

Analysis of Integration of Coffee Plantations and Goats Farm on Farmer's Income in The Atu Lintang District Aceh Tengah Regency

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ABSTRACT

Aceh Tengah Regency, especially Atu Lintang District, is one area that integrates plantations and agricultural agriculture. The increasing production of coffee plants every year will increase the need for fertilizers, both inorganic fertilizers and organic fertilizers, where for organic fertilizers you can use goat waste which is needed between coffee farming and farming. This study aims to analyze the components in the integration of coffee farming and business goat farming, analyzing the value of the savings from the integration of coffee farming and goat farming in Atu Lintang sub-district, Aceh Tengah Regency. The research method used is descriptive and calculation of coffee and goat farming. The results showed that the integration of coffee farming and goat farming was in the cost savings of integrated fertilizers from goat livestock waste (with a share value of 78.33%), while in livestock farming the savings were obtained from feed produced from coffee farming.

Keywords: Integration, arabica coffee, goat

BACKGROUND

The agricultural sector is a sector that is quite important in economic activity in Indonesia. To always have high productivity and be able to increase farmers' income, the development of the agricultural sector must be carried out sustainably by developing the ability of farmers to manage their farming business. The development of the agricultural sector which includes the

plantation and livestock sectors is one of the efforts to increase farmers' income, so all these sectors must be implemented in an integrated manner.

The technically integrated system of agriculture is an agricultural integration activity in a broad sense which is introduced to the business of food crops, secondary crops and horticulture, animal husbandry, plantations, fisheries and forestry plants in one area or location of activity. The targets of an integrated agricultural system include increasing planted area, livestock population, fisheries and product quality, availability of quality animal feed throughout the year, availability of organic fertilizers and pesticides, biogas, then developing business diversification and economic business institutions and infrastructure in rural areas (Department of Food Crops and Agriculture, 2013). The main activity of the integrated farming system is to integrate the cultivation of crops and livestock. Plant waste is processed for animal feed, organic fertilizer and feed reserves during the dry season. Livestock waste (faeces, urine) is processed into biogas, bio-urine, organic fertilizers and biopesticides (Wisnuardhana, 2009).

Arabica coffee production in Indonesia reached 161.08 thousand tons in 2017. Where Aceh Province the second-largest Arabica coffee producer in Indonesia in 2017 reached 41.309 thousand tons under North Sumatra province which reached

50,416 thousand tons in the same year. The other largest arabica coffee-producing provinces are South Sulawesi, West Sumatra and West Java, each with an average production of 20.10 thousand tons,

15.11 thousand tons and 9.37 thousand tons or a share of 12.50%; 9.40% and 5.83% of arabica coffee production in Indonesia. Meanwhile, other provinces only contributed 15.09%.

**Table 1. Production of Coffee Plantation (Tons) by District
In Aceh Tengah Regency 2016-2019**

No	District	Production of Coffee Plantation (Tons)			
		2016	2017	2018	2019
1	Linge	2.283	2.294	2.318,5	2.318,5
2	Atu Lintang	5.045	5.090	5.188,5	5.188,5
3	Jagong Jeget	4.079	4.099	3.999,1	3.999,1
4	Bintang	1.736	1.745	1.828,6	1.828,6
5	Lut Tawar	1.191	1.228	1.246,9	1.246,9
6	Kebayakan	1.797	1.763	1.768,7	1.768,7
7	Pegasing	3.091	2.851	2.876,6	2.876,6
8	Bies	613	619	620,6	620,6
9	Bebesen	1.268	1.288	1.315,2	1.315,2
10	Kute Panang	1.092	1.107	1.126,3	1.126,3
11	Silih Nara	2.690	2.654	2.657,3	2.657,3
12	Ketol	2.109	2.136	2.193,7	2.193,7
13	Celala	1.777	1.782	1.821,4	1.821,4
14	Rusip Antara	2.602	2.602	2.619,2	2.619,2
Total		31.373	31.258	31.580,5	31.580,5

Source: Statistic Board of Aceh Tengah Regency 2019

Atu Lintang district is the largest amount of coffee production in Aceh Tengah Regency, which is 5,045 tons in 2016, 5,090 in 2017, 5,188.5 in 2018 and 5,188.5 in 2019. The increasing production of coffee plants every year will also increase the need for fertilisers, both inorganic fertilisers and organic fertilisers, where for organic fertilisers you can take advantage of goat manure waste. Priyanti (2007) states that the integration system is an integrated business application through a Low External Input approach between coffee and goat commodities, where livestock manure is the main ingredient for making compost as organic fertilizer that can increase land

fertility. The Low External Input approach is a way of applying the concept of integrated agriculture by seeking to use inputs from the farming system itself, and minimizing the use of production inputs from outside the agricultural system. Aceh Tengah Regency, especially Atu Lintang District, is one of the areas that carry out integrated agriculture between plantations and livestock. Aceh Tengah Regency has potential in agriculture and animal husbandry which plays an important role in the community's economy, where most of the people work as farmers and ranchers.

**Table 2. Goat Livestock Population by District
In the Aceh Tengah Regency 2016-2019**

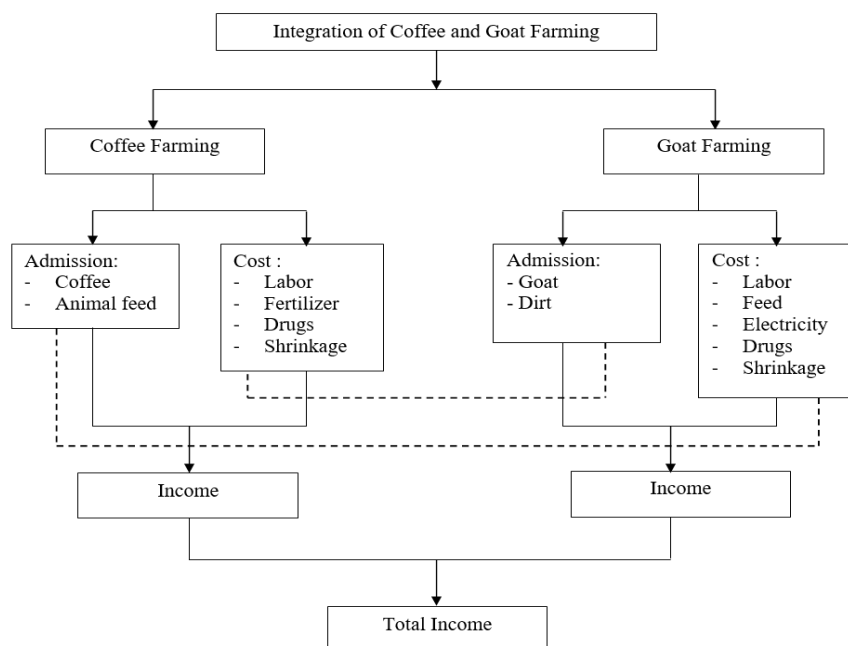
No	District	Goat Livestock Population			
		2016	2017	2018	2019
1	Linge	1.287	1.376	1.874	1.874
2	Atu Lintang	1.458	1.523	2.144	2.144
3	Jagong Jeget	1.051	1.125	1.485	1.485
4	Bintang	1.590	1.761	2.357	2.357
5	Lut Tawar	1.251	1.413	112	112
6	Kebayakan	839	927	689	689
7	Pegasing	586	649	443	443
8	Bies	581	646	669	669
9	Bebesen	915	1.013	465	465
10	Kute Panang	762	844	1.079	1.079
11	Silih Nara	1.191	1.271	1.556	1.556
12	Ketol	1.050	1.163	1.521	1.521
13	Celala	899	918	1.110	1.110
14	Rusip Antara	575	736	984	984
Total		14.035	15.365	16.488	16.488

Source: Statistic Board of Aceh Tengah Regency 2019

Bintang district has the largest goat population in Aceh Tengah Regency, which is 2,357 heads in 2019. Atulintang district is the second-largest district with a goat population in Aceh Tengah Regency with a total goat population of 2,144 heads in 2019. Based on the data above, the goat population has increased every year. This indicates that the goat farming business is integrated with coffee plants and has the potential to be developed to support the creation of sustainable agriculture and animal husbandry by optimizing the use of available local resources to generate profits for farmers.

