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Optimizing the Integrated Farming System of Coffee and Goat to Maximize Farmers' Income in North Sumatra, Indonesia

Dinda Aslam Nurul Hida♥, Dwi Rachmina, Amzul Rifin
Department of Agribusiness, Faculty of Economic and Management, IPB University, Indonesia
♥Corresponding author email: dindaaslam@apps.ipb.ac.id

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Abstract. Most coffee farmers in North Sumatra still need to implement an integrated coffee and goat cultivation system. Only 0.2% of farmers have implemented the program. An integrated farming system cannot be implemented due to limited resources, and optimal conditions for an integrated farming system for coffee plants and goat livestock in North Sumatra have yet to be found. Therefore, this study aims to determine the optimal conditions for an integrated farming system for coffee plants and goat livestock to maximize farmers' income. The sample size is six farming units spread across three districts: Simalungun, North Tapanuli, and Karo districts in North Sumatra Province. Quantitative analysis using a linear programming model was carried out computationally with the help of LINDO 6.1 software. The study results show that the revenue for the optimal solution from the integration model generates IDR 169,358,700.00, 1.04% higher than the actual income. This was due to an increase in coffee bean productivity to 1.68 tons.ha^{-1} per year with a simple shading coffee pattern, namely coffee planting with a cover crop of 300 trees per ha, as well as an increase in the number of goats kept. , from the actual condition of 59.33 goats to 117 goats. Farmers are advised to utilize all products between coffee and goat farms as their respective production inputs and not sell intermediate products.
Keywords: farmer's income; integrated farming system; linear programming; optimization model

INTRODUCTION

An integrated farming system (IFS) solves one of the negative impacts of developing conventional farming systems. Conventional agriculture technically uses the concept of high external input agriculture (HEIA), a concept whose production depends on synthetic chemical compounds such as fertilizers, pesticides, superior seeds, and growth regulators (Uftori, 2010). HEIA can provide benefits in the short term by increasing production. However, long term, it will create problems such as damaged and dangerous environmental conditions for living things, including humans. Low External Input Sustainable Agriculture (LEISA) is a new direction for conventional agriculture that is more environmentally friendly (Dini & Salbiah, 2019; Fadilah et al., 2020; Mendoza, 2005).

LEISA is a form of agriculture that seeks to optimize resource utilization by combining various farming components, synergizing and complementing each other. Utilization of available inputs aims to achieve a stable production level in the long term, preserve the environment and reduce production costs. LEISA is a reference for the prospect of an integrated farming system, also known as an integrated farming system (IFS). One farm branch produces intermediate products that can be used or further processed in other branches to produce the final product (Debertin, 2012; Kusnadi, 2012; Soedjana, 2007). IFS is oriented towards a zero-waste agricultural business, a zero-waste production system that will produce 4F (food, feed, fertilizer, and fuel) (Ditjenbun, 2010).

The Ministry of Agriculture, through the Directorate General of Plantations 2017, has implemented a policy of developing sustainable plantation commodities combined with livestock management, namely by rolling out the coffee and goat IFS programs. This program has excellent and sustainable prospects (Arofi et al., 2015; Diwyanto, 2014; Elisabeth et al., 2013; Hida, 2020; Lubis et al., 2021; Sudana, 2005). This is because the waste generated from coffee farming in the form of coffee pulp can be used as goat fodder, and goat livestock waste managed through the separation of solid and liquid waste can be used as organic fertilizer for coffee plants. Farmers greatly benefit from producing their organic fertilizers and

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then being able to cultivate organic farming. Using organic fertilizers to integrate coffee and goat farming can improve production quality, productivity, and farmer income by reducing production costs (Kariyasa, 2005; Nurcholis, 2011).

The percentage increase in income from integrated coffee in Simalungun Regency was 1.94% from the previous. This increase was obtained from the rise in coffee production by 5.59% due to integration in that period and the decrease in the overall cost of producing coffee after integration, which decreased by 4.3% (Chalil & Negara, 2022).

