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The impact of food price and farmer's income on the food demand in kurau sub-district, Tanah Laut Regency of South Kalimantan

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Abstract

Indonesia is an agricultural country, which places the agricultural sector as the main source of income for its population. South Kalimantan is one of the provinces where some of the population relies on the needs of life in the agricultural sector. Agricultural development in South Kalimantan plays an important role in economic development. The agricultural sector continues to consistently make a considerable contribution to GRDP in South Kalimantan. Along with the role of agriculture at the provincial level, the same trend is also felt in every regency in South Kalimantan, including Tanah Laut Regency. According to the results of Village Potential data in 2021, Kurau Sub-district has the highest agricultural household profile in Tanah Laut Regency. This study aims to look at the characteristics of farmer households in Kurau Sub-district, analyze the structure of the proportion of farmers' household expenditures, and see the effect of food prices and income on the demand for food in farmer households in Kurau Sub-district. The data was obtained by conducting interviews with 100 farmer households that were randomly drawn using *simple random sampling* techniques. The analysis methods used in this study are descriptive analysis and the *Linear Approximation Almost Ideal Demand System* (LA/AIDS) demand model. The results showed that farming households in Kurau Sub-district spend more of their money on food purposes. The results of own price elasticity show that all food groups are inelastic, which indicates that price changes do not change the amount of demand much. The results of cross-price elasticity show that most of the relationships between groups of food commodities are complementary. Meanwhile, income inequality shows that six groups of food commodities are normal groups of goods for farming households in Kurau Sub-district.

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Introduction

The agricultural sector in Indonesia is a very important sector in national development because it is a sector that provides employment and a source of livelihood for the population. Most of the land in Indonesia is used for agriculture, and almost 50% of the total labor force works in the agricultural sector. The agricultural sector has a very important role in the Indonesian economy because the agricultural sector serves as the foundation of economic development.

One of the provinces in Indonesia that relies on the agricultural sector is South Kalimantan. The agricultural sector plays a role in increasing production to ensure the availability of food for the population and provides quite a lot of jobs. This sector is also a source of income that allows for an increase in income for farming households, which will lead to an improvement in the welfare of the people in South Kalimantan.

According to business fields, the agricultural sector's contribution to the Gross Regional Domestic Product (GRDP) in South Kalimantan is still the primary support, followed by the mining and processing industry sectors. The agricultural sector continues to consistently make a considerable contribution to GRDP in South Kalimantan. However, during 2010–2021, the contribution of the agricultural sector continued to decline from 16% to around 13%. This shift continues to occur because it is accompanied by the development of other sectors, such as the mining sector and processing industry in South Kalimantan.

Along with the role of agriculture at the provincial level, the same trend is also felt in every regency in South Kalimantan. Almost all regencies in South Kalimantan rely on the agricultural sector as the main contributor to the formation of the GRDP. One of the regency that relies on the agricultural sector as a major contributor (18%–19%) to the regional GRDP is Tanah Laut Regency. Tanah Laut Regency has agricultural products that are the potential of the area, namely the production of corn, rice, and cattle breeding. This potential is taken seriously by the local government of Tanah Laut Regency, which has

conducted various programs for the development of farming businesses. This development is very reasonable; at first, Tanah Laut Regency was indeed an agricultural center in South Kalimantan. However, due to the closure of sugar companies in Tanah Laut Regency, the economic structure shifted to the mining sector. Today, the development of the mining sector is being continuously reduced to reduce the impact of environmental damage. For this reason, the Tanah Laut Regency government is again aggressively developing the agricultural sector to replace the declining mining sector.

Tanah Laut Regency is able to provide many jobs for the public. Of the many jobs available in Tanah Laut Regency, almost 50% of the workforce in Tanah Laut Regency is accommodated by the agricultural sector. This is certainly a fairly close relationship between household expenditure and employment. Because it is dominated by the agricultural sector, the proportion of agricultural households to total households is, of course, also getting bigger.

Data on Village Potential in 2021 shows that Kurau Sub-district has the highest agricultural household profile in Tanah Laut Regency (BPS, 2022). Kurau Sub-district is one of the sub-districts in Tanah Laut that is very rich in agricultural products, especially food crop commodities. As the main source of household income, paddy rice farming is developed quite well in Kurau Sub-district.