Based on data from farmers-breeders in each village in Atulintang District, 60 families carry out integrated farming of coffee plants and goat farming from 6,903 residents consisting of 1,865 households. This means that there are still very few farmers who integrate with goats when compared to the population and number of households. The expected result is that more than 60 households in Atulintang District can develop integrated agriculture. The people of the Atulintang district are already running their integrated agriculture, but the implementation of the program is

still not optimal. There is still some goat and coffee waste that has not been fermented, as well as weeds and protective plants that have not been fully utilized as animal feed. Coffee fruit waste is usually in the form of fruit pulp which physically has a composition of up to 48%, consisting of 42% fruit skin and 6% seed coat. In 2019 the Atulintang District produced 5188.5 tons of coffee where the waste generated was around 2000 tons. An economic system based on environmentally friendly technology and optimization of all energy sources produced (Utomo and Himawanto, 2021). Kathleen (2011) states that crop-livestock integration agriculture can improve soil quality, increase yields, produce diverse foods and improve land-use efficiency. The benefits of plant-livestock integration can be synthesized through (1) agronomic aspects, namely increasing productive soil capacity, (2) economic aspects for higher production, yield and quality, and lowering costs, and (3) ecological aspects, namely reducing pests and use of pesticides, erosion control, and (4) social aspects, namely a more even distribution of income.



Note:
----- : Declare Integration

Figure 1. Conceptual Framework

The integration system of coffee farming and goat farming is very profitable because coffee farming can produce waste that can be used as goat feed, while goats produce waste in the form of faeces (compost) and urine (liquid fertilizer) which are useful for coffee plants as organic fertilizer. Coffee farming income which is integrated with goat farming has the potential to increase family income. Integration of coffee and goat farming can be obtained through integration components such as costs, revenues and income from coffee and goat farming. The value of savings from the integration of coffee farming and goat farming is that for coffee farming it is fertilizer produced from goats, while for goat farming it is feed obtained from coffee plantations.

RESEARCH METHOD

The research was conducted in Atu Lintang District, Aceh Tengah Regency. The selection of this research area was done purposively with several considerations. The first consideration is that the Atu Lintang sub-district is the sub-district that has the largest average coffee production in Aceh Tengah Regency. The second consideration is that Atu Lintang District is one of the sub-districts that has implemented an integration system for coffee plants and goats. Determination of the sample in this study was carried out with the type of Non-Probability Sampling. Non Probability Sampling This type of sample was not chosen randomly. The determination of the sample in this study was carried out with the type of Non-Probability Sampling. Non Probability Sampling This type of sample is not chosen at random.

Primary Data, is data obtained through interviews, observations, and discussions with farmers who implement the integration system of coffee plants and goats in Atu Lintang District, Central Aceh Regency

using a questionnaire that has been prepared. Secondary data collected includes a general description of the research area, demographic data, and data on the area, production, and productivity of coffee farmers. Secondary data was obtained from relevant agencies, such as the Central Statistics Agency (BPS Aceh Tengah), the Agriculture Service, the Atu Lintang District Office, literature books and internet media that were by the research.

To analyze the identification of problem 1 "How are the components in the integration of coffee and goat farming in the research area" carried out descriptively, namely by identifying what are the components of coffee and goat farming in the research area. To analyze the identification of problem 2 "Benefits of the integration of coffee and goat farming in the research area" was carried out descriptively and by looking at the share value of each component of the integration of coffee and goat. Before calculating the share, the income, revenue and costs of coffee and goat farming will first be calculated using farming calculations. After calculating the integration of coffee and livestock farming, then each component of the integration will see the value of the savings. Savings are calculated by comparing costs between integrated and non-integrated coffee farming and goat farming.

