An Economic Analysis of Meat Demand in Indonesia

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Abstract

Meat is one of animal protein source which contains with good nutrition for human life. Consumption of meat is low than consumption of other animal protein sources because of its availability and expensive price. The objective of this study is to analyze of meat consumption pattern and the factors affecting it. The method used was descriptive and econometrics analysis. Specification of model was Quadratic of Almost Ideal Demand System (QUAIDS) and modified with size of household and wife education variable. Data used was the data of national socio-economic survey 2005, 2008, 2011, and 2014. Results of the study found that variation in the amount of meat consumption dependent on income level, price, education of wife, and size of household, also is closely related to the household area. Increasing consumption of meat as a source of animal protein was increase income, price stability, support the availability of meat at the household level, especially for low income also escorted with information about the important role of nutrients.

Keywords: meat, demand, QUAIDS Model, household

1. Introduction

As one of the countries with the largest population in the world, changes in the Indonesian economy will certainly attract a lot of attention from various parties. Changes in the economy, at least in the last decade has resulted in a change that is striking in the consumption patterns of food communities. National Socio-Economic Survey (Susenas) data from the Central Statistics Agency (BPS) show that along with economic growth and the increase in average per capita income, Indonesian people's consumption expenditure for food from 2002 to 2013 tends to decline. In 2002 it was recorded that an average of 58.7 percent of the proportion of income was for food expenditure, the trend decreased to 47.9 percent in 2013 (BPS. 2014). In the study of economic theory, things like this are in line with Engel's Law which says that the more income increases, the proportion of food spending decreases.

In the other, hence the Bennett Law also apply to complement Engel's Law (Soekirman, 2002), ie if the average revenue to increase it will be followed by improvements in the quality of food . The proportion of energy from carbohydrate sources will decrease and from sources of fat and protein will increase, and vice versa. In the case of Indonesia, the share of consumption expenditure that declines the fastest is expenditure on main food, in this case rice. In the context of the increase in value added, basic foodstuffs such as rice, corn, and wheat , often referred to as low-value commodities. While commodities such as vegetables early , horticulture, fish, meat, and poultry referred to as high-value commodities. The symptom of shifting of commodities from low to high value commodities in line with the increase in income in the literature is called the structure of increasing the added value of agricultural commodities.

Likewise, the progress of population growth and improvement in people's living standards as well as changes in consumer tastes will encourage an increase in food needs and household food consumption will experience a change in the direction of increasing consumption of animal protein. In addition, it does not rule out the possibility for economic groups to reduce their consumption of certain types of food for reasons of health, which can be interpreted as a shift in consumer preferences. This group of people will substitute other types of food that are of higher quality in terms of health. Therefore, in general, changes in the structure of consumption of meat can occur due to the enactment of Engel's Law , as a result of economic changes as well as the impact of shifting consumer preferences.

One of the sources of animal protein for public consumption is meat. Meat is a livestock product that has an important role in overcoming nutritional problems. Lack of meat consumption, especially during the growing period, can lead to slow growth and intelligence of children. According to Sompotan (2011) states that lack of meat consumption is a threat to children's intelligence. Meanwhile, according to Ariani (2004), food from animal sources is a food group that plays a very important role in shaping the quality of human resources.

According to the Food and Agriculture Organization (FAO), a major meat consumption of Indonesian society has reached an average 10.62 kg / capita / year, consisting of 6.17 kg of poultry meat, 2.0 kg of meat pork, 2.13 kg of beef and buffalo, and 0.32 kg of mutton and lamb (FAO, 1999). It's shows that the consumption of meat in Indonesian society is still far from expectations.

Furthermore, for the development of the average consumption of protein per capita per day in 2004 to 2010, it was still below the protein adequacy rate required by Widyakarya Nasional Pangan dan Gizi (WNPG) in 2012, which was 57 grams per capita per day. However, especially for the consumption of animal protein from livestock products in Indonesia, until 2013, it has not reached the target of 18 grams per capita per day (WNPG, 2012). This condition certainly adds to the food and nutrition problems that exist, especially in relation to food sources of animal protein, which are still low in consumption. This problem encourages the need to examine more deeply the condition of the consumption pattern or household expenditure on food sources of animal protein, especially meat in various income groups, especially low income.

From this description , the following problems can be formulated: How is the demand for meat in households in Indonesia? And what factors influence the demand for various types of meat in Indonesia?

