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Profit Analysis of Pig Farmers on a Smallholder Scale in West Kakas, Minahasa

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Abstract
This study aims to determine the cost, income, and profit of small-scale pig farming in West Kakas Sub District, Minahasa District, North Sulawesi, Indonesia. The number of respondents in this study amounted to 30 people carried out in three villages including Touliang village, Wasian village, and Simbel village which was carried out during January 2021. Data collection using primary data through direct interviews with respondents with questions that have been prepared, and secondary data obtained from the sub-district office and related agencies. The determination of the sample for the research location was carried out using the purposive sampling method or carried out deliberately based on the criteria for length of business, business character, and the number of livestock and the scale of smallholder businesses run by farmers. The method used in this research is descriptive analysis to describe the pig farming business in the West Kakas Subdistrict, and the amount of R / C of the pig farming business in the West Kakas Subdistrict during one maintenance period. The results of this study show that: 1). The amount of costs incurred by pig farmers in the western Kakas sub-district is IDR.296,523,750 with an average cost per farmer of IDR.9,884,125 during one maintenance period, so the income earned is IDR.385,300,000 with an average revenue per farmer of IDR.12,843,333, during one maintenance period, so that the profit earned by farmers is IDR.88,776,250 with an average profit per farmer of IDR.2,959,208 per maintenance period. R / C on pig farms in the sub-district of West Kakas, Minahasa District is 1.29, meaning that if the costs incurred by the farmer are IDR. 1.00, the revenue is IDR.1.29 and the profit income is IDR. 0.29. So, the pig farming business in West Kakas District, Minahasa District is profitable.

Keyword: *Profit Analysis, Smallholder-Scale Pigs, Minahasa*

1. Introduction

Nationally, pig farming is concentrated in the eastern part of Indonesia and plays an important role in the economy of rural communities, as it contributes significantly to the development of the household economy. Pig farming is a livestock business that can provide pork production while absorbing family labor even though it is a small-scale business.

In general, the livestock business in the Minahasa district has a high pig population, especially in the Sonder, Tombulu, and West Kakas sub-districts [1]. Pig farming is a business run by the majority of people in Minahasa, which is dominated by smallholder farms with small-scale businesses and traditionally cultivated, especially those in rural areas, and carried out from generation to generation as a side business by the local community.

West Kakas sub-district is one of the sub-districts in Minahasa district which has a pig population of 1,114 heads (West Kakas in Figures 2020). Based on the results of the research, the pig farming business is cultivated by the community with the location of the cage behind the farmer's house which is close to the water source.

Production factors such as profit, costs, and maintenance factors of livestock numbers and meat production are the determining factors for rural pig farming [2][3]. The papers collectively

provide insights into the profitability of pig farming on a smallholder scale. [4] suggests that the pig industry in Swaziland is currently attractive for smallholder farmers to maximize their profits, but future market competition and socio-environmental challenges could pose threats. [5] found that smallholder pig farmers in Tharaka-Nithi County, Kenya had varying levels of profit efficiency, with potential for improvement through better management practices and marketing channels. Analysed smallholder pig production in Xishuangbanna, China, and identified potential improvements in feeding, culling, and breeding that could enhance profitability [6]. Pig production in Nkanu-West Local Government Area, Nigeria, and found that the majority of pig farmers relied on cooperative societies as a source of capital, with the profitability of pig production being influenced by factors such as access to credit and household size. Overall, these papers highlight the potential for profitability in smallholder pig farming, but also the need for strategic management and adaptation to market challenges [7].

Farmers' behaviours towards the maintenance of pig livestock is carried out in the morning and evening with activities carried out to feed, bathe pigs, and clean stalls, which are carried out by family heads and housewives. Based on the research conducted, the pig farming business in the West Kakas sub-district is a smallholder farm that raises pigs ranging from 1-5 heads per farmer. Feed given to sows is in the form of concentrate, corn, and rice bran, each type of feed is 1kg mixed and fed to one sow.

Although farmers have long experience in running a pig farm, they do not know exactly how much the costs, revenues, and income from the pig farming business are. Therefore, it is necessary to analyze small-scale pig farmers, so that it can be known whether the pig farming business is profitable or not. Based on this description, this study was conducted to know: 1). the number of costs and profits of small-scale pig farming in West Kakas District, Minahasa Regency during one maintenance period. 2). the amount of r/c of pig farming in the West Kakas sub-district during one rearing period.

