**RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences**
ISSN 2226-1184 (Online) | Issue 3(147), March 2024

UDC 636

# FACTORS INFLUENCING FARMERS' DECISIONS IN MANAGING PIG'S BREEDING BUSINESSES IN LAMBA LEDA TIMUR DISTRICT OF MANGGARAI REGENCY, INDONESIA

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## ABSTRACT
A study has been conducted in Lamba Leda Timur District which aims to determine farmers' income and analyze the factors that influence farmers' decisions in running a pig farming business. The research method used is the survey method. The method of determining the example is carried out through two stages. First, the determination of sample villages uses the purposive sampling method and secondly the determination of sample farmers is carried out randomly proportionally. The results of the analysis show that the pig farming business run in Lamba Leda Timur District has provided cash income of Rp5.853.641/year for farmers. Based on the results of binary logistic regression analysis, it shows that capital factors ($X_1$), income ($X_2$), number of livestock ($X_3$), number of family dependents ($X_4$), and education level ($X_5$) have a real effect on farmers' decision making in running a pig farming business.

## KEY WORDS
Influence factors, farmer decision, pigs, farming business, binary logistic regression.

The pig farming business in East Nusa Tenggara (NTT) Province has become a part of community culture and has been carried out for quite a long time. Most of the people of NTT Province have businesses in the livestock and agricultural sectors which are a source of income for farming families. The NTT Province Central Statistics Agency (BPS) (2021) reported that the pig population in NTT in 2020 was 2,694,830 head and in 2021 it was 2,598,370 head with a growth rate of –0.35% per year. Based on this data, it can be seen that the pig population in NTT has decreased. This is due to the African Swine Fever (ASF) outbreak.

Basically, the pig farming business is very popular with the people of East Manggarai Regency because it has benefits as a source of animal protein and also as a source of cash for farmer households. Furthermore, the East Manggarai Regency Animal Husbandry Service reported that the pig population in East Lamba Leda District in 2019 was 2,831 head and in 2020 it was 1,627 head with a growth rate of -0.42% per year. The pig population in this region has also experienced a decline apart from the ASF outbreak and the sale of livestock when there is an urgent need, resulting in no funds being allocated to develop the business further.

East Lamba Leda District has a fairly large pig population so it is a pig farming development area in East Manggarai Regency, with most of the businesses carried out being smallholder farming (both as a main business and as a side business). Pigs are known as a type of livestock that can reproduce quickly, and are able to utilize almost all types of feed, including forage. The availability of sufficient forage that is easy to obtain in gardens or around community residential areas, such as banana stems, taro stems and tubers, makes it very easy for people to develop pig farming businesses.

Pigs also have a fast growth rate and high productivity, which makes people interested in keeping them because they don't have to wait a long time to sell them. However, pig farming in rural communities is often influenced by social and economic factors in the community.

Factors of socio-economic characteristics of farmers such as capital, income, number of livestock, number of family dependents and level of education have a very important role

in the development of pig rearing businesses. These breeder characteristics will later shape the breeder's mindset in handling the livestock cultivation process which can reflect the success of the livestock business.

## METHODS OF RESEARCH

This research was conducted in East Lamba Leda District, East Manggarai Regency, Eas Nusa Tenggara Province, Indonesia. Data collection was carried out for one month starting from March to April 2023. The type of data used was based on its nature, namely quantitative data and qualitative data and based on its source, namely primary data and secondary data. The data collection methods used are observation, interviews and documentation methods.

The determination of sample villages was carried out using a purposive sampling method, namely from 18 villages in East Lamba Leda District, 8 sample villages were selected with the criteria of having the largest population of livestock and pig breeders. The population in this study were all community members in East Lamba Leda District who were raising pigs and who were not raising pigs. The determination of sample breeders was carried out proportionally at random. The number of samples taken was 100 breeders spread across eight villages. The example farmers chosen are people who do not want to keep pigs and people who currently keep pigs with the consideration that they have had a pig farming business that has been running for 2 years.

The data analysis used in this research is income analysis and binary logistic regression analysis to determine the factors that influence farmers' decisions in running a pig farming business in East Lamba Leda District, East Manggarai Regency. According to Soekartawi's (2003) instructions, income is mathematically formulated as follows: π=TR –TC, where: π = income, TR = total revenue, and TC = total costs.

