that beef has inelastic demand in response to income changes. This suggests that increased income leads to a modest increase in beef demand. Goods with this level of income elasticity are everyday necessities whose quality or quantity slightly increases with income growth.

The inelastic cross-price and income elasticities of beef of demand indicate that changes in price of chicken egg or income have a minor impact on beef of demand in Indonesia. Therefore, the hypotheses are accepted. These findings align with Juárez & Rebollar (2021) study on beef of demand at Mexican livestock slaughter centers, which found that beef of demand elasticity is inelastic.

CONCLUSION, SUGGESTION, AND LIMITATION

Based on this study conducted on " Demand Analysis of Beef in Indonesia," the following conclusions can be made: (1) The variables, including the price of beef, goat meat, chicken meat, chicken eggs, rice, and per capita income, simultaneously exert a significant influence on beef demand in Indonesia. Specifically, the price of chicken egg negatively and significantly influence beef of demand, while income per capita positively and significantly influences beef of demand. In contrast, between 1990 and 2022, the prices of beef, goat meat, chicken meat, and rice did not significantly affect beef demand in Indonesia. (2) Elasticity beef of demand in Indonesia from 1990 to 2022 includes: cross-price elasticity with price chicken egg at -0.09, indicating inelasticity, and income per capita elasticity at 0.52, indicating inelasticity.

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