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Comparison of Silkworm Farm Income (Bombyx Mori L.)

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Abstract

South Sulawesi is still the largest producer of natural silk in Indonesia, although processing is still conventional. It is becoming an important trading centre and an important non-timber forest product resource. This type of research is quantitative research, the data sources used are primary data and secondary data, with a population of silkworm-rearing farmers located in Salojampu Village, Wajo Regency and Pising Village, Soppeng Regency. The results showed that silkworm farming in Salojampu Village, Wajo Regency, had the smallest income of Rp 183,667 per production cycle, while Pising Village, Soppeng Regency, had the largest income of Rp 311,333 per production cycle. Both farmer groups earned a total of IDR 495,000, with an average total income of IDR 247,500 per silkworm production cycle.

Keywords: Silkworms, farm income

A. Introduction

Natural silk is one of the most easily available centres of the silk fabric trade and is a very useful non-timber forest product (NTFP) resource (Harbi et al., 2015). The people of South Sulawesi are very familiar with the natural wealth of the region in the form of natural silk. Almost all natural silk processors still conduct conventional processing on a small scale with a subsystem pattern, although South Sulawesi continues to be the largest natural silk producer in Indonesia (Nurhaedah & Bisjoe, 2013). Natural silk has long been part of the cultural life of rural communities in South Sulawesi (Ramli et al., 2023). Rural communities are still cultivating silkworms, which have been around for a long time and this is used as clothing in cultural events such as weddings and traditional ceremonies in the form of silk sarongs (Iwang & Sudirman, 2020). Producing silk cloth from silk thread has a unique meaning, important lessons, and high cultural value.

Known as the main centre of natural silk in Indonesia, this area is mainly located in South Sulawesi, especially in Wajo District and Soppeng District. Social forestry in South Sulawesi focuses on adaptive attitudes, sustainability, independence, cooperation, partnerships, cross-sectoral integration, and a gradual and sustainable approach (Pratama et al., 2019). Wajo and Soppeng districts are famous for their natural silk trade. Silk has been produced for generations in the South Sulawesi region, especially in Wajo, through part-time businesses, households, and medium-sized weaving industries (Qaiyimah et al., 2022). However, silk fabric production in Wajo has declined, which has impacted market demand. The weaving industry began to flourish again in the 1990s when imports of raw materials were allowed again, and the market regenerated (Djabar & Utiarahman, 2019). However, due to poor production and marketing, natural silk management declined. This is due to changes in silkworm seed quality and low seed supply, which makes the selling price of silk cloth very different from the market price (Soetriono

et al., 2022). So this change has a major impact on the quality of the products produced and also affects the decline in sales (Abidin et al., 2023). So this research aims to find out the comparison of silkworm farmers' businesses and solutions to keep sales running optimally.

B. Methodology

The method used in this research is the Quantitative research method. The population used in this study were silkworm-rearing farmers in Salojampu village, Wajo district and Pising village, Soppeng district. The number of samples in this study was determined in a deliberate manner which amounted to two groups of silkworm-keeping farmers from different districts so that the selected samples could represent the respondents. The sampling technique used observation techniques, questionnaires and documentation studies. The variables in this study used silkworm farming income variables in one production cycle. The types of data used in this study were primary data and secondary data. Primary data is data sourced from the results of the interview process with silkworm keepers while secondary data supports the data obtained from relevant agencies, such as the Central Bureau of Statistics, as well as the local government related to this research. In this study, researchers used descriptive data analysis to calculate the income that would be obtained by farmers who raise silkworms.

C. Findings and Discussion

Findings

1) Respondent Characteristics

Silkworm rearing activities were still carried out by some residents in Salojampu Village, Wajo District and Pising Village, Soppeng District. Samples were determined by purposive sampling that could represent the population.

Table 1. Respondent Name

No	Name	Region
1	Matahari	Pising Village, Soppeng Regency
2	Semmang	Salojampu Village, Wajo District

Source: Processed Primary Data, 2023

This study used 0.5 hectares of land owned by each farmer. Farmers use this land to grow silkworm feed, namely mulberry leaves. Each farmer group member is involved in planting mulberry leaves..

a) Age Level

Age is an identity that is closely related to the human mindset and physical ability to work. The age level of respondents can be seen in Table 2.

