Profile and business performance of people's laying ducks in Harapan Mulya II farmers' group in Bekasi Regency of West Java Province

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Abstract. One of the many farm enterprises in urban and rural locations is raising ducks. Duck farming provides both a source of income and a source of animal protein in the form of meat and eggs. This study aims to evaluate the performance and analysis of the laying duck business in the Pahlawan Setia Village, Tarumajaya District, Bekasi Regency, West Java Province. The study was conducted in the Harapan Mulya II Farmer Group. Surveys and in-depth interviews were used in the investigation. It was found that there are two main types of farmers in the duck industry: large-scale farmers with flocks of 1,000–2,000 ducks and small-scale farmers with herds of 25–100 birds/household flocks. The feed ingredients are primarily rejected bread and shrimp processing wastes (SPW); the average production rate is between 40 and 55 per cent. One of the feed formulations used is 42.86% SPW and 57.14% rejected bread; the feed price was IDR 1,800/kg. It was found that the R/C value for the small-scale farmers was 1.42 and 1.31 for the large-scale. It can be concluded that the laying duck business in the Bekasi Regency region is fruitful and worthwhile.

1 Introduction

Ducks in Indonesia are one of the economically valuable poultry farming commodities and have the potential to be developed to meet animal protein and as a source of income to support family needs, as well as employment provider and source of organic fertiliser. The national duck population is 49.877 thousand heads, with egg and duck meat production of 322.61 thousand tons and 37.31 thousand tons, respectively [1].

The problems faced in raising ducks are the high price of feed and the cost of disease mitigation. It is a threat to small-scale duck breeders with low capital. Therefore, it is

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important to pay more attention to small-scale agricultural industries where they receive marginal income [2].

Environmental factors, including feed and temperature, influence egg production. Therefore, quality feed and sufficient quantities are needed for optimal egg production and profitable livestock business. High ambient temperatures can cause stress in livestock, which can decrease feed consumption and decrease feed and will usually affect production. Different quality and amount of feed will lead to different egg production in quantity and quality [3].

According to research reported by Santoso et al. [4], duck farming is economically feasible, profitable and socially acceptable. Furthermore, it was added that farmers need to make innovative improvements by utilizing livestock manure waste and feeding residues into environmentally friendly fertilizer/biogas. It is in accordance with the opinion of Purbajanti et al. [5] that economic and environmental aspects affect business sustainability.

Feed is one factor that needs to be considered in the livestock business. According to Santoso et al. [6] and Lei et al. [7], feed innovation is needed to reduce feed costs without reducing production by utilizing quality, safe and cheap feed ingredients. Quality feed is cheap, and its availability can be maintained as one of the keys to success in doing livestock business. Feed costs are the largest in the livestock business, between 60-70% of production costs [8, 9]. Therefore, reasonable efforts and strategies are needed by farmers so that the livestock business carried out produces optimal production and provides adequate profits. One of the efforts required is to maintain business cost efficiency using unconventional feed ingredients that are available continuously, safely, and cheaply. However, in using these uncommon feed ingredients, you must pay attention to balanced nutritional content according to livestock needs so that production remains optimal with adequate profits [8-10].

Some researchers have reported the utilization of rejected bread. Rejected bread can be utilized as 30% of the meal for Peking ducks [11]. Substituting rejected bread up to 30% in quail feed does not cause adverse effects and can even provide more significant economic benefits Gaol et al. [12]. Feed with 10% rejected bread flour and 2% mangosteen peel flour has a good influence on the growth of Cihateup ducks and has an *Income Over Feed Cost* (IOFC) value that is as good as control treatment feed [13]. Hidayatullah et al. [14] reported their research on hybrid ducks that using 60% rejected bread flour in feed provides good production and the most considerable IOFC value. A study on purebred chickens by Christina et al. [15] found that rejected bread flour can reduce yolk colour. Other parameters, including egg weight, egg yolk index, egg white index, haugh units, centipede thickness, and air cavities, do not fall. The experiment revealed that rejected bread might make up to 40% of the laying hens' meals. Another study reported by Susanti et al. [16] that using 15% and 30% rejected bread flour resulted in the same percentage of the carcass in broiler chickens fed commercial feed. Still, the weight of the carcass part was lower than in chickens given commercial feed. Bread flour substituting up to 15% can replace corn in commercial feed for broiler chickens when viewed against digestive organs [17]. For dairy cows, rejected bread could replace rice bran and cassava paste by up to 30% [18]. Utilising rejected bread in laying ducks has yet to be studied.

