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Article

Empowering Goat Farming: Implementing Complete Silage Rations from Local Resources in Talawi Hilie Village

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Abstract

This article presents an innovative approach to addressing the challenges faced by goat farmers in Talawi Hilie Village, Sawahlunto City, West Sumatra Province, Indonesia. The study focuses on implementing complete silage rations utilizing local agricultural and industrial by-products to improve goat nutrition and feed availability. Through community engagement and training, farmers were empowered with knowledge and skills in utilizing readily available feed resources, including rice straw, sugarcane tops, corn straws, coffee husks, and rice bran, for silage production. The training sessions included practical demonstrations of forage processing and silage preparation techniques. Results indicate that implementing complete silage rations effectively addressed the feed scarcity issue and improved the feed quality provided to goats. Farmers demonstrated enthusiasm and willingness to adopt the technology, leading to increased self-sufficiency and welfare improvement in the community. The study underscores the importance of community empowerment and utilization of local resources for sustainable livestock production. Further research is recommended to explore the long-term impact of complete silage rations on goat performance and productivity.

INTRODUCTION

Karya Maju Farmer Group is located in Talawi Hilie Village, Talawi Sub-district, Sawahlunto City, West Sumatra Province. Sawahlunto City is a mining city with an area of 27,345 ha or 273.45 km^2, administratively consisting of 4 sub-districts, 10 urban villages, and 27 villages. The smallest sub-district is the Silungkang sub-district, with an area of 32.93 km^2, while the largest sub-district is the Talawi sub-district, with an area of 99.39 km^2.

Geographically, Sawahlunto City is located in a coordinate position between 100.41 and 100.49 East Longitude, 0.34 - 0.46 South Latitude, with the following boundaries: the north is bordered by Tanah Datar Regency, Solok Regency borders the south, Sijunjung Regency borders the east, while Solok Regency borders the west. The topography of Sawahlunto City is hilly, with an altitude between 250-650 meters above sea level with an air temperature ranging from 22º-28ºC.

The population in the Sawahlunto area is dominated by farmers who cultivate food crops and horticulture and raise livestock. Goat rearing is a livestock commodity that is a priority for the government. Goats as a type of beef livestock is an option for farmers to be developed and used as livestock assistance for underprivileged families to increase the

income and welfare of the community in this area, including the Karya Maju Farmer Group.

However, based on information from the local community, the production performance of Jawarandu goats still needs to be improved due to feed factors, lack of knowledge of reproduction and disease control, and marketing factors. Raising goats as a side business is a trigger factor for the above problems. However, this livestock commodity has excellent economic prospects if developed and pursued correctly and can be used as the main livelihood for the community. For this reason, good goat breeding knowledge, maintenance management, feeding, reproduction knowledge, and disease control are needed. For this reason, it is necessary to socialize good farming practices (GFP) of goats in this area.

Enhance goat farming in Talawi Hilie Village by implementing complete silage rations from local resources; it is crucial to consider the nutritional benefits and practical aspects of utilizing silage in goat diets. Silage, a fermented forage feed, has been shown to enhance meat fat content in goats (Tahuk & Bira, 2020). Studies have highlighted the potential of various silage types, such as alfalfa treated with *Lactobacillus buchneri*, olive by-products, and maize silage containing Moringa leaves, to improve nutrient utilization, growth performance, and milk quality in goats (Kung et al., 2003; Arco-Pérez et al., 2017; Sangadji, 2020; Kumar et al., 2022). These findings underscore the versatility of silage in enhancing the overall nutritional profile of goat diets.

Identification problems of the farmer group

The lack of knowledge about the utilization of livestock waste and industrial waste is still one of the reasons for the lack of development of goat populations, especially goats in several regions in Indonesia. The goat population in the Village is relatively underdeveloped, with around 200 heads. Based on the interviews, information was obtained that farmers need more time and energy to get forage for animal feed. However, the potential for agricultural waste and industrial by-products as animal feed is quite large. Farmers in the Talawi sub-district still need more knowledge of feed processing technology.

Complete feed is food nutritionally adequate for certain animals at a certain physiological level, formed or mixed to be given as the only food and capable of maintaining basic life or production (or both) without adding other ingredients/substances except water. Dry and hay included in this class are all cut and treated forages, hay, and other products with more than 10 percent crude fiber and more than 35 percent cell walls. These forages and hay have low net energy per unit weight, usually due to their high cell wall content. Examples of dry forages and hay are hay, straw, fodder (aerial parts of maize or sorghum plants), stover (aerial parts without seeds and maize or sorghum plants), husks, hulls, and leguminous seeds.

The problems farmers face are as follows: First, farmers need to learn about the feed ingredients that have the potential as feed ingredients for goats. Second, farmers need to gain knowledge about goat feed formulations. The third is farmers' need for knowledge about feed processing technology to improve feed quality.

The solution offered to solve the problems

The solution offered by the community engagement team was transferring knowledge of appropriate technology by utilizing agricultural waste commonly found in Talawi District. Fermentation technology of agricultural waste, named silage, can be formulated with leguminous plants to provide a complete feed for small ruminants. Some agricultural waste widely available in the Talawi Sub-district and identified as potential animal feed are rice straws, sugