Original Article

Investigating the Determinants of the Livestock Sub-sector in Aceh Province, Indonesia

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Abstract: This study analyzes the effect of livestock subsector farmers' exchange rate, inflation, and human development index on the livestock subsector economy in Aceh Province. This study uses multiple regression models with a time series period of 2012-2021 totaling 40 observations. The results showed that the exchange rate of livestock subsector farmers had a negative and significant effect on the economic growth rate of the livestock subsector in Aceh Province. In addition, inflation has a positive and significant effect on the economic growth rate of the livestock subsector in Aceh Province, while the human development index has no significant effect. Therefore, various policies are needed to overcome the inequality of livestock subsector farmers' welfare and improve the quality of human resources. This study is only able to describe Aceh Province in general. Still, it has yet to be able to capture inter-regional phenomena in Aceh Province to get a more reliable picture of the livestock subsector economy.

Keywords: exchange rate; inflation; human development index; livestock subsector farmers.

1. Introduction

Indonesia is one of the countries that has various good economic potentials. It is inseparable from the optimal utilization of natural and human resources, including the agricultural sector. The share provided by the agricultural sector to the Indonesian economy in general in 2021 was 13.36 percent. The share provided is obtained evenly, but 4 regions have an agricultural sector contribution above 30 percent. These regions include West Sulawesi Province (43.83 percent), Gorontalo Province (38.92 percent), Jambi Province (31.56 percent), and Aceh Province (30.06 percent) (Badan Pusat Statistik, 2020). One of the regions with high economic potential in the agricultural sector is Sumatra Island, where all regions in Sumatra Island are highly dependent on the agricultural sector. The high share of the agricultural sector in Sumatra Island is inseparable from the large number of agricultural sector workers in Sumatra Island. It is one of the government's hopes and desires to increase the agricultural sector's growth to reduce inequality on the island of Sumatra (Sari & Sartiyah, 2019).

Figure 1 shows that the amount of Gross Regional Domestic Product (GRDP) of the agriculture, forestry, and fisheries sectors in all provinces on the island of Sumatra continues to increase. In 2010, the highest GRDP value of the agriculture, forestry, and fisheries sector on the island of Sumatra was Riau

Province at IDR 91.15 trillion, while the region with the lowest GRDP of the Agriculture, Forestry and Fisheries Sector was Riau Islands Province at IDR 4.51 trillion. This composition persists until 2021 when Riau Province still has the highest GRDP in the agriculture, forestry, and fisheries sectors. Riau Islands Province is the province with the lowest GRDP. Aceh Province has the average GRDP of the agriculture, forestry, and fisheries sectors among all areas on the island of Sumatra. There is promising potential for animal husbandry because Aceh Province has various natural resources to support the improvement of the agriculture, forestry, and fisheries sectors.
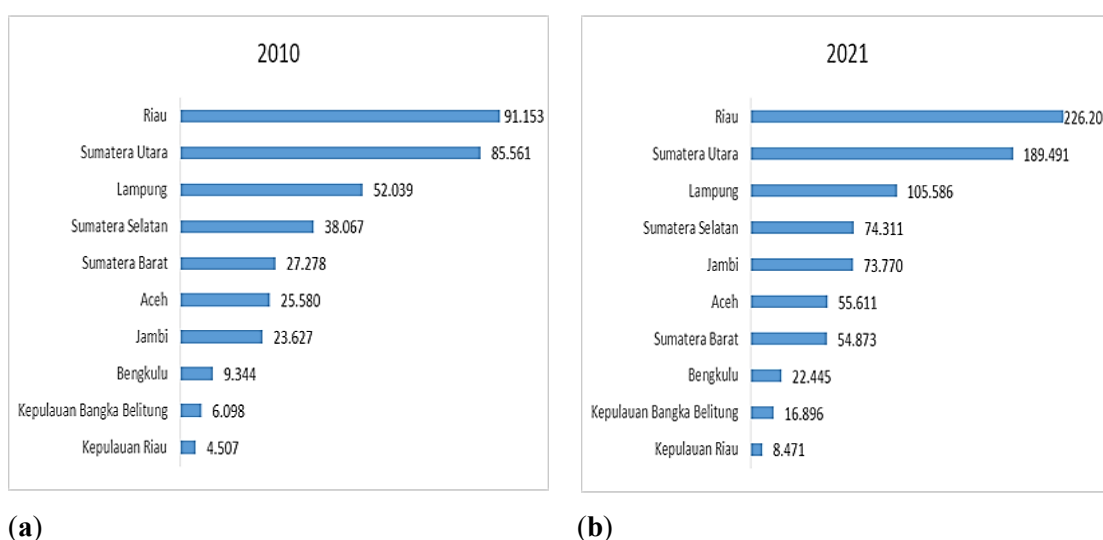

(a)   (b)

Figure 1. GRDP of Agriculture, Forestry, and Fisheries Sectors in Sumatera Island (a) for 2010 and (b) 2021 in Billion Rupiah

Good economic growth is economic growth that all elements of society can feel. Achieving good economic growth has different strategies in each region. This is because the potential that each region can utilize is different, including Aceh Province. With all its characteristics, Aceh Province has great potential for the agricultural sector, especially the livestock subsector (Safrida et al., 2022). It is inseparable from the various cultures and behaviors of the Acehnese people, who have a high level of consumption in the livestock sector (Handayani & Rasyid, 2012). The high level of consumption is reflected in the role of the livestock subsector in the GRDP of Aceh Province. The livestock subsector is the third largest sector capable of supporting the agriculture, plantation, and livestock sectors in Aceh Province. In 2010, the livestock subsector contributed 3.43 percent to the value of GRDP in Aceh Province. This contribution increased by 0.72 percent to 4.15 percent in 2021. Inflation in Aceh Province shows a very unstable trend and is even above the economic growth rate of the livestock subsector. The highest inflation occurred in 2014 at 8.09 percent, very high compared to the economic growth rate of the livestock subsector at 4.28 percent. Although the movement improved in the following period, in 2020, the economic growth rate of the livestock subsector (0.27) was lower than inflation (3.54 percent). It indicates that there were several periods when the income increase of livestock subsector farmers was a nominal increase only because it was eroded by inflation.

In addition to inflation, the human resource factor is important in optimizing a region's economic growth. Improving the quality of human resources will be able to encourage various innovations to be able to develop production. It will have an impact on the optimization of production that can be achieved so that it will be able to increase economic growth. Chisti (2018) found that one of the main factors to accelerate economic growth is to improve the quality of human resources. The linkage of the Farmer Exchange Rate of the livestock subsector is shown by the increase in farmer welfare, which is not higher than the increase in the livestock subsector's economic growth rate. It illustrates that the welfare of farmers has not been evenly distributed, so it can only be felt by some groups. The rate of increase in the Farmer Exchange Rate value of the livestock subsector shows that the rate of investment provision, which tends to be high, has not been able to produce a high level of welfare and evenly distributed to all elements of livestock subsector farmers in Aceh Province. Therefore, a study is needed to examine how much influence the farmer exchange rate of the

livestock subsector, inflation, and human development index (HDI) have on the economic growth rate of the livestock subsector in Aceh Province.

2. Literature Review

Mahendra (2017) explains the factors that determine the increase in per capita output in the long term, and there is an explanation that can explain the process of economic growth. Masloman (2018) states that economic growth is a long-term change that can slowly increase savings and population. Several economists have found various theories related to economic growth, including Adam Smith's economic growth theory, David Ricardo's economic growth, Harrod-Domar's economic growth, and Solow-Swan economic growth. One theory of economic growth that refers to the development of the quality of human resources is the Endogenous Theory (Hartoyo et al., 2018). The endogenous theory states that economic growth is not only limited to constant capital but there is a movement based on the quality of human resources.

Economic growth is the long-term increase a region generates to provide various goods and services to its population. Various things that affect this ability include technological progress, labor, and the ability to optimize capital goods owned. Economic growth can be seen from the Gross Regional Domestic Product (GRDP) compared to the GRDP in the same region in different periods. GRDP in Indonesia is generally divided into 17 categories, one of which is the category of agriculture, fisheries, and forestry. This is certainly inseparable from the role of farmers in an area to increase the subsector. In addition, the role of economic growth is also expected to encourage an increase in farmers' quality of life, which is illustrated empirically by the farmer exchange rate.