From this research, it is hoped that it can reveal how the factors that influence the demand for meat in Indonesia so that it can provide information in the application of its policies.

2. Method

This study is limited to the demand for the commodity meat in Indonesia covering of meat in grouped into nine types, namely: (1) beef, (2) buffalo, (3) mutton, (4) pork, (5) purebred chicken, (6) native chicken, (7) preserved meat, (8) offal, and (9) others based on susenas data for 2005, 2008, 2011 and 2014 which includes expenditure data, total consumption, wife's education level as well as the number of household members during that period, but did not differentiate between age group and sex. In addition, the analysis carried out is partial, namely only examining the consumer side and ignoring consumers who have dual roles as producers.

The data analysis method uses econometric analysis which is used to explain the response of the demand for various types of meat to changes in the price of the type of meat itself, the price of other types of meat, expenditure, household size and the level of education of the wife. The model specification formulated in this study is the *Almost Ideal Demand System model* (Deaton and Muellbauer, 1980) which is used in the form of Quadratic AIDS (Banks, *et al.,* 1997) and is modified to include variables for the number of household members and the level of education of the wife.

First stage, consumers allocate their expenditure for food and non-food expenditures. At this stage , the model used is:

$$Ln\,(M) = \alpha + \gamma Ln(Pf) + \beta Ln(X) + \sum \theta i Z + \varepsilon$$

Where:

M: household food expenditure (IDR/capita/ month)

Pf: the price index of s tone

X: income (IDR/capita/ month)

Z: demographic variable

α, γ , β: parameters to be predicted

ε: random component

Second stage, consumers allocate food expenditure into the meat and non-meat groups, with the following formulation:

$$F = \alpha' + \sum \gamma_i' Ln(P_i) + \beta' Ln(M) + \sum \theta_j' Z + \varepsilon$$

Where:

F: expenditure for meat group (Rp/cap/month)

Pi: the ith stone food price index

M: food expenditure (Rp/cap /month)

Z: demographic variable

α',γ'and β' parameters to be predicted

ε: random component

Furthermore, in the third stage, consumers allocate meat expenditure based on groups or types of meat which are then disaggregated into various types of meat. In this third stage, the share of expenditure for each type of meat is approximated by the previously modified QUAIDS model with the following equation:

$$S_i = a' + \sum_j b_{ij} Ln(FP_i) + c_i Ln(F/I) + d_i Ln(F/I)^2 + \sum_i e_{ik} Z + u_i$$

Si: share of the expenditure for the ith type of meat to the total expenditure of meat

Pi: the price of the i type of meat,

I: stone price index for meat

ai, bij, ci, di, and eik: predicted parameters.

ε: random component

To maintain a consistent man with utility theory, need to do restriction of demand function parameters, namely:

1) Homogeneous itas degree zero in prices or

2) Symmetry where bij=bji, which means that the effect of changes in the price of goods i on the amount of goods demanded j is the same as the effect of changes in the price of goods j on the amount of goods demanded i.

3) *Adding up* $\sum a_i = 1$ and $\sum_i a_{io} = \sum_i c_{io} = \sum_i b_{ij} = \sum d_i = \sum_i e_{ik} = 0$.

Then the method of estimating the model using the econometric technique *Seemingly Unrelated Regression* (SUR) and using the *Statistical Analysis System* (SAS) software.

3. Results and Discussion

3.1 Estimated Parameters

The coefficient of determination (R^2) in this study generally ranges between 15-80 percent. This means that by system the diversity of expenditure proportions that can be explained by the model, such as changes in prices, expenses or the number of household members and the education level of wives is less than 78 percent. This shows that there are other factors beyond the four variables included in the model that influence the diversity of the proportion of expenditure, such as tastes, and other socio-cultural factors. The R^2 value of this relatively low meat demand model shows that the independent variable, which includes meat prices, in the model has little variation in explaining changes in the share of meat commodity expenditure. Variations in the prices of meat are relatively small due to the due to the data being analyzed is Susenas of data collected over a period of one week prior to se each period. There is also a small variation in price data due to spatial factors and commodity quality. Rated R2 was low also found in research on general food made by Rachman (200) is equal to 8,22 percent and Daud (1986) amounted to 15-78 percent.

