

Counselling on the utilization of agricultural waste as alternative feed for poultry

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ABSTRACT

Poultry concentrate feed is predominantly produced by animal feed factories in Indonesia. Unfortunately, the selling price of concentrates has been steadily increasing, causing difficulties for poultry farmers in maintaining their businesses. Indonesia, being an agricultural country, possesses a wealth of agricultural products. The abundance of agricultural products, coupled with significant amounts of agricultural waste from by-products, can be processed and utilized as animal feed. In order to address this issue, a service activity was conducted in Suru Village, Doko District, Blitar Regency. The objective was to provide socialization and training on utilizing agricultural waste, which is abundant in Suru Village, as an alternative feed for poultry livestock. The approach employed involved socializing the activities to farmers, addressing the challenges faced by partners, and providing counselling and direct assistance. The counselling sessions focused on the types of agricultural waste readily available in Suru Village that can be utilized in poultry feed, as well as training on formulating simple rations. As a result of this activity, breeders were able to utilize rice bran, an agricultural waste product, as an alternative feed, thereby reducing the cost of expensive commercial feeds. By substituting rice bran in feed formulations for commercial concentrates, farmers were able to save Rp410,000 per 100 kg of purchased feed.

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1. INTRODUCTION

Doko Subdistrict is located in Blitar Regency, East Java Province, approximately 40 km east of Blitar City. Geographically, Doko Subdistrict consists of mountains, valleys, and hills. The livelihoods of the population vary, including rice farmers, clove farmers, corn farmers, sweet potato farmers, cassava farmers, coffee farmers, cocoa farmers, goat breeders, sheep breeders, cattle breeders, and chicken breeders, while some individuals work as employees or traders (BPS, 2022).

Doko Subdistrict is one of the areas in Blitar Regency, situated northeast of the capital city of Blitar – Kanigoro, with a distance of 27.8 km. The majority of the subdistrict's surface topography consists

of hilly areas, with an elevation of approximately 510 meters above sea level. The total area of Doko Subdistrict is 70.95 km², including surplus land due to its fertile soil enriched by volcanic ash, allowing for the successful growth of various crops. Suru is one of the villages in Doko Subdistrict, covering 6.55% of the total area, with a population of 3,686 inhabitants. The population density in Suru village is 794 people/km². The agricultural sector is the dominant livelihood, accounting for 91.35% of the population. Among those engaged in agriculture, 42.23% are also involved in livestock farming. Some residents work as breeders of male chickens, with a population range of 45,000 birds. The agricultural and livestock products play an important role in the village.

In Suru village, 80% of the chicken breeders practice independent farming. There are 14 chicken breeders in Suru village, with a range of 1,000-4,000 birds per breeder. Mr. Mahsun Hudri is one of the chicken breeders in the village, owning 3,000 birds distributed in three separate cages, each housing 1,000 birds. He implements a rotating system for chicken husbandry, with a new batch of day-old chicks introduced every 3 weeks. The rearing period for male chickens is 2 months, with a live weight range of 8-9 ounces. The meat from male chickens falls under the category of red meat, similar in texture and taste to free-range chickens, which is highly preferred.

The success of poultry farming depends on the availability of superior breeding stock, effective management, and the use of high-quality feed (Anggitasari et al., 2016). These three factors are interconnected and essential for a successful poultry farm. Feed plays a crucial role in poultry production, as 60-70% of the production cost is allocated to feed expenses (Falah et al., 2022). Currently, farmers still rely on commercial feed, which is subject to annual price increases rather than decreases. The main challenge faced by farmers is the high cost of feed, accounting for 70% of the total production cost. Concentrate feed given to livestock provides comprehensive nutrition for chickens. Meeting the nutritional needs of livestock is crucial to maximize production and ensure high farmer income. Unfortunately, the use of nutrient-rich concentrate feed reduces the farmers' profits. They remain highly dependent on commercial feed for poultry nutrition.

