

Income Analysis and Factors Affecting Pig Farmer Income in East Flores Regency

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Abstract. Livestock has potential to be developed in East Flores Regency because it supporting the economy of the farmer's household and used in various traditional rituals. This study aims to analyze the income and factors that affect the income of pig farmers. The study was conducted from September to November 2021. The research location using the multistage sampling method, the determination of the sub-districts and villages that have the highest pig population in East Flores Regency. A sample of 120 respondents was taken purposively that breeding has at least 3 broods, fattening has 5 pigs, and a combination, has sold livestock in the last 1 year and experience raising more than 1 year. Analysis of the data using descriptive statistics while determining the factors that affect income using multiple linear regression. The results of the study is the highest average income was in the combination which was IDR13,862,908/breeder/year. The positive influence factor is the number of pig ownership and the negative influence is the dummy breeding system. This type of business combination is recommended because it provides the highest income and from a socio-cultural perspective that is accepted by the community.

Keywords: pigs, income, breeding, fattening, combination

1. Introduction

Pigs are known as one type of livestock that has great potential to be developed because it is more efficient in converting food ingredients into meat compared to other livestock, the feed is easy to obtain, namely from agricultural waste and household waste as well as commercial feed that is widely available, its growth is relatively fast, and pigs are prolific livestock capable of producing 8-14 heads per birth [1]. From an economic point of view, pigs can be useful as a source of income, produce meat, and their manure can be used as fertilizer [2]. From a socio-cultural perspective, pigs are always used in various traditional ritual activities in East Flores Regency, so that they are still sustainable to this day.

East Nusa Tenggara Province is the largest pig producer nationally with 2,432,501 heads (27.26%), followed by North Sumatra Province with 1,274,904 heads (14.28%) and Bali Province with 850,870 heads (9.53%) [3]. The high population of pigs in East Nusa Tenggara is because pigs are used as sacrificial animals in traditional ceremonies, dowry/belis, and as the main source of meat

in various events [4] . East Flores Regency is one of the regencies in East Nusa Tenggara with a population of pigs in 2015 as many as 80,765 heads, increasing to 87,217 in 2019 [5] . The increase in the population of pigs in the last five years can be an indicator that the demand for pig products is always increasing. With the increasing demand for pork, making pig farming as a source of income for the community [6] .

There are three types of pig farming in rural communities, namely breeding, fattening, and combination [7] . Pig farming in East Flores Regency generally carries out business with extensive, semi-intensive, and intensive rearing patterns. In addition, the maintenance of pigs is generally still done traditionally [7,8] so that breeders don't pay attention economic aspects, especially the use of production inputs such as feed, health and livestock sanitation, which have an impact on the income obtained to be less than optimal .

The success of a pig farming business can generally be seen from the losses and profits obtained, so that income has become the main goal in any pig farming system. Although there are many obstacles in the development of pigs in East Flores such as traditional maintenance and limited capital and resources of farmers, the increasing demand for pork, which is supported by many traditional ritual activities, provides opportunities for farmers to increase their income. Previous research shows that the increase in farmer's income is not only influenced by the price of production inputs but is also influenced by socio-economic characteristics [9] .

This study aims to analyze the factors that influence the income of pig farmers in East Flores Regency, East Nusa Tenggara, Indonesia. The identification of these factors can provide recommendations for pig farmers, livestock managers, and government policies to increase the income of pig farmers.

2. Materials and Methods

2.1. Research locations and samples

The research was conducted from September to November 2021 , using the multi - *stage sampling method* as a sampling technique. There are 3 sub-districts (Wulang Gitang, East Adonara, and West Solor) which have the largest pig population in East Flores Regency. Two villages were selected from each sub-district *purposively* so that the total sample villages were six villages, namely Boru Village, Hokeng Jaya Village, Waiwerang Village, Karing Lamalouk Village, Ongalereng Village and Nuhallolon Village . Furthermore, 20 farmers were selected from each sample village so that the total sample used is 120 farmers with the criteria for the type of breeding business to have at least 3 brooders, the type of fattening business to have 5 pigs, and the type of combination business to have parents and males, and have sold livestock in 1 year. and experience raising more than 1 year .

2.2. Data collection

Data was collected through interview techniques guided by questionnaires to collect information from farmers. The data collected includes the characteristics of the respondents, the scale of pig ownership, production and reproduction parameters of pigs (weaning age, litter size, length of rearing, selling age of pigs, and mortality), as well as economic variables such as production costs and revenues. obtained from pig farming.

2.3. Data analysis

Data analysis was carried out descriptively and quantitatively. Descriptive analysis is used to explain the characteristics of respondents. Quantitative analysis is used to analyze the income of farmers and

determine the socio-economic factors that affect the income of farmers by using multiple linear regression models. The equation model can be written as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + D_1 + \beta_3 X_3 + D_2 + D_3 + \beta_4 X_4 + \mu$$

where :

Y	=	Pig farmer income (IDR/farmer/year)
A	=	Intercept
β_1	=	regression coefficient
...		
β_4		
X_1	=	Number of pig holdings (AU)
X_2	=	Education level (score)
1	=	None
2	=	elementary school
3	=	junior high school
4	=	high school
5	=	Academy
6	=	College
X_3	=	Breeding pig breeds (score)
1	=	Local pork
2	=	Local and imported pork
3	=	Imported pork
X_4	=	Number of family members (person)
D_1	=	Dummy breeding system
1	=	Breeding
0	=	Others (fattening/combination)
D_2	=	fattening system dummy
1	=	Fattening
0	=	Others (breeding/combination)
D_3	=	dummy maintenance pattern
1	=	Intensive
0	=	Semi intensive
μ	=	stochastic disturbance term

3. Results and Discussion

3.1. Farmer characteristics and livestock ownership

Table 1 provides an overview of the characteristics of respondents in the three types of pig breeding, fattening, and combination businesses. It can be seen that most of the breeders from the three types of businesses fall into the category of productive age (15-60 years), so they still have the ability to develop potential and adopt technology in running their business. At a productive age, it will make it easier for someone to accept and apply new ideas in aspects of life, especially in meeting economic needs [10] . The education level of the dominant breeder is equivalent to that of elementary school . This shows that the education level of pig farmers in East Flores Regency is still relatively low. Formal educational background is one of the supporting factors to understand the pattern of development and management of pig farming [11] .

The experience of the breeder in carrying out the pig farming business from the three types of breeding, fattening, and combination businesses, respectively, was 11.53 ± 5.07 , 10.34 ± 5.16 , and 11.25 ± 4.10 . Overall , the respondents have experience in raising pigs for a long time so that they are able to face problems with their solutions in developing their business. The experience factor is largely determined by the length of the respondent's effort in running a pig farming business [12] . The number of family members is one of the factors that can affect the pig farming business, the more the

number of family members , the availability of labor is also quite available [13] . The results showed that the range of the number of family members was 3-8 people, with the averages for each type of nursery, fattening, and combination business respectively 5.03 ± 1.42 , 4.91 ± 1.62 , and 5.28 ± 1.17 . Some pig farmers work as farmers and others work outside of farming specifically as if I'm a civil servant and self-employed .

The pig farming system in East Flores Regency is semi-intensive and intensive. The extensive rearing system was not carried out because there had been a recommendation from the government that all pigs that were kept should be kept in cages. The negative impact of the extensive rearing system is that livestock roam the streets, damage crops, pollute the environment with feces and urine and have an impact on health, thereby disturbing the peace and order of local residents [14] . The type of business combination is the type of business that is most in demand (Table 1) . The reason for choosing this type of business is that farmers can adjust to the availability of feed. If farmers have difficulty getting feed, especially during the dry season, they reduce the number of livestock they keep and only raise broods and males with the aim of selling weaned piglets. On the other hand, during the rainy season where the availability of feed is abundant, in addition to maintaining the mother and the male with the aim of selling the offspring, the farmer also raises the piglets from the mother and the male.

