Economic Performance on Small Holder Ettawah Cross Breed Goat Farming at Malang Indonesia

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ABSTRACT

Goat production is an integral part of farming systems in Indonesia and can play an important role in improving livelihood and food security in rural households. This study aimed to assess the economic performance of goat production in Malang regency, East Java Province of Indonesia. Data were collected from a total of 42 farmers using a survey based on structured questionnaire. Indicators for the economic performance of goat production were profit (P), breakeven point (BEP), margin of safety (MOS) and revenue -cost ratio ((R/C ratio). Farmers were classified into three strata, stratum-1 (0.6-1.0 AU, n=15), stratum-2 (1.1-1.5 AU, n=14), and stratum-3 (1.6 -2.1 AU, n=13). Data included primary information (i.e. production cost, revenue) that obtained by survey method using structured questionnaire, whereas the related institution has supplied secondary data. Descriptive technique with applying economic formulation namely, profit, BEP, MOS and R/C ratio were employed to analyze the data. Results show that feed (concentrate and forage) cost shared the highest costs (expenses ranged from 59.36% to 71.15 %.) of the total production costs. Total variable costs per animal unit were lowest (69.57%) in stratum-1 than those in stratum-3 (80.51%) and stratum-2 (80.79%). Stratum-1 therefore, consider as the best BEP of IDR 346, 694/AU during one month period. The monthly revenue per Animal Unit of stratum-2 (IDR 1,038,945) was slightly different compared to sratum-3 (IDR 978,884), with the lowest one (IDR 824,765) come from stratum-1. Hence, stratum-3 ECB for goat enterprise represented as the best feasible farming with monthly profit of IDR 613,768/AU. Likewise, this farming also executed an efficient enterprise on the basis of 62.64% of MOS and 2.68 of R/C ratio. Overall, high feed cost was the major problem that affected goat economic production. Therefore, improvement of feed use efficiency is recommended.

Keywords: economic performance, goat farming, Profit, BEP, MOS, R/C

INTRODUCTION

Goat farming is unlikely a preferred occupation among village community. These farms however still represented as the livelihood alternative in the rural areas besides the others job in the rural areas. These farms have very valuable role in household nutrition and food security. The previous studies have confirmed the important reasons for entering in small ruminant farming. Raising goats require a relatively small acreage land (Gillespie et al, 2016),that offers an effective and feasible way for enhancing livelihoods of the resource-poor people (Dossa et al, 2008) and produce enough household wealth for the succession of the business that associates jobs opportunity, income generation, and development of the rural environment (VieiraI et al, 2009).

Potential reasons for joining the meat goat production associate with lifestyle, farm management, productivity, and economics (Gillespie et al, 2016). Another point of relevance is the fact that this activity can produce enough wealth by the succession of the business which employed more family members, which is an important tool for an increase household earning as well as the development of rural environment (VieiraI et al, 2009). Hence, the economic role of small ruminants become useful for poor rural households that have limited access to credits and have few opportunities for entering off-farm income (Dossa et al, 2008)

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Women have more participation in this enterprise (Gillespie et al, 2016) than men because of the low investment risk and the easier in keeping of goats (Dossa et al, 2008). Moreover, the inclusion of women in the development of need-based technologies and training programs are key factors in an effort to achieve improved goat production, increase food security, and enhance rural livelihoods.

Goat production was profitable in the study area as depicted by the net returns per animal per month of $3.7 (Alex et al, 2013). The income generated is equivalent to a monthly salary of R$ 732.96 (US$ 278.52), which is a competitive income compared to the Brazilian minimum wage of R$ 300.00 (US$ 114.00) paid (Vieira et al, 2009). The work in this activity can allocate the whole family and the economic performance of goat dairying turns smallholdings viable, as it represents more than 85% of the income (VieiraI et al, 2009). On average, the dairy goat enterprise contributed, correspondingly, about 15.2% and 4.8% to the total livestock and overall household income (Ogola et al, 2010).

Improving farmer technological skills would improve agricultural productivity and sustainability (Mafukata, 2015). Furthermore, accessing information on new technologies and better farming practices may help to improve their farming efficiency and productivity (Qushim et al, 2016). Alex et al, 2013 emphasized on technical efficiency especially the farm size and concentrated raising animals in one certain area, while they discovered insignificant association between technical efficiency and sex, education, land size and family size.