2. Materials and Methods

This research was conducted in the Kakas Barat sub-district in January 2021, data collection using primary data through direct interviews with respondents with questions that have been prepared, and secondary data data obtained from the sub-district office and related agencies. The determination of the sample for the research location was carried out using the "purposive sampling" method [8] or carried out deliberately based on the criteria for length of business, business character, the number of livestock, and the scale of smallholder businesses run by farmers. The analysis model used in this research is descriptive analysis to describe the smallholder livestock business in the West Kakas sub-district using the formula.

Cost Analysis

Cost analysis with the formula according to [9] to calculate the total cost (Total Cost) obtained by adding up fixed costs with variable costs with the formula:

$$TC = FC + VC$$

Where:
TC = Total Cost
FC = Fixed Cost (Total Fixed Cost)
VC = Variable Cost

Acceptance Analysis

According to [7] in general, to calculate the total demand to calculate the total revenue cost (Total Revenue) is the multiplication of the amount of production (Y) by the selling price (Py) and is expressed by the formula:

$$TR = Py. Y$$

Where:

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TR = Total Revenue
Py = Cost of Goods
Y = Total Production

Income analysis

According to [8] income is the difference between revenue (TR) and costs (TC) and is expressed by the formula:

I = TR- TC
Where:
I = Income
TR = Total Revenue
TC = Total Cost

R/C Analysis

According to [8], R/C is the ratio between revenue and total cost. With the formula:

$$\mathbf{R/C} = \frac{\textbf{PTotal Revenu (TR)}}{\textbf{Total Cost (TC)}}$$

Where:
Revenue = the amount of revenue earned
Cost = the amount of costs incurred
There are three criteria in the assessment, namely:
If R/C > 1, it means that the farm is profitable.
If R/C = 1, it means that the farm breaks even.
If R/C < 1, it means the farm is losing money.

3. Results and Discussion

3.1. Respondent characteristics

The number of respondents taken was 30 people, out of 62 farmers in three villages that have pig populations in West Kakas District, Minahasa Regency. The characteristics of respondents in this study include the age of the farmer, education level, main occupation, and farming experience. The characteristics of respondents according to the research can be seen in Table 1.

Table 1. Characteristics of Respondents of Small-scale Pig Farmers in West Kakas District.

No	Characteristics	Number of Respondents	People Percentage (%)
1	Age (Year)		
	32 - 55	22	73,33
	> 55	8	26,67
	Total	30	100
2	Education Level		
	SMP	5	16,66
	High School	23	76,66
	Higher Education	2	6,68
	Total	30	100
3	Jobs		
	Farmer	24	80
	Self-employed	4	13,33
	PNS	2	6,67
	Total	30	100
4	Breeding Experience (Years)		
	Jan-15	27	90
	16	3	10

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Total	30	100

In this study, the age of respondents varied from 32 to 65 with an average of 45.33, almost the same as the opinion of [2], the age range of farmers in small-scale pig farming is 25 to 65 years with an average of 45.96 years. Farmers aged 32-55 years were 22 people (73.33%) and more than 56 years were 8 people (26.67%). In general, the age of small-scale pig farmers in the West Kakas sub-district is still classified as the working productive age.

Education can be obtained formally such as in school or non-formally such as courses or training. According to the research results above or in Table 1. The level of education of respondents according to the results of the above research is formal education and also varies, namely the junior high school level of 5 people (16.66%), the high school level of 23 people (76.66%), and college 2 people (6.68%). Formal education background is one of the supporting factors in understanding the development and management of pig farming [2].

One of the indicators on the social level of the household is employment. Based on the research results in Table 1. Most of the pig farmers work as farmers and some also work outside the farming sector. In this study, the occupations of respondents were farmers, teachers, entrepreneurs, and civil servants. The most common occupation of respondents is as a farmer 24 people (80%), self-employed 4 people (13.33%) and civil servants 2 people (6.67%). This shows that most respondents raise pigs as a part-time business [10].

Farming experience is also one of the factors that can determine the success of a pig farmer's efforts. From the research results in Table 1. The length of time farmers have had sufficient experience in running a pig farm. Farmers run a business ranging from 1-15 years 27 people (90%) and more than 16-23 years 3 people (10%). The results showed that some of the respondents had deep experience in raising pigs so that respondents could be able to deal with problems and the economy [11].

3.2. Pig Farming in Kakas Barat Sub-district

From the results of the research, the pig farming business in the West Kakas sub-district is managed by the head of the family alone. The maintenance of pigs in the West Kakas sub-district is carried out by feeding twice a day, namely in the morning and evening. Feeding for pigs is given 3 kg per day, the majority of respondents buy commercial feed such as concentrates, corn, and rice bran as commercial feed for pigs in the research area is mixed by farmers themselves to minimize feed costs.

