BREAK EVEN ANALYSIS OF POULTRY EGG PRODUCTION IN RURAL AREA IN SOUTHEAST SULAWESI

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ABSTRACT

This research aimed to analyze break-even point and margin of safety of poultry egg production in the rural area in Southeast Sulawesi. The research used a case study approach by using questionnaire1, in-depth interviews, and observation to collect data and information from a small-scale poultry egg producing enterprise which was selected purposively with the consideration that the farm is located in rural area and had less than 1.000 laying hens. Data were analyzed using costs and returns, break-even point, and margin of safety ratio. Research results show that the enterprise record net income of Rp9.232.165,00. R/C ratio of 1,32 means that the enterprise would earn a revenue of Rp1,32 for every one rupiah it invested. Break even sales are Rp3.374.474,00 and break even volume was 140,60 kg. The egg production is far above both the break-even sales and units, meaning that the enterprise earns a profit from egg production. The margin of safety is Rp34.750.526,00 or 91,15%, indicating a high level of safety in the enterprise. In view of its profitability and the importance of poultry egg production in the generation of employment and fulfillment of protein needs of the population, local government and other stakeholders are suggested to take measures to promote poultry egg production in rural areas by providing technical assistance program for small-scale poultry farmers at the community level and improving managerial skills in the poultry egg production.

Keywords: break even analysis, egg. poultry, production, rural area

INTRODUCTION

Livestock is one of Indonesia's strategic commodities. However, its production level is inadequate to meet domestic market demand. In addition, the average Indonesian consumption of animal food is only 76 kcal, which is far below the required level of 264 kcal to support the nutrition and health requirements for developing high-quality human resources (Government of Indonesia and FAO, 2009). One of the fastest means to meet the gap is the poultry egg industry, which can provide high quality, nutritious food. Eggs out-rank chicken, beef and soy in terms of protein quality, and egg-white protein has a biological value of 100, the highest biological value of any single protein (Layman & Rodriguez, 2009). In addition to domestic consumption in households, eggs are used in confectionery, bakery products, ice cream, and cosmetics (Tijani *et al*., 2006). In Indonesia, consumption of layer egg is 6,5 kg per capita per year (Ditjen PKH, 2013), which is far below annual per capita consumption of egg in Brunei (14,1 kg) and Malaysia (11,9 kg) (Bondoc, 2009).

In addition to providing high-quality, nutritious food, the poultry egg industry is a potential agricultural business as a source of income and livelihood. In line with the increase in the number of population, education level, awareness of nutrition and its roles in the human body, and the purchasing power of the community, there is growing demand for eggs (Candra *et al.*, 2015). In addition, poultry egg production is attractive because it has a quick capital turnover.

Nevertheless, egg production is facing some problems such as high cost of feed, outbreaks of diseases, and marketing is sues. Because of these problems, new producers found it hard to start a business, and existing producers were difficult to expand or to earn an optimum profit (Nmadu *et al*., 2014; Khaleda, 2013). To be profitable, it is essential to provide optimal utilization level of capacities which are determined by many factors, especially the costs and their structure (Beierlein *et al*., 2014).

In Southeast Sulawesi, the layer egg production reached 1.405 tons in 2013. This level of production was not enough to meet the need for egg consumption, so the province had to procure as many as 2,83 million eggs from other provinces in 2013, mainly from South Sulawesi (Ditjen PKH, 2013). The data indicated that poultry egg industry has not been commercially developed in the province. There are only limited number of layer farms, and almost all of them are located in the areas close to provincial and district capitals. researchers, the number of small-scale layer farms with less than 1,000 laying hens, which might be appropriate for rural areas, is very limited. Studies about the profitability of the egg production in layer farmers in surrounding the provincia l capital of Southeast Sulawesi (Isra, 2011; Endang, 2012; Aisah, 2015) had been conducted, but those conducted on layer farms in rural areas are lacking.

