Additional income for poor families through native chicken farming (KUB and Sensi) development in Gorontalo Province

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Abstract. Poverty has remained a major governmental concern and in 2019, Indonesia's poor population was 25.14 million, most of whom lived in rural areas. Consequently, several government programs have been designed to alleviate poverty, such as the development of native chicken farming for poor households which was implemented by the Ministry of Agriculture. Therefore, the purpose of this study is to analyze the cash income from native chicken farms on a household scale. The location was Bulontala Village, Bone Bolango Regency where a total of 53 chickens were reared, and this research took place between July to September 2020. Subsequently, analysis results showed that at 70 days of harvest, the mortality rate was 1.88%, while the Sensi and KUB native chickens were estimated to have average body weights of 892 g/bird and 925 g/bird respectively. A total revenue from the sales was calculated to be IDR 2,340,000 with IDR 1,652,375 as incurred cash costs and IDR 687,625 obtained as the resultant earnings of the farmers. The RC ratio of the native chicken farming was 1.42 which was regarded as feasible, and as a result, this business was deemed capable of serving as a source of family income for the community. However, information on the chicken sales market and/or an increase in business scale are needed by the breeders and farmers to enable them to have the potential to realize profits.

1. Introduction
Livestock development is as an integral part of agricultural development aiming, among others, at increasing the income and welfare of breeders, the availability of job opportunities, and the fulfillment of animal source foods. Livestock development focuses on the efforts that can improve the economy in rural areas, as the largest place where farmers are located. Statistics Indonesia [1] reports that the
number of poor in Indonesia reaches 26.42 million people, of which 57.76% or 15.26 million people are in rural areas. In 2020, the number of poor in Gorontalo Province was 185 thousand people, in which the percentage of rural poverty-stricken people was more significant than the national level (88.64% or 164 thousand). Therefore, improving the welfare of the poor is one of Indonesia's development goals. Agricultural development is a sector that can reduce poverty in many developing countries [2,3]. Meanwhile, the agricultural sub-sector expected to be able to drive the economy at a weak economic level is the sub-sector of Ayam Kampung (Indonesian native chicken).

Ayam Kampung is a local Indonesian chicken which is also known as Indonesian native chicken (domestic chicken). The types and appearance of Ayam Kampung are very diverse, as well as their genetic characteristics. They have the advantage that they are quite good about dealing with difficult climates, like a long dry season. The distribution is very wide because the population of Ayam Kampung (Indonesian native chickens) is found in all corners of the country. According to the Ministry of Agriculture [4], the population of Ayam Kampung (Indonesian native chickens) in Indonesia in 2019 reached 311.9 million birds. There is an increase compared to 2015 reaching 285.3 million birds. In other words, it grew by 2.3 percent/year. Likewise, in Gorontalo Province, the population of Ayam Kampung (Indonesian native chickens) increased from 1.4 million (2015) to 1.6 million (2019). Meanwhile, the public demand and interest for Ayam Kampung (Indonesian native chickens) is relatively high, especially for the needs of bistros and restaurants. It is proven that the consumption of Ayam Kampung (Indonesian native chickens) continues experiencing an increasing trend from 0.521 to 0.730. Therefore, Ayam Kampung (Indonesian native chickens) demonstrate considerable potential to be developed in Gorontalo Province.

One of the Ayam Kampung (Indonesian native chickens) lines that should be developed is the Ayam Kampung Unggul Balitbangtan (KUB-1), produced by the Research and Development Agency, Ministry of Agriculture. KUB-1 possesses the characteristics of high egg productivity, 160-180 eggs per year, and low incubation properties, so that it can be categorized as laying hens. However, KUB-1 also still have good broiler potential. At 12 weeks of harvest, the weight of KUB-1 can reach 0.8 - 1 kg (Sartika et.al., 2013). In addition to KUB-1, the Agricultural Research and Development Agency has produced Ayam Sentul Terseleksi (Ayam Sensi-1) Agrinak, which is a new breed of local chicken that provides advantages in meat production, the live body weight of Ayam Sensi-1 Agrinak aged 70 days reaches 1,066 g/b for male, while the female is 745 g/b.

Therefore, this study is expected to provide information about the performance of KUB- and Ayam Sensi-1 business in Gorontalo Province and its potential in increasing the income of modest households.

2. Methodology

3. Time and site
The study was conducted in Bulontala Timur Village, South Suwawa District, Bone Bolango Regency. The research was designed with an on-farm research method, in which the research involved cooperative breeders; in this case, it is a modest household. The selection of modest households was based on data published by the Social Service Agency of Bone Bolango Regency and followed by the directions coming from the Agriculture Office of Bone Bolango Regency and Agricultural Training Center (BPP; Balai Pelatihan Pertanian) of South Suwawa. The study started from July to September.
2020. The number of chickens studied was 53 chickens consisting of 23 Ayam Sensi-1 and 30 KUB-1. The chickens were raised until they were ready to be sold, which was up to the age of 70.