IFS Coffee and goat has been implemented by Starbucks Indonesia agronomists assisted by the Farmer Support Center (FSC) in North Sumatra. Initially, this program involved 19 farmer groups, each consisting of 20-25 people. However, only 5% of farmers are currently implementing this integrated farming system in North Sumatra. According to Elisabeth et al. (2013) and Diwyanto (2014), the obstacles that cause farmers not to maintain the sustainability of this program are farmers doing IFS without good planning, without considering achievement targets, doing it according to the capabilities of the resources they have, and only according to what they want (Setyawan & Utami, 2020). Limited resources and ability to manage IFS are often based on considerations of customary factors and what farmers can do rather than on efficiency considerations. Under these conditions, the allocation of resources controlled by farmers is often not optimal, and business management becomes inefficient with relatively low productivity levels so that the income level achieved by farmers is not maximized. This research needs to determine the optimal conditions for the coffee and goat integrated farming system to maximize the farmers' income.

METHODS

The research method uses a quantitative approach with primary data types. Primary data were obtained through direct field observation and interviews with respondents using a questionnaire. This research was conducted in North Sumatra Province. The selection of the research location was carried out purposively or deliberately with the consideration that the Starbucks Indonesia Farmer Support Center (FSC) is in North Sumatra, and there are IFS coffee and goat. This research was conducted for five months, from November 2021 to April 2022. The types of data in this study were primary data and secondary data.

Sampling for IFS coffee and goat farmers will use a non-probability method, purposive sampling. The sample size is six farming units spread over three regencies: Simalungun Regency, North Tapanuli Regency, and Karo Regency in North Sumatra Province, each with two farming units. The criteria used in this study are farmers with two farming branches, namely coffee plants and goat livestock, and farmers participating in the Starbucks Farmer Support Center (FSC) program.

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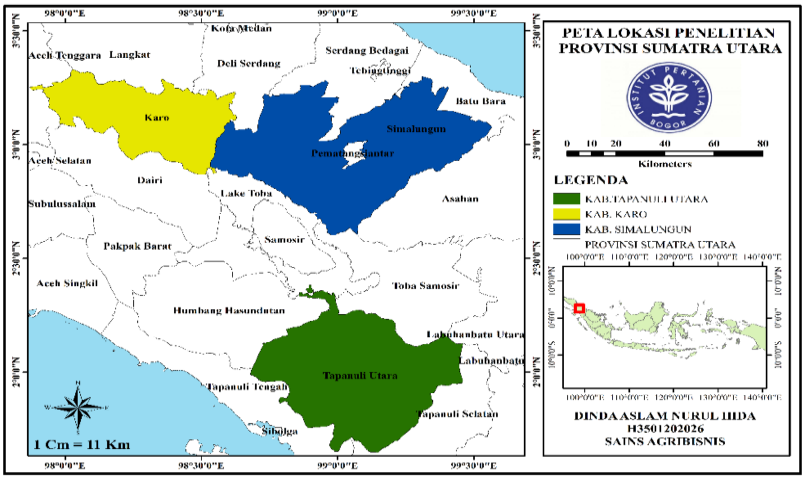

Figure 1. Map of research locations for IFS coffee and goat farmers in North Sumatra

Data analysis was carried out using a quantitative analysis using a linear programming (LP) model with one goal: to see maximum income when available resources are used optimally. The objective function of this linear programming model is to maximize the income of IFS coffee and goat farmers in North Sumatra. Farmer income is the total income from each coffee and goat farming business. Income is the difference between coffee and goat farming and production costs.

The revenue received by farmers is the amount of output produced by farmers multiplied by the output price (Debertin, 2012). Mathematically acceptance can be formulated as follows:

TR = P x Q ....(1)

Information:
TR = Total revenue (IDR)
P = Product price (IDR)
Q = Production results

To find out farmer income, data analysis uses farming income analysis which is calculated by the following formula:

I = TR – TC.......................................(2)

Information:
I = Farming income (IDR)
TR = Total revenue (IDR)
TC = Total cost (IDR)

Beneke and Winterboer (1973) stated that linear programming is a planning method that can assist decision-making. Linear programming will provide instructions on what should be done by decision-makers if goals, conditions, or constraints have been determined to achieve goals and alternatives for achieving these goals. Data processing is done computationally with the help of LINDO (Linear Interactive Discrete Optimizer) software version LINDO 6.1.