Indonesia is one of the large shrimps exporting countries; the form of shrimp exported is frozen shrimp without shell, head, and tail; about 60-70% of the weight of shrimp is waste obtained from shrimp processing plants, called the SPW [19]. The nutritional content of SPW (including shrimp skin, head, and tail) consists of 53.74% protein, 6.65% fat, 17.28% water, 7.72% ash, and 14.61% chitin/chitosan [20]. Shrimp contain astaxanthin as the primary pigment (67.4–70%), which can affect the colour of the yolk. SPW as a feed ingredient in laying eggs can affect the colour of eggs, becoming more yellow, but in carotenoids, the presence of chitin limits SPW in animal feed [21].

Substituting a local fish meal with SPW for broilers up to 20% can be done without adverse effects or replace 100% local fish meal [22]. Ducks given feed with SPW content of 20% provide the highest egg weight compared to other treatments with daily egg production of 75% Ahmad et al. [23]. Abun et al. [24] reported that fermented SPW at 1-2% can be used in local chicken feed for the laying phase.

This paper presented the findings of a study conducted to evaluate the performance and analysis of the laying duck business in the peri-urban area of Bekasi Regency.

2 Methodology

This study was conducted in November-December 2022 at the Harapan Mulya II Breeders Group in Pahlawan Setia Village, Tarumajaya District, Bekasi Regency, West Java Province. Surveys and in-depth interviews were used in the investigation.

The collected data includes egg production, weight, feed given, and business analysis. The collected data is analysed descriptively, and the effort analysis is performed by calculating inputs and outputs. Secondary data were obtained from relevant agencies to complement this research and paper.

The formula used for business analysis is according to Soekartawi [25]. Farmer revenue is the multiplication between production obtained and selling price, and income is the difference between revenue and total cost. The formula is as follows:

$$I = TR - TC \quad (1)$$

I = Total Income
TR = Total Revenue
TC = Total Cost
Furthermore, the formula for calculating R/C is as follows:

$$RC\ Ratio\ (Revenue\ Cost\ Ratio = \frac{Total\ Revenue}{Total\ Cost} \quad (2)$$

Criteria:
If the R/C Ratio is >1, then the business is feasible.
If the R/C Ratio is <1, then the business is said to be unfeasible.

3 Results and Discussion

3.1 Business Performances

The Harapan Mulya II Breeders Group has 15 members. There are two kinds of duck farming operations: large-scale (1000–2000 heads) and small-scale (25–100 ducks). Duration of keeping ducklings per period for 1-2 years, depending on the condition of the livestock. The length of the egg production period is between 10-12 months. Eggs can be sold in one of two ways: the farmer can bring them to the customer, or the customer can pick them up themselves.

The feed given is only two feed ingredients, rejected bread and SPW, if converted to dry matter, with usage percentages of 42.86% and 57.14%, respectively. The price of feed in wet form (existing condition) is IDR 1,800/kg. This feed is much cheaper than commercial feed for layer ducks, ranging from IDR 7,000-7,500/kg. The feed contains metabolisable energy of 2,883.43 kcal/kg with crude protein 20.37% (Table 1). When viewed from the energy and protein content, it is qualified for duck feed for the egg/layer laying period. However, crude fiber, fat, calcium, and phosphorus content exceed the recommended limits. Nutritional

requirements for local laying ducks, metabolic energy is 2,700 kcal EM/kg, crude protein 17-19%, calcium 2.90-3.25%, P available 0.6%, methionine 0.37%, and lysine 1.05% [21].