Pig farms in the Kakas Barat sub-district are generally close to residential areas and close to water sources or waterways. The pens used are individual or group-type pens with an average length and width of 3x4 m for each pen. Activities carried out by farmers are cleaning the cages, bathing livestock, and feeding. The length of time devoted by pig farmers while in the cage ranges from 2 - 3 hours/day. Almost the same as research [12] the average time devoted to the cage is 3 hours/day. Activities in the cage are carried out twice a day, namely morning and evening.

The types of businesses carried out by pig farmers in the Kakas Barat sub-district are breeding, fattening, and mixed. However, the most common type is the combination of fattening and breeding because it can adjust to the price of feed, if the price of feed increases, farmers will reduce the number of pigs raised by selling pigs at starter age. The sale of pigs will be carried out by farmers if the target has been achieved, namely 45 days of age for breeding, and 100 kg weight for fattening. Pricing for pigs is almost the same following the market price.

3.3. Production Cost

Production costs in this study are the result of the sum of fixed costs and variable costs. Table 2 shows that the largest cost is the variable cost of IDR. 272,545,750 or (91.54%). This is because variable costs or non-fixed costs can be defined as costs incurred by farmers during the production period which are influenced by the amount of production. This is following the opinion [3], that the higher the scale of production, the more variable costs that must be borne by farmers during the production period.

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The highest production cost is the cost of feed IDR. 198,720,000 or (67.01%) of the total production cost. The lowest cost is the cost of medicines, which is IDR. 1,071,250 or (0.36%). From the results of this research, the total production costs amounted to IDR. 296,523,750, and feed costs were the largest cost, amounting to (67.01%). This is to previous research, [13] which states that feed costs have the largest percentage of the total production costs of 60-80%.

Table 2. Production costs of pig farmers in the West Kakas sub-district

Type of production cost	Total (Rp.)	(IDR/Period) (%)
Fixed Cost		
- Stud Rent	9,750,000	3.38
- Cage depreciation and	6,850,000	2.31
- Equipment	7,175,000	2.52
Total Fixed Cost	23,775,000	8.21
Variable Cost		
- Feed 1	98,720,000	67.01
- Labor	67,500,000	22.76
- Pharmaceuticals	1,071,250	0.36
- Electricity	5,254,500	1.77
Total Variable Cost	272,545,750	91.54
Total Production Cost	296,523,750	100

3.4. Reception

Table 3 shows that the amount of revenue obtained from the sale of sows during one period amounted to IDR. 188,000,000 while the revenue from changes in livestock value amounted to IDR. 197,300,000. So the total revenue amounted to IDR. 385,300,000. Revenue in this study is influenced by sales and changes in the value of livestock, while the amount of value from sales and changes in the value of livestock is determined by the number of livestock ownership raised.

Table 3. Production Costs, Receipts, and Profits of Small-scale Pig Farmers in West Kakas District, Minahasa Regency

Description Total Average	(IDR/Period)	(IDR/Period/Farmer)
Revenue	385,300,000	12,843,333
Total production cost	296,523,750	9,884,125
Profit	88,776,250	2,959,208

3.5. Revenue

Table 3 shows that the income of smallholder pig farmers in the West Kakas sub-district amounted to IDR.88,776,250 or the average farmer earned an income of IDR.2,959,208 during one period. The amount of income generated is influenced by the number of livestock owners. This is in line with the opinion [14], that the income of livestock is strongly influenced by the number of livestock sold by the farmer himself so that the more livestock owned, the higher the income earned.

3.6. R/C

The higher the ratio of revenue received by farmers [9], the more profitable the business is. In this study, the pig farmer business in the Western Kakas Sub-District, R/C is as follows: revenue of IDR.385,300,000 during one maintenance period and total production costs of IDR.296,523,750 during one maintenance period, then the R/C is 1.29. R/C of 1.29 means that every rupiah of costs incurred by farmers will get 1.29 rupiah of revenue and 0.29 rupiah of income.

4. Conclusion

The amount of costs incurred by small-scale pig farmers in the West Kakas sub-district during one maintenance period is IDR.296,523,750 with an average cost per farmer of IDR. 9,884,125.

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Revenue of IDR.385,300,000 with an average revenue per farmer of IDR. 12,843,333, during one maintenance period, so the profit earned by farmers is IDR. 88,776,250 with an average profit per farmer of IDR.2,959,208 per maintenance period. R/C on pig farms in the sub-district of West Kakas, Minahasa Regency is 1.29, meaning that if the costs incurred by farmers are IDR. 1.00, a revenue of IDR.1.29 is obtained, and a profit income of IDR. 0.29. So the pig farming business in West Kakas District, Minahasa Regency is profitable.

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