Furthermore, to find out the factors that influence farmers' decisions in running a pig farming business in Lamba Leda Timur District, East Manggarai Regency, binary logistic regression analysis was used. Binary logistic regression is a regression analysis method that describes the pattern of relationship between one response variable (dependent) and one or more predictor variables (independent). The response variable consists of two categories, namely "decision to raise pigs" and "decision not to raise pigs" which are denoted by y = 1 (raise pigs) and y= 0 (not raise pigs) where the response variable (y) follows the Bernoulli distribution for each observation single. The probability function for each observation is: $f(y) = \pi^{y}(1-\pi)^{1-y}$ dengan, y= 0,1.

Hosmer and Lemeshow (2000) explain that the logistic regression model is formed with the value P (Y = 1|x), as π(x), which is denoted as follows: $\pi(x)\frac{ekp\ (\mathrm{g(x)})}{1+ekp\,(g(x))}$. A function of π(x) is found using the logit transformation, namely g(x) which can be expressed as follows: $\mathrm{g(x)} = \ln\left[\frac{\pi(\mathrm{x})}{1-\pi(\mathrm{x})}\right] = \beta_0 + \beta_1$. Logistic regression also produces an odds ratio associated with the value of each predictor. The odds ratio of an event is defined as the probability of an outcome occurring divided by the probability of an event not occurring. In general, the odds ratio is a set of opportunities divided by other opportunities. The odds ratio for a predictor is defined as the relative amount by which the odds of an outcome increase (odds ratio >1) or decrease (odds ratio <1) when the value of the predictor variable increases by one unit.

Testing the feasibility of the model uses G statistics (Fadly, 2013) which is the maximum likelihood ratio to determine the role of predictor variables in the model simultaneously. The G-test statistic is defined as: G = -2ln $\left[\frac{l_o}{l_p}\right]$, where: lo = likelihood without predictor variable, and lp = likelihood with predictor variable.

This G statistic is used to test the following hypothesis: $H_0$: $\beta_1 = \beta_2 = ... = \beta_k = 0$; this means that the model is not significant (there is no influence of the identified factors ($X_i$) together on the credit repayment rate (Y). $H_1$: there is at least one $\beta_i \neq 0$, i = 1, 2, ..., p; meaning the model significant (there is an influence of the identified factors ($X_i$) together on the credit repayment rate (Y). The decision rule used is: If G > p (α) or the p value of the G

statistic < α = 0.10 then the decision is to reject $H_0$, meaning there is at least one predictor variable that has a real effect on the response variable.

The next step is to carry out a goodness of fit test by paying attention to the chi-square distribution value from Hosmer and Lemeshow (Shah and Barnwell, 2003). The hypothesis formulation in the goodness of fit test is formulated as follows: $H_0$ = There is no significant difference between the observed values and the predicted values by the model (model fit); $H_1$ = There is a significant difference between the observed value and the predicted value by the model (the model is not fit). The decision rule used is: If the p-value of the statistic is greater than the real level (α=0.10), then the decision is to accept $H_0$, which means the model is suitable for use.

Next, testing the significance of each predictor variable individually was carried out using the Wald test ($W_j$) with the following formula: where: = β estimator, = standard error estimator of β, and $\beta_i$ = regression coefficient of the ith predictor variable (i = 1, 2, 3..., k). The hypothesis being tested can be formulated as follows: $H_0 = \beta_i = 0$; meaning that there is no influence of the identified factors ($X_i$) on the decision to start pig farming (Y); and $H_1 = \beta_i \neq 0$; This means that there is an influence of the identified factors ($X_i$) on the decision to start pig farming (Y) where, i = 1, 2, …, 5.

The $W_j$ statistics follow the normal distribution (Z). The decision rule used to accept or reject the hypothesis is: if the $W_j > Z_{\alpha/2}$ or the p-value of the $W_j$ statistic is smaller than the real level (α = 0.10), then the decision is to reject $H_0$. This means that the i predictor variable has a real/significant effect on the response variable.

## RESULTS AND DISCUSSION

East Lamba Leda District includes 18 villages/sub-districts. The center of East Lamba Leda District is in Lawir, Golo Lero Village with an area of 108.58 Km2. The population in East Lamba Leda District is 32,173 people. The climate in East Lamba Leda District is tropical with the flora mostly consisting of forests and bushes, while the fauna found in East Lamba Leda District include cows, buffalo, horses, goats, pigs and other animals such as wild boars, monkeys, etc. The most abundant agricultural income is coffee, rice and cloves, while the most abundant types of livestock are goats and pigs.

The results of the research show that 91% of breeders in East Lamba Leda District are male and 9% are female. The average age of breeders is 46.5 years (CV 24%) of which 96% are of productive age and 4% are of non-productive age. The central statistics agency has grouped the number of family dependents into three groups, namely small family dependents of 1–3 people, medium family dependents of 4–6 people, and large family dependents of >6 people (Nurlaila, 2018). The average dependent of farmer families is 4.08 (KV= 31%). Data shows that 32% of farmers have family dependents of <3 people and 68% have dependents of >3 people.