Meat goat enterprises can be scaled efficient if their size of operation is more than 60 goats or more than 40 breeding does (Qushim et al, 2016). The combination among crops, fish, duck and goats resulted in the best integration and provided maximum return and employment (Kumar et al, 2012). The dissemination of such integrated farming system models will help in promoting sustainability in agriculture and its allied sectors.

This case study was carried out at Malang regency, East Java Province of Indonesia. In this study area, the Ettawahh cross breed (ECB) farming is unlikely preferred earning among rural society since this farm is considered as the second job. Majority of rural household works on agriculture sector such as paddy field as the primary livelihood. The presence of ECB goat farming however, becomes crucial as alternative job opportunity and income generator among rural community. The little investment and the easier in keeping ECB goats may become the reason for entering in the enterprise. More attention and efforts need to be addressed to maintain, develop, and guarantee the sustainability of these farms. The research therefore, aimed to examine the economic feasibility of the small holder of ECB goat farming through the following indicators namely profit, Break Even Point (BEP), Margin of Safety (MOS) and the Revenue –Cost ratio (R/C ratio) are required.

MATERIALS AND METHODS

The research was held at Argoyuwono village, Ampel Gading Sub-district, Malang Regency of East Java Province. This study area was selected by purposive sampling method based on two criteria. Firstly, this area is known as one of the center of Ettawahh cross breed (ECB) development. Secondly, farmers have long experience (more than 10 years) in raising CEB goats.

Sampling procedure and data collection

Multistage sampling method was applied to select 42 ECB goat farmers. Farmers were classified into three strata based on the number of goat's belongings. They were stratum-1 (0.6-1.0 AU, n=15), stratum-2 (1.1-1.5 AU, n=14), and stratum-3 (1.6 -2.1 AU, n=13). Animal Unit (AU) for goats was calculated based on their age. First, goats aged less than 6 months equals to 0.035 AU. Second, goats aged 0.5-1 year equals to 0.07 AU. Third, goats aged more than 1 year equals to 0.14 AU.

Data included Primary and secondary information about ECB goats farming during one-year period. The study utilized a structured questionnaire required as instrument for

interviewing respondents in order to obtain primary data, for instance production cost, revenue from rearing ECB goat farming. Several institutions including Department of Animal Husbandry, Central of Statistics, Local Government, and related institutions have provided the secondary data.

Economic performance of goat production

The economic performance of goat production was evaluated on the basis of profit (P), breakeven point (BEP), margin of safety (MOS) and revenue -cost ratio ((R/C ratio). All monetary values of inputs and outputs are given in Indonesian Rupiah (IDR) with the exchange rate of 1 USD = IDR 13,500 at the time of the study (year 2017). The total costs and total revenues were calculated on yearly, monthly, and daily basis. The calculation of costs, revenues and economic parameters per farm household used similar unit cost namely animal unit (AU). One animal unit (AU) equals with seven (7) heads of mature goats or 14 heads of young goats or 28 heads of kids.

Statistical analysis

Two analysis methods consisted of descriptive and economic equation to analyze the data. Firstly, the application of descriptive technique addressed to identity the characteristics of smallholder goat farmer. In addition, the implementation of the economic formulation proposed to examine the economic performance of the small holder goat farming. The economic formula covered the production cost, revenue, profit, Break Even Point (BEP), Margin of Safety (MOS) and Revenue–Cost ratio (R/C ratio).

The production costs consisted of fixed costs and the variable expenses which are required to yield goat products. The fixed expenditure included (i) hiring permanent labor, (ii) land rent, and (iii) the following depreciation namely goat, housing, housing equipment and vehicle. The variable costs involved (i) concentrate feed, (ii) forage feed, (iii) medicine and herbal, (iv) electricity, (v) transportation cost and (vi) the petrol expenses. The revenue of small-scale goat farming was ranged from goat kids' production, sell live animal, selling goat milk, sell excreta, to the return of wood by product. The farm income is defined as the total revenue minus total production costs.

