

## Coffee Seed Waste silage technology as goat feed in Tigapanah Sub-district, Karo regency

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**Abstract.** Coffee is a plantation that produces waste in its processing such as coffee seed waste. Farmers do not realize that the nutritional content of coffee seed waste can be used as a good resource for animal feed. Coffee bean waste is high in moisture content and caffeine which reduces the goat palatability. Therefore, the use of coffee seed waste silage technology could be a solution to this problem. The purpose of this community service is to increase farmers' knowledge so that coffee husk waste can be used to make silage as animal feed, breeders apply silage continuously for animal feed, establish an integrated livestock concept with plantations and reduce the impact of pollution. The method used in the community service program is interviewing to find solutions to problems, learning by doing with teaching media in the form of guidebooks, giving brochures and demonstrations and banners, training practices by showing how to make silage from coffee fruit waste. The results achieved were increased breeders' knowledge and skills, an increase in the number of farmers who applied coffee husk waste as livestock, management of integrated business cooperation in the field of livestock and plantations. and reduce environmental pollution. It can be concluded that the application of coffee seed waste silage waste is effective in having a positive impact on livestock, the environment, and farmers.

**Keywords:** Silage, Farmer, Coffee Seed Waste, Breeders, Plantation waste

**Abstrak.** Kopi merupakan tanaman perkebunan yang menghasilkan limbah dalam pengolahannya yaitu kulit biji kopi. Ketidaktahuan peternak akan kandungan nutrisi kulit biji kopi menjadi penyebab tidak dimafratkannya limbah tersebut sebagai pakan ternak. Kulit biji kopi dapat diberikan langsung pada ternak, namun memiliki kadar air yang cukup tinggi sehingga kurang disukai ternak. Solusi untuk meminimalkan hal tersebut adalah menggunakan teknologi silase. Tujuan pengabdian masyarakat ini adalah meningkatkan pengetahuan peternak sehingga

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*limbah kulit kopi dapat dimanfaatkan untuk membuat silase sebagai pakan ternak, peternak mengaplikasikan silase secara kontinyu untuk pakan ternak, terjalin konsep peternakan yang terintegrasi dengan perkebunan dan mengurangi dampak pencemaran. Metode yang dilakukan dalam program pengabdian masyarakat adalah wawancara dan pendalaman permasalahan untuk mencari solusi permasalahan, learning by doing dengan media ajar berupa buku panduan, pemberian brosur dan peragaan serta banner, praktik pelatihan dengan memberi peragaan cara pembuatan silase dari limbah buah kopi. Hasil yang dicapai adalah peningkatan pengetahuan dan keterampilan peternak, peningkatan jumlah petani yang menerapkan limbah sekam kopi sebagai ternak, pengelolaan kerjasama usaha terpadu di bidang peternakan dan perkebunan. dan mengurangi pencemaran lingkungan. Dapat disimpulkan bahwa aplikasi limbah silase biji kopi efektif dalam memberikan dampak positif bagi ternak, lingkungan dan petani.*

**Kata Kunci:** *Silase, Kulit biji kopi, Peternak, Limbah perkebunan*

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## 1. Introduction

Karo Regency is one of the largest coffee producers with a plant area of about 5,010 ha out of a total of 7,741 ha in North Sumatera. Coffee production in Karo District in 2015 and 2016 are amounted to 5 785.86 tons and 7 485.85 tons, respectively with 19 companies stripping and cleaning coffee skins [1].

There are some problems arise for farmers in Karo District, such as the potential for having plantation waste, the abundance of available coffee seed waste, limitation of forage in the dry season and the lack of farmers' understanding of the nutritional content of coffee seed waste. In addition to this, agricultural waste that has not been utilized as animal feed is the cause of environmental pollution. According to Statistics Indonesia, the population of goats in Karo District has increased to 12,591 animals in 2016 [2]. Moreover, in the dry season, farmers find it difficult to get forage, especially sweet potato and cassava leaves for goat feeding. Therefore, the utilization of coffee seed waste is expected to help farmers as an alternative feed for goats in the dry season. In other words, coffee seed waste can be used as an alternative feed for livestock when it is difficult to get feed because forage production is reduced in the dry season.

