# The Effect of Innovation on Increasing Productivity and Goat Farming Income in Cocoa-Goat Integration System

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## ABSTRACT

The productivity and farmers income fromgoats farming is currently low.The aim of this study is to determine the effect of innovation on improving goat productivity and the increase of goat farming income in the cocoa-goat integrated system. This study was conducted at "Andum Rejeki" farmer groupin Banjarharjovillage, Kalibawangsub-district, KulonProgoregency.The number of farmers involved in this studywere 30 people divided into 2 models, namely modelA and B.Each model consisted of 15 people.Model A is a farmer who apply goat farming using innovation, while the technology used in farmers model B based on farmers' experiences, without innovation.Innovations in farmers model A include the use of slatted floor, mating calendars and optimization of goat feed by utilizing cocoa biomass. The variables observed in models A and B were goat productivity. Goat productivity was observed for 7 months (May to November, 2014) using farm record keeping. The productivity of goats between models A and B were analyzed using independent T-test. The income analysis of goat farming was done on each model. The results indicated that the average number of goats for 7 months on model An increased from 4.8 to 5.7 head, whereas in model B the number of goats at the beginning and end was the same, 3.3 head.The birth of a kid for 7months on model A was 1.8 ± 2.1 heads higher than model B of 0.1 ± 0.4 head. Income from goat farming per year on farmer model A (IDR3.34 million) was higher than farmermodel B (IDR0.55 million). The study concluded that goat productivity and income of goats on farmers using innovation are higher than those without innovation.

**Keywords**: goats, income, innovation, productivity

## INTRODUCTION

Goat is one of the ruminantsmany kept by farmers in the village. Goats easily adapt to the environment and are efficient on converting low-quality feed to meat. Goat meat has a distinctive taste when compared with other meat and popular by the community. Goat farming is generally smallholder activity, so that productivity and income from goat farming are still low (Cahyono, 1998). Goats can be a main business for farmers and provide an adequate income, if goats are kept intensive with innovation (AARD, 2005).

Cocoa plantations have an opportunity to develop goat, one of the reasons is the availability of abundant feeding potential of cocoa biomass. Potential cocoa biomass as animal feed is cocoa pod husk, cocoa leaf, cocoa shell bean and cocoa bean cake (Adamafio,

2013).Atharvest time, 60-75% of cocoapod husk is wasted, not optimally utilized as goat feed (Gunawanet al., 2012). Though the cocoa pod husk is one source of good forage for goats (Munieret al., 2009: Puastuti, 2009). Improving the quality of goat feed using cocoa biomass can improve goat productivity and farmer income (Santianandaet al., 2009). Improvement productivity of goats can be done, among others, through the application of mating calendars. The mating calendars contain schedules for when goats are born, when mated again, when kids are weaned and when goats need to be given additional feed during pregnancy or after birth.

Goat farming in cocoa plantations can utilize cocoa biomass to feed goats, while goat manure is processed into fertilizer for the cocoa plant, especially to increase cocoa production and reduce the use of chemical fertilizers (Ismail and Djajanegara, 2004). According to Santianandaet *al.* (2009) in every hectare of cocoa plantations can accommodate about 2-8 goats. Each goat kept on a stage cage in every day produces dry feces of 0.72 kg/head/day and urine of 1.2 liters/head /day (Gunawan and Talib, 2016).Feces and urine separated in the stage cages. Feces are processed into a solid organic fertilizer (SOF), while the urine is processed into liquid organic fertilizer (LOF) and both as fertilizer for cocoa plants. Gunawan and Budisatria (2016) found that the use of SOF of 17 kg/tree/year and LOF of 2 liters/tree/year increased cocoa production by 39-52%.

Based on the above description, it is necessary to conduct a study on the effort to improve goat productivity and to increase the goat farming income on cocoa farmers in KulonProgo through innovation. Innovations in goat farming include the use of slatted floor, mating calendars and optimization of goat feed by utilizing cocoa biomass.

## MATERIALS AND METHODS

### Model and farmers involved

This study was conducted at "AndumRejeki" farmer group, locatedin Banjarharjo Village, Kalibawang Sub-District, KulonProgo Regency. The number of farmers involved in this study were 30 people which divided into 2 models namely model A and B. Each model consisted of 15 people. Farmers are selected by purposive randomly. Model A is farmers who apply goat farming using innovation, while the technology used in farmers model B is the farmers'experience, without innovation.Goats kept by most farmers are Bligon goat for meat. The explanations of models A and B are listed in Table 1.

**Table 1.** Description of the model andinnovation in models A and B

| Description | Model A | Model B |
|---|---|---|
| Model explanation | Farmers model who do goat farming with innovation | Farmers model who do goat farming in the way of farmers, without innovation. |
| Innovation | Goat farming technology uses slatted floor, mating calendars and optimization of goat feed provision by utilizing fresh cocoa pod husk, cocoa leaves and cocoa leaf silage. | Goat farming technology uses ground floor cages, mating arrangement of goats without calendars and goat feed mostly using grass, without harnessing cocoa pod husk and cocoa leaves. |

### Farming income analysis

The income earned by farmers from goat farming in each model was analyzed using farm income analysis according to Soekartawi (1995). The farm income was derived from the

total revenue minus the total cost of the goat farming. This revenue analysis was conducted to determine the magnitude of the increase in revenues caused by innovation.

**Statistical analysis**

The variables observed in models A and B are goat productivity. Observation of goat productivity was done for 7 months (May to November, 2014) using farm record keeping. The productivity of goats between models A and B was analyzed using independent-test. If $t_{count} > t_{table}$ it will indicate that between models were significantly different ($H_o$ was rejected) and if $t_{count} < t_{table}$ it was not significantly different ($H_o$ was accepted).