Table 1 . Characteristics of Pig Farmers in East Flores District

Component	Nursery (n= 26)		fattening (n= 23)		Combination (n=71)	
	Fr	%	Fr	%	Fr	%
Age (years)						
Productive 15 – 60	23	88.46	19	82.61	64	90.14
Non productive	3	11.54	4	17.39	7	9.86
Education Level						
Elementary school	9	34.62	8	34.78	31	43.66
Junior High School	4	15.38	4	17.39	21	29.58
Senior High School	8	30.77	7	30.44	10	14.10
College	5	19.23	4	17.39	9	12.66
Business experience						
10 years	2	7.69	4	17.39	5	7.04
>10 years	24	92.31	19	82.61	66	92.96
Work						
Farmer	13	50.00	16	69.56	55	77.46
civil servant	6	23.08	4	17.40	10	14.09
Self-employed	7	26.92	3	13.04	6	8.45
Maintenance system						
Semi intensive	14	53.85	10	43.48	63	88.70
Intensive	12	46.15	13	56.52	8	11.27
Type of business	26	21.66	23	19.17	71	59.17
Pig breed						
Local	2	7.69	3	13.04	4	5.63
Landrace	6	23.08	5	21.73	7	9.86
Duroc	5	19.23	5	21.73	10	14.08
Local + import	13	50.00	10	43.50	50	70.43

The pig breeds kept in East Flores Regency are local pigs, *landrace* (white with hanging ears), *duroc* (brown red), and crosses between the three breeds of pigs. Pigs that are mostly kept are cross breeds of pigs. This is because according to respondents, body weight gain is faster and has a larger Litter Size when compared to local pigs. The productivity of local pigs is much lower than that of imported pigs [15] . Some pig farmers who keep local pig breeds have reasons because there are many socio-cultural activities, especially certain customs that require the use of local pigs.

The average ownership of the most pigs was the combination type of business, namely 13.54 tails or 2.72 UT , followed by the breeding business type as many as 12.57 tails or 2.19 UT, and the type of fattening business as many as 6.96 tails or 2.01 UT (Table 2) . With this scale of ownership, farmers can sell free- weaned piglets with an age range of 2-3,5 months in the type of nursery business. The sale of weaned piglets can increase income and limit pig ownership. The purpose of limiting the number of pigs owned is so that the time and maintenance costs are not too high. In the fattening business, farmers can sell easy pigs with an age range of 6-8 months, and adult pigs over 8 months old. In a combination type of business, farmers can sell weaned piglets when they need cash, and also raise their own pigs from their breeding business . People's pig farmers generally raise pigs as a side business to increase family income with a small business scale. Pig farmers do not want to increase the scale of ownership for reasons of capital and are afraid of the high cost of animal feed [16] .

Table 2 . Composition i of pig ownership in East Flores Regency

Type	Nursery (n= 26)		fattening (n= 23)		Combination (n=71)	
	Tail	UT	Tail	UT	Tail	UT
Parent/adult female	2.46	0.98	1.21	0.48	2.50	1
Male/adult male	0.69	0.27	1.95	0.78	1.29	0.51
young male			2.13	0.42	1.26	0.25
young female			1.65	0.33	1.22	0.24
Male piglets	4.50	0.45			3.67	0.36
Female piglets	4.92	0.49			3.60	0.36
Total	12.57	2.19	6.94	2.01	13.54	2.72

Note: 1 adult pig (> 1 year) = 0.40 UT
1 young pig (½– 1 year) = 0.20 UT
1 piglets (< years) = 0.10 UT

3.2 Production parameters and analysis of pig farming income

The average age of weaning pigs in East Flores Regency in the types of breeding and combination businesses was not much different, namely 6.26 ± 1.68 and 6.00 ± 1.53 weeks, respectively. The purpose of weaning is to provide an opportunity for the mother to be bred again when the time of lust has arrived. Generally, piglets are weaned at the age of 2 to 6 weeks because after 6 weeks from the time of delivery the mother's milk production has begun to decline so that if weaning is not carried out, it is feared that the piglets will lack milk [17] . In addition, weaning time is too long causing a decrease in body weight of the parent, extending the time to re-breed the parent so that the number of offspring produced per parent per year will be reduced.