Coffee seed waste can be given directly to livestock, but high water content makes it easy for coffee seed waste to be damaged and reduces the animal's palatability. In addition to this, coffee contains high levels of crude fiber, tannins, caffeine, and lignin, so that it can interfere with animal digestion if given in large quantities. One solution to minimize the

problem is the use of silage technology to increase digestibility, palatability, protein content, reduce crude fiber content, and tannin [3].

Concluded the introduction of 200 g/ day coffee seed waste in the composition of feed can help to overcome the problem of animal feed difficulties in the dry season [4]. Similarly [5] stated that coffee seed waste silage up to 20% can be used as basal feed for goats, and is an alternative basal feed to replace grass. Other researchers stated that coffee seed waste has not been used optimally for animal feed [6]. Coffee seed waste is very potential to be used as feed ingredients for ruminants including goats. The content of nutrients found in the coffee seed waste are 10.4% crude protein, 17.2% crude fiber, and 14.34 MJ / kg metabolic energy which is relatively comparable to grass nutrients [7]. Feed is one of the most important factors to increase livestock production so that knowledge is needed in processing feed ingredients to meet the nutritional needs of livestock [8][9].

The target of community service is the farmer group that raises goats in Tigapanah District, Karo Regency. The farmer group, chaired by Andreas Ginting, is comprised of around 20 people. Community service team demonstrated the utilization of coffee bean waste with silage technology in the Karo Regency farmer groups, with an output target a) Providing a package of guidelines to farmers about making coffee seed waste silage b) Counseling services for introducing nutritional contents and how to provide coffee seed waste silage, c) Assistance and application of silage technology d) Provide leaflets and manuals on silage technology using coffee bean waste e) provide equipment for making coffee seed waste silage f) the development of integrated agribusiness concept between the fields of animal husbandry and plantations so that all products can be utilized to the fullest g) Improving the science and technology of farmers in Karo District so that the productivity of goats increases and becomes a local superior commodity.

This community service aims to: 1) Providing skills and knowledge to farmers about the use of coffee seed waste as animal feed through silage processing technology 2) Application of coffee fruit skin waste silage as animal feed, 3) The development of integrated concept between the fields of animal husbandry and plantations so that all products from each field can be utilized optimally, 4) reduce environmental pollution.

## **2. Method**

The problem-solving methods were carried out in a variety of continuous approaches, involving adult learning methods, counseling, training, and using the right technology. Participants consisted of farmer groups and farmer-based groups. All community service activities are carried out to the community by using groups as a medium of learning and assistance through adult learning methods/ Andragogy. Besides, all comprehensive community service activities were carried out concerning human resources, raw materials, processes, feed preparation through counseling, training, and assistance. Moreover, the activities were conveyed by using affordable technology, both in the materials and tools.

The methods above are implemented in 6 (six) stages:

1. Observation and survey [9] was run to determine the conditions in the field, by exploring the problems of goat farmers in Tigapanah District, Karo District.
2. Questions and answers [10], interviews were conducted with farmer groups to find out their potential and enthusiasm in the service program. Before and after the community service activity, data was collected through questionnaires from farmers
3. The community service programs were introduced, in which the community service team explained the community service activities to members of the farmer group. At this stage, an agreement was achieved upon the time and schedule of activities that were carried out in detail, including the delivery of material, training/demonstrations, assistance for making coffee fruit husk waste silage.
4. Counseling and demonstration methods to make silage coffee seed waste was carried out by the team (lectures). The extension activities were divided into 3 materials, namely management of goat raising, identification of types/ goat fodder, and the process of making coffee seed waste silage.
5. Assistance was provided for the participants to make silage feed. As the farmers have seen the process of making silage from the coffee seed waste, then, they can practice to do it by themselves. The topics were divided into 3 stages: making feed using silage technology, harvesting silage, and how to feed goats with the silage.
6. Finally, the team monitored the progress of making coffee seed waste into silage by the farmers.

### 3. Result and Discussion

The results achieved can be seen from the suitability of the type and number of outcomes that have been produced with the expected target. The results achieved during the implementation of activities are:

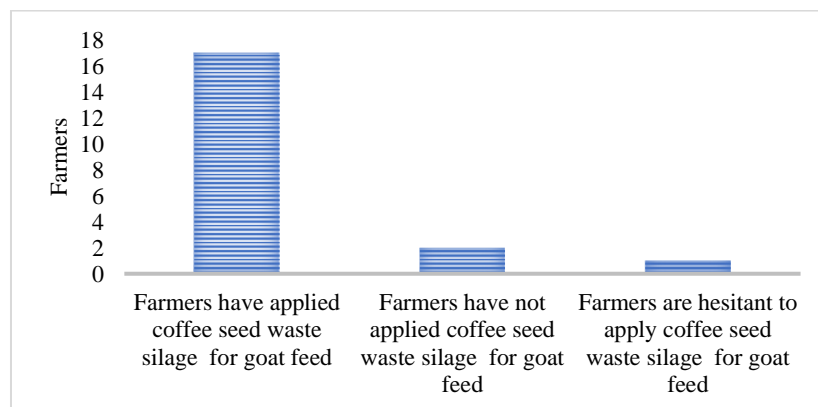
#### a. Application of coffee seed waste for goat feed

The use of coffee fruit skins as animal feed could reduce feed costs. As the feed is the biggest cost for livestock business, the farmers can develop their own business that leads to saving the costs.



**Figure 1.** Application of coffee seed waste for goat feed

Firstly, the farmers had doubts about the use of coffee skin. However, after approaching and giving outreach activities, training with material on silage technology accompanied by leaflets, handbooks, and interesting banners, they began to think that innovation was needed to develop more on their businesses. Based on interviews and questions/answers from farmers, they then understood that the use of food ingredients, such as coffee waste, could be a solution to save on feed costs. A survey was done before training and until the completion of training (Figure 2). From 17 trainees people were interested in having the training materials because they were still confused about making silage.



**Figure 2.** Application of coffee seed waste for goat feed

Then, their interest increased after distributing the guidebooks and leaflets because they have a good understanding of making silage. Besides, they found that the silage making was not so difficult and very practical, as well as it could reduce the feed costs. Moreover, the practicing stage of making silage accompanied by instructions from

banners attracted a higher number of interested participants. Finally, while the team provided samples for goat feed, 17 participants denoted that they are very keen to learn about making silage. They also discovered that the silage could also be given to cattle because of the high palatability or preference of animals to silage.

#### **b. Improving farmers knowledge and skills in making coffee seed waste silage**

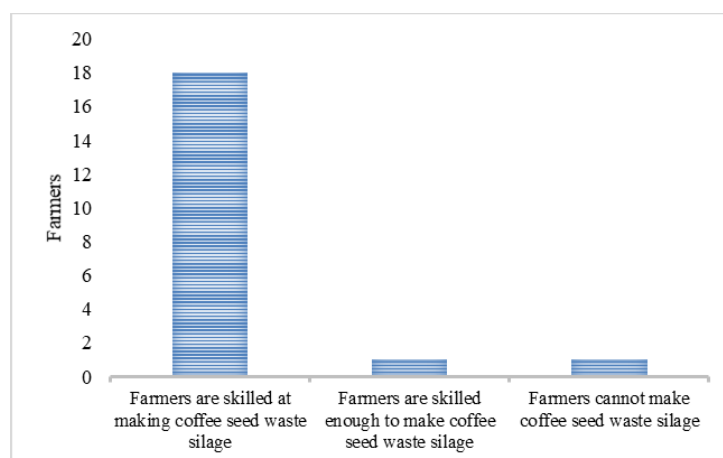
The preparation of livestock rations using silage technology from plantation waste is still very new for farmers in Tiga Panah Subdistrict, Karo District. After community service is carried out, the monitoring of activities is carried out to see whether the farmers are skilled in making coffee fruit skin waste silage.



**Figure 3.** Improving farmers knowledge and skills in making coffee seed waste silage

The results obtained by 18 farmers were skilled in processing coffee seed waste into silage. Every 1 week the farmer collects the coffee fruit skin waste to make silage. Good quality silage, not moldy, smells fresh and has good palability for goats.

They thought that the skill of making silage was very useful and wanted to apply it especially in the dry season



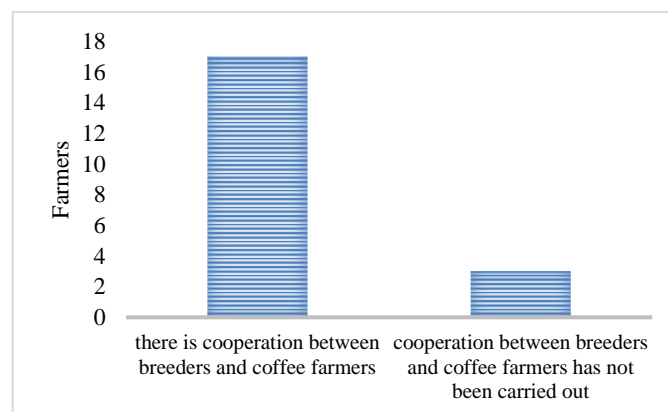
**Figure 4.** Improving farmers knowledge and skills in making coffee seed waste silage

The skills of breeders in making silage from coffee fruit skin waste can be developed for other wastes. Potential waste that can be used to make silage from coffee seed waste such as rice straw, corn straw, grass, and agricultural crop waste.

### 3.3 Development of integrated concepts between livestock and plantations

The results of community service activities are expected to develop towards the business concept between integrated coffee plantations and animal husbandry. The development of livestock that is integrated with plantations requires communication between farm owners and coffee farmers. With communication, breeders can request coffee seed waste from coffee farmers. The coffee seed waste is later processed into animal feed such as silage. Based on the results of the questionnaire, coffee farmers and breeders have agreed to cooperate.

Plantation wastes that are underutilized in the community who are working on plantations can be used for animal feed. For example, coffee seeds are not used and become waste. The waste can still be employed for animal feed because the nutritional content of coffee skin is quite good. The number of participants who want to develop an agribusiness concept, integration between plantations and livestock, and require coordination with coffee farmers are presented in Figure 5.



**Figure 5.** Amount of cooperation undertaken to achieve integration between livestock and plantations

Based on the results of the questionnaire, a total of 20 breeders have collaborated with coffee farmers. Moreover, some farmers 17 do not need to coordinate with others, because they have their coffee plantations so that it is easier for them to utilize the waste. figure 5 shows that 3 farmers who do not own coffee plantations require coordination with other coffee plantation owners. The 3 farmers have not coordinated with the coffee farmers because they have received coffee waste from the farmer groups. Farmers who own coffee plantations can immediately apply silage making from coffee seed waste as animal feed.

### 3.4 Application of coffee seed waste as animal feed can reduce environmental pollution

The accumulation of unutilized coffee seed waste will become garbage and pollute the environment. The negative impacts of environmental pollution include a bad smell that causes flies and bacteria to grow, which affects health. Livestock is very vulnerable to flies because they can be an intermediary for various diseases. Therefore, the utilization of coffee fruit seed waste is expected to reduce environmental pollution. Based on this analysis, the service team plan monitors the impact of silage technology application by using coffee seed waste to reduce pollution resulted from plantation wastes.



**Figure 6.** Interview with farmer about environmental conditions after application of coffee husk waste for animal feed

The farmer has applied the coffee seed waste silage as animal feed. Based on interviews with breeders, after the coffee seed waste is processed into silage for animal feed, it can reduce environmental pollution. Pollution of odors and flies is reduced. A comfortable environment has a positive influence on health. After conducting testimonials and interviews with breeders, they found that the application of coffee waste silage is very effective in reducing the environmental pollution.

## 4. Conclusion

Community service activities make silage from coffee fruit skin waste and its application has many benefits, including an increase in knowledge and skills of farmers, an increase in the number of farmers who apply coffee husk waste as livestock, management of integrated business cooperation in livestock and plantations. Application of silage from coffee fruit skin waste as animal feed can also reduce environmental pollution. It can be concluded that the application of the coffee seed silage waste is effective in having a positive impact on livestock, the environment, and farmers.



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