The farmer exchange rate is one of the indicators of the development of welfare felt by agricultural sector actors (Badan Perencanaan Pembangunan Nasional, 2013). The Farmer Exchange Rate is calculated based on comparing the index value of the price obtained by agricultural sector actors against the index of the price that farmers must pay. The farmer exchange rate is with a value above 100, and it can be stated that the price obtained by farmers is higher when compared to the price that farmers have to spend, so it can be concluded that farmers tend to be more prosperous and vice versa (Badan Pusat Statistik, 2020). Farmer Exchange Rate has several subsectors, including the food crop subsector, horticulture subsector, smallholder plantation crop subsector, fisheries subsector, and livestock subsector. This research focuses on developing the welfare level of livestock subsector farmers. This is because the low level of welfare of livestock subsector farmers is reflected in the high poverty rate in Aceh Province (Nansadiqa et al., 2019).

The farmer exchange rate has various benefits if used for various interests and policies related to the livestock subsector. The index obtained by livestock subsector farmers (It) can indicate fluctuations or movements in prices produced by livestock subsector farmers. This index can be a projection of income calculations in the livestock subsector. Furthermore, the price index that must be spent by livestock subsector farmers (Ib) is an approach to see the price movement of goods consumed by livestock subsector farmers and can describe the development of inflation in rural areas. The farmer exchange rate also aims to measure the exchangeability of products produced for sale with products needed by farmers for production and household consumption. It can illustrate the level of welfare of livestock subsector farmers. Economic growth is also inseparable from the influence that inflation can have. Healthy inflation is inflation that grows accompanied by increased income to encourage production growth to meet the population's needs. Fahrika & Roy (2020) state that inflation is the general price movement of goods and services in a region in a certain period. Inflation itself can describe people's purchasing power for goods and services, and inflation can also describe the real value of a currency. Inflation occurs due to factors such as the imbalance between aggregate demand and supply, resulting in general price movements. s

Fadila & Salim Purnamasari (2021) state that the characteristics of inflation are based on three characteristics: an increase in prices, general price increases, and continuous occurrence. The theory underlying inflation on the welfare level of livestock subsector farmers is demand-pull inflation, which states that inflation will occur when the amount of goods and services offered is less than the goods and services demanded. It increases income obtained by farmers only increasing nominally because the nominal value is eroded by inflation. Mauliana et al. (2020) state that excess liquidity can trigger changes in consumption patterns, resulting in changes to product distribution patterns and a continuous decline in currency values. Furthermore, there is the biggest influence, namely the main actors to be able to run the economy optimally, namely the human factor (Meutia et al., 2021). The quality factor of human resources is still well illustrated by the HDI (Abd Majid, 2018). The HDI indicator is calculated based on four constituent components: life expectancy, average years of schooling, expected years, and per capita expenditure. Ridha Maulana et al. (2020) stated that the constituent components can describe the quality of human resources and significantly increase economic growth. Economic development must be accompanied

by human resource development to suppress the negative impacts of economic growth (Fitriady et al., 2022).

Susanti & Sartiyah (2019) studied the role of livestock in Central Java Province and positively contributed to meeting the needs of both provincial and national levels. However, the contribution of livestock to GRDP and employment in Central Java Province is still relatively small. The research is supported by the findings in a study conducted by Aiba et al. (2018), which states that cattle inventory at the end of the year affects beef cattle business income, while the education and age of respondents have no statistical effect on livestock business income. Ibrahim et al. (2014) investigated the implementing policies that can support the increase in the output of the livestock subsector. The community generally increases the number of jobs to reduce the number of unemployed in a region. The policy can be an important investment for development in rural areas to increase income to the community with low operational costs but generates great benefits. Otiman et al. (2014) stated that the basic component of improving the rural economy is a policy that can support the development of the agricultural sector, including the livestock subsector.

Grimm (2012) examined how the inflation rate affects farmers' welfare only in the long term but has no significant effect in the short term. He found that inflation in Indonesia has long-term inflation characteristics that can stimulate macroeconomic structure conditions. However, the results of research conducted by Girik Allo et al. (2018) show that the short-term effect of dynamic price changes has a greater impact on farmers' welfare without seeing the impact on the economy, especially the livestock subsector. Mwaura et al. (2021) stated that the quality of human resources is an important aspect of increasing the livestock subsector's production. Human resource quality can be improved through job training programs and so on. Yang & Liu (2012) added that increasing agricultural sector specialization can significantly increase rural income. This can be achieved by determining the characteristics of farmers and formulating policies to encourage the economic organization of farmers so that the government is expected to be a catalyst for the development of the agricultural sector, especially the livestock subsector.