Sanga (2022) states that the level of education greatly influences a person's thinking, especially in terms of making decisions and management arrangements in managing a business. The majority of farmers and breeders in East Lamba Leda District are elementary school, namely 53%, middle school at 13%, high school at 16%, and tertiary education at 17% and those in the no school category are 1%. The main occupation of the people in Lamba Leda Timur District whose livelihood is farmers is 85%, civil servants 7%, entrepreneurs 2%, regional honorary workers (THD) 5%, and entrepreneurs 1%. Side jobs are dominated by livestock breeders, namely 62% and farmers, 38%.

Weol et al., (2014) stated that income is the total real income of all household members which is contributed to meet collective or individual needs in the household. In Lamba Leda Timur District, 73% of people have a monthly income of <1 million and 27% have an income of >1 million. In business decisions, 75% decided "yes" to run a pig farming business and 25% decided "no" to run a pig farming business.

Farmers with less than 5 years of business experience accounted for 56%, 32% for 5–10 years, and 12% for more than 10 years. This means that pig farmers in East Lamba Leda District do not have sufficient experience in raising pigs, so it is hoped that based on the

results obtained by farmers, they will be able to encourage them to continue running their business.

The aim of raising pigs as a source of income is 92%, as savings is 6.7%, and for customary purposes is 1.3%. This means that the pig farming business can be relied on as a source of income for farmers.

Ownership of pigs, the types of pigs kept by farmers are duroc pigs and local pigs. The average number of pigs owned by each farmer is 0.65 ST. Total pig ownership is 50 ST. Of the total, there are 6 STs which are baby pigs, 20.8 STs are young pigs, and 23.2 STs are adult pigs. According to the classification based on gender, there are 24.4 ST which are male livestock and 25.6 ST are female livestock.

Feed, the type of feed given is local feed. Sources of animal feed are obtained from their own gardens. The average cost incurred for purchasing feed is IDR 2,657/day.

Cages, the types of cages made by breeders consist of 2 types, namely emergency cages and semi-permanent cages with a percentage of 84% being emergency cages and 16% being semi-permanent cages. Health, the types of diseases that generally attack pigs are diarrhea and skin diseases, namely scabies. Livestock treatment is carried out by administering drugs that are not routine. Pig farmers in the research area mostly use traditional medicine which consists of plants. The average cost used for livestock treatment is IDR 20,000/year.

Labor, all breeders use labor within the family and the main workforce is adult women and is assisted by adult men and children, with work allocations namely looking for feed, preparing feed, feeding and washing cages. The average length of time spent working in one year is 157.10 HK (hours/year).

The investment costs incurred consist of cage costs and equipment. The research results show that the investment costs incurred by breeders for procuring cages is IDR 674,666 and for procuring equipment IDR 264,866. Thus the total investment for the pig farming business is IDR 938,932.

Operational costs are divided into two, namely fixed costs and variable costs. The average fixed costs incurred by farmers are IDR 88,622-/year, which is the cost of depreciation of cages and equipment, while the average variable costs incurred in the pig production process is IDR 3,292,805. Thus the total operational costs incurred are IDR 3,381,427.

Revenue from the pig farming business is obtained from the sale of baby, young and adult pigs. The average income of farmers from the sale of pigs is IDR 10,094,000/year. The proceeds from the sale of pigs are used to meet the economic needs of the farmer's household. This is in line with the opinion of (Sura, 2023).

Based on the results of the cost and revenue analysis, it can be seen that the average income received by breeders in one business year is IDR 6,712,573/year. Based on these results, it can be concluded that the pig farming business in East Lamba Leda District is a source of cash for farmers.

The factors identified as influencing pig farmers' decision making are capital (X1), income (X2), number of livestock (X3), number of family dependents (X4), and level of education (X5). The response variable for decision making in running a pig farming business (Y) is (0) deciding "not" to run a pig farming business and (1) deciding "yes" to running a pig farming business. The results of the analysis show that the G test in the binary logistic regression model is $\chi2=64.423$ with a p value=0.000. This shows that the p value (0.000) < $\alpha$ = 0.10, so it is sufficient proof to reject H0 or accept H1. This means that the variations that occur in relation to decision making (yes or no) are jointly influenced by the five factors identified. Furthermore, the Nagelkerke R2 value obtained was 0.703. This indicates that the variation or diversity of decisions (yes or no) can be explained by the factors identified in the model amounting to 70.30% while the remaining 29.7% can be explained by factors not involved in the model. Factors these include health, feed, interest and support from the government.