The results of the estimation of expenditure parameters, which are proxies of income for all equations, show a real figure at the level of 5-10 percent in all household groups and all periods. The majority of the coefficients are positive, which means that the increase in spending on meat commodities will be accompanied by an increase in the percentage of expenditures for various types of meat which have this positive coefficient.

The average value of the estimated expenditure parameters for types of beef, broilers and native chickens according to the income level shows the same pattern, namely the higher the income level, the smaller the estimated expenditure parameter value. The estimated expenditure parameters for the three types of meat were generally positive . This shows that these three types of meat are the main choice of households when they experience an increase in income. That is why these three types of meat, both the level of consumption and the level of participation in consumption, are the highest among other types of meat. These results are same with study of Junaedi and Jatmiko (2018).

Furthermore, the results of the estimated price parameters show that the majority of the equations show real

figures up to the level of 10 percent. Estimated parameters of price, both self-price and cross-price, have a positive sign and a negative sign. The estimated price parameter which is positive indicates that the demand will increase if the price of the type of meat itself or other types of meat increases, and vice versa if the sign is negative. From the overall equation, around 65 percent is negative and the rest is positive for the estimation of other meat price parameters and about 80 percent is negative for the estimation of the price parameter for the type of meat itself. For allegations own pricing parameters, generally are negative, which indicates that when there is an increase in meat prices will reduce demand for many types of meat. So in general this is in accordance with the theory of demand. Meanwhile, the estimation of the cross price parameter shows that all pairs of meat commodities have a symmetrical sign and magnitude.

Meanwhile, the estimated household size parameters for all equations show a real number at the level of up to 10 percent, which means that the number of households has a significant effect on the level of consumption of various types of meat . Of the total 324 equations, 133 equations are positive and 190 equations are negative and there is only one equation with a value of 0. This indicates that in general the number of household members has the impact of reducing the share or share of expenditure for meat consumption. In other words, the greater the number of household members, the lower the proportion of spending on meat commodities. This result is in line with several previous studies, for example with the results of Harianto (1994) which shows that number of household members has a negative impact on the consumption of animal food groups. Likewise, the research of Kemalawaty (1999) which found that the number of members had a negative relationship with the consumption of livestock meat, meat and milk, where the greater the number of family members, the less the share of animal food expenditure was. Another similar result of the research of Harianto (1994), Latief et al. (2000), Haley (2001), and Erwidodo et al. (1996).

Then estimated parameters for education, generally significantly affect the demand for various types of meat at level 5 -10 percent. Then seen from the sign that the parameters are mostly positive, which means that the higher the level of education of the wife, there is a tendency for an increase in the consumption of various types of meat for all household groups at various income strata and for the entire period. This is presumably because with the increasing level of education, knowledge of food and beverage in general and nutrition in particular will lead to changes in consumption patterns. Of the 324 equations with details 151 are positive, 171 are negative and 2 are zero.

3.2 Income Elasticity

The income elasticity of demand for meat in Indonesia listed in Table 1. From the data in Table 1 to Table 4, several things can be revealed: *First,* all signs of income elasticity are positive, which means that the demand for various types of meat will increase along with the increase in household income. This also means that all types of meat commodities consumed by the household are considered normal goods. These results are same with study of Zhang and Wang (2003), Chern et al. (2002), Lanfranco et al. (2001), and study of Purnomo and Junaedi (2019).

Second, the elasticity value for all types of meat in all social groups and the entire period is more than 1 or elastic. This means that the meat commodity is a luxury item where the increase in income will be accompanied by an increase in demand for meat with a larger proportion of the increase.

Table 1. Income elasticity of meat demand in Indonesia by region and income level in 2005

Kinds of Meat	Urban			Rural			National		
	Low	Midle	High	Low	Midle	High	Low	Midle	High
Cow	1.693	1.516	1.593	1.953	1.622	1.437	1.624	1.437	1.390
Bufallo	1.616	1.349	1.337	1.895	1.555	1.340	1.570	1.339	1.239
Goat	1.609	1.337	1.343	1.885	1.554	1.341	1.562	1.336	1.242
Pig	1.637	1.409	1.438	2.021	1.614	1.418	1.626	1.387	1.319
Purebred Chicken	1.917	1.620	1.636	2.250	1.830	1.551	1.874	1.574	1.453
Free-range Chicken	1.710	1.487	1.528	2.061	1.704	1.486	1.673	1.454	1.380
Preserved Meat	1.614	1.366	1.422	1.876	1.536	1.317	1.561	1.336	1.251
Innards	1.715	1.502	1.522	1.913	1.588	1.387	1.625	1.418	1.327
Others	1.646	1.398	1.453	1.912	1.574	1.349	1.589	1.364	1.279

Source: Processed from Susenas data 2005. BPS.