Mathematically, the model developed in this study is:

$$\textbf{Maks } Z = \sum_{i=1}^{n}\sum_{m=1}^{12} JX_{im} - \sum_{i=1}^{n}\sum_{m=1}^{12} X_{im} - \sum_{i=1}^{n}\sum_{m=1}^{12} PO_{im} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Constraints considered:

Land:

$LAHAN_m)\ \sum_{m=1}^{12} X1m + \sum_{m=1}^{12} a1X3m \leq b_{1m}$

Goat quantity every month:

$KK_m)\ \sum_{m=1}^{12} X3m \leq b_{2m}$

Labor every month:

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$TK_m)\ \sum_{m=1}^{12} a2X1m + \sum_{m=1}^{12} a3X3m \leq b_{3m}$
Transfer of coffee bean products every month:
$TPX1_m) - \sum_{m=1}^{12} a4X1m + \sum_{m=1}^{12} JX1m = 0$
Transfer of goat products every month:
$TPX3_m) - \sum_{m=1}^{12} a5X3m + \sum_{m=1}^{12} JX3m = 0$
Transfer of goat feed every month:
$TPK_m)\ \sum_{m=1}^{12} a6X3m - \sum_{m=1}^{12} X2m + \sum_{m=1}^{12} JX2m = 0$
Transfer of husk organic fertilizer every month:
$TPO1_m)\ \sum_{m=1}^{12} a7X1m - \sum_{m=1}^{12} PO1m = 0$
Transfer of chicken manure as organic fertilizer every month:
$TPO2_m)\ \sum_{m=1}^{12} a8X1m - \sum_{m=1}^{12} PO2m = 0$
Transfer of cow manure as organic fertilizer every month:
$TPO3_m)\ \sum_{m=1}^{12} a9X1m - \sum_{m=1}^{12} PO3m = 0$
Transfer of goat feces as organic fertilizer every month:
$TPO4_m)\ \sum_{m=1}^{12} a10X1m - \sum_{m=1}^{12} a11X3m - \sum_{m=1}^{12} PO4m + \sum_{m=1}^{12} JX4m = 0$
Transfer of goat urine as organic fertilizer every month:
$TPO5_m)\ \sum_{m=1}^{12} a12X1m - \sum_{m=1}^{12} a13X3m - \sum_{m=1}^{12} PO5m + \sum_{m=1}^{12} JX5m = 0$

Information:

Z	=	Income to be maximized (IDR)
$JX1_m$	=	Selling price of coffee bean in month m (IDR per kg): m=1..12
$JX2_m$	=	Selling price of coffee pulp in month m (IDR per kg): m=1..12
$JX3_m$	=	Selling price of goats in month m (IDR per goat): m=7 and 12
$JX4_m$	=	Selling price of goat feces in month m (IDR per kg): m=1..12
$JX5_m$	=	Selling price of goat urine in month m (IDR per liter): m=1..12
$X1_m$	=	Production cost of coffee farming in month m (IDR per ha): m=1..12
$X2_m$	=	Production cost of coffee pulp in month m (IDR per kg): m=1..12
$X3_m$	=	Production cost of goat farming in month m (IDR per goat): m=1..12
$X4_m$	=	Production cost of goat feces in month m (IDR per kg): m=1..12
$X5_m$	=	Production cost of goat urine in month m (IDR per liter): m=1..12
UTK_m	=	Goat farm and livestock labor wages in month m (IDR per HOK): m=1..12
$PO1_m$	=	Purchase price of husk fertilizer in month m (IDR per kg): m=4
$PO2_m$	=	Purchase price of chicken manure in month m (IDR per kg): m=7
$PO3_m$	=	Purchase price of cow manure in month m (IDR per kg): m=11
$PO4_m$	=	Purchase price of goat feces in month m (IDR per kg): m=8
$PO5_m$	=	Purchase price of goat urine in month m (IDR per kg): m=12
$PK1_m$	=	Purchase price of concentrate feed in month m (IDR per kg): m=1..12
b_{1m}	=	Land area available for IFS (ha)
b_{2m}	=	Average number of goats owned by each farmer (goat)
b_{3m}	=	Total available family labor (HOK)
a_1	=	Coefficient of land area needed to build a goat breeding shed (ha)
a2	=	Coefficient of labor needed in coffee farming (HOK per ha)
a3	=	Coefficient of labor needed in goat farming (HOK per goat)
a4	=	Coefficient of coffee production in month m ($kg.ha^{-1}$)
a5	=	Weight coefficient of production of goats in month m (kg per goat)
a6	=	Coefficient of feed requirement for goats in month m (kg per goat)
a7	=	Coefficient of use of husk fertilizer as coffee fertilizer in month m ($kg.ha^{-1}$)
a8	=	Coefficient of use of chicken manure as coffee fertilizer in month m ($kg.ha^{-1}$)
a9	=	Coefficient of use of cow manure as coffee fertilizer in month m ($kg.ha^{-1}$)
a10	=	Coefficient of use of goat feces as coffee fertilizer in month m ($kg.ha^{-1}$)
a11	=	Coefficient of goat feces production in month m (kg per goat)
a12	=	Coefficient of use of goat urine as coffee fertilizer in month m ($liters.ha^{-1}$)
a13	=	Coefficient of goat urine production in month m (liters per goat)