Changes in prices and changes in household income, of course, will greatly affect the fulfillment of farmers' household needs, especially their needs for food. Food expenditure, as the primary need in meeting daily needs, will have an impact on the proportion of household expenditure.

In fulfilling household living needs, the price of an item and the income obtained by a household are very dominant factors in influencing the demand for goods, where the demand for an item can be seen from the total expenditure of a community. This will have an impact on household expenses if there is a change in the price of goods or a change in income or both, which

results in the household having to adjust total spending to continue to meet the needs of their household.

This study aims to (1) analyze the characteristics of farmer households in Kurau Sub-district; (2) analyze the structure of the proportion of farmer households in Kurau Sub-district; and (3) analyze the effect of changes in food prices and income on the proportion of food expenditure of farmer households in Kurau Sub-district, Tanah Laut Regency.

This research is expected to help the government better understand the picture of farmer households in Kurau Sub-district and the overview of farmer houses in general in Tanah Laut Regency. The government can provide policies that continue to support the improvement of farmer households, which in turn can have an impact on increasing regional incomes, especially in the agricultural sector.

Material and methods

This research was conducted in Kurau Sub-district, Tanah Laut Regency, South Kalimantan. The research is carried out from March 2022 until it is completed, starting with making proposals and ending with writing reports. The field implementation will be carried out in June–August 2022.

The types of data collected in this study are primary data and secondary data. Direct interviews with farmer households that served as research samples yielded primary data. Meanwhile, secondary data is obtained from relevant agencies in this study, such as the Central Statistics Agency of Tanah Laut Regency (BPS), the Sub-district Extension Center (BPK), the Kurau Sub-district Office, and so on.

According to data from Tanah Laut Regency's Department of Food Crops and Horticulture, there are 3,012 farmer households spread across 11 villages in Kurau Sub-district. The next step is to determine the sample of households that will be spread across several villages in Kurau Sub-district. Judging from the concentration of farmer households, there are four villages that have a proportion of farmer households above 90%, namely Maluka Baulin

village, Bawah Layung, Kali Besar, and Tambak Sarinah. so that the four villages can be selected for this study. Furthermore, the sampling of farming households uses a simple random sampling technique, with the number of samples taken by 100 farmer households chosen randomly from the farmer household population.

The data analysis methods used in this study are descriptive analysis methods and LA/AIDS analysis. Descriptive analysis aims to make a picture or description that is factual about the observation unit that will be studied. Meanwhile, LA/AIDS analysis will be used to estimate the demand system from the observation unit to be studied (Deaton & Muellbauer, 1980). In this study, the food commodity group was formed based on the Classification of Individual Consumption According to Purpose (COICOP) code, which is a standard classification of expenditures and consumption carried out by households to acquire goods and services grouped according to their use. The COICOP code used is sourced from the 2003 Indonesian Standard Classification of Household Expenditure and Consumption (BPS, 2020).

In this study, food consumption was categorized into six food groups. In full, the six food groups analyzed were as follows:
1. Rice and tuber groups;
2. Egg, dairy, and yield groups;
3. groups of vegetables, nuts, fruits, marinades, fats, and oils;
4. Fish and meat groups
5. Prepared food and beverage groups; and
6. Other food groups

The LA/AIDS model is formulated as follows:

$$w_i = \alpha_i + \sum_{j=1}^{6} \gamma_{ij} \ln P_j + \beta_i ln\frac{y}{P} + u_i \ ....(1)$$

with:

j : 1,2,3,4,5,6 (commodity group)

w_i : the proportion of expenditure on commodity group i to total household food expenditure

P_j : the estimated price of the jth group

(y/P) : total household food consumption expenditure deflated by the Stone price index

P : Stone price index, where $\ln P = \Sigma \ w_i \ln pi$

The LA/AIDS model also requires restrictions on its parameters, namely:

1. Homogeneity, fulfilled if ; i,j=1,2,...... $6\gamma_{ij} = 0$
2. Adding Up, fulfilled if $\Sigma\alpha_i = 1; \Sigma\gamma_{ij} = 0; \Sigma\beta_i = 0$
3. Symmetry, fulfilled if $\gamma_{ij} = \gamma_{ji}$

Based on the parameters generated by the AIDS model, it can be calculated the own price elasticity, cross-price elasticity, and income elasticity. Formulas for income elasticity (e_i), own-price elasticity (ε_{ii}) and cross-price (ε_{ij}) Marshallian (*uncompensated*) and compensated price elasticity (ε^*_{ij}) Hicksian (*compensated*):

$$\varepsilon_{ii} = -(1 + \beta_i) + \gamma_{ij}/w_i \dots\dots\dots (2)$$

$$\varepsilon_{ij} = \gamma_{ij}/w_i - \beta_i(\frac{w_j}{w_i})\dots\dots (3)$$

$$\varepsilon^*_{ij} = \varepsilon_{ij} w_j e_i \dots\dots\dots (4)$$

where e_i is defined as:

$$e_i = 1 + {\beta_i}/{w_i} \dots\dots\dots(5)$$

Results and discussion

Characteristics of Farmer Households in Kurau Sub-district

Gender of Household Head

The Household head is the person who is the main person in charge of meeting the daily living needs of his household. Of the 100 respondents collected, 96% were male. There were only 4% female household head included in the study respondents (Fig. 1). This indicates that the responsibility as the household head is still basically the duty and role of men, in accordance with the norms prevailing in society in general.
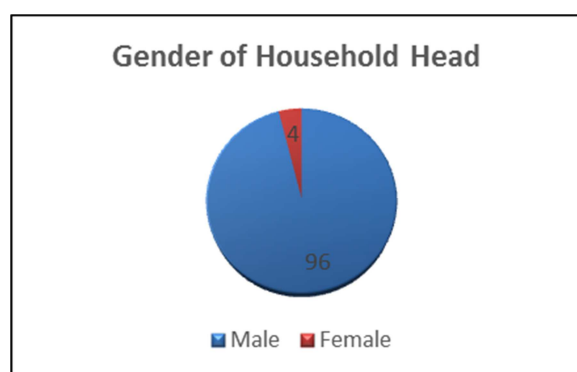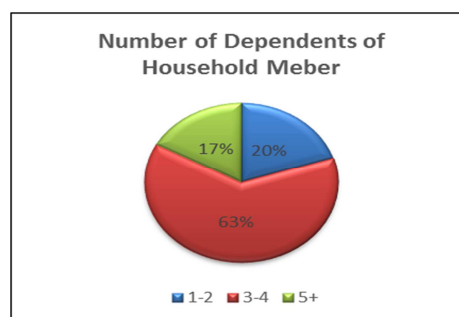

Fig. 1. Respondents by gender of Household Head.

Number of Dependents of Household Members

The number of dependents of household members is all people who eat and live in the house, but do not

include the head of the household. Based on the results of the study, the number of dependents of household members in Kurau sub-district is dominated by a range of 3 to 4 household members. As many as 63% of the heads of farmer households in Kurau sub-district bear 3 to 4 household members. More complete information about the dependent characteristics of household members can be seen in Fig. 2.

Fig. 2. Respondents based on dependents of household members.
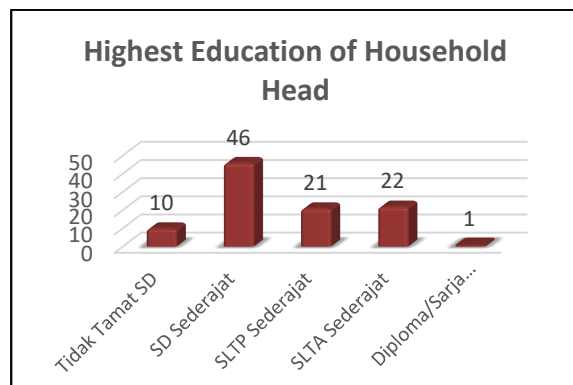
Age of Household Head