4. Data and data analysis

The data collected consisted of two (2) aspects: technical aspects (data on the amount of feed, mortality and body weight of chickens) and economic aspects (input costs and sales of chickens). The data were analyzed to determine the growth in body weight, feed conversion, mortality, revenue value, cost requirements, profits and the point of return of the livestock business. These parameters were calculated employing the following formula.

Farming revenue is the multiplication of the production/yield obtained by the farmer and the selling price [5]. This definition can be formulated as follows:

\[ TR = Q \times Py \]

Where:

- \( TR \) = total receipts
- \( Q \) = production of activities
- \( Py \) = price of \( Q \)

Meanwhile, the amount of costs for farming activities can be stated in the following formula:

\[ TC = FC + VC \]

Where:

- \( TC \) = total cost
- \( FC \) = fixed costs of farming
- \( VC \) = variable costs of farming activities.

Meanwhile, to analyze farm income, it can be done by calculating the difference between total revenue and total cost, with the following formula:

\[ Pd = TR - TC \]

Where:

- \( Pd \) = farm income
- \( TR \) = total receipts
- \( TC \) = total cost

The economic feasibility analysis will be analyzed by using the R/C ratio, which is the ratio between total revenue and costs, with the following formula:

\[ A = \frac{TR}{TC} \]

Where:

- \( A \) = R/C ratio
- \( TR \) = total revenue
- \( TC \) = total cost

Economic eligibility criteria, if: \( R/C \) ratio > 1 then the farming is said to be feasible/profitable \( R/C \) ratio < 1 then the farming is said to be unfeasible/loss.

\[ R/C \text{ ratio} = 1, \text{ then the farm is said to be even (neither profit nor loss)} \]

5. Result and discussions

6. Breeding of KUB-1 and Ayam Sensi-1 Agrinak

Chickens are bred from the age of 1 day or DOC until the age of 70 days. Feeding is carried out three (3) times: at 07.00-08.00 WITA, at 15.00-16.00 WITA and at 20.00-21.00 WITA. Provision of drinking water plus vitamins is given continuously, and the water is replaced every morning and evening. The feed given to chickens is adjusted to the age of the chickens as shown in table 1.

Table 1. The dose of feeding is based on the age of native chickens.
To prevent disease attacks, chickens are given vaccines aiming at increasing their immunity against disease attacks. Following are the types and timing of vaccines given to KUB-1 and Ayam Sensi-1 in Bulontala Village (table 2).

**Table 2.** Types and timing of chicken vaccines administration.

| Types of vaccines | Time of administration/age (days) | Method         | Dose                                 |
|-------------------|-----------------------------------|----------------|--------------------------------------|
| ND-IB             | 4                                 | Eye drops       | 1 drop                               |
| Gumboro 1         | 7                                 | Mouth drops     | 1 drop                               |
| Gumboro 2         | 21                                | Mouth drops     | 1 drop                               |
| ND-IB             | 28                                | Drinking water  | 2 doses/2 litres of water/50 birds    |

Drops-based vaccination is carried out in the morning at around 8.00 WITA, aiming at preventing the vaccines and chickens from being exposed to the sun. Then, the intensity of the incoming sunlight is also minimized by covering the cage with a tarpaulin.

The administration of vaccines through drinking water for 50 chickens is 100 doses mixed with 2 liters of drinking water (not chlorinated) divided into 2 drinking places given for 2 hours. After 2 hours, the water is replaced with water added with vitamins. Vaccine administration is carried out in the afternoon at around 16.30 and followed by closing the cage to prevent sunlight.

Prevention of chicken disease is carried out not only through the vaccine method but also by maintaining the cleanliness or sanitation of the cage. The chicken coop is cleaned of dirt/feces or food every morning so as to reduce the appearance of unpleasant odors and to prevent disease germs from developing. In addition, there is also a change in the base of the cage (litter), which is used paper boxes for every 2 days. The cardboard mat is used until the chicken is 6 weeks old. After that, the chicken immediately use bamboo slats as floor.

**7. Growth of KUB-1 and Ayam Sensi-1**

The assistance activities of development program of KUB-1 and Ayam Sensi-1 aims at increasing the income of farmer families through the sale of Ayam Kampung (Indonesian native chickens). Superior
Ayam Kampung (Indonesian native chickens) farming is aimed at raising chickens, so that a high final chicken weight is the objective of the activity. The breeding was carried out for 70 days. Chicken weight growth per week can be seen in figure 1.

**Figure 1.** Chicken weight growth per week.

Figure 1 shows a graph of the body weight of chickens for 10 weeks. The figure shows that the two chicken lines experience relatively the same growth. Although starting at week 5, it can be perceived that the growth of KUB-1 is slightly higher than that of Ayam Sensi-1. However, statistically, the two lines did not experience a significant difference in the weight of 10 weeks. The weight of KUB-1 at 10 weeks of age is not much different from that reported by [6] reporting that KUB-1 with 10 weeks of basal feed weighed 953.3 grams. Thus, this final weight is still lower than the research conducted by [7] which reporting that KUB-1 and Ayam Sensi-1 at the age of 10 weeks can gain weights of 1031 and 1100 g/bird, respectively.