RESULTS AND DISCUSSION

IFS, with the zero waste concept, has synergistic interactions and linkages between the various components in coffee farming and goat farming units. The characteristics of the farmers in this study included age, education level, number of family dependents, and

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farming experience. The description of the respondent farmers can be seen in Table 1. The average age of the farmers is 60.33 years, the highest education level is a Bachelor's degree, the number of family members is 2.67 people, and the farming experience is 12 years.

Table 1. Respondent profile

Attribute	Number (people)	Percentage (%)
Age		
55-60th years old	3	50
61-65th years old	2	33.33
66-70th years old	1	16.67
Education level		
High school graduate	3	50
College graduate	3	50
Number of family		
2	2	33.33
3-5	3	50
>6	1	16.67
Farming experience		
<5 years	2	33.33
>5 years	4	66.67

In the study area, the average available land area for carrying out coffee and goat IFS is 2.33 ha, with the status of owning the land. The types of coffee planted by the respondent farmers were the Andungsari 1 and Komasti varieties (Komposit Arabika Andung Sari Tiga). The coffee seeds of the respondent farmers came from the Jember Coffee and Cocoa Research Center, with as many as 3,500 seeds per ha at IDR 500 per seed. Fertilizers used as production inputs for coffee farming consist of organic and inorganic fertilizers. Farmers spend IDR 6,41,429 to buy organic fertilizer for one hectare of land within one year. Organic fertilizers used include husks fertilizer, chicken manure, and cow manure. Farmers spend IDR 3,399,999 to buy inorganic fertilizer for one hectare of land within one year. The inorganic fertilizers include NPK Mutiara 16, NPK Petro Nitrate, and Yara Liva. Some of the coffee plants belonging to the respondent farmers were affected by the *Helopeltis* spp. pest, so pest control in the respondent's coffee farming was by administering a pesticide drug called Cypermethrin Ripcord. The costs incurred by farmers for pest control amounted to IDR 85,714 for one hectare of land within one year. The cost of production inputs for one hectare of coffee farming in one year can be seen in Table 2.

In the same area, the respondent farmer also built a pen with an area of 15 x 20 m for goat farming. The number of goats owned by the respondent farmers is 50 to 60 goats of the kacang goat type. Kid goats in the study area came from Deli Serdang and Serdang Bedagai Regencies. The age of the kid goats purchased by the respondent farmers was 6-7 months old on average. The price of one kid can vary, depending on the weight of the livestock that the farmer wants to buy. On average, respondent farmers in North Sumatra buy kid goats at IDR 400,000 – IDR 500,000 per goat.

Goat farming in the study area applies an intensive system of raising goats, namely rearing them in pens. Farmers will provide feed to goats every day without being grazed. The feeding system in the cage can keep the livestock from expending a little energy, so

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the goats become fatter (Chaniago, 1993). Goat fodder consists of forage feed and booster feed (concentrate). Farmers also add salt as a complement to the feed, which is a source of minerals for the goats, and provide vitamin B-Sanplex once every three months. Farmers spend a production cost of IDR 563,539 per goat within one year. The production input cost of one goat in one year can be seen in Table 2.

The labor used by farmers in coffee farming are labor for fertilizing, spraying pesticides, harvesting, and post-harvesting. The labor used by farmers in goat farming are labor to feed, care for, and sometimes clean goats. The workforce used at IFS in the study area is a daily workforce that comes from outside family workers, with eight working hours, starting from 07.00 WIB to 16.00 WIB, with one hour break time at 12.00 WIB until 13.00 WIB. The fee system uses HOK (daily workers) with a daily wage of IDR 50,000 per HOK.

Table 2. Cost of coffee farming and goat farming in one year

Attribute	Volume	Total Price
Coffee farming		
NPK Mutiara 16 (kg.ha^{-1})	129	1,542,857[a]
NPK Petro Nitrat (kg.ha^{-1})	71	928,571 [a]
Yara Liva (kg.ha^{-1})	71	928,571 [a]
Husk fertilizer (kg.ha^{-1})	500	471,429 [a]
Chicken manure (kg.ha^{-1})	2,500	3,428,571 [a]
Cow manure (kg.ha^{-1})	14,000	2,571,429 [a]
Sipermetrin Ripcord (bottle.ha^{-1})	1	85,714 [a]
Labor (HOK per ha)	428.76	21,438,000 [a]
Goat farming		
Kid goats (goat)		500,000 [b]
Concentrate (kg per goat)	20.22	60,674 [b]
Salt (kg per goat)	1	2,022 [b]
B-Sanplex		843 [b]
Labor (HOK per goat)	1.72	86,000 [b]

Noted: IDR per ha per year (a), IDR per goat per year (b), HOK(daily workers).

Our coffee farming and livestock business produces main products and intermediate products. The main product of coffee farming are coffee cherries, and the intermediate products are coffee pulp, leaves of cover crops, and grasses from coffee fields. The intermediate product of coffee farming can be used as goat fodder. Likewise with goat farming, besides producing the main product of broiler goats, goat farming also produces intermediate products. The intermediate product of goat farming is used as organic fertilizer in coffee farming. Organic fertilizers derived from goat farming are divided into two: solid organic fertilizers of goat feces and liquid organic fertilizers of goat urine.

The coffee farming owned by the respondent farmers is harvested once in 10 days so that within a month, the farmers harvest coffee plants three times. Harvesting of coffee cherries is done manually by picking coffee cherries by hand, and the results are collected using a bucket. During the main harvest, from October to December, farmers can harvest their coffee plants every day, which is 2 to 3 times the usual yield. The average productivity of coffee cherries belonging to respondent farmers in North Sumatra in one year is 2.8 tons.ha^{-1}. The coffee cherries picked will be ground using a pulper machine. The purpose of grinding coffee cherries is to separate the coffee cherries from their skin (coffee pulp) so that

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the result of the grinding is coffee beans. Respondent farmers sell their coffee beans at an average price of IDR 35,000 per kg to a coffee collecting company, namely PT. Sumatra Specialty Coffee (SSC) is located in Siborongborong District, North Tapanuli Regency.

Separating coffee cherries into coffee beans produces waste in the form of the coffee pulp as an intermediate product of coffee farming. Around 20-40% of the coffee pulp can be obtained by separating cherries into the coffee bean (Agustono et al., 2018). If the production of coffee cherries in the study area is 2.8 tons.ha^{-1} per year, the respondent farmers can obtain 640 kg.ha^{-1} per year of coffee pulp, which can be used as animal feed because the coffee pulp has the potential to be used as goat fodder. The nutritional content of non-fermented coffee pulp, such as crude protein, is 8.49% (Ismayadi, 2000).

Forage production in the form of grasses spread over coffee land, which grows and develops under the shade of coffee plants, is also a feed source for goats. One hectare of coffee land can produce 13.73 tons.ha^{-1} per year of grass (Kleden et al., 2015). The grasses are collected by farmers every three days, using sickle cutters and push rickshaws. Grasses from coffee fields contain 6.95% crude protein (Agustono et al., 2018). The high crude protein content in the grass is because the grass spread over the coffee grounds is the grass that has just grown and is relatively young due to the rainfall. The lamtoro tree, as a coffee cover plant, also produces waste that can be used as goat fodder. Lamtoro is highly favored by livestock, with a very high crude protein content of around 34%. Farmers collect lamtoro by pruning the lamtoro trees once every three months.