In the type of nursery business the average *Litter Size* of the parent is 9.65 ± 1.29 , while in the combination business it is 8.95 ± 1.12 . It can be seen that the mean of LS in the type of nursery business is greater than the type of combination business. This is because in the type of breeding business, breeders pay more attention to parent and male management, detection of lust, and the timeliness of males and broodstock mating. Meanwhile, in the type of business combination, the focus of breeders in managing their business has been divided, namely rearing management and management of broodstock and stud. Differences in *Litter Size* of sows are caused by several things, such as the breed of sows and males used, the level of lust observation, and the accuracy of mating or AI [18] .

average selling age of livestock in the type of nursery business is not much different from the type of combination business that sells weaning piglets, namely 2.84 ± 0.39 and 2.88 ± 0.51 months. In this type of fattening business, the average length of maintenance is 8.84 ± 1.59 months with an average selling age of 12.21 ± 1.41 months. In general, the ideal length of maintenance is 4 months, because after 4 months the profit will decrease and vice versa the cost of feed will be higher [19] . The length of maintenance in this type of fattening business is quite long. This is because farmers generally use feed derived from agricultural waste and household waste whose nutritional value is not known for certain which causes body weight growth to be longer. Pigs that are given improvised feed, namely from kitchen waste, whose nutritional value is not considered, cannot guarantee the nutritional elements that enter and are utilized in the body of the livestock, resulting in poor performance in both production and reproduction [20] .

pig mortality from the three types of business is piglets. The high mortality rate was caused by diarrheal disease, low birth weight, being crushed by the mother herself, and being trapped in the cage fence. The causes of mortality in young and adult pigs are diseases such as diarrhea, shortness of breath, decreased appetite, and disease outbreaks such as *African Swine Fever* (ASF), and *hog cholera* . High mortality in pigs is also influenced by the system of maintenance carried out, the feed given, and the lack of attention of farmers to the livestock being kept [21] .

Table 3. Parameters of pig production in East Flores District

Component	Breeding	Fattening	Combination
Weaning age (weeks)	6.26 ± 1.68		6.00 ± 1.53
Litter Size (tail)	9.65 ± 1.29		8.95 ± 1.12
Maintenance time (months)		8.84 ± 1.59	
Selling age of piglets (months)	2.84 ± 0.39		2.88 ± 0.51
Selling age of young pigs (months)		5.78 ± 1.24	6.32 ± 1.27
Selling age of adult pigs (months)		12.21 ± 1.41	12.59 ± 2.12
Mortality (%)			
Piglets	15.03 ± 4.14		14.70 ± 3.03
Young and adult pigs	10.57 ± 16.59	9.79 ± 10.10	11.80 ± 9.74

Overall, judging from the parameters of production and reproduction of pigs in East Flores Regency , it has met the ideal standard . The reproductive performance of pigs in the nursery in Kebek and Penginyahan, for LS (*Litter size*), weaning age, and the average number of weaned chicks were 9.50 ± 1.65 and 10.86 ± 1.68 heads, 29, respectively. 00 ± 2.11 and 29.00 ± 1.91 days, and 7.90 ± 1.45 and 9.43 ± 1.99 tails [19] .

Table 1. Cost, Revenue, and Income of pig farming by type of business			
Information	Average (IDR/year)		
	Breeding	Fattening	Combination
(A) Revenue			
Livestock sales			
Piglets are weaned	22,273,076		8,378,169
Young pig		5,630,435	4,564,789
Adult Pig		22,369,565	13,232,394
Total Revenue (A)	22,273,076	28,000,000	26,175,352
(B) Operational Cost			
Variable Cost			
Feed Cost	7,360,000	8,372,000	8,310,479
Stud Rental Fee	611,538		581,690
Cost of bakalan		4,110,870	
Labor costs	3,299,039	3,212,351	3,420,275
Total Variable Cost	11,270,577	15,695,221	12,312,444
Fixed cost			
Cage Shrinking	273,564	276,041	216,254
Equipment Depreciation	253,141	195,145	241,972
Total Fixed Cost	526,705	471,186	458,226
Total Operating Cost (B)	11,797,282	16,166,407	12,770,662
Income			
Income/breeder/yr	10,475,794	11833.593	13,862,908

Cost is a sacrifice that must be incurred by farmers in raising pigs [22, 23]. Operational costs are costs used to carry out a pig farming business which is used up in one production period. Operational costs include *fixed costs* and *variable costs* [24]. The variable costs consist of the cost of feed, the cost of procuring seeds/pilots for the type of fattening business, the cost of renting a stud for the type of breeding and combination business, the cost of labor, and the cost of animal health. Based on the results of interviews with farmers at the research site, since the ASF (*African Swine fever*) outbreak that attacked pigs in East Flores at the end of 2019, there has been a program from the local government as an effort and preventive measure that carries out free vaccination and treatment activities for pigs. every six months so that in this study there is no component of livestock health costs because it has been borne by the government. Based on the data in Table 4 , the largest portion of the variable cost components of the three types of businesses is feed costs . The cost of feed has the largest percentage of the total production cost, which is above 50% of the total production cost [25] .