Table 2. Characteristics of Respondents Based on Age Level

No	Age (Years)	Number of Respondents (People)	Percentage (%)
1	65	1	50.00
2	< 65	1	50.00
Total		**2**	**100.00**

Source: Processed Primary Data, 2023

Age level affects a person's ability to carry out activities and thinking ability. In the results of this study, representative respondents had an age of 65 years and less than 65 years.

b) Education Level

The level of education is the most important thing in the research process because the knowledge and insight they have is very influential to discuss based on the reality and what they have experienced.

Table 3. Classification of Respondents Based on Education Level

No	Education Level	Number of Respondents (People)	Percentage (%)
1	SD	2	100.00
2	SMP	-	00.00
Jumlah		**2**	**100.00**

Source: Processed Primary Data, 2023

Based on Table 3, it can be seen that the education level of the respondents is at the elementary school level. The education level of silkworm keepers showed that they lacked intellectual human resource knowledge because the surrounding community was accustomed to managing nature traditionally. It is undeniable that in terms of technology, the knowledge of keepers is proven to be lacking when compared to using modern technological devices.

c) Gender of Respondents

Respondent criteria based on gender, researchers found female respondents. The gender of respondents can be seen in Table 4.

Table 4. Classification of Respondents Based on Gender

No	Gender	Number of Respondents (People)	Percentage (%)
1	Laki-Laki	-	00.00
2	Perempuan	2	100.00
Jumlah		**2**	**100.00**

Source: Processed Primary Data, 2023

Based on Table 4 above, it is known that the selected respondents in Salojampu village, Wajo district and Pising village, Soppeng district are female.

d) Family Dependents

Table 5. Classification of Respondents Based on Family Dependents

No	Family Dependents	Number of Respondents	Percentage (%)
1	3	1	50.00
2	< 3	1	50.00
Jumlah		**2**	**100.00**

Source: Processed Primary Data, 2023

Based on the results of research in the field, it can be seen that the number of family dependents ranges from 0-5 people. The number of family dependents can influence respondents to carry out activities in farming, as well as encourage farmers to have more income in order to meet their daily needs.

e) Employment Level

Work is a necessity of life and an activity that must be carried out by everyone for the sake of survival to fulfill various kinds of life needs. Residents in Salojampu Village, Wajo District and Pising Village, Soppeng District generally work as farmers and gardeners. The table for employment levels can be seen in Table 6.

Table 6: Classification of Respondents Based on Employment Level

No	Jobs	Number of Respondents	Percentage (%)
1	Silk Farmer	2	100.00
2	Non Silk Farmer	0	00.00
Total		**2**	**100.00**

Source: Processed Primary Data, 2023

Table 6 shows that the level of employment is generally farming. The main occupation of respondents is as a farmer because they have the skills and knowledge about farming, in addition to having a large area of land, the farmers also raise silkworms at the same time and it has become a job that has been passed down from generation to generation.

2) Production Cost of Silkworm rearing

Production costs are costs incurred in each period of silkworm rearing. Production costs can be divided into 2, namely fixed costs and non-fixed costs (variable costs). Fixed costs come from the cost of equipment depreciation. Non-fixed costs are costs incurred by silkworm farmers whose amount is influenced by the number of silkworms to be maintained.

a). Fixed Costs

Table 7. Total Fixed Costs Per One Silkworm Production Cycle

No	Respondent Name	Depreciation Cost (Rp)	Pbb (Rp)	Total (Rp)
1	Matahari	241.667	95.000	336.667
2	Semmang	196.333	55.000	251.333
Total		**438.000**	**150.000**	**588.000**
Average		**219.000**	**75.000**	**294.000**

Source of Processed Primary Data, 2023

Table 7 shows the amount of depreciation costs that have been incurred by respondents in the silk yarn making business every one production cycle. The smallest total fixed cost incurred by respondents from Salojampu Village, Wajo District is Rp.196,333 and the largest is incurred by respondents from Pising Village, Soppeng District which is Rp.241,667 per production cycle. The total fixed cost of the two farmer groups is Rp. 588,000 with a total average fixed cost of Rp. 294,000 per one silkworm production cycle.

b). Variable Cost

Table 8. Total Variable Cost of Each Silkworm Production Cycle

No	Respondent Name	Non-Fixed Costs (Rp)
1	Matahari	227.000
2	Semmang	220.000
Total		**447.000**
Rata-Rata		**223.500**

Source of Processed Primary Data, 2023

Table 8 shows the largest total variable costs incurred by representatives of farmer groups namely from farmer groups in Pising Village, Soppeng Regency amounting to Rp. 227,000 per one production cycle and the smallest variable costs incurred by representatives of farmer groups in Salojampu Village, Wajo Regency which is Rp. 220,000 per one silkworm production cycle. The total variable cost incurred by the two farmer groups is Rp.447,000 with an average total variable cost of Rp.223,500 per silkworm production cycle.