In addition to the above mentioned problems, lack of technical understanding of the rearing method of layers and its profitability could be the reasons for such underdevelopment of poultry egg industry. It is against this background that the current study was conducted with the aim to examine break-even point and margin of safety of a small-scale layer farm in the rural area in Southeast Sulawesi. This work will be useful for formulating policies and promoting investment leading to an increased level of egg production and thereby bridging the gap between the demand and supply of eggs in the province. Information from this study will be useful for farmers or micro entrepreneurs to establish and/or manage their poultry egg production enterprises more efficiently and may lead to a better productivity to earn higher profits.

METHODS

This research used case study approach to allow an in-depth analysis of conditions of a specific enterprise over a particular period. The research was carried out in December 2014 in a small-scale egg production enterprise "CV X" in Oempu Village, Tongkuno Subdistrict in Muna District. Oempu Village is situated 72 km from Raha, the capital of Muna District, which is located on Muna Island. Tongkuno subdistrict has a land size of 440,98 km^2 and in 2014 has 15.290 inhabitants. The major economic activity of the inhabitants is agriculture. The main crops grown are cashew, root crops, and other secondary crops. Like any other areas in Indonesia, the subdistricthas a

tropical climate marked by dry and rainy seasons.

The sample layer farm was selected purposively with the consideration that the farm is located in rural area and had less than 1.000 laying hens, which is included in a small-scale category. Most egg production enterprises are managed intensively with laying hens more than 5.000 (Triana *et al*., 2007; Tugiyanto *et al*., 2013; Deruli *et al*., 2015; Candra *et al*., 2015; Rembet *et al*., 2013; Eviana *et al*., 2014). The data were collected during November and December 2014 through observation and the use of a structured questionnaire and in-depth interview with the owner and staff at the enterprise. In the layer budget, current prices were used to determine costs and returns from physical inputs and outputs.

Data were analyzed using costs and returns, break-even analysis, and margin safety ratio. Costs and returns analysis was used to determine the profitability of poultry egg production in the study area. The analysis used the relationships $I = TR - TC$ and $TC = TVC + TFC$, where I is the net income, TR is the total revenue, TC is the total cost, TVC is the total variable cost and TFC is the total fixed cost.

Break-even analysis was used to estimate the break-even output for poultry egg farmers in the study area. The formula for estimating the required output to break even according to Saediman *et al*. (2014) is as follows:

$$\text{Break Even Point (Rp)} = \frac{\text{Fixed Cost}}{\left(1 - \dfrac{\text{Total Variable Cost)}}{\text{Total Revenue}}\right)}$$

The margin of safety indicates the difference between the total output and the output at the break-even point (Reddy & Ram, 1996). In this regard, the margin of safety will be calculated as a percentage

RESULTS AND DISCUSSIONS

The sample layer farm was established in 2011 on the own land of 2 ha. The owner is only a Senior High School graduate but has had sufficient experience in poultry egg production as he had been working previously in other layer farms. Poultry egg production has become his primary source of income.

With the capacity of 600 laying hens, the total cost of production during two months was Rp28.892.835,00. Variable costs amounted to Rp28.032.000,00 and fixed costs account ed for Rp860.835,00 which were equivalent to 97,02% and 2,98% of the total cost, respectively. Variable costs consist of feed, medication, electricity, fuel, and other costs. Fixed costs consist of chicks, electrical installation, water pump, and depreciation of building, facilities, and equipment. The labor cost for two persons was not included in the cost as they were family labors. Depreciation cost was calculated

using straight-line method over the estimated life of depreciable assets. Depreciation was calculated from poultry house, battery cage, feeding shed, feed storage and DOC house, and supply and equipment.

Table 1 shows details of production costs for two months. The cost of feed had the greatest share (76%) of the total cost of production. This is in line with the findings of Olagunju (2007), Adepoju (2008), and Nmadu *et al.* (2014) that the feed cost was the major important cost element in poultry egg production. The enterprise used the feed from maize and K9 concentrate, which was provided twice a day at 10 am and 1 pm. The medication was used to provide the vaccine, vitamin, and medication to prevent diseases. Although the cost of medication was not significant, its use can save the farm from major losses associated with disease. The enterprise used gasoline as fuel, but the main power supply was obtained from State Electricity Company (PLN). The enterprise used separate installation for its electricity supply. The miscellaneous cost consisted of costs for plastic bags, repair, and maintenance, among others.