In general, the age of household head is very decisive in terms of physical condition in activities and work, as well as meeting the daily needs of his household. The Central Bureau of Statistics conducts categories in determining a person's productive age. It is said to have a productive age if in the age range of 15 to 64 years. Meanwhile, the age of residents over 64 years old is categorized as unproductive residents. Based on the results of the study, the average age of the household head is 46 years. According to their age group, the most heads of farmer households were in the age range of 45 to 54 years, namely 43%. Meanwhile, there were 4% of farmer households who fell into the unproductive category. More details can be seen in the image below.
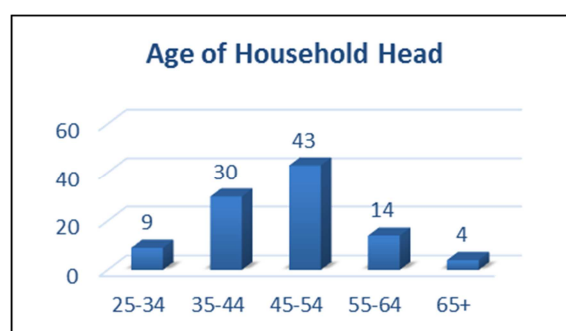
Fig. 3. Respondents by age of household head.

Highest Education of Household Head

One of the approaches used to measure the extent of education that the household head has obtained is with the highest education possessed by the household head. A person who completes his education to a higher education has sufficient knowledge and broader knowledge, and has better skills / expertise. The results showed that the head of households who had the highest education at the equivalent elementary level was the most dominant, at 46%. Meanwhile, judging from the distribution of data, there is a tendency for fewer household head to become farmers as the education is getting higher. This can be seen from the number of farmer houshold head who have diplomas / bachelors only as much as 1% (Fig. 4).

Fig. 4. Respondents based on the highest education of the head of household.

Major Agricultural Enterprises

Broadly speaking, the main farms cultivated can be seen from two sides of the approach. The first approach is from the number of people who work on it (in this case the household members who work on its agricultural business). Then the second approach is to see which commodity has the highest production value. In this study, the approach taken was based on the highest production value produced by farmer households. The results showed that the majority of farmer households in Kurau Sub-district cultivated the food crop subsector as the main agricultural business. This can be seen from the dominance of households that strive for food benefits, which is 63%. On the other hand there are only 2% of farming households that strive for agricultural services as the main agricultural business, as shown in Fig. 5.
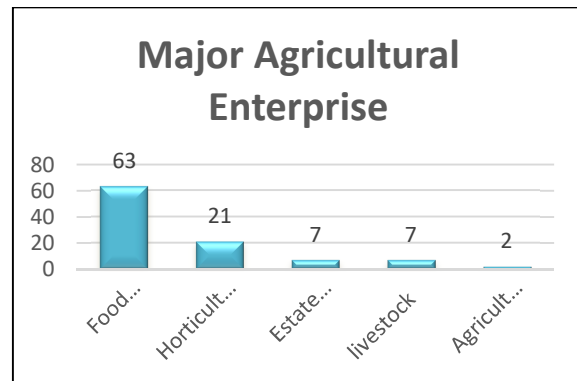

Fig. 5. Respondents based on the main agricultural business of household head.

Proportion of Farmers' Household Expenditure in Kurau Sub-district

Broadly speaking, household expenses can be divided into two groups of expenditures. These expenditure groups are food and non-food expenditures.

Basically, the demand for both groups of expenses in the fulfillment of household needs is different. One of these differences can be seen from the income factor. In times of relatively low income, households tend to prioritize the fulfillment of food needs. This will be seen in the spending pattern of people who have low incomes, where household spending will be more for food consumption.
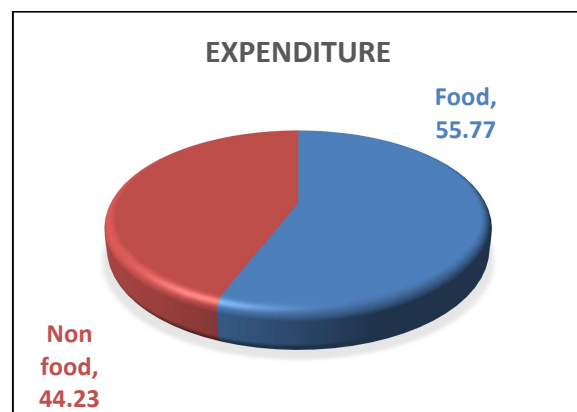
Fig. 6. Proportion of household expenditure in Kurau Sub-district.