3. Materials and Methods

This study was conducted to examine the effect of the farmer exchange rate of the livestock subsector, inflation, and human development index on the economy of Aceh Province. The data structure used is time series data or time series data in the form of quarterly data during the 2012-2021 period in Aceh Province. The data used in this study are secondary data sourced from the Aceh Livestock Service Office and BPS – Statistics of Aceh Province. This research uses inferential analysis. Inferential analysis is an analytical method used with the aim of forecasting and drawing a conclusion related to various economic phenomena that occur. The inferential analysis in this study uses multiple regression analysis. The multiple linear regression model is the development of a simple linear regression model but has several independent variables studied. This model can directly identify the effect of several independent variables on the dependent variable. According to Susanti & Sartiyah (2019), the general equation of multiple regression analysis is as follows:

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + ... + \beta_n X_{nt} + \varepsilon_t \tag{1}$$

On the basis of general equation 1, the equation proposed in this study is as follows (Gujarati, 2021):

$$G_t = \alpha + \beta_1 NTP_{1t} + \beta_2 INF_{2t} + \beta_3 IPM_{3t} + \varepsilon_t \tag{2}$$

Where: G is economic growth, NTP is the farmer exchange rate of the livestock subsector, INF is inflation, IPM is the human development index, ε is residual, and t is the year.

4. Results and Discussion

The first analysis is descriptive analysis, which aims to see the variations and phenomena that occur based on the data. Table 1 describes the descriptive statistics of the variables used in this study. Table 1 shows that the number of observations used in this study is 40 observations. The data used also tends to be homogeneous, where the value of the highest standard deviation is only 2.64 points. The highest economic growth achieved by the livestock subsector was 5.90 percent, but the deepest contraction was 5.44 percent. During the study period, the average economic growth of the livestock subsector in Aceh Province was 0.77

percent. Price movements can generally increase the value of a commodity in real terms so that it tends to impact economic growth. The highest inflation in Aceh Province was 3.36 percent, while the highest deflation was 1.83 percent. This movement tends to be within healthy inflation, where the average inflation during the study period was 0.51 percent.

Table 1. Result of Descriptive Statistics

Variable(s)	N	Minimum	Maximum	Mean	Std. Dev.
Economic Growth	40	-5,44	5,9	0,77	2,35
Farmer Exchange Rate	40	90,71	103,74	96,98	2,64
Inflation	40	-1,83	3,36	0,51	1,03
Human Development Index	40	67,81	72,18	70,22	1,6

The welfare of livestock subsector farmers in Aceh Province can be described through the movement of the livestock subsector farmers' exchange rate. The average Farmer Exchange Rate of the livestock subsector is 96.98 points, which means that the welfare of livestock subsector farmers still does not meet the elements of a decent life. The Farmer Exchange Rate value of the smallest livestock subsector during the study period amounted to 90.71, while the Farmer Exchange Rate of the largest livestock subsector reached 103.74 points. The quality of human resources is the initial capital to increase the economic growth rate of the livestock subsector. This can be seen through the human development index achieved by a region. The human development index in Aceh Province has always increased every period. The average HDI in Aceh Province is 70.22 points. The smallest HDI achieved was 67.81, while the highest HDI achieved by Aceh Province was 72.18 points.

Furthermore, inferential analysis was carried out using multiple regression analysis. Multiple regression analysis was used in this study to analyze the amount of influence given by each independent variable on the dependent variable. The first step taken before proceeding with multiple regression analysis is an examination of the classical assumptions in the model formed in this study. The classical assumptions tested are normality, heteroscedasticity, multicollinearity, and autocorrelation assumptions. All classical assumptions made in this study have been met, so the model formed is the best linear unbiased estimator (BLUE). HDI is one of the capitals to support economic growth. Aceh Province is one of the provinces that has a consistently growing human development index. The human development index of Aceh Province in 2012 amounted to 68.30 points and continued to increase until 2021 to 72.18 points. This happened because of the Aceh Provincial government's seriousness in preparing human resources that support the economy in Aceh Province. After carrying out the classical assumption test, the next analysis is carried out on the multiple regression analysis models, namely as follows:

Table 2. Result of Multiple Regression

Variable(s)	Coefficient	Std. Error	t-Statistic	Prob.
Farmer Exchange Rate	-0.197705	0.096525	-2.048225	0.0479**
Inflation	0.457769	0.261449	1.750897	0.0885*
Human Development Index	0.64034	0.846106	0.756809	0.4541
C	19.58314	9.261027	2.114575	0.0415**
R-squared	0.379911	Prob(F-statistic)		0.038531
Adjusted R-squared	0.323798	Durbin-Watson stat		1.714385

Note: **,* is significant at 5 percent and 10 percent.