Break-even analysis provides a simple method for measuring profits and losses at different levels of output. Break-even point (BEP) explains the minimum revenue that meet the value of the resources required for goat production. In the circumstances, where no profit and neither loss nor the farm obtains zero profit. Margin of safety (MOS) refers to the excess of sales over the break-even point. MOS can explain the level by which sales can fall before obtaining the BEP. The margin of safety can be counted in units, IDR or percentage. The R/C ratio refers to the comparison between total revenue and total cost. The value of R/C ratio can be used to determine the level of farm efficiency. The efficient farming should have more than one of the values of R/C ratio (R/C ratio >1). In contrast, the valuing less than one of R/C ratio (R/C ratio < 1) explained inefficient enterprise. The break-even farm will exist when the value of revenue equal to the production costs.

RESULTS AND DISCUSSIONS

Socio-economic characteristics of goat farming household

Generally, male (97.60%) and married (92.80%) respondents were more dominant among small scale ECB goat farmers. They aged 15-64 years (92.80%) with the primary school attainment which is counted for about 74%. The farmer's education level can utilize particularly in accessing new technology and even the easy to adopt it for enhancing the ECB goat farming. Moreover, majority of farmers (62%) also had quite long experience in rearing goat, approximately 10-20 years. The length of experience in operating farm can result in the capability of solving the problems that may exist in their enterprise.

More than half farmers (52%) involved in the large family members. This is quite often the more family labor devoted their time in

running the goat farming. The more time allocated in daily work to operate this farm can save the expenses of hiring the permanent labor. In this study area, goat farming represents as secondary job for farmers in the three strata. This evident implies that agriculture sector has predominant as the primary livelihood. Therefore, farmers give more attention in developing this paddy field rather than improving the more return from the goat farming.

Production costs of small-scale ECB goat farming

Overall, total monthly production cost per animal unit (AU) was more efficient, about IDR 346694, among goat farming in stratum-1 in comparison with IDR 3666116 and IDR 446117 in stratum-3 and stratum-2, respectively (Table 1). A similar trend appears for the proportion of variable costs. There is about 69.57% for stratum-1, 80.51$ for stratum-3 and 80.79% for stratum-2.

Table 1. Production costs of small scale ECB goat farming monthly

Production Costs	Stratum-1 (n=15)		Stratum-2 (n=14)		Stratum-3 (n= 13)	
	Number (IDR/AU)	Percenta ge	Number (IDR/AU)	Percenta ge	Number (IDR/AU)	Percenta ge
A. Fixed Cost						
1. Permanent Labour	37037	10,68	25641	5,74	17544	4,79
2.Land rent	2676	0,77	4121	0,92	3036	0,83
3. Depreciation of						
a.Goat	22963	6,62	20696	4,63	21019	5,74
b. Housing	20991	6,05	19261	4,31	21480	5,87
c.Housing Equipments	3704	1,07	2885	0,65	2159	0,59
d. Vehicle	18133	5,23	13164	2,95	6115	1,67
Total Fixed Costs	105503	30,43	85768	19,21	71354	19,49
B. Variable Costs						
1. Concentrate feed	5787	1,67	6429	1,44	6748	1,84
2. Forage feed	200000	57,69	304945	68,28	255061	69,67
3. Medicine and herbal	4630	1,34	3846	0,86	3509	0,96
4.Electricity	338	0,10	519	0,12	616	0,17
5.Transportation costs	343	0,10	13164	2,95	6115	1,67
6. The petrol expenses	18519	5,34	23901	5,35	11750	3,21
7. Daily worker	11574	3,34	8013	1,79	10965	2,99
Total Variable Costs	241190	69,57	360817	80,79	294762	80,51
C. Total Production Costs	346694	100	446584	100	366116	100

Note: Stratum-1: 0.6 -1 AU; stratum-2: 1.1 =1.5 AU; stratum-3: 1.6-2.1 AU
1AU equals to 7 heads of mature goat or 14 heads of young goat .

There is a lower number (IDR 346,694) observed for small scale goat farming in stratum-1 compared to those of stratum-3 (IDR 366,116) and stratum-2 (IDR 446,584) per AU in monthly basis. It confirms that farmers in stratum-1, having less than one animal unit, have a good management in raising the ECB goat.