Farmers are in need of affordable alternative feed options that offer comparable nutritional value to concentrates. One way to achieve this is by utilizing agricultural waste that is readily available to produce alternative animal feed. Currently, a significant amount of agricultural waste remains unused due to farmers' lack of understanding about its potential as alternative livestock feed. In Indonesia, there are various types of agricultural waste; however, not all of them are suitable for poultry feed, and some may not be easily accessible.

In Suru village, the most abundant agricultural waste is rice bran, which is generated from both livestock farming and rice cultivation. Doko Sub-district has a total paddy field area of 3,912 hectares, producing an average of 74.18 quintals of dry unhulled rice per hectare (BPS, 2022). Rice bran, a by-product of rice processing, can be effectively utilized as feed for both ruminants and poultry. The solution for chicken breeders is to provide them with knowledge about the types of agricultural waste suitable for poultry feed. Additionally, they can be taught how to formulate simple feed compositions using readily available agricultural waste in Suru village as alternative feed for poultry. This community engagement program aims to raise awareness and provide training on utilizing the abundant agricultural waste in Suru village as an alternative feed for poultry.

2. METHODS

This community engagement was conducted in Suru Village, Blitar Regency, on July 16 and August 7, 2022, involving 15 male chicken breeders. The engagement team consisted of a team leader, members, and two university students. The involvement of students aimed to provide them with practical

experience in applying their knowledge gained on campus and to learn how to communicate and discuss directly with the breeders. The implementation stages of the community engagement program are outlined in Table 1.

Table 1. Stages of implementation

Date	Activities	Implementer
19 th June 2022	Surveys and discussions with several breeders regarding the problems experienced in raising male chickens	Chairman and Service Members
16 th July 2022	Counselling regarding the types of agricultural waste that can be used for poultry feed.	Service Team
07 th August 2022	Selection of agricultural waste that is easily available to prepare ration formulations and ration preparation training	Service Team

The method used in this activity is as follows: (1) Socialization of activities to breeders related to problems faced by partners. In this activity the servant engages with students in the hope that students can help identify the types of agricultural waste that can be used for poultry feed, help formulate the right feed for poultry, help calculate feed requirements by using waste feed appropriately. In addition, students can also gain additional knowledge about socializing with breeders in the transfer of knowledge that has been obtained during college; (2) counselling related to agricultural waste that can be given to poultry.

This counselling includes: (1) counselling to breeders at partner locations by introducing several types of agricultural waste that can be used in poultry feed; (2) Training on the preparation of simple ration formulations with various agricultural waste feeds; (3) Production of feed based on the results of preparing the rations that have been carried out previously according to the formulation presented in Table 2; (4) The results of the extension process and mentoring in the manufacture of fermented feed must be evaluated to measure the success rate of science and technology transfer.

Table 2. Poultry feed ration formulation

Feed Ration	Percentage (%)
Concentrate (Factory-made)	30
Corn	40
Fine rice bran	30
Total	100

3. RESULTS AND DISCUSSION

Survey

Survey activities were carried out by the chairman and service members to Suru Village, Blitar Regency. This activity is in the form of discussions with male chicken breeders regarding the problems experienced by farmers while raising male chickens. From the results of discussions with breeders, the problem that is often experienced by breeders is the price of commercial concentrate feed (factory-made) which continues to increase and makes it difficult for breeders to buy the feed. Some breeders experience losses for several maintenance periods because production results are unable to cover operational costs.

Counselling to breeders

The counselling session regarding the types of agricultural waste that can be used for poultry feed was held on July 16, 2022. It was attended by 15 farmers, 2 members of the engagement team, and 2 students. The farmers showed great enthusiasm during the counselling session. They expressed their concerns about the high cost of factory-made feed, which is the highest operational expense for them. The farmers lacked understanding regarding the substitution of feed using readily available agricultural waste, especially considering its low cost. Agricultural waste can be categorized into two types: agricultural waste and agro-industrial by products (Agustono et al., 2017). The use of feed ingredients should not compete with human needs. If these ingredients are still in demand for human consumption, the price of the feed will be high. One of the considerations in choosing feed ingredients is the cost of raw materials. If the raw materials are expensive, the selling price of the feed will also be high, making it unaffordable for small-scale farmers. It is advisable to produce animal feed from agricultural and plantation waste that still contains valuable nutrients for the animals.