Based on the results of the study, it can be seen that farmer households in Kurau Sub-district still choose food commodities as the top priority for meeting household needs. This can be seen from the proportion of expenditure on food obtained from the

results of the study which reached 55.77% of the total expenditure of farmer households in Kurau Sub-district. Deaton & Muellbauer (1980) revealed the share of spending on food to be an important indicator for looking at household food security. Alarge amount of spending on food indicates that household food security will be reduced.

Effect of Food Prices and Income on Food Demand
Description of Budget Share
In this study, what was used as a bound/dependent variable in the LA/AIDS model was the proportion of *expenditure (budget share)* in the food group. This study grouped food commodities into 6 food groups.

Table 1. Average budget share of food groups among farmer households in Kurau Sub-district (in %).

Food Group	Budget Share (%)
Rice and tuber groups	12,45
Egg, milk, and yield groups	6,27
groups of vegetables, nuts, fruits, marinades, fats, and oils	25,60
Fish and meat groups	26,01
Prepared food and beverage groups	14,59
Other food groups	15,07
Total	100,00

Source: Data processing, 2022

Based on the data shown in Tabel 1, it can be seen that the IV food group (fish and meat), and group III (vegetables, fruits, seasonings, nuts, fats and oils) are the groups that have the highest *share*. Meanwhile, Group II (eggs, milk and derivatives) only received a *share* of 6.27%. In terms of protein fulfillment, it turns out that farming households seem to prefer fish and meat over eggs and milk. This is quite reasonable, because the geographical location of Kurau Sub-district which borders the sea and has a large swamp, so it becomes a source of abundant protein fulfillment for households.

Meanwhile, food group I (rice and tubers) only has a *share* of 12.45%. If you look at the size, this commodity is slightly inferior compared to the finished food and beverage group. This shows that in addition to consuming raw foodstuffs for further processing, the average farmer household also consumes ready-made food for daily needs, such as

buying breakfast in the morning, pastries for *snacks* and ready-made meals for students.

Demand System Estimation
In this study, the modeling of the request system using the LA/AIDS method was approached from the *Seemingly Unrelated Regression* (SUR) modeling. The model formed by the use of the Stata application has guaranteed the fulfillment of the restrictions that are required in the establishment of the LA/AIDS demand system. The required restrictions are *adding up, homogeneity,* and *symmetry.*

Before calculating the coefficient of determination (R^2), a model of demand security can be written. Based on this formed model, the amount of elasticity will be lowered, both price elasticity and income elasticity. The demand equation model formed from the results of research by farmer households in Kurau Sub-district is as follows:

w_1 = 0,0079 + 0,1176 lnP1 - 0,0294 lnP2 - 0,0265 lnP3 - 0,0256 lnP4 -0,0280 lnP5 - 0,0080 lnP6 - 0,0356 lnY/P

w_2 = 0,0265 - 0,0294 lnP1 + 0,0430 lnP2 - 0,0001 lnP3 - 0,0131 lnP4 +0,0015 lnP5 - 0,0018 lnP6 + 0,0004 lnY/P

w_3 = 0,6754 - 0,0265 lnP1 - 0,0001 lnP2 + 0,1221 lnP3 - 0,0078 lnP4 -0,0216 lnP5 - 0,0661 lnP6 + 0,0537 lnY/P

w_4 = 0,3922 - 0,0256 lnP1 - 0,0131 lnP2 - 0,0078 lnP3 + 0,1015 lnP4 -0,0112 lnP5 - 0,0437 lnP6 + 0,0214 lnY/P

w_5 = 0,2744 - 0,0280 lnP1 + 0,0015 lnP2 - 0,0216 lnP3 - 0,0112 lnP4 +0,0881 lnP5 - 0,0287 lnP6 + 0,0270 lnY/P

w_6 = -0,3765 - 0,0080 lnP1 - 0,0018 lnP2 - 0,0661 lnP3 - 0,0437 lnP4 -0,0287 lnP5 + 0,1484 lnP6 - 0,0669 lnY/P

After compiling the demand model, a coefficient of determination analysis (R^2) is carried out. Based on the results of processing research data, information was obtained that the estimation of the LA/AIDS equation model formed gave an R^2 between 29 to 75%.