The results of the goodness of fit test or suitability of the model using the Hosmer-Lemeshow test show that the value of $\chi2= 4.049$ with a value of p = 0.853. P value = 0.853 <

α =0.10; which means that H0 is accepted, which means the logistic regression model is fit. In other words, this model can be used to predict the farmer's decision whether or not to start a pig farming business. Overall, the model obtained in this research (predicted model) can explain the actual situation by 75%. The results of data processing to determine the influence of the independent variables identified as having a partial influence or not on decision making were carried out by a Wald test as shown in Table 1.

Table 1 – Wald test analysis results

| Variables | B | S.E. | Wald | df | Sig. | Odd Ratio |
|---|---|---|---|---|---|---|
| Capital | -1.791 | .539 | 11.021 | 1 | .001 | .167 |
| Income | -.895 | .307 | 8.473 | 1 | .004 | .409 |
| Number of livestock | .853 | .382 | 4.985 | 1 | .026 | 2.346 |
| Number of family members | -1.218 | .364 | 11.212 | 1 | .001 | .296 |
| Education | 1.156 | .356 | 10.532 | 1 | .001 | 3.178 |

*Source: Primary data 2023 (processed).*

The results of the analysis show that of the 5 factors identified and thought to influence decision making in running a pig farming business at the level of α = 0.10, it turns out that all of these factors have a very real influence on decision making in running a pig farming business except for the number of livestock which only has a significant effect.

The p value for the capital variable is 0.001 or smaller than α = 0.10, so it can be said that the capital variable has a very real influence on decision making in running a pig farming business. The odds ratio value for the capital factor obtained is 0.167. This shows that breeders who have business capital one level higher have a smaller chance of making a decision to raise pigs compared to breeders who have capital one level lower. This is in accordance with the opinion of Ritan (2023) who said that farmers who have greater capital will decide to pursue other endeavors rather than deciding to raise pigs.

The results of the logistic analysis show that the income variable has a very significant effect on decision making with a probability of p = 0.004 and smaller than α = 0.10. The odds ratio value for the income factor obtained is 0.407. This shows that breeders who have an income one level higher have a smaller chance of deciding to raise pigs compared to breeders who have an income one level lower (ceteris paribus). This is contrary to Longa (2018) in his research on cattle farming businesses where it was found that the higher the income earned by cattle breeders, the more interested they would be in running the business compared to breeders whose income was one level lower.

The p value is 0.026 or smaller than α = 0.10, so it can be said that the variable number of livestock ownership has a real influence on decision making in running a pig farming business. The odds ratio value obtained for the variable number of livestock ownership is 2.346. This shows that the opportunity for breeders who have a livestock number one level higher has a chance of 2.346 times greater than that of a breeder who has a livestock number one level lower. This is also in accordance with Soekartawi (1995), livestock business income is greatly influenced by the number of livestock sold by the breeder himself, so that the greater the number of livestock, the higher the net income obtained.

Situngkir (2007), family responsibilities are one of the main reasons for household members to participate in helping the head of the household decide to work to earn an income. The results of the analysis show that the p value for the variable number of family dependents is 0.001 or smaller than α = 0.10, so it can be said that the variable number of family dependents has a very real influence on decision making in running a pig farming business.

The odds ratio value obtained was 0.296. This shows that breeders who have one level more family dependents have a chance of 0.296 times smaller than breeders who have one level lower number of family dependents, assuming all variables remain constant. This is in accordance with the opinion of Dewantari (2017) who states that a larger number of family dependents is an obstacle in business development efforts. This is because the business

results obtained are almost always used to meet household needs, so there is no opportunity to allocate the funds to develop the business further.

The p value for the education level variable is 0.001 or smaller than α = 0.10, so it can be said that this variable has a real influence on decision making in running a pig farming business. The odds ratio value obtained for the education level variable is 3.178. This shows that breeders with an education level one level higher have a 3.178 times greater chance than breeders with an education level one level lower. This is in accordance with the opinion of Auwiyah (2020) that the higher a person's education, the more developed their thinking insight and the better the decisions they make in determining more productive ways of farming or raising livestock.

## CONCLUSION

Based on the results of the analysis and discussion that has been carried out, it is concluded that the pig farming business carried out in East Lamba Leda District provides cash income for farmers of IDR 6,712,573/year. Factors that have a very real influence on farmers' decision making in running a pig farming business are capital, income, number of livestock kept, number of family members, and the farmer's education level.

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