Several types of agricultural waste that are easy to obtain in Doko District and can be used for poultry feed include outer rice bran (*dedak*) and inner rice bran (*bekatul*).

Outer rice bran (*Dedak*)

Dedak is a by-product of rice milling, consisting of the outer layer of rice grains along with a number of seed coats. Rice bran is a good source of energy for livestock feed. Good-quality rice bran should have a minimum protein content of 12% (Standar Nasional Indonesia, 2013). For growth processes, livestock generally require protein as a nutrient. The nutrient content of rice bran may vary in different regions. This is because during the rice milling process, the milling machine does not separate the rice husk, which ends up in the by-product (Mila & Sudarma, 2021).

Coarse rice bran accounts for 14.44%, fine rice bran for 26.99%, rice hulls for 3%, and 1-17% as bran fraction of the dry weight of paddy. Munandar et al. (2020) reported that rice bran contains metabolizable energy of 2980 kcal/kg, crude protein of 12.9%, fat of 13%, crude fiber of 11.4%, Ca of 0.07%, available P of 0.22%, Mg of 0.95%, and moisture content of 9%, which can be used as feed ingredients for both poultry and ruminant livestock. The use of rice bran in animal feed, particularly for poultry, is limited due to its high crude fiber content of 13.0%. Non-ruminant animals like poultry have limitations in consuming high levels of crude fiber. For poultry, rice bran and rice hulls are considered high-energy feed ingredients, and many feed mills use them as the main raw materials in feed production.



Figure 1. Counseling for broiler breeders

Figure 2. Rice bran (*dedak*)

Inner rice bran (*Bekatul*)

Bekatul is a by-product of rice milling consisting of the inner layer of rice grains, including a small portion of starchy endosperm. The amount of rice hulls produced depends on the processing method. The high content of crude fiber in rice hulls contains an anti-nutrient called phytic acid, which can affect the absorption of minerals, especially phosphorus, in the chicken's digestive tract, thereby inhibiting animal growth (Farid et al., 2019). In addition, rice hulls are prone to spoilage, and a decrease in quality is characterized by a foul smell and clumpy texture. If rice hulls have a bad odor, they should not be fed to animals. The nutritional content of rice brans can be seen in Table 3 below.

Table 3. Nutrient content in some agricultural wastes

Agricultural Waste	Crude Protein (%)	Crude Fiber (%)	Crude Fat (%)
Outer rice bran	12,9	11,4	13
Inner rice bran	10,8	4,9	2,9

Source: National Research Council (1994)

The use of agricultural waste as poultry feed is aimed at reducing production costs by substituting concentrates. When choosing agricultural waste for animal feed, it is important to consider the nutritional content of the waste. It is recommended to select feed materials that still have good nutritional value. Edi (2021) suggests several alternative feed ingredients that can be used, including tapioca waste, wheat, sorghum, millet, potato flour, cassava meal, palm kernel cake, broken rice, banana peel flour, expired noodles, solid heavy phase, and expired bread.

Training on preparing ration formulations and making feed

The selection of feed ingredients should be based on the nutritional content and nutritional requirements of the poultry. Rasyaf (2008) and Setiyono et al. (2015) state that the required nutrient content in poultry feed should have a protein value of 22-24%, fat 2.5%, metabolizable energy (ME) 2800-3500 Kcal, crude fiber 4%, calcium (Ca) 1%, and phosphorus (P) 0.7-0.9%. The essential nutrients that should be present in poultry feed include: (1) Proteins. Feed ingredients that contain a source of vegetable protein can be soybeans, peanut meal, tofu dregs, lamtoro leaf flour, and other grains. Meanwhile, feed ingredients containing animal protein are in the form of fish meal, blood meal, meat meal, snail flour and others; (2) Energy. Energy source feed ingredients are found in several ingredients such as corn, rice bran, rice bran, cassava flour, cassava and so on; (3) Vitamins & Minerals. Vitamins can be obtained from plants such as sprouts, spinach, kale, turi leaves, cassava leaves and others. Minerals are only used in small amounts (1-4%). Feed ingredients containing several mineral sources include shell meal, bone meal, table salt and others. The nutritional requirements needed by poultry livestock can be seen in Table 4.

Table 4. Nutritional requirements in poultry

Nutrition	Starter Phase	Grower Phase
ME (kcal/kg)	2900	2900
Protein (%)	22	16

Source: National Research Council (1994)

The easily available and affordable agricultural waste in Suru Village, Blitar Regency is fine rice bran. When selecting feed ingredients, apart from considering their nutritional content, it is also important to consider the ease of obtaining the feed ingredients and their affordability. The main purpose of using agricultural waste is to substitute expensive factory-made concentrates. Anggraini et al. (2017) state that one alternative to reduce feed costs is to use by-products or agricultural-livestock waste because these materials are inexpensive.

The feed formulation used in this outreach program involves substituting commercial feed with agricultural waste, specifically fine rice bran. Corn, as shown in Figure 4, is still used in the feed formulation because it is a palatable feed ingredient and does not contain anti-nutritional factors like other feed ingredients. Additionally, corn is easily digested by poultry, making it safe to use as a feed ingredient (Kustyorini et al., 2022b). Figure 3 shows the commercial feed brand used by the farmers, which is New Hope 611. This feed contains a complete set of essential nutrients required by the animals. However, due to its complete nutrient composition, the price of this feed is expected to be high.

During the training on feed mixing with the predetermined formulation, the farmers manually mixed the feed. The feed ingredients were spread on a tarpaulin-covered floor, as shown in Figure 5. The farmers mixed a batch of 50 kg of feed during the training. Figure 6 displays the mixer equipment used for large-scale feed mixing. This mixer has a capacity of mixing feed ingredients up to 100 kg. If, on average, the animals require 50 grams of feed per day, a single batch of mixed feed can be used for 2 days of feeding. Once all the ingredients are evenly mixed, the feed is ready to be given to the animals, as shown in Figure 7.



Figure 3. Concentrate (factory-made)

Figure 4. Milled corn

Figure 5. Process of Mixing feed ingredients

Figure 6. Feed Mixer when mixing in large batches

Figure 7. Mixed feed given to poultry

Evaluation

After the community service activities are completed, an evaluation is made of the cost of the feed incurred by the farmer if he does not use feed substituted for agricultural waste. It can be seen in Table 5, the feed costs incurred by farmers if they only use commercial feed are Rp. 950,000 per 100 Kg. Whereas in Table 6, if the farmer uses commercial feed substituted with the use of agricultural waste in 100 kg of feed, it only costs Rp. 540,000. This shows that farmers can reduce the cost of purchasing feed by up to 56.8%. Kustyorini et al. (2022a) said that the biggest expense for farmers is when buying feed. This can be anticipated by substituting commercial feed using agricultural and plantation wastes which are easily available and cheap. The use of rice bran as much as 30% as a substitute for commercial feed can increase feed efficiency so as to minimize costs incurred by farmers.

Table 5. The cost of commercial feed

Commercial feed (Kg)	Amount (Kg)	Feed price (Rp/Kg)	Total feed price (Rp)
Commercial feed	100	9.500	950.000

Table 6. Cost of feed substitution of agricultural waste

Agricultural Waste Substitution Feed (Kg)	Amount (Kg)	Feed price (Rp/Kg)	Total feed price (Rp)
Commercial feed	30	9.500	285.000
Milled corn	40	3.500	180.000
Rice bran	30	2.500	75.000
Total	100		540.000

4. CONCLUSION AND RECOMMENDATIONS

The results of this activity breeders can utilize agricultural waste in the form of rice bran from easily available agricultural waste to be used as alternative feed so as to reduce expensive feed costs. Based on the results of feed formulations that use rice bran substitution for commercial concentrates, the feed costs incurred by farmers to purchase feed per 100 kg can save Rp. 410,000.

Assistance is still needed in the process of calculating ratio formulations if one day you want to use agricultural waste other than fine bran such as using corn dregs and soybean dregs. Because currently dried corn dregs and soybean dregs are sold in feed stores or online stores.

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