c). Total Production Cost

Table 9: Total Production Cost of Each Silkworm Production Cycle

No	Respondent Name	Fixed Cost (Rp)	Variable Cost (Rp)	Total (Rp)
1	Matahari	241.667	227.000	468.667
2	Semmang	196.333	220.000	416.333
Total		**438.000**	**447.000**	**885.000**
Average		**219.000**	**223.500**	**442.500**

Source of Processed Primary Data, 2023

Table 9 shows the results of the largest total production costs incurred by respondents from silkworm farmer groups in Pising Village, Soppeng Regency, namely Rp. 468,667 per production cycle and the smallest total production costs incurred by respondents from Salojampu Village, Wajo Regency, namely Rp. 416,333 per production cycle. The total production cost incurred by the two farmer groups is Rp.885,000 with an average total production cost of Rp.442,500 per silkworm production cycle.

d). Total Revenue of Silkworm Farming Business in Salojampu Village, Wajo and Pising Village, Soppeng

Table 10: Total Revenue for Each Silkworm Production Cycle

No	Respondent Name	Number of Eggs	Number of Threads Sold (Kg)	Price/Kg (Rp)	Total Revenue (Rp)
1	Matahari	0.5	2.6	300.000	780.000
2	Semmang	0.5	2	300.000	600.000
Total		**1**	**4.6**	**600.000**	**1.380.000**
Average		**0.5**	**2.3**	**300.000**	**690.000**

Source of Processed Primary Data, 2023

Table 10 shows the largest total revenue from the amount of yarn sold, namely, from respondents in Pising Village, Soppeng Regency amounting to Rp.780,000 every one production cycle with a yield of 2.6 kg of yarn and the smallest total revenue from yarn products is in Salojampu Village, Wajo Regency with a total revenue of Rp. 600,000 every one production cycle and produces 2 kg of yarn. The total revenue of the two farmer groups from the sale of yarn is Rp.1,380,00 with an average revenue of Rp.690,000 per one silkworm production cycle.

e). **Total Income of Silkworm Farming**

Table 11: Total Income for Each Silkworm Production Cycle

No	Respondent Name	Total Acceptance (Rp)	Total Cost (Rp)	Total Revenue (Rp)
1	Matahari	780.000	468.667	311.333
2	Semmang	600.000	416.333	183.667
Total		**1.380.000**	**885.000**	**495.000**
Average		**690.000**	**442.500**	**247.500**

Source of Processed Primary Data, 2023

Table 11 shows that the income earned by silkworm farmer respondents in Salojampu Village, Wajo District and Pising Village, Soppeng District during one production cycle was different in each business they owned. The smallest total income is the silk farming business in Salojampu Village, Wajo Regency, which is Rp. 183,667, while the largest income is the silk farming business in Pising Village, Soppeng Regency, which is Rp. 311,333 every one production cycle. The overall total income of the two farmer groups is Rp.495,000 with an average total income of Rp.247,500 per one silkworm production cycle.

Discussion

1) Comparison of Silkworm Farming Income

a) Fixed Cost

Fixed costs are costs that are very large and do not change according to the amount of yield produced by silkworm rearers. Fixed costs include the cost of depreciation of cages and equipment (Yuni et al., 2021). Fixed costs will remain even if production is stopped. In this study, Pising Village had higher fixed costs of around IDR 80,000 than Salojampu Village.

b) Variable Cost

Variable costs are costs that are strongly influenced by how much maintenance effort. The more effort put in, the more costs that must be paid (Sherly et al., 2021). Farmer groups in Soppeng and Wajo use local silkworm seeds purchased with government subsidies. Because of this subsidy, farmer groups do not need to spend money on buying silkworm seedlings. Farmers also have their mulberry gardens, so they do not need to buy feed for Morus Multicaulis, Morus Alba and Morus Cathayana species. Since silkworms are susceptible to diseases, silkworm rearers should always pay attention to the health of the worms to achieve optimal production results. Unstable environmental factors, such as temperature, rainfall, and humidity, can cause the caterpillars to develop diseases or even die. Therefore, lime or chlorine should be applied to prevent disease. The variable costs incurred by Pising Village are also higher than Salojampu Village, at IDR 27,000.

c) Total Production Cost

By looking at the relationship between revenues and costs, we can find farmer businesses that are profitable to operate. The total production cost of each respondent varies depending on the number of livestock owned by each farmer (Winarko & Astuti, 2018). The biggest cost for silkworm farming is the variable cost. In this study, production costs often increased along with the number of eggs hatched. This was due to differences in the number of eggs hatched by each farmer and Pising Village also had a higher total production cost of IDR 50,000.

d) Total Revenue of Silkworm Farming Business

In general, gross revenue is the difference between total expenses and gross income. Profit, technically, can be obtained by subtracting total revenue and total expenses, or total costs. In economic analysis, profits can also be categorized as fixed costs or unfixed costs (Maryati & Siswanti, 2022).