Table 1. The nutrient contents of shrimp processing wastes (SPW) and rejected bread used by laying duck farmers

Feed Ingredients	BK (%)	EM (Kcal/Kg)	PK (%)	L (%)	SK (%)	Ca (%)	P (%)
SPW	42.86	1,196.57	14.51	1.70	3.12	6.94	6.94
Rejected bread	57.14	1,686.86	5.86	7.67	6.88	0.04	0.04
Total	**100.00**	**2,883.43**	**20.37**	**9.37**	**10.00**	**6.98**	**6.98**

Farmers use both feed ingredients because they are easy to obtain, affordable, and have a good effect on ducks. The farmer buys both feed ingredients from the group leader, and the group leader places an order with the collecting merchant. The Harapan Mulya II group had almost no problems obtaining the two feed ingredients. As a result, farmers continue to use these two feed ingredients because other feed items like bran, corn, and others are far more expensive.

Farmers prevent disease by buying vaccinated ducks and spraying environmental disinfectants regularly between 2-4 weeks. Disinfectant is mixed with water and sprayed on the pen's location, the floor, walls and equipment, and the ducks. Maintaining environmental sanitation and disinfection is one of the effective ways to control disease in the livestock business [27]. They further mentioned that this could impact productivity, feed conversion, and welfare.

Bodreks tablets are administered to duck if it exhibits disease symptoms or looks sick. Bodreks pills are given regularly between 2-4 weeks with a dose of 2 tablets for every 20 litres of drinking water. According to farmer information, ducks that look sick or sick, if given Bodreks pills, will show gradually healed changes, so farmers continue to use Bodreks pills as prevention and medicine.

The production of duck eggs on average is 50% per period, and duck egg weights are between 60-70 grams per piece. The yolk colour score is at number 12 on a scale of 12. The resulting yolk colour of duck eggs attracts consumers. The red colour of egg yolks is caused by the SPW feed containing astaxanthin, which can provide a yellow tint to duck eggs [24]. The duck eggs produced in this study are somewhat different from that reported by Ismoyowati et al. [28]; the average egg production of Tegal ducks is 70.71%, with an average egg weight of 62.06 grams and egg yolk colour of 7.87. It is likely due to the length of observation, which Ismoyowati et al. [28] did in 12 weeks, while in this study, the average production was for one year. The colour of the egg yolk produced in this study has a high score because the feed used is SPW, which can increase the colour of the yolk. The higher the use of SPW in duck feed, the higher the egg yolk colour score [24]. Natural pigment astaxanthin is widely found in shrimp species, so if the feed contains more pigments, it can give a reddish orange colour [29]. The weight of eggs produced in this study was higher than that reported by Abun et al. [24], who used fermented SPW, between 41.75 and 51.68 grams.

3.2 Business Analysis

Based on the calculations, it is known that duck farming carried out in dense settlements with feed consisting of rejected bread and SPW is worth trying. Business analysis is carried out on large-scale and small-scale duck farmers. The price of duck eggs calculated in this study

is IDR 2,100 per piece, and feed prices are IDR 1,800/kg with an average production of 50%. The price of SPW in this study is lower than what Susanti et al. [17] reported was IDR 3,000/kg. The low price of this rejected bread will reduce the feed cost for ducks.

Analysis of duck farming on a large scale with 1200 ducks with a duration of observation of 1 year obtained an R/C value of 1.31 with an income of IDR 124,550,000/year or around IDR 10,379,167/month (Table 2). The amount of income is quite large and can be the primary source of income for farmers, but it requires significant capital, especially to buy ducks, which is 22.27%, and feed costs are 68.29%. It aligns with the opinions of Swain [8] and Thirumalaisamy et al. [9] that feed costs 60-70% of production.