Table 2 shows that the Prob. (F-statistics) value is significant when compared to the alpha value of 5 percent. It indicates that the model is fit, i.e., all independent variables used in this study are jointly able to significantly influence the rate of economic growth of the livestock subsector in Aceh Province. The Farmer Exchange Rate of the livestock subsector, which represents the welfare of farmers in Aceh Province, negatively affects the economic growth of the livestock subsector. Every 1 percent decrease in the Farmer Exchange Rate of the livestock subsector can increase the economic growth of the livestock subsector by 0.1977 percent. This finding shows that the welfare of livestock subsector farmers has not been able to encourage balanced economic growth of the livestock subsector. The effect is not by the purchasing power theory, where the higher the welfare level of livestock subsector farmers will increase purchasing power, thereby increasing economic growth (Alfrida & Noor, 2017). Therefore, more measurable policies are

needed to increase the welfare level of livestock subsector farmers. It is in line with the research of Ringga et al. (2022), where most workers in Aceh Province are in the agricultural sector and are classified as poor people so that measurable policies can increase productivity to improve the welfare of livestock subsector farmers in general.

Inflation positively affects the economic growth of the livestock subsector in Aceh Province. Every 1 percent increase in inflation can increase the economic growth of the livestock subsector by 0.4578 percent. This finding corroborates the research results of Ringga et al. (2022) that inflation in Aceh Province is still at a good level, so inflation encourages increased productivity and indirectly encourages an increase in the gross value added of the livestock subsector in Aceh Province. HDI does not affect the economic growth rate of the livestock subsector in Aceh Province. This finding is in line with the results of research by Putri et al. (2023) that the inequality of the quality of human resources between regions in Aceh Province is a problem that causes the quality of human resources not to have a significant effect in general on the rate of economic growth of the livestock subsector in Aceh Province. It shows that the policy of developing the quality of human resources is still experiencing obstacles. This finding confirms that there are still various inequalities in the quality of human resources in Aceh Province, where only Aceh Province is above 80, which is 85.71 points. In comparison, other regions are still in the 60 to 79.99 points range. In addition, the quality of human resources is a factor that can be felt in the long term, so the influence given in the short term tends to be insignificant.

5. Conclusions

This study concludes that the farmer exchange rate of the livestock subsector significantly negatively influences the economic growth of the livestock subsector in Aceh Province, Indonesia. It indicates that the welfare of livestock subsector farmers in Aceh Province is still uneven. Livestock subsector farmers in Aceh Province tend to be poor, so they have not been able to play an active role individually in the economic growth of the livestock subsector in Aceh Province. Inflation positively affects the economic growth of the livestock subsector in Aceh Province. The effect indicates that inflation control in Aceh Province is very good because inflation can encourage increased productivity but is accompanied by maintaining prices so as not to decline, which impacts the economic growth of the livestock subsector in Aceh Province. HDI does not affect the economic growth of the livestock subsector in the province. Based on the results of the study, it is recommended that increasing the economic growth of the livestock subsector in Aceh Province can be done by paying attention to the factors used in this study, such as paying attention to the welfare level of livestock subsector farmers so that it can continue to increase so that it can support the share that can be given to the economic growth of the livestock subsector in Aceh Province. This can be done by facilitating access to raw production goods such as seeds, feed, etc. It aims to reduce the expenditure index for production purposes to increase the welfare level of livestock subsector farmers.

Furthermore, maintaining a good inflation rate can encourage increased production but not reduce market prices. Maintaining the value of inflation to always be at a productive level is certainly very influential on the economy and the welfare of farmers. Unreasonable inflation can encourage increased production, but consumers will experience a phase of difficulty in reaching these prices. In particular, the increase in aggregate prices impacts the decreasing purchasing power of livestock subsector farmers, reducing the welfare of livestock subsector farmers in Aceh Province. Evaluate policies to improve the quality of human resources more evenly. One of the things that can be done is to increase the quantity and quality of health and expand the ease of obtaining health and education facilities to encourage economic growth in the livestock subsector. Recommendations for further research should be carried out using a more detailed classification of livestock, such as the education of livestock subsector farmers, the number of livestock subsector farmers both in the lowlands and highlands, and the gender of livestock subsector farmers to describe the problems yet to be seen from efforts to improve the economy, especially the livestock subsector in Aceh Province.

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