The length of experience ranging 10-20 years in rearing goat may also support this finding. However, stratum-2 has efficiency in the fixed cost, about 30.21%, compared to 19.49% for stratum-3 while the more expenses of 30.43% come from stratum-1.

Table 1 describes that feed expenses is very costly, and it increase in line with the more number of ECB goat owned by the farmers. In particular, the forage feed need more expenses, ranged from 57.69% to 69.67%. Farmers in stratum-1 indicate efficiency in utilising fodder and it cost about IDR 200,000 per animal unit in monthly basis. This is followed by stratum-3 (IDR 255,061) and stratum-2 (IDR 309,945). In contrast, stratum-2 used less concentrate feed, about IDR 6,429 (1.44%) than stratum-1 and stratum-3, IDR 5,787 (1.67%) and IDR 6,748 (1.84%), , respectively. The lowest variable expenditure however, appears for electricity and its value is going up as the goat number increased. Table 1 shows that it is ranging from 0.10%-0.17% of total production cost. Stratum-1 has the efficient expenditure of electicity of IDR 338 (0.10%) in comparison with stratum-2, IDR 519 (0.12%) and stratum-3, IDR 616 (0.17%) for.

The fixed cost per animal unit during one month decrease as ECB goat number increased. It was ranging from 19.29% to 30.43%. The less fixed expenses come from stratum-2 with the proportion of 19.29% which followed by 19.49% for stratum-3 and 30.43% for stratum-1. A similar trend was on the permanent labour salary with the proportion between 4.79% and 10.68%. The lowest worker salary is about IDR 17,544 (4.79%) for stratum-3, then inclining into IDR 25,641 (5.74%) for stratum-2, and IDR 37,037 (10.68%) for stratum-1. The little

number of fixed costs is the depreciation of housing equipments with the proportion between 0.57% - 1.07%. Likewise the wages of permanent employment inclination, the depreciation of the expenses of pen instruments will reduce as the more number of ECB goat controlled by the farmer. Its cost is about IDR 2,159 (0.57%) for stratum-3, then climbing to IDR 2,885 (0.65%) for stratum-2, and finaly increasing to the higher value of IDR 3.704 (1.07%) for stratum-1.

Revenue of small-scale ECB goat farming

The revenue of smallholder goat farming involves kid production, selling live animal, sell of goat milk, the return from excreta and the wood by products (Table 2). The ECB goat farming in stratum-2 presents the highest revenue, about IDR 1,038,945 per AU, during one month period, compared to IDR 979,884 and IDR 824,765 for stratum-3 and stratum-2, respectively.

Selling goat occupied the highest contribution to total revenue, correspondingly 45.31% for stratum-2, 43.42% for stratum-3, and 41.84% for stratum-1. The kid production also play an important role as the second contribution to the total revenue of ECB goats farming with the greatest value come from stratum-1 about IDR 288,889 (35.03%) and followed by IDR 335,789 (34.27%) for stratum-3 and IDR 323,846 (31.17%) for stratum-2

Profit of small-scale ECB goat farming

Figure 1 explains the highest to the lowest profit achievement per AU in monthly basis which started by IDR 613,768 for stratum-1, IDR 592,828 for stratum-2, and IDR 478,071 in stratum-3. This invention implies that small scale ECB goat farming represents the profitable venture in rural areas. This farm becomes interesting enterprise when farmers have raised 0.6-1 AU ECB goats. This corporate with the study of Alex et al. (2013) that a greater number of adult animals can reduce their technical efficiency as well as the returns per animal unit.

Table 2. Revenue of small scale ECB goat farming in monthly basis

Revenue	Stratum-1 (n=15)		Stratum-2 (n=14)		Stratum-3 (n= 13)	
	Number (IDR/AU)	Percentage	Number (IDR/AU)	Percentage	Number (IDR/AU)	Percentage
1. Kid production	288889	35,03	323846	31,17	335789	34,27
2. Sell live animal	345062	41,84	470696	45,31	425472	43,42
3. Selling goat milk	54167	6,57	60721	5,84	62961	6,43
4.Selling excreta	56648	6,87	61703	5,94	53637	5,47
5.Selling wood by products	80000	9,70	121978	11,74	102024	10,41
Total Revenue	**824765**	**100**	**1038945**	**100**	**979884**	**100**

Note: Stratum-1 : 0.6 -1 AU; stratum-2 : 1.1 =1.5 AU; stratum-3 : 1.6-2.1 AU
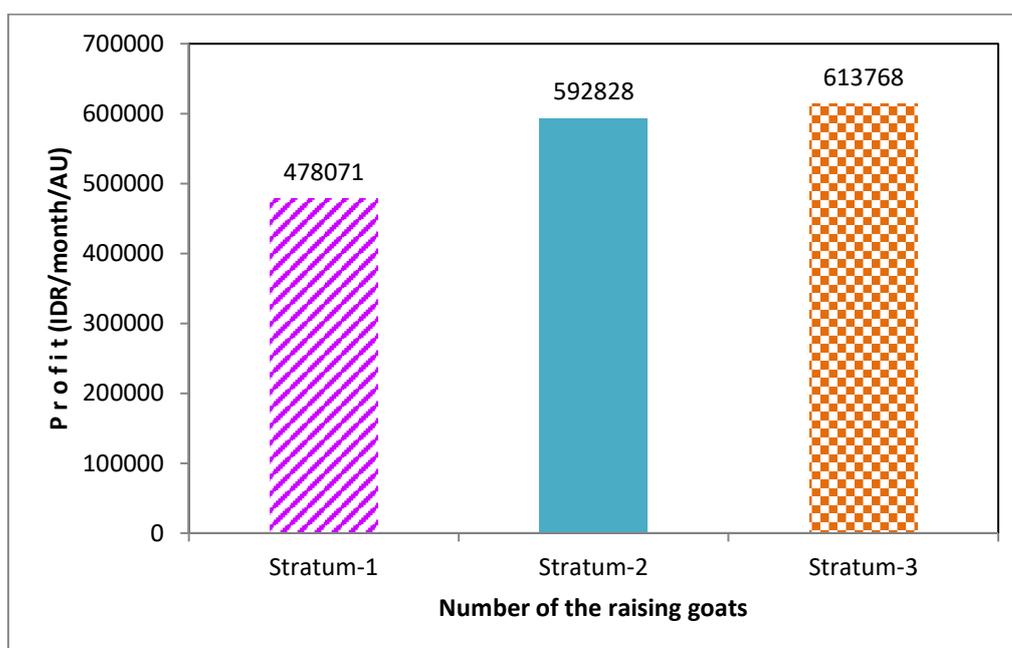

Figure 1. Profit of small scale ECB goat farming

The most income in stratum-1 has associated with the efficiency in the feed expenditure. For instance, farmers fed the goats using forage surrounding garden or coffee plantation, and even, they rarely offered concentrate feed. All of those can save more feed cost. Furthermore, family members have more involved in the cattle farming activities, and thereby less expenditure in labour salary.

Break Even Point (BEP) of small-scale goat farming

The small holder of ECB goats farming is likely to have the skewness value in the break even point (BEP) as seen in Figure 2. The production cost is revolving between IDR 346,694 and IDR 446,584 for producing one animal unit of ECB goats for one month period. In regard to BEP, farmers in   stratum-1 demonstrate efficient farm in rearing ECB goats