This can be interpreted to mean that the variation in the proportion of expenditure (*budget share*) of the 6 food groups in this study can be explained by the model between 29 to 75%, while the rest can be explained by other factors that are not included in the model. When viewed from the magnitude, the resulting R² value is small, this happens because the data used in this study is *cross sectional*. According to Gujarati (2010) in *cross-sectional* research there is no need to worry if the model formed has a not very high value of R 2. The results also showed that although the R² formed was not too high, the F value used for simultaneous testing gave a significant number (p-value 0.0000).

Elasticity of demand
The reaction of a commodity package as a result of price changes in other commodity packages will vary. This occurs as a result of the sensitivity of demand for food commodities to the fluctuations that occur. The magnitude of the sensitivity fig. in the commodity package that is formed can be measured by calculating the elasticity of the price of one's own goods (own-price elasticity), cross-price elasticity and income elasticity. The calculation of these three elasticities is very useful for obtaining information about the response of public demand to price changes that occur.

Table 2. Price elasticity, cross-price elasticity, and farmer household income elasticity in Kurau Sub-district according to 6 food groups in 2022.

Food Group	Againts Price						Income Elasticity
	Group I	Group II	Group III	Group IV	Group V	Group VI	
Group I	**-0,101**	-0,214	-0,037	-0,089	-0,132	-0,145	0,719
Group II	-0,472	**-0,309**	-0,006	-0,214	0,022	-0,027	1,007
Group III	-0,080	-0,014	**-0,659**	-0,112	-0,148	-0,193	1,205
Group IV	-0,089	-0,055	-0,079	**-0,646**	-0,069	-0,143	1,081
Group V	-0,177	-0,002	-0,268	-0,155	**-0,442**	-0,147	1,189
Group VI	-0,104	0,017	-0,174	-0,116	-0,052	**-0,108**	0,537

Source : Data processing, 2022

Price Elasticity of Goods
The initial stage in seeing the sensitivity of a food group is to calculate the elasticity of the price of goods. In general, the elasticity of the price of goods will be of negative value in accordance with the law of demand, if the price of goods rises, then the demand for the goods will decrease.

Based on the table above, it can be seen that the value of the elasticity of the price of goods produced in the research of farmer households in Kurau Sub-district shows a negative value (located on the diagonal). This phenomenon already corresponds to the law of demand in economic theory. Judging from the numbers, the six komoditas packages have an elasticity value of the price of goods worth less than 1 (inelastic). In other words, it can be explained that in the condition that the price increases by 1%, the demand for the goods will decrease by less than 1%.

This finding is in line with the research conducted by Hafizah *et al.* (2021) about the structure of household food demand in Indonesia, which showsthe result that the demand for foodstuffs is inelastic.

Cross-Price Elasticity
Cross-price elasticity is a value used to measure how much demand for a commodity package changes when the price of another commodity package changes in price. According to Widarjono, (2016) there are three types of goods if interpreted according to the relationship between goods, namely substitution, complementary, and independent goods. An item will be substitutionary if its elasticity value is positive, and it will be complementary if the elasticity of the item is negative. While the goods will be independent if they have an elasticity value of 0. Based on the results of data processing, information is obtained that most of the relationships between food groups are complementary. For example, all groups from group 2 to group 6 are complementary items to packages of rice commodities and tubers. There is no food groups that is a substitution for rice and tuber food group.

In the commodity package of eggs, milk and yields group (food groups II) there is one food group which is a substitution of this group, namely the commodity package of other food group. This is strongly suspected because in other food commodities there are goods in the form of beverage ingredients such as tea and coffee. So that if households cannot consume milk, it will be replaced by tea and coffee. Meanwhile, other food groups (group I, III, IV, V) are complementary items for eggs, milk, and yield group. Meanwhile, the commodity packages of vegetables, nuts, fruits fats and oils (food group III) do not have substitution items. Items in the group other than vegetables, fruits, herbs, nuts, fats and oils are complementary to this food group. The same thing is also found in fish and meat groups (food group IV), and other food group commodity packages (food group VI).