## RESULTS AND DISCUSSION

**Goat productivity**

Goat productivity in farmers of models A and B is presented in Table 2.The number of goats in A model farmers for 7 months showed an increase (1.0 ± 1.9 head) due to birth of goat (1.8 ± 2.1 heads)from the average number of does of 2.0 head, whereas in model B the number of goats was not increased, due to the birth of goat was low (0.1 ± 0.4 heads) from the average number of does of 1.3 head.The average number of goats on farmers of model A initially (May,2014) was 4.8 head after 7 months (November, 2014) to 5.7 head, whereas in farmers model B the average number of goats at the beginning and end was the same namely 3.3 head.

**Table2.** Productivity of goats raised by the farmers in models A dan B for 7 months

| Description | Model A | Model B |
|---|---|---|
| | ---------- (head/7 months) ---------- | |
| Birth of goats | $1.8 \pm 2.1^a$ | $0.1 \pm 0.4^b$ |
| Mortality of goats | $0.8 \pm 1.1^a$ | $0.0 \pm 0.0^b$ |
| Purchasing goats | $1.3 \pm 0.6^a$ | $0.1 \pm 0.4^b$ |
| Selling goats | $1.3 \pm 2.1^a$ | $0.2 \pm 0.5^b$ |
| Addition | $1.0 \pm 1.9^a$ | $0.0 \pm 0.0^b$ |

[ab]Different superscriptsdenote significant differences between means within a row ($p \leq 0.05$)

The use of mating calendars will optimize the reproductive function of goats.If the does are mated at 1 to 2 months after the birth and weaning of the young goats at 3 to 4 months, the kidding intervalwas 7 to 8 months, so that each of the does can delivery the kids 3 timesin 2 years, according to Azmi *et al.*(2006). In this study, the productivity of each doe on farmer of model A is 0.9 head/year, ideally at least 1.5 head/year. The productivity of the doe can be increased if the mortality of a young goat decreased and ideally the mortality is 5%.

Optimization of feed provision has an effect on optimizing goat reproduction function. Optimizing the provision of goat feed at farmersin model A is done by utilizing cocoa leaves result from pruning of cocoa tree and cocoa pod husk result from harvest. This is not so in farmers model B. The use of fresh cocoapod husk as goat forage average 112 g/head/day approached the previous research result of 110 g/head/day, the use of fresh cocoa leaves of 145 g/head/day also approached the previous research result of 130 g/head/day (Gunawan*et al.,* 2013). Cocoa leaf silage has been used as goat forage on farmers in model A as much as 26 g/head/day as one alternative feed in case of forage difficulty. Utilization of

cocoa biomass as goat forage on farmer in model A is still limited, 283 g/head/day, because the grass is available enough and pruning of cocoa tree branches have not routinely done.

**Goat farming income**

Goat farming income is derived from revenue minus cost (Table 3). Income from goat farming of farmer in model A is increase than model B, partly because the goat sold and goat added value in farmer model A is higher than model B. The result of goat sales is mainly obtained from the sale of goat which has been prepared by farmers for sale on the event of Eid-al Adha. According to Budisatria*et al.* (2008), Eid-al Adha has a significant effect on the marketing of small ruminant, the price of goats sold during Eid-al Adha increased by an average of 1.6 times compared to the normal situation.

**Table3.** Goat farming income per year in farmers models A and B

| Description | Model A | | Model B | |
|---|---|---|---|---|
| | Volume | Value (IDR) | Volume | Value (IDR) |
| Revenue | | | | |
| 1. Goat sales | 2.2 head | 4,400,000 | 0.4 head | 800,000 |
| 2. Addition of goats | 1.7 head | 1,700,000 | 0 | 0 |
| Total revenue | | 6,100,000 | | 800,000 |
| Cost | | | | |
| 1. Purchase of goat | 2.2 ekor | 2,200,000 | 0.2 head | 200,000 |
| 2. The value of the cage shrinkage | 1 year | 500,000 | 1 year | 50,000 |
| 3. Medicines | 1 year | 40,000 | 0 | 0 |
| 4. Feed (rice bran) | 10 kg | 20,000 | 0 | 0 |
| Total costs | | 2,760,000 | | 250,000 |
| Income | | 3,340,000 | | 550,000 |

Note:Goat selling price:IDR 2,000,000 /head, purchase price or addition price:IDR 1,000,000 /head, the value of shrinkage cage: IDR 5,000,000/10 years (model A) and IDR 50,000/10 years (model B), medicines:IDR 40,000/year, rice bran price:IDR 2,000 /kg.

The number of goats maintained by the farmers has an influence on the income of farmers obtained from the goat farming (Suryanto*et al.,* 2007). Budisatria*et al.* (2010) stated that the farmers who keep 4 heads of does have 38% more income than the farmers who only keep 3 heads of does.The results of this study indicate that the income of goat farming per year increased from IDR0.55 million to IDR 3.34 million through innovation include the use of slatted floor, mating calendars and optimization of feed by utilizing cocoa leaves and pod husk.

## CONCLUSION

Innovation in goat breeding has a significant effect on goat productivity and farmer income from goat farming. The birth of a kid to a farmer who uses innovation is higher than a farmer without innovation, especially by the use of mating calendars. The income of goat farming on innovative farmers is also higher than that of farmers without innovation, mainly from the increase of goat addition and higher goat sales.

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