Respondent farmers fatten their goats twice a year. Farmers sell goats in July and December. In July, within the context of Eid al-Adha, the respondent farmers could sell 23 of their goats, and the respondent farmers resold 13 of their goats in December. Respondent farmers can sell 883 kg of goats in one year, with an average price of IDR 45,000 per kg. Goats also produce goat feces and urine as solid and liquid organic fertilizer for coffee farming, which supports the integrated farming system for coffee plants and livestock. Murwani & Karyanto (2010), conducted research in West Lampung, which proved that goat manure increased the growth and productivity of coffee plants. The benefits of goat manure are not only to provide essential nutrients needed by plants but also to improve soil structure, and this effect lasts until the next growing season.

Goat cages are built in the form of stilts, and holes are made under the cage or dug lower than the ground level to make collecting goat feces and urine more accessible. Goat feces and urine collection is done once a week when cleaning the cage. Then, goat feces and urine can be used as solid and liquid organic fertilizer by letting it sit first. No special activities are issued for producing this organic fertilizer, so the production of fertilizer from goat feces and urine does not require costs. One goat can produce 1.45 kg of feces and 1.15 liters of urine daily. One goat can produce 530 kg of goat feces and 420 liters of goat urine in one year.

Optimization Results the Integrated Farming System of Coffee and Goat

The optimal solution for IFS coffee and goat can be seen in Figure 2, the main products from coffee farming and goat farming are the main potential for earning the respondent farmers' income, and the intermediate products obtained are all used as production inputs for coffee farming and goat farming.

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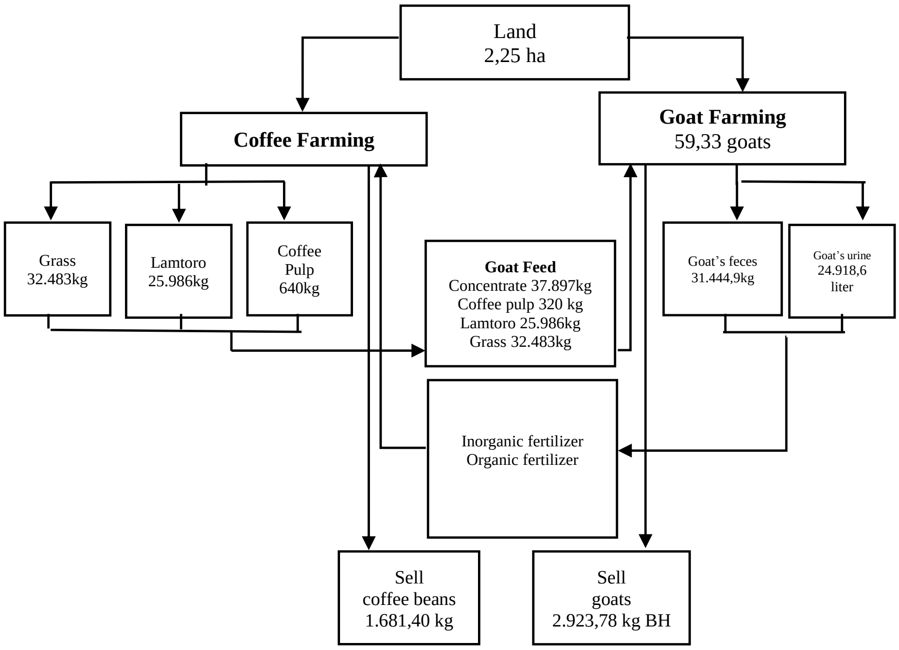

Figure 2. Production flow chart for optimal IFS coffee and goat solutions

Based on the analysis of the optimal income of IFS coffee and goat, there is a difference between the optimal solution income and the actual conditions. The income can be seen in Table 3 is the total income derived from the sale of the main product and the product between coffee farming and goat farming minus the total production costs and wages for labor outside the family from coffee farming and goat farming.

