Applicative Model in Utilizing Mulberry Plant as a Worth Feed Resource for Increasing Farmers' Income

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Abstract

Integration of mulberry plant and livestock can be optimal when implement the applicable management that promote benefits to the farmers, so it can support its sustainability. The aim of this research was to improve farmers' income as well as animal productivity by exploring some applicative models. There were three applicative models which were tested: the P1 Model= introduction of two goats into the silkworm farming system to enable them to utilize mulberry leaves that are not consumed by the silkworms; the P2 Model= Using the whole mulberry plants as feed ingredients for two feedlot cattle; the P3 Model= Selling mulberry leaves produced for concentrate ingredient. Parameter measured was net income generated from each model. Result of the study indicated that integration models of mulberry plant with livestock have their own uniqueness to be applied. The highest income for farmer was obtained when the whole mulberry plant was used as feedstuff for feedlot cattle (the P2 model). Income of Silkworm farmers also increased when applying the P1 model, which introduced two goats for each box of silkworm rose. But in a certain occasion, it was more beneficial for the farmers to harvest and dry mulberry plant then sells it for concentrate ingredient (the P3 model). In conclusion, the main factor to be considered in choosing one particular model to be implemented is mainly determined by ability of the farmers to procure cattle or goat to be raised in the mulberry plant–livestock integration model without ignoring the forecast of dry and rainy seasons.

Keywords: Integration model, mulberry, livestock, income, farmers

Introduction

Utilizing locally available feedstuff can be considered as a strategic and wise choice. The choice is giving a chance to enhance nation self-sufficiency in livestock sector. Mulberry plant as a local feed resource has a potency to be a value feedstuff

due to its potential production, its nutrient content and its well adaptable growth. Estimate production of mulberry leaves could reach 19 tones DM/ha/year, which is higher than the yield of such other legumes as *Gliricidia sepium* with production 7-9 tones DM/ha/year (Horne et al., 1994). Nutrient contents of mulberry are crude protein 22-23%; total sugars 8-10%, minerals 12-18%, ADF 35%, NDF45.6%, hemicellulosess 10-40%, cellulose 21.8% (Datta et al., 2002). Based on the nutrient contents and high production of leaves, it is potential to substitute concentrate in ruminant feeding system (Doran et al., 2006).

An experiment to evaluate the potency of mulberry leaves for substitution of concentrate on rice straw based feeding system has been conducted. The result of the study indicated that 50% of mulberry leaves could be used as the optimum level for substitution of concentrate. This level increased the ruminal bio-fermentation (Syahrir et al, 2009).

A good management in crop-livestock integration should prioritize the benefit for farmer so that it could support sustainable increase in livestock production. Therefore a study on integrated farming system, especially applicative model on the integration of mulberry plants and livestock becomes important. The purpose of this research was to build a management model of the integration of mulberry plant and livestock system in order to increase farmer income and to support sustainable livestock production.

Materials And Methods

The study was carried out in three spots of lands of mulberry plant estate, Enrekang Regency. The size of each land section was approximately 3,000 m^2 (the size is equivalent to an area of a mulberry estate required to raise three boxes of silkworms). Each section of land was assigned to one of the three applicative models of integrated mulberry plant and livestock as treatments. The models were:

The P1 Model = The introduction of two goats into one box of silkworm farming so that the goats can utilize mulberry leaves which are not consumed by the silkworms.

The P2 Model = Replacing the silkworm farming with fattening two beef cattle

The P3 Model = Farmers produce mulberry leaves that will be sold as ingredient for concentrate. The selling price will be adjusted similar to the market price of mulberry leaves.

Field study was conducted for six months consisted of three periods (two periods for raising silkworm and one period for beef cattle fattening). The whole cost used for raising silkworms and for feed supplement (other than mulberry leaves) of the P1 and the P2 models were calculated as the production cost. Similarly, income generated from selling the cocoon and livestock of both models was considered as

the income. Parameters measured were total production cost and income of each applicative model. Data were analyzed descriptively.

Results And Discussion

All of the three models showed certain uniqueness. The selection of one particular model to be applied by farmers will be strongly influenced by each farmer's capital for obtaining cow or goat as well as the season and condition of mulberries. Each of the resulting applicative models is described below:

The P1 Model

This applicative integration model of silkworm farming with goat is intended to maximize the utilization of mulberry. In this integration model, farmers raise silkworms by providing an area of ± 1000 m^2 of mulberry plants.

Some of the mulberry plants were not utilized during the silkworm farming, because farmers always provide an area of mulberry plantation that exceed the necessary amount needed, anticipating a condition of ineffective mulberry plants. In addition, the mulberry leaves left over from feeding on the silkworms are usually available. The introduction of goats for silkworm farmers can optimize mulberry plant utilization, leading to an increase of the farmer's income.

During the 6 months of mulberry farming activity, the introduction of two goats increased the farmer's income by Rp 633,000. This additional revenue almost equals to the main income obtained from sole silkworm farming of Rp 643,667 (Table 1), giving total revenue for the farmers of Rp 1,277,000. Another advantage gained from the introduction of two goats into silkworm farming was the availability of composted manure from goat feces which helped reduce the production cost of mulberry planting.