compared to those in stratum-3 and stratum-2. The lowest one Animal Unit (AU) break-even point in stratum-1 was IDR 346,694 than those of IDR 366,116 for stratum-3 and IDR 446,584 for stratum-2. It means that IDR 346,694 return only is required to cover the production cost per one Animal Unit ECB goat especially for stratum-1. However, farmers provides more expenses, about IDR 366,116 (stratum-3) and IDR 446,584 (stratum-2), to meet the monthly production cost for one AU of ECB goat.
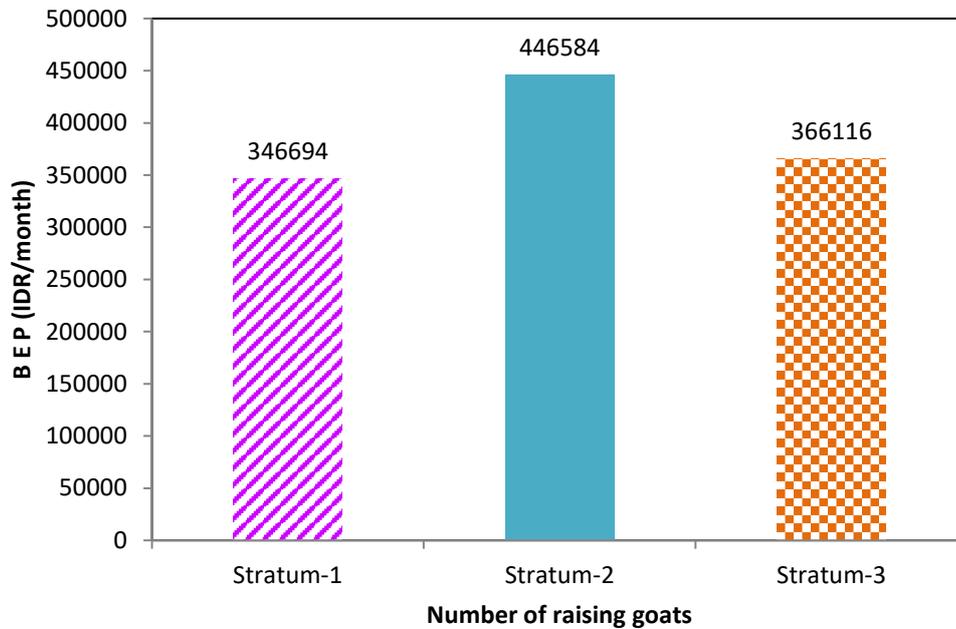

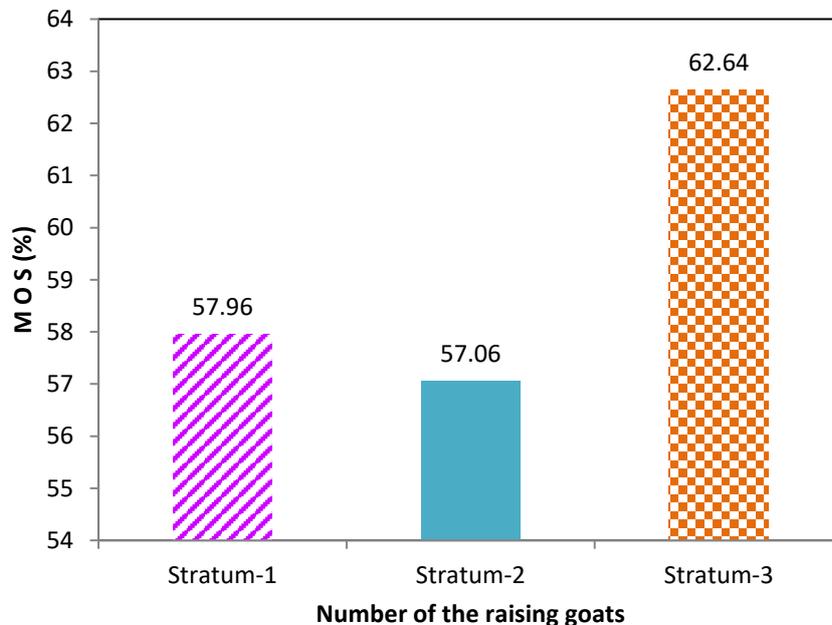Figure 2. BEP of small scale ECB goat farming

Figure 3. MOS of small scale ECB goat farming

Margin of safety (MOS) of small-scale ECB goat farming

Margin of safety of small-scale ECB goat farming ranged from 57.02% to 62.64% as seen

in Figure 3. Generally, farmers in stratum-1, stratum-2, and stratum-3 still in the break even when the goat farming revenue decrease up to 50 %. The more safe farming is presentted in the goat farming of stratum-3. It figures that farmer's still has zero income when the revenue decreased to 62.64% (IDR 478,071) per animal unit in monthly basis.

Stratum-1 and stratum-2 performed quite similar MOS corresponding of 57.96% and 57.02 %. The lowest one Animal Unit (AU) Margin of Safety in stratum-2 can interpret that the dropping revenue has allowed about IDR 592,828 only to put this farm in the safety position. Similarly, farmers in stratum-1 obtained no profit and avoided loss, where the farm revenue has reduced up to IDR 478,034 (57. 96%).