For the management practice, the farm used battery cage system to rear birds. In this regard, laying hens were housed in multi-tiered battery cage made from bamboo. The use of battery cage, according to Amos (2006), it provided easy collection of eggs, supply of water and feed, and safety of the eggs. The farm relied mostly on commercial feed for which they had little or no control over the quality and cost. The enterprise used family labor, so the labor cost was not included in the cost calculation.

The enterprise had 600 laying hens with the production of 450 eggs each day. That was meant that the percentage of the most productive layers was 78,6%. As Table 2 shows during the two month period of October and November 2014, the egg produced amounted to 27.150 eggs or 1.597 kg. Within those numbers, the amount of cracked eggs was 488 eggs or 29 kg which was 1,8% of the total produced eggs. With the price of egg of Rp24.000,00 per kg (and Rp17.000,00 per kg for cracked eggs) the total revenue was Rp38.125.000,00. This was earned from sales of eggs and cracked eggs. The sales of spent layers were not included because there were no such sales during the two-month period of the study.

The income, break-even point, and margin of safety ratio are shown in Table 3. During two months, the enterprise obtained a net income of Rp9.232.165,00. This indicates that poultry egg production is a profitable business in the study area. The results of the analysis showed that R/C ratio was 1,32 meaning that the enterprise would earn a revenue of Rp1,32 for every one rupiah it spent. This favorable R/C ratio is consistent with the findings in many studies about the profitability of egg production such as Halim *et al.* (2007), Tugiyanto *et al.* (2013), Candra *et al.* (2015), Eviana *et al.* (2014), and Deruli *et al.* (2015).

Break-even point is the point at which cost and revenue are equal: the producer generates neither a profit nor a loss from its operational activities. During two months, the enterprise recorded a break-even point of Rp3.374.474,00. By dividing this BEP in sales with the selling price of output, BEP in units is obtained at 140,60 kg. The enterprise production was far above both the break-even sales and units, meaning that the enterprise earned ed a profit from egg production. Further, for the sake of improving the sustainability of the enterprise, the BEP value can be used to find out the soundness of the proposed budget and to evaluate new proposal and alternatives.

The margin of safety for an enterprise is defined as total sales minus the break-even sales, which shows how much sales can decline before losses will occur for the enterprise. The margin of safety was Rp34.750.526,00 or 91,15%. This is very high margin of safety ratio indicated that poultry egg business was highly safe. In other words, the enterprise has the shock-absorbing capacity in the case of fluctuation in returns due to any unpredictable conditions. The general results show that the poultry egg production enterprise is highly profitable and economically viable in the study area.

The profitable poultry egg production in the sample enterprise deserves the attention of policymakers and other stakeholders. This is because of the distant location of the sample enterprise, which is very much similar to the rural settings in the province. While the enterprise does not find any issues with the marketing of outputs due to the high demand of egg, it depends on industrial feed and chicks, as well as medicines and vaccines, which should be procured from Surabaya in East Java and Makassar in South Sulawesi. The study area is located on Muna Island, so the input materials will need to be transported over the air to Kendari, the provincial capital, and then over sea and land to the enterprise location. Transport distance imposes stress on chicken and may sometimes lead to deaths. In fact, the long distance from sources of quality input materials mean higher prices and risks, so the ability of the sample enterprise to cope with such constraints in the supply of input materias may provide lessons for other micro entrepreneurs who want to enter or establish poultry egg business.