RESULT AND DISCUSSION

COFFEE FARMING

a. Coffee Farming Revenue

The average farmer production (from data samples) yields 48,988 Kg/year multiplied by the price of IDR 6,180.58/Kg and gets the farm income in 1 year of IDR 302,774,416. The revenue component in integrated and non-integrated coffee farming is the same.

b. Coffee Farming Costs

Table 3. Average Cost of Coffee Farming (Rp/Year/Farmer)

Description	Integration (IDR)	Non-Integration (IDR)
Variable Cost		
- Fertilizer Cost	1.135.060,00	3.975.000,00
- Labor Cost	116.279.883,33	116.279.883,33
- Drug Cost	496.667,67	496.667,67
Fixed cost		
Equipment depreciation costs	557.700,00	557.700,00
Total Cost	118.469.311,00	121.309.250,00

From the data above, we can see that the average production cost of integrated coffee farming per farmer per year is IDR 118,469,311.00 and the cost of coffee farming without integration in coffee farming is Rp. 121.309.250.00 per farmer per year.

average total cost of integrated coffee farming is IDR 118,469,310, without integration IDR 121,309,250. Then the average income of coffee farming received by integration farmers is IDR 184.305.106 and without integration is IDR 181,465,116 farmers per year.

c. Coffee Farming Income

The average income from coffee farming per farmer/year is IDR 302,774,416, and the

GOAT FARMING

a. Goat Farming Revenue

Table 4. Average Goat Livestock Business Revenue (IDR/year/farmer)

Description	Integration (IDR)	Non-Integration (IDR)
- Goat Sales	44.106.666,67	44.106.000,67
- Goat Manure Sales	94.660,00	2.908.320,00
Total Revenue	44.201.326,67	47.014.986,67

The average total income from the goat farming business to the integration farmer is IDR 44,201,326,67 and farmers without

integration are IDR 47,014,986.67 per farmer per year.

b. Goat Farming Cost

Table 5. Average Cost of Goat Farming (IDR/year/farmer)

Description	Integration (IDR)	Non-Integration (IDR)
Variable cost		
- Feed Cost	0,00	1.938.880,00
- Drug Cost	986.667,67	986.667,67
- Labor Cost	5.920.000,00	5.920.000,00
Fixed Cost		
- The cost of depreciation of the cage	300.000,00	300.000,00
- Tool depreciation cost	40.000,00	40.000,00
- Electricity cost	180.000	180.000
Total Cost	7.426.667,67	9.365.546,67

The total cost of goat production for integrated farmers is IDR 7,426,667,67 and the total cost of goat production for integrated farmers is IDR 9,365,546.67.

c. Goat Farming Income

For integrated farmers, the average income from goat farming per farmer/year is IDR 44,201,326,67 and the average cost of goat farming per farmer/year is IDR

7,426,666.67, then the average income of goat farming received by integration farmers is IDR 36,774,660.00 (farmers/year) and for farmers without integration, the average income of goat farming per farmer/year is IDR. 47,014,986.67 and the average cost of goat farming per farmer/year are IDR 9,365,546.67, then the average income of goat farming received by farmers without integration is IDR 37,649,440.00 (farmers/year).

Contribution of Coffee and Goat Farming Income to Farmers' Income

Calculate the contribution of farmers' income, it is obtained by comparing one of the farmers' incomes (coffee farming or goat farming) with the total income of farmers. The total income of farmers who implement an integrated system of coffee farming and goat farming is the sum of coffee farming income and goat farming income. From the data above, we can see that the average income of integrated coffee farmers and goats from coffee farming is Rp. 184,305,106/year or has a contribution of 83.37%, and the average income from goat farming is Rp.36,774,660/year or has a contribution of 16.63% and the average income of farmers without the integration of coffee farming and goat farming from coffee farming is Rp. 181,465,166/year or has a contribution of 82.82%, and the average income from goat farming is Rp.37,649,440/year or has a contribution of 17.18%.

The average contribution of goat farming income to farmers' income is 16.63% for integration and 17.18% for farmers without integration. The average contribution of coffee farming income to farmers' income is 83.37% for integration and 82.82% for farmers without integration. The contribution of coffee farming income to farmers' income is greater than 50%, which means that coffee farming income contributes greatly to farmers' income.

CONCLUSION

Components in the integration of coffee farming and goat farming are the costs of coffee and goat farming as well as revenue earned from the sale of coffee and goats which will earn income from the integration of coffee farming and goat farming. In the integration of coffee farming and goat farming, savings for coffee farming are fertilizer costs which are integrated from the results of goat waste, in goat farming the savings are obtained from feed produced from coffee farming.

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