Table 2. Income elasticity of meat demand in Indonesia by region and income level in 2008

Kinds of Meat	Urban			Rural			National		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
Cow	1.885	1.610	1.748	2.046	1.706	1.565	1.755	1.515	1.502
Bufallo	1.808	1.461	1.518	2.023	1.626	1.452	1.710	1.421	1.349
Goat	1.805	1.459	1.525	2.040	1.633	1.452	1.713	1.422	1.351
Pig	1.837	1.522	1.596	2.112	1.696	1.524	1.750	1.471	1.416
Purebred Chicken	2.148	1.751	1.829	2.453	1.927	1.690	2.057	1.683	1.591
Free-range Chicken	1.895	1.563	1.662	2.176	1.779	1.616	1.799	1.518	1.486
Preserved Meat	1.813	1.485	1.604	2.003	1.631	1.452	1.706	1.431	1.381
Innards	1.929	1.620	1.705	2.030	1.688	1.537	1.782	1.518	1.465
Others	1.872	1.545	1.638	2.051	1.665	1.496	1.752	1.470	1.416

Source: Processed from Susenas data 2008. BPS.

Table 3. Income elasticity of meat demand in Indonesia by region and income level in 2011

Kinds of Meat	Urban			Rural			National		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
Cow	1.477	1.367	1.456	1.508	1.375	1.315	1.506	1.386	1.381
Bufallo	1.383	1.225	1.282	1.464	1.311	1.227	1.437	1.283	1.252
Goat	1.379	1.221	1.279	1.453	1.308	1.222	1.430	1.280	1.247
Pig	1.420	1.285	1.359	1.546	1.400	1.327	1.493	1.352	1.341
Purebred Chicken	1.631	1.455	1.514	1.731	1.540	1.432	1.700	1.509	1.464
Free-range Chicken	1.454	1.314	1.392	1.564	1.418	1.334	1.515	1.372	1.357
Preserved Meat	1.380	1.228	1.306	1.448	1.303	1.222	1.427	1.280	1.257
Innards	1.443	1.308	1.366	1.479	1.336	1.263	1.474	1.333	1.306
Others	1.412	1.265	1.337	1.479	1.337	1.268	1.457	1.312	1.297

Source: Processed from Susenas data 2011. BPS.

Table 4. Income elasticity of meat demand in Indonesia by region and income level in 2014

Kinds of Meat	Urban			Rural			National		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
Cow	1.354	1.288	1.382	1.386	1.309	1.280	1.422	1.345	1.370
Bufallo	1.285	1.168	1.225	1.361	1.271	1.206	1.374	1.265	1.250
Goat	1.285	1.166	1.223	1.352	1.270	1.208	1.370	1.263	1.250
Pig	1.331	1.229	1.297	1.448	1.345	1.299	1.438	1.327	1.333
Purebred Chicken	1.523	1.396	1.451	1.614	1.499	1.413	1.628	1.492	1.466
Free-range Chicken	1.352	1.257	1.337	1.449	1.371	1.318	1.447	1.351	1.359
Preserved Meat	1.288	1.176	1.245	1.349	1.266	1.206	1.370	1.265	1.256
Innards	1.346	1.251	1.308	1.371	1.295	1.238	1.411	1.315	1.304
Others	1.331	1.227	1.289	1.378	1.301	1.239	1.405	1.305	1.296

Source: Processed from Susenas data 2014. BPS.

Third, when viewed from time to time from 2005, 2008, 2011 and 2014 the overall elasticity value has changed where in 2008 it has increased compared to 2005. Then in the next two periods it has continued to experience a decrease in magnitude below the 2008 and 2005 periods.

Four , chicken meat have the highest elasticity value than others. This means that the demand for chicken meat is the most responsive to changes in household income. Moreover, the consumption of chicken meat is the most, both the level of participation and the amount of consumption, which means that the level of community dependence on commodity chicken is very high. Meanwhile, the types of meat with the lowest elasticity value are mutton and buffalo.