Revenue from pig farming in East Flores Regency is obtained from the sale of pigs for 1 year. In the type of nursery business, farmers sell weaned piglets at the age of 2-3,5 months with an average selling price of IDR 880,769±97,032. In this type of fattening business, farmers sell their livestock to two age groups, namely young and adult pigs. The average price of young pigs aged 6-8 is IDR 2,782,609±253,435. Adult pigs over 8 months old are IDR 5,260,870 ±688,700. In this type of business combination, farmers sell their livestock to three age groups, namely weaning piglets with an average price of IDR 849,296±107,069, young pigs at an average price of IDR 2,807,042±380,723, and adult pigs with an average price of IDR 5,112,676±586,742 per head.

Income is the difference between revenues and costs incurred in the production process [10] . Profits are obtained by subtracting the cost of production from the revenue generated from the sale of

pigs [26] . The results of the study revealed that the average income of pigs from the three types of business was highest in the type of combination business of IDR 13,862,908, followed by the type of fattening business of IDR 11,833,593, and the type of breeding business of IDR 10,475,794. High and low income is highly dependent on the amount of revenue and the amount of costs incurred in the production process [27] . Therefore, in the future, this business must be maintained because economically it can provide income for farmers.

3.3. Factors Affecting the Income of Bali Cattle Farmers

Multiple linear regression analysis using SPSS software version 16.0 . The classic assumption test, namely normality, shows that the data is normally distributed, which is indicated by the Jarque Bera prob value (5.9385) > 0.05 so that it is said that the residue is normally distributed. Multikolinearity test with Deviation from Linearity sign > 0.05, heteroscedasticity test with the Glejser model showed that the value of Obs * R square (15.47) > 0.05 , and Serial Correlation LM Test model, the value (2.28) > 0.05 indicates that the data meets classic assumption. The adjusted R-square value was 0.273 (Table 5) . This value means the independent variables, including the number of pigs , the level of formal education, breed of pigs raised, number of family members, the dummy system of fattening, dummy system of fattening and dummy pattern of rearing had an effect of were 27.30 %. Other factors are influenced by other independent variables that are not included in the estimation model. The independent variables that have a positive effect on incomes is pig ownership (p < 0.01) and have a negative effect is the dummy nursery (P < 0.01).

Table 5. Multiple linear regression for the factors affecting farmer's income

Independent variable	Coefficient	Std. Error	t-Statistic	Prob
Constanta	15.549	0.334	46,527	0.000
Number of pig ownership (X1)	0.873	0.185	4.720***	0.000
Education (years) (X2)	-0.065	0.094	- 0.688	0.493
Breed pig breed (score) (X3)	0.175	0.131	1.343	0.182
Number of family members (person) (X4)	0.011	0.143	- 0.074	0.941
Dummy nursery system (D1)	- 0.376	0.101	-3.739***	0.000
Fattening system (D2)	- 0.052	0.112	- 0.463	0.644
Dummy system maintenance (D3)	0.072	0.093	0.778	0.438
R-squared	0.360			
Adjusted R-squared	0.273			
F-statistics	7.398			
Prob(F-statistic)	0.000			

Note: *** = level significantly 0.01 (P<0.01)

The number of pig raised by farmers affects the income of the farmers. Farmers with fattening systems and combinations are preferred by breeders to increase income. On the other hand, breeders must maintain a breeding system because pigs are needed for traditional rituals that require the existence of pigs.

4. Conclusions

Pig Farming Business in East Flores Regency can provide *income generation* , the average income earned by breeders based on the type of breeding, fattening, and combination business in a row is Rp. , IDR **11,833,593** , and IDR **13,862,908** /breeder/year . The factors that affect the farmers' income are the number of pig ownership and breeding dummy. This type of combination business is

recommended to be run because economically it provides the highest income from a socio-cultural perspective and is accepted by the community

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