Actually, the poultry egg production is already one of the popular activities in the rural area with the raising of free-range native chicken (*ayam kampung*), but it is still done in subsistence or traditional ways. The usual method is to let the native chicken find food and water by themselves leading to low egg production and high mortality rates. On the other hand, commercial layer farm requires much higher technology and management (Ames & Ngemba, 1986). In this regard, the findings of this study revealed the need to promote commercial poultry egg production since it is profitable, generate employment, and provide quality food; poultry manure may also be used as a source of plant nutrients and as a soil amendment. Nevertheless, for this to be successful, there is a need to take into account some very common problems of the subsector.

As pointed out by Khaleda (2013), the common problems associated with poultry egg production are related to the supply of input materials, inadequate support services, production and profit, and occurence of diseases. Inadequate support services include lack of access to formal financial institutions to get a loan, and lack of extension activities and training programs on poultry egg production. On the farmer side, the unavailability of skilled and trained workforce, inadequate management ability, lack of education and lack of knowledge of modern technology make them unable to maximize production and make a profit.

Table 1 Production Cost for Two Months
in Poultry Egg Producing Enterprise

No	Cost Items	Amount (Rp)	Percentage (%)
	A. Fixed Cost		
1.	Depreciation		
	a. Poultry house	407.556,00	1,41
	b. Battery cage	95.238,00	0,33
	c. Feeding shed	36.889,00	0,13
	d. Feed storage and DOC house	166.667,00	0,58
	e. Supplies and equipment	94.236,00	0,33
2.	Electricity installation	31.250,00	0,11
3.	Property taxes	12.333,00	0,04
4.	Chicks	16.667,00	0,06
	Sub-total	**860.835,00**	**2,98**
	B. Variable Cost		
1.	Feed	21.960.000,00	76,0
2.	Medication and services	2.322.000,00	8,04
3.	Electricity	350.000,00	1,21
4.	Fuel	1.400.000,00	4,85
5.	Miscellaneous	2.000.000,00	6,92
	Sub-total	**28.032.000,00**	**97,02**
	Total cost	**28.892.835,00**	**100**

Table 2 Production of Eggs in Two Month Period (Oct-Nov 2014)

No	Description	Production (egg)	Production (kg)	Price (Rp/kg)	Revenue (Rp)
1	Eggs	26.662	1.568	24.000,00	37.632.000,00
2	Cracked eggs	488	29	17.000,00	493.000,00
	Total	**27.150**	**1.597**		**38.125,000,00**

Table 3 Net income, R/C Ratio, BEP and Margin of Safety
for the Two-Month Period

Items	Amount (Rp)
Total Revenue (Rp)	38.125.000,00
Total Cost (Rp)	28.892.835,00
Net Income (Rp)	9.232.165,00
R/C Ratio	1,32
BEP (Revenue, in Rp)	3.374.474,00
BEP (Production Volume, in kg)	140,60
Margin of safety ratio (Revenue, in Rp)	34.750.526,00
Margin of safety ratio (%)	91,15

CONCLUSIONS

This article analyzed break-even point of poultry egg production in a rural area in Southeast Sulawesi. Research results showed that the share of fodder costs in egg production amounted to 76% to the total cost. For the period of two months, the enterprise recorded a total revenue of Rp38.125.000,00 the total cost of Rp28.892.835,00 and net income of Rp9,232,165,00 R/C ratio of 1,32 meant that the enterprise would earn a revenue of Rp1,32 for every one rupiah it invested. Break even point was Rp3.374.474,00 or 140,60 kg. The egg production was far above both the break even sales and units, meaning that the enterprise earned a profit from egg production. The margin of safety ratio was Rp34.750.526,00 or 91,15%, indicating a high level of safety in the enterprise. The general results show that the poultry egg production in rural areas is a profitable business. The local government is suggested to promote the development of poultry egg production in rural areas since it is profitable, supports the fulfillment of protein needs of the population, and generates employment. Poultry manure may also be used as organic fertilizer to improve soil fertility and increase plant productivity. The local government can take such efforts as improving access to credit from the formal banking sector, providing technical assistance program for small scale poultry farmers at the community level, and improving managerial skills in the poultry egg production. Future researches need to focus on the constraints for the adoption and expansion of commercial poultry egg production in the province.

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