Table 2. Analysis of large-scale duck farming at the study site for one year

No.	Items	Amount	Unit	Price (IDR)	Total Price (IDR)
1	Expense				
	Ducks	1,200	Heads	75,000	90,000,000
	Feeds	153,300	Kg	1,800	275,940,000
	Medicines:				
	▪ Bodreks tablets	96	Strip	5,000	480,000
	▪ Disinfectants	48	Packaging	10,000	480,000
	Labour	12	Person-month	2,500,000	30,000,000
	Electricity	12	Month	100,000	1,200,000
	Cage shrinkage	12	Month	500,000	6,000,000
	Sub-Total				**404,100,000**
2	Income				
	Eggs	219,000	Pieces	2,100	459,900,000
	Non-Productive Ducks	1,100	Heads	62,500	68,750,000
	Sub-Total				**528,650,000**
3	Revenue				124,550,000
4	R/C				1.31

The calculation of the business analysis is also carried out on a small scale of 100 heads. The results of the analysis are shown in Table 3. The calculation results show that the maintenance of small-scale ducks is also profitable and worth cultivating with an R/C value of 1.42 with an income of IDR 13,050,000/year or IDR 1,007,500/month. The costs incurred for purchasing ducks and feed amounted to 24.27% and 74.42%, respectively. This study's results align with research reported by Harjanti et al. [30] that duck farming with a scale of 250 heads has an R/C value of 1.55, meaning it is feasible and profitable. Another study reported by Saragih et al. [31] found that ducks with small scale (150-340 heads, medium (350-500 heads), and large (500-850 heads) produce different R/C values, namely for small and medium scale R/C values of 1.30 and large scale 1.33. The R/C value obtained highly depends on the level of egg production, egg prices, feed costs, and other costs. The greater the production level at a high price, the greater the R/C value.

Businesses with good prospects but need help facing, namely, the location of farms are in densely populated residential areas. It is prone to protests from the surrounding community and will cause environmental pollution through odours, noise, and the possibility of bacteria or fungi that plague it. For the long term, it is recommended that duck farmers have other locations far from settlements, especially if the maintenance scale is large enough. The distance of duck farming business from settlements and the availability of labour are essential factors of the social component [32].

Table 3. Analysis of small-scale duck farming at the study site for one year

No.	Items	Amount	Unit	Price (IDR)	Total Price (IDR)
1	Expense				
	Ducks	100	Heads	75,000	7,500,000
	Feeds	12,775	Kg	1,800	22,995,000
	Medicines:				
	▪ Bodreks tablets	8	Strip	5,000	40,000
	▪ Disinfectants	4	Packaging	10,000	40,000
	Labour	-			-
	Electricity	1	Month	25,000	25,000
	Cage shrinkage	12	Month	25,000	300,000
	Sub-Total				**30,900,000**
2	Income				
	Eggs	18,250	Pieces	2,100	38,325,000
	Non-Productive Ducks	90	Heads	62,500	5,625,000
	Sub-Total				**43,950,000**
3	Revenue				13,050,000
4	R/C				1.42

4 Conclusion

There are two types of laying duck businesses carried out by the Harapan Mulya II Livestock Group: small and large. Small-scale businesses are 25-100 ducks/family, and large-scale businesses are 1000-2000 heads. Eggs can be sold in one of two ways: the farmer can bring them to the customer, or the customer can pick them up themselves. The results of calculations show that duck rearing is profitable and feasible to carry out both on a small and large scale. On a small scale, an R/C value of 1.42 is obtained with an income of IDR 13,050,000/year or IDR 1,007,500/month. On a large scale, the R/C value is 1.31, with a revenue of IDR 124,550,000/year or around IDR 10,379,167/month. The laying duck business in the Bekasi Regency region is fruitful and worthwhile.

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