In the prepared food and beverage food group (food group V) has one item that is a substitution of this group. The item is food group II. While the other 4 food groups are complements of this food group.

Income Elasticity
Income elasticity has a definition of the magnitude of the percentage of changes in the number of goods requested as a result of changes in income. Nicholson (1995) mentioned that if an item has an elasticity value of more than zero, then the item is a normal item. Then, if the elasticity of the item is less than zero, it can be said that the item is an inferior item.

The results of data processing showed that all food groups studied showed positive numbers. This indicates that all these food groups are classified as normal goods. Then, judging from the size, it can be seen that commodity packages on and tubers and other food groups are basic necessities for farmer households in Kurau Sub-district. While other commodity packages are goods that have value more than one elasticity. This indicates that the demand for eggs, milk and derivative products, vegetables, fruits, seasonings, nuts and oils, fish and meat, and finished food and beverages are sensitive items in the event of changes in the household income of farmers in Kurau

Sub-district. For example, if farmers' incomes increase by 10%, then farmers' demand for rice and tubers only increases by 7.19%. However, a 10% increase in farmers' income will increase farmers' demand for vegetables, fruits, herbs, nuts, fats and oils by 12.05%. This research is in line with research conducted by Pardede, (2022) which conducted research on local food consumption in Papua Province. The results showed that rice is a commodity that has an income elasticity below one, and fish, meat, eggs, and milk commodities are commodities that have more than one income elasticity.

Conclusion
1. The household head who were respondents to the study in Kurau Sub-district was dominated by men. As many as 96% of the respondents who were sampled were men.
2. Most of the household head in Kurau Sub-district bear 3 to 4 household members. As many as 63% of the farmer household head in Kurau Sub-district bear 3 to 4 household members.
3. Judging from the proportion of farmers' household expenditures in Kurau Sub-district, expenditure on food needs is still more when compared to non-food expenditures.
4. Based on the calculation of the *budget share*, the largest portion of food expenditure of farmer households in Kurau Sub-district is in the fish and meat food group, while the smallest portion of farmers' household food expenditure in Kurau Sub-district is in the egg, milk and yield groups. Most of the farming households in Kurau Sub-district choose to consume raw foodstuffs to be processed/cooked, and the rest by consuming ready-made food and other foodstuffs.
5. The price elasticity of goods shows that the 6 food groups studied are negatively marked and inelastic, which means that every time a price change occurs, it has little effect on changes in demand for the goods.
6. The results of cross-price elasticity show that most of the relationships between food groups formed are as complementary goods.
7. The results of income elasticity showed that the 4 food groups studied were more than one one elasticity.

The four food groups are eggs, milk and derivatives, fruit vegetables, herbs, nuts, fats and oils, fish and meat, and finished food and beverages. The increase in the household income of farmers, will have a lot of effect on increasing consumption in the keemapt of the food group.

Suggestion

1. The local government must continue to ensure the sustainability of agricultural business in Kurau Sub-district in particular and Tanah Laut Regency in general. The results showed that the heads of peasant households were still dominated by people over the age of 40. Regeneration is needed in agricultural business in Kurau Sub-district.

2. The government needs to conduct socialization and training on modern agricultural knowledge to farmers in Kurau Sub-district. This is considered very important, because judging from his education, the head of the peasant household is still relatively poorly educated. The agricultural knowledge gained from farmers is the result of hereditary farming habits (traditional agriculture). With training for farmers, it will further open farmers' insights about modern agriculture.

3. Judging from the proportion of household expenditure, the largest proportion is still on food needs. The large proportion for food indicates that the welfare of farmers in Kurau Sub-district is still not good. The government as a policymaker is expected to provide assistance for agricultural businesses that are run, so that their agricultural businesses become better and the welfare of farmers in Kurau Sub-district can be further improved.

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