Fifth, based on region and income level, the income elasticity value of low and medium income groups of households in urban areas is greater than that of rural households for the entire period. This means that low- and middle-income urban households are more responsive in increasing the amount of consumption of various types

of meat when there is an increase in income. This is due not only to the relatively low consumption of meat , but more due to the more varied tastes of urban household groups and the availability of meat which is generally more in urban areas. Meanwhile, households with high income levels, households in rural areas have a higher elasticity value than households in urban areas. This shows that the household income higher in rural areas respond more shifts in increasing the amount of meat consumption as a result of the change in income.

Six, if dis-agregation according to income group, generally indicates that the more higher the level of income the amount of the elasticity decreases. This shows that the demand for various types of meat by low-income household groups is more responsive to changes in income compared to middle or high- income households. This indicates of low-income households to obtain commodity meat adequately, both the quantity and quality of his. For this reason, it is necessary to have policies that can encourage increased income and also price stability. Thus, low-income household groups have more ability to access meat commodity .

3.3 Price Elasticity

According to Harianto (1994) price elasticity obtained from cross section data can be categorized as long-term price elasticity, which tends to be more elastic when compared to the short-term. Furthermore, the price data used is the implicit price which is the result of dividing the expenditure data by the quantity data. The quality factor is often not taken into account in measuring this price elasticity. For more details regarding this price elasticity, it will be explained in the following section which covers the own price elasticity and the cross elasticity.

3.3.1 Own Price Elasticity

Table 5 to Table 8 below presents the value of the price elasticity of the demand for various types of meat in Indonesia households for four different periods and according to different regions and household income groups.

Table 5. Own price elasticity of meat demand in Indonesia by region and income level in 2005

Kinds of Meat	Urban			Rural			National		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
Cow	-1.314	-1.550	-1.273	-1.167	-1.323	-0.954	-1.185	-1.389	-0.977
Bufallo	-1.287	-0.954	-0.759	-1.205	-1.179	-1.114	-1.226	-1.107	-1.104
Goat	-1.033	-1.199	-1.096	-0.990	-1.085	-1.220	-1.004	-1.145	-1.260
Pig	-0.999	-0.940	-0.948	-0.957	-1.002	-1.340	-0.970	-1.007	-1.162
Purebred Chicken	-1.238	-1.150	-1.166	-1.424	-1.422	-1.320	-1.405	-1.294	-1.225
Free-range Chicken	-1.226	-1.179	-0.784	-1.264	-1.558	-1.226	-1.217	-1.336	-0.932
Preserved Meat	-1.008	-1.037	-0.914	-1.008	-1.014	-0.839	-1.013	-1.029	-0.891
Innards	-1.305	-1.111	-0.951	-1.068	-1.273	-0.868	-1.166	-1.139	-0.897
Others	-1.378	-1.190	-0.931	-1.066	-1.281	-0.851	-1.176	-1.172	-0.874

Source: Processed from Susenas data 2005. BPS.

Table 6. Own price elasticity of meat demand in Indonesia by region and income level in 2008

Kinds of Meat	Urban			Rural			National		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
Cow	-1.156	-1.216	-1.392	-1.153	-1.485	-1.621	-1.096	-1.313	-1.603
Bufallo	-0.910	-0.832	-0.992	-0.921	-0.756	-1.437	-0.929	-0.841	-1.201
Goat	-0.826	-1.001	-1.139	-1.068	-0.991	-1.153	-0.952	-0.982	-1.115
Pig	-1.274	-1.273	-1.250	-1.129	-1.326	-1.066	-1.183	-1.246	-1.156
Purebred Chicken	-1.414	-1.294	-1.351	-1.425	-1.349	-1.221	-1.490	-1.340	-1.333
Free-range Chicken	-1.248	-1.221	-1.304	-1.084	-1.431	-1.420	-1.224	-1.240	-1.311
Preserved Meat	-1.065	-0.982	-1.101	-0.994	-1.005	-0.891	-1.038	-0.995	-1.035
Innards	-1.298	-1.000	-0.845	-1.015	-1.030	-0.872	-1.143	-0.990	-0.836
Others	-1.344	-1.000	-0.779	-1.015	-1.030	-0.857	-1.150	-0.988	-0.798

Source: Processed from Susenas data 2008. BPS.