Table 3. Comparison of income of IFS coffee and goat farmers in one year on actual conditions and optimal solutions

Descriptions	Actual Conditions		Optimal Solutions	
	Total (IDR)	Percentage (%)	Total (IDR)	Percentage (%)
Revenue				
Revenue coffee bean	113,850,000	68.88	167,530,410	57.44
Revenue goat	39,750,000	24.05	124,153,850	42.56
Revenue coffee pulp	495,555	0.30	0	00.00
Revenue goat feces	5,600,000	3.39	0	00.00
Revenue goat urine	5,600,000	3.39	0	00.00
Total Revenue	165,295,555	100.00	291,684,260	100.00
Cost				
Cost coffee farming	23,233,333	28.29	48,488,185	39.64
Cost goat farming	3,770,000	4.59	24,100,000	19.70
Labor rent	55,125,500	67.12	49,737,375	40.66
Total Cost	82,128,833	100.00	122,325,559	100.00
Income	**83,166,722**		**169,358,700**	

The optimal solution obtains income 1.04% higher than the income of actual conditions because there was an increase in coffee and goat farming sales. Hence, the total revenue obtained from the optimal solution integration model was IDR

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291,684,260 of which 57.43% came from selling coffee beans and 42.56% came from selling goats. In the optimal solution of the integration model, there is no product market between coffee farming and goat farming because all intermediate products are used as production inputs for each coffee farming and goat farming. However, the integration model's absence of an intermediate product market does not affect its total acceptance. In actual conditions, sales of intermediate products only amounted to 3.39% of total revenue. The product sales results between coffee farming and goat farming have a negligible effect on total revenue, so the total revenue obtained in actual conditions is still less than the total revenue of the optimal solution of the integration model.

Sensitivity Analysis Results

The assumption of deterministic nature in linear programming analysis causes the developed model to be formed in a situation of complete certainty. In reality, certain situations rarely occur. In research by Howara (2011); Setyawan & Utami (2020), the results of a sensitivity analysis which is the optimal solution is to reduce the cost of hiring unprofitable outside-family labor, increase the number of livestock, and increase the utilization of intermediate products.

The sensitivity analysis in the LINDO program used in this study is divided into two parts. The first part analyzes the sensitivity of the values of objective function sensitivity, and the second part contains an analysis of right hand side function sensitivity. A sensitive variable with a minor sensitivity interval will be vulnerable to changes in income. If the production input costs change more or less than that interval, it will cause the optimal income solution to change. Based on the results of the sensitivity analysis of objective function sensitivity, the model in this study has 23 production input cost variables that are sensitive, namely the variables of livestock production costs, the purchase of husk fertilizer, and the purchase of organic cow manure as organic fertilizer.

The sensitivity analysis of the value of the right hand side (RHS) of the constraint shows that RHS value changes interval does not change the value of the dual constraint in question. Based on the sensitivity analysis results, goat feces and urine constraints are active constraints and have a small sensitivity interval. That is, the constraints on goat feces and urine are the constraints that limit the objective function and are the most sensitive to changes in the RHS value. If there is a change in the RHS value so that there is a change that exceeds the sensitivity interval, it will cause the dual price and the optimal solution to change. Labor constraints in the family are passive constraints that have unlimited allowable increases. That is, if the RHS value of the passive constraint is increased to infinity, the dual price for the constraint will still be zero. If the respondent farmer adds RHS, it will only be a waste.

CONCLUSION

IFS coffee and goat, based on available resources, allows farmers to implement it in North Sumatra with the concept of LEISA and zero waste. Based on the analysis of optimal income, the optimal solution income of the integration model is 1.04% higher than the actual income. The optimal solution for the integration model can be increased by increasing coffee bean productivity to 1.68 8 tons.ha^{-1} per year using the simple shade coffee pattern, namely planting coffee with cover crops of 300 trees per ha. Raising goats is an optimal activity that farmers can carry out by utilizing all products between coffee farming in the form of coffee pulp, lamtoro, and grasses as goat fodder and goat livestock products in the form of goat feces and urine used as organic fertilizer for coffee plants. In the optimal solution, there is an increase in the number of goats raised, from the actual condition of 59.33 goats to 117 goats.

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