Under these circumstances, the more thread the farmer produces, the more income the farmer earns, which in turn results in greater profits for the keeper. However, if many eggs hatch but the yield of silk thread is low, it is because of the rearing treatment. Silkworm farming requires good and intensive rearing methods. However, some keepers simply raise silkworms without following all the ideal rearing methods. Pising and Salojumpo villages produce the same number of silkworms at 0.5kg, but Pising village sells 0.6kg more than Salojampu village. So although the price offered is the same, the results obtained by Pising Village are much greater.

e) Total Income of Silkworm Farming Business

Revenue is the difference between total income and costs. If there is a positive earned value, the company will earn a profit. This is to the idea of Abas et al. (2019), that revenue or net profit is the difference between gross revenue and total costs. Technically, profit can be calculated by subtracting total revenue or costs. Income from silkworm farming can differ between silkworm rearers. Variations in the number of eggs hatched and cocoons successfully harvested account for these differences in income. The more eggs hatched, the more thread produced, which in turn will result in greater income. Thus, the total net income of Pising Village is IDR 170,000 greater than Salojampu Village.

2) Income Influencing Factors

Factors affecting silkworm farming income can be multi-dimensional and include aspects involving silkworm farming. First, local climatic and environmental conditions are important factors that affect silk production and quality. The level of humidity, temperature, and availability of natural resources such as mulberry leaves as silkworm feed greatly affect the growth and health of the caterpillars as well as silk production (Mutiara & NH., 2017). In addition, the technology used in cultivation also contributes to income. The use of more efficient and innovative cultivation methods, such as the utilization of advanced technologies in monitoring and management, can increase productivity and ultimately have a positive impact on silkworm farm income (Nursita, 2013).

Another important factor is the managerial aspect of silkworm farming. Management skills, good planning, and the selection of appropriate marketing strategies can help improve the competitiveness of silk products in the market (Estetika & Endrawati, 2018). Social and economic factors, such as farmers' skill level, access to markets, and government policies related to the agricultural sector, also play a role in determining the income level of silkworm farming (Mas'ud et al., 2017). Therefore, a holistic understanding of these factors is crucial to optimize income and improve the sustainability of silkworm farming.

3) Income of Silkworm Farming Businesses that Provide Greater Income

The results showed that silkworm farmers in Pising Village, Soppeng Regency, and Salojampu Village, Wajo Regency, had high incomes. This was a result of silkworm farmers in Pising Village being more careful during their silkworm-rearing process, from seedlings to cocoons. However, the high number of eggs hatched but the low yield of cocoons and threads obtained was the result of the rearing technique itself. Good silkworm rearers followed the proper rearing procedures, while the others only reared yet did not fully follow the correct procedures.

The implications of the findings for the sustainability of silkworm farming in the two villages of Salojampu and Pising may provide strategic insights for the development of the sector. If the findings showed that one of the villages had a higher income and better sustainability, this could serve as a model or a reference point for the other villages. The results of the study could provide insight to local governments, researchers, and businesses on the key factors that contribute to the sustainability of silkworm farming. The implementation of best practices from successful villages could serve as a guide for efficiency improvement, risk management, and income generation in other villages. In addition, this research could help formulate policies that support the growth of the sector, including innovative approaches in the farmer's education and training, improved market access, and utilization of modern agricultural technologies to ensure the long-term sustainability of silkworm farming at the village level.

D. Conclusion

Based on the results of the discussion, it can be concluded that the income of silkworm farming varies, with the lowest recorded income recorded in Salojampu Village, Wajo Regency, amounting to just Rp. 183,667, while the highest recorded income was in Pising Village, Soppeng Regency, reaching Rp. 311,333 every one production cycle. The total income of the two farmer groups was Rp. 495,000, with an average total income of Rp. 247,500 per production cycle. Silkworm farming that provided a large income was located within the group of farmers in Pising Village, Soppeng Regency.

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