R/C ratio of small-scale goat farming

The comparison between revenue and the production cost of small scale ECB goat farming describes somewhat high value ranged 2.33 to 2.68 (Figure 4). The best R/C ratio occurs in stratum-3 which obtains up to 2.68. It can be interpreted that every IDR 1,000,000 of expenses will provide IDR 2,680,000 of revenue, and therefore, IDR 1,680,000 of income. This finding is supported by the fact that the farmer's education level can utilize particularly in accessing new technology to make a good management in rearing goats. Hence, they become efficient in production cost and even improve the farming revenue of the ECB goat farming.

In contrast, the lowest R/C ratio (2.33) exist in stratum-2. It can be interpreted that every IDR 1,000,000 expenditure in operating the ECB goat farming will able to obtain approximately IDR 2,330,000 of revenue. The inefficient feed management followed by farmers impact on the high expenses of forage feed (68.28 %). Moreover, the kid productions contribute smaller proportion toward the total revenue.
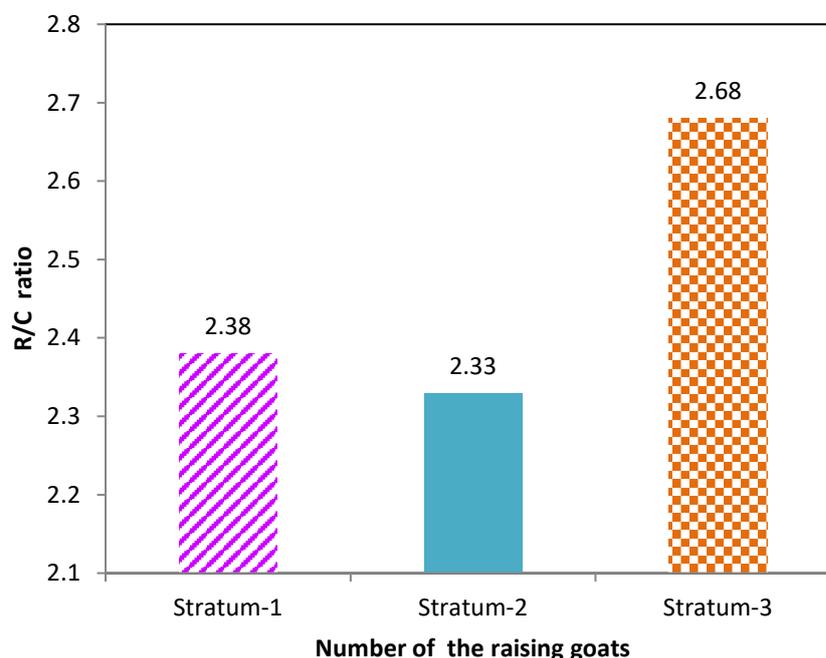

Figure 4. R/C ratio of small scale ECB goat farming

CONCLUSIONS

This study found differences in the costs and revenues of the Ettawahh cross breed goat farming among the three strata namely stratum-1 (0.6-1.0 AU), stratum-2 (1.1-1.5 AU), and stratum-3 (1.6 -2.1 AU) which detailed the following inventions.
1.   Feed (concentrate and forage) shared the highest costs (expenses ranged from 59.36% to

71.15%.) of the total production costs. Total variable costs per animal unit were lowest (69.57%) in stratum-1 than those in stratum-3 (80.51%) and stratum-2 (80.79%). Stratum-1 therefore, considered as the best BEP of IDR346, 694/AU during one month period.

2.   The monthly revenue per Animal Unit in stratum-2 (IDR 1,038,945) was slightly different compared to sratum-3 (IDR 978,884), with the lowest one (IDR 824,765) come from stratum-1. Hence, stratum-3 ECB goat enterprise represented as the best feasible farming with monthly profit of IDR 613,768/AU.

3.   Likewise, this farming in stratum-3 also executed an efficient enterprise on the basis of 62.64% of MOS and 2.68 of R/C ratio.

SUGGESTION.

Generally, high feed cost is the major problem that affected goat economic farming. Therefore, improvement of feed use efficiency is recommended.

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