Table 7. Own price elasticity of meat demand in Indonesia by region and income level in 2011

Kinds of Meat	Urban			Rural			National		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
Cow	-1.741	-1.265	-0.964	-1.272	-1.148	-0.856	-1.484	-1.203	-0.931
Bufallo	-1.055	-0.966	-0.940	-1.073	-0.988	-0.935	-1.069	-0.982	-0.936
Goat	-1.046	-0.947	-0.934	-1.035	-0.979	-0.965	-1.041	-0.964	-0.956
Pig	-1.004	-0.612	-0.357	-1.010	-0.903	-0.470	-1.070	-0.863	-0.578
Purebred Chicken	-1.419	-1.105	-0.980	-1.342	-1.233	-0.954	-1.477	-1.204	-1.004
Free-range Chicken	-1.744	-1.047	-0.374	-1.171	-1.115	-0.515	-1.447	-1.118	-0.484
Preserved Meat	-1.018	-0.995	-0.980	-0.994	-1.000	-1.002	-1.003	-0.995	-0.983
Innards	-1.404	-1.007	-0.779	-1.147	-1.117	-0.902	-1.268	-1.054	-0.845
Others	-1.450	-1.009	-0.751	-1.142	-1.114	-0.909	-1.274	-1.058	-0.845

Source: Processed from Susenas data 2011. BPS.

Table 8. Own price elasticity of meat demand in Indonesia by region and income level in 2014

Kinds of Meat	Urban			Rural			National		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
Cow	-1.885	-1.421	-0.431	-1.058	-1.096	-0.659	-1.369	-1.200	-0.519
Bufallo	-1.027	-0.948	-0.884	-1.022	-0.991	-0.966	-1.027	-0.972	-0.935
Goat	-1.031	-0.990	-0.982	-1.010	-1.020	-0.921	-1.020	-1.007	-0.943
Pig	-1.095	-0.641	-0.417	-0.932	-0.799	-0.440	-1.066	-0.802	-0.547
Purebred Chicken	-1.516	-1.182	-0.877	-1.583	-1.193	-0.850	-1.647	-1.233	-0.898
Free-range Chicken	-1.810	-0.941	0.069	-1.531	-1.313	-0.515	-1.671	-1.124	-0.247
Preserved Meat	-1.018	-0.999	-0.965	-1.009	-0.997	-0.966	-1.011	-0.994	-0.961
Innards	-1.444	-1.205	-0.633	-1.191	-1.175	-0.868	-1.322	-1.181	-0.745
Others	-1.468	-1.235	-0.613	-1.184	-1.167	-0.874	-1.321	-1.185	-0.747

Source: Processed from Susenas data 2014. BPS.

There are some interesting phenomena that can be brought out of the data are: *First,* viewed from the sign, the entire value of its own price elasticity of various types of meat in all periods and groups of households have a mark that is negative. This indicates that the increase in meat prices will be followed by a decrease in demand for meat. So this result shows conformity with the theory of demand in general where the price of the goods itself is negatively related to the demand.

Second, if viewed according to size, there are elastic and inelastic values for the price elasticity of various types of meat, but in general most of the values are elastic in certain periods and household groups. This shows that meat for most household groups in Indonesia is a luxury item and partly as a normal or staple goods item.

Third, if analyzed by type of meat, out of the nine types of meat analyzed, beef and broilers were the types of meat most sensitive to price changes. Meanwhile, for buffalo, goat, pork, it has a relatively lower value and the changes from the period 2005, 2008, 2011 and 2014 are also relatively small. This can happen because the segment or consumers of these three types of meat are from certain groups, whether related to culture, religion and belief, and taste. Even so, most of the low-income groups in both rural and urban areas have an elastic elasticity value (>1), which indicates that these three meats for low-income groups are luxury goods. Meanwhile for the middle and especially high income groups, most of them have elasticity values that are not elastic (<1), which means that buffalo, goat and pork are the main necessities.

Fourth, for local or native chicken, the elasticity value is different from the others. In the low-income household group, the elasticity value is higher than that of purebred chickens and cows. However, the high- income household group had the lowest elasticity value of all types of meat, both in rural areas, urban areas and nationally. Meanwhile, for rural and high-income households, compared to urban and high-income households, the elasticity value is lower. This phenomenon occurs because native chicken meat generally has its own consumers and its function is difficult to replace by other meats (Purnomo & Junaedi, 2019). Meanwhile, for some people, native chicken meat is believed to have magical powers and is often used in certain rituals such as salvation, harvest festivals and so on.