The P2 Model

Applicative model which replace silkworms with fattening two beef cattle was used by farmers who possess a land of mulberry plants to raise one box of silkworm. The descriptive data can be seen in Table 1, in which during the 6 months of study, when the whole mulberry plant was used as feedstuff for feedlot cattle, the average income for the farmers was Rp 1,833,000. The income was even larger if the cost of grass supplies used to feed cattle which is usually calculated as a maintenance cost of Rp 950,000/farmer, was included as farmer's income.

In addition to the income obtained from the purchase and sale price of the fattening cattle, farmers also benefited from the feces production of the cattle. The feces produced by one beef cattle was approximately 3 kg DM/day, therefore each farmer can acquire more profit from as much as 6 kg DM/day of feces production. This can replace most of the cost of fertilizer used on mulberry plants.

Table 1. The average production cost, gross income, and net income of silkworm farmers applying either the P1,P2, or P3 models

No	Description	Value
The P1 Model		
Main income from silkworm		
	Production cost :	
	- Raising period I (Rp)	128,000
	- Raising period II (Rp)	183,000
	Total cost (Rp)	311,000
	Gross income (Rp)	954,667
	Net income (Rp)	643,667
Additional income from inclusion of goat		
	Production coast:	
	- Price of goat (Rp)	1,666,667
	- Vaccination and medicine (Rp)	100,000
	Total cost (Rp)	1,766,667
	Gross income (Rp)	2,400,000
	Net income(Rp)	633,333
	Total net income (Rp)	1,277,000
The P2 Model		
Cattle fattening		
	Production cost :	
	- Cattle (Rp)	9,066,667
	- Grass (Rp)	950,000
	- Vaccination and medicine (Rp)	100,000
	Total production cost (Rp)	10,116,667
	Gross income (Rp)	12,000,000
	Total net income (Rp)	1,883,333
The P3 Model		
Harvest I	Fresh mulberry leaves production (kg)	526
	Dry mulberry leaves production (kg)	149
	Net income* (Rp)	446,000
Harvest II	Fresh mulberry leaves yield (kg)	973
	Dry mulberry leaves yield (kg)	224
	Net income* (Rp)	673,000
Total production	Fresh mulberry leaves (kg)	1,499
	Dry mulberry leaves (kg)	373
	Total net income (Rp)	1,119,000

*Price of mulberry leaves meal = Rp. 3.000/kg

The P3 Model

The application of the P3 model that involves the production of raw material in the form of mulberry plant biomass by mulberry plant farmers, which will then be sold as feed ingredients for concentrate, is another viable alternative. During the 6 month period of research, the income that farmers gained from the sale of dried mulberry leaves usually used for feeding 1 box of silkworms was Rp. 1,119,000. (Table 1). This result was higher than the income of farmers who solely farm silkworms, which amounted to Rp. 643,667, but slightly lower than the income of mulberry farmers who farm silkworms and also introduced two goats, which amounted to Rp 1,277,000 (Table 1).

The application of the P3 model is effective for farmers who face certain problems which resulted in incapability for them to farm silkworms for a certain period of time. All this time, during the periods where mulberry farmers are incapable of farming silkworms due to certain constraints, the mulberry plants are left to grow and are only trimmed when the farmers are ready to nurture silkworms.

Conclusion

Application of each of the Integration models of mulberry-livestock has its own uniqueness. The conclusions that could be drawn from the application of those three models are:

1. Utilization the whole mulberry leaves as feedstuff for fattening beef cattle (the P2 Model) generates the highest income for the silkworm farmers.
2. Revenue for the silkworm farmers increases when applying the P1 Model, which is introducing two goats for every box of silkworm.
3. When mulberry farmers face a problem particularly in a certain condition, they could harvest and dry the mulberry plant then sell it as ingredient for leaf meal concentrate (the P3 Model).

Reference

Datta RK. 2002. Mulberry cultivation and utilization in India. Di dalam: Sanchez MD, editor. Mulberry for Animal Production. Proceedings of an electronic conference carried out, May and August 2000. Roma: FAO Animal Production and Health Paper 147. hlm 45-62.

Doran MP, Laca EA and Sianz RD. 2006. Foliage (*Morus alba*), alfalfa hay and oat hay in sheep. *J Anifeed Sci* 2006:11.016

Horne PM, Pond KR, Batubara LP. 1995. Sheep under rubber: prospects and research proirities in Indonesia. Di dalam: Mullen BF, Shelton HH, Editor. Integration of Ruminants into Plantation Systems in Southeast Asia p. 58- 64

Singh B, Makkar HPS. 2002. The potential of mulberry foliage as a feed supplement

in India. Di dalam : Sánchez MD. Editor. Mulberry for animal production. Proceedings of an electronic conference carried out, May and August 2000. FAO Animal Production and Health Paper 147. hlm 139-156.

Stewart CS. 1991. The rumen bacteria. Di dalam : Jouany JP, editor. Rumen Microbial Metabolism and Ruminant Digestion. Paris: INRA Editions, Paris. p. 15 – 26.

Syahrir, S., K.G. Wiryawan, O.N. Sari. 2009. Fermentabilitas Pakan Berserat dalam Rumen in vitro yang diberi Eksrak Daun Murbei. Buletin Ilmu Peternakan dan Perikanan Vol. XIII (2) Juli 2009.