**Table 3.** Growth of chicken body weight during breeding (70 days).

| Parameter                  | KUB-1 | Sensi-1 |
|----------------------------|-------|---------|
| Initial body weight (g/b)  | 22    | 23      |
| Final body weight (g/b)    | 925   | 892     |
| Total body weight gain (g/b)| 903   | 870     |
| Daily body weight gain (g/b/day) | 12.9 | 12.4    |
| Feed Conversion Ratio/FCR  | 2.9   | 3.2     |
| Mortality                  | 3.3   | 0       |

Table 3 shows that the initial weight of DOC KUB-1 and Sensi-1 is relatively the same. However, the daily body weight gain shows that KUB-1 is relatively slightly higher than Sensi-1, which 12.9 g/b/day and 12.4 g/b/day, respectively. The efficiency of feed administration also showed that the feed conversion of KUB-1 was slightly better than Sensi-1, which is 2.9 and 3.2, respectively. This FCR value is still more significant than the results of research conducted by [8] reporting that KUB-1 and Sensi-1 got an FCR of 2.4. Concurrently, [9] stated that the FCR of KUB-1 in Central Sulawesi was 4.2 when the chicken was 12 weeks old. The two chicken lines also showed quite good performance; it was proven that only one KUB-1 died during breeding.

8. **Analysis of the Income from KUB-1 and Sensi-1 Livestock**

Factor needing to be considered for farmers to get benefit is by managing their farms efficiently. Costs incurred for 10 weeks need to be examined properly; farmer expenses include variable costs and depreciation costs for cages and equipment. Apart from that, the combination of the chicken body weight and the selling price of the chicken is important. Expenditures for farmers for 70 days can be seen in table 4.

**Table 4.** The cost of *Ayam Kampung* (Indonesian native chicken) for 70 days.

| Cost          | Volume | Unit | Unit price | Total (Rp) | Percentage |
|---------------|--------|------|------------|------------|------------|
| Variable costs|        |      |            | 1,530,000  | 92.59      |
| DOC           | 53     | Bird | 5000       | 265,000    | 16.04      |
| Feed          | 150    | Kg   | 7,200      | 1,080,000  | 65.36      |
| Vitamin       | 30     | unit | 1200       | 36,000     | 2.18       |
Table 4 shows that the expenses for raising *Ayam Kampung* (Indonesian native chicken) are divided into two (2): variable costs and fixed costs or depreciation costs for coops and equipment. The number of variable costs will be in line with the scale of production. If the number of chickens raised increases, the variable costs will also increase. The variable costs in this livestock business include the purchase of DOC, feed, vitamins, drugs and vaccines. Variable costs contribute 92.59% to total livestock business expenses, and the rest is depreciation costs. If you look at each cost component, it can be identified that the cost of feed is the highest compared to the others with a percentage of 65.36%, equivalent to IDR 1,080,000 followed by the cost of purchasing DOC and vaccines, respectively 16.04% and 8.11%.

Previous research has shown that feed and DOC are the most significant contributors to the production costs of village livestock business. Research by [6] concluded that feed and DOC contributed to production costs of around 75.7%, while suggesting that KUB-1 livestock in Central Sulawesi required feed costs and DOC of 72.12%. Meanwhile, research by Istikomah (2018) and Pakage et al (2020) states that chicken production is significantly affected by DOC and feed with coefficient values of 0.744-0.944 and 0.075-0.168, respectively. The benefits of *Ayam Kampung* (Indonesian native chicken) farming, KUB-1 and Sensi-1, can be seen in table 5.

Table 5. The benefits of KUB-1 and Sensi-1 farming for 70 days.

| Parameter           | Quantity | Unit price | Total   |
|---------------------|----------|------------|---------|
| Revenue             | 52       | 45,000     | 2,340,000 |
| Profits per period  |          |            | 687,625 |
| RC ratio            |          |            | 1.42    |
| BEP production      | 37       |            | 37      |
| BEP price           | 31,777   |            |         |

Table 5 shows that the business of *Ayam Kampung* (Indonesian native chicken) has positive farming indicators. The profit value obtained by the farmer during 1 period was IDR 687,652, while the value of RC ratio was more than 1, which was 1.42. Therefore, the business can contribute to the family income of IDR 687,625. The value of the RC ratio above 1 means that it is feasible to run this business because the revenue value is much higher than its expenses. The value of BEP production and the price were 37 and IDR 31,777, respectively. The value of BEP price of business for livestock in Bulontala is lower than the BEP for business in Kalukubula Village, Central Sulawesi, which has a
value of BEP of IDR 39,665/bird [9] and BEP for KUB-1 livestock in Jayapura, Papua with a BEP of IDR 55,426 [6].

9. Conclusions

It is appropriate for a modest household to cultivate Ayam Kampung (Indonesian native chicken) because it can increase family income by IDR 687,652 per period. The performance of chickens was also quite good, as evidenced by the mortality rate of chickens by 3.3% for KUB-1 while for Sensi -1 at 0%. However, feed efficiency still needs to be improved because the FCR value is still 2.9-3.2.

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