Fifth, if viewed according to the level of income, it shows that in general the higher the level of income, the lower the elasticity value. This means that the higher the income level, the less responsive it will be to changes in

prices. This result is in line with research of Utari (1996) which shows that in the low income class the price elasticity of animal food is relatively higher compared to the middle and high income classes.

Based on the results above, it appears that the impact of price changes on the demand for various types of meat is very large, especially in rural areas with low income levels. For this reason, one of the efforts to make meat needs by this household fulfilled and / or to increase the consumption of meat as a relatively more affordable source of animal protein is through price policies, especially production input policies, and increasing availability at the household level, especially for low-income households. Efforts like this must also be accompanied by counseling on nutrition so that people, especially in villages, can use their livestock products as a source of consumption of animal protein.

3.3.2 Cross Price Elasticity

The cross-price elasticity data for the demand for various types of meat in Indonesia, which resulted from this study briefly, informs that the value of cross price elasticity varies widely. From the data, sign or a sign of cross-price elasticity there is positive and negative, indicating a substitution and complementary relationship between the various types of meat such . Meanwhile, the overall size or value (2592 pairs of meat types) is less than 1 and some are 0, which means inelastic and less closely related and there is even no relationship between the various types of meat if the value is 0.

For more details, from these data, several interesting things appear as follows: *First,* in rural households of a total of 864 pairs of various types of meat, 483 pairs (55.90 percent) are positive, which means that between the various types of meat is substitution, 367 pairs (42.48 percent) has a negative relationship, which means that the various types of meat are complementary. Meanwhile, 14 couples (1.62 percent) had zero value, which means that the various types of meat did not influence each other.

For urban households, from a total of 864 pairs of various types of meat, 471 couples (54.52 percent) were positive, which means that between the various types of meat was substituted, 382 couples (44.21 percent) had a negative relationship, which means that between the various types of meat. it is complementary. The remaining 11 couples (1.27 percent) had zero values, which means that the various types of meat did not influence each other.

Second, if seen from the sign there is irregularity elasticity value over the period 2005-2014. The point may be that for 2005 the pairs of various types of meat commodities will have a negative sign but the following year will be positive or remain negative. However, seen from this sign, there is a distinctive pattern, which is symmetrical, meaning that for example, the commodity pair of chicken- beef has a negative sign, so the pair of commodity beef - chicken meat also has a negative sign. Meanwhile, the elasticity value has an asymmetric effect. For example, if the pair of commodity beef-meat with purebred chicken is 0.1001, then the cross-elasticity value of the pair of broiler-beef commodity pairs is not the same as 0.1001. This occurs both in rural, urban and national households for the overall level of income and for the entire period.

Third, when viewed per commodity pair, the beef-broodstock commodity pair has a relatively large elasticity value compared to other pairs with a positive sign which means that if the price of beef increases there is a tendency for households to replace it with purebred chicken. This happened consistently throughout the period 2005, 2008, 2011, and 2014 and occurred both in rural areas and in urban areas as well as by income group.

Fourth, for the commodity pair of beef-domestic chicken, the value of its elasticity is below that of the beef-chicken pair. However, the signs are mostly negative, only a few household groups and certain periods have positive signs. Relationship between the two indicates that in general when the price increase of domestic poultry will shortly demand for beef cattle. In other words, that the relationship between the beef-range hens are generally complementary or complementary.

4. Conclusions

Changes in household income and meat prices on the demand for various types of meat in Indonesia generally have a significant effect, especially for low-income groups in rural and urban areas. Likewise with wife's household and general educational level has an effect on demand for various types of meat even though its influence much insignificant.

Overall income elasticity shows a positive sign and the magnitude of the elasticity value is elastic for all types of meat in all groups of society and the entire period. While elasticity own prices are all different kinds of meat are negative and large elastic in all groups of households and income levels as well as the whole period. Meanwhile, the cross price elasticity between various types of meat is also inelastic and between commodity pairs has a symmetrical sign, but the magnitude of the value is not symmetrical for all household groups and all periods.

Although the level of meat consumption increases along with the improving economy, given the relatively low level of meat consumption, several policies that need to be taken to increase the level of meat consumption require efforts to improve the economic welfare of the community, policies to loosen the quantity or quota of meat so that its availability is at a level households or more regions of adequate community needs m and the necessity of socialization and education more intensively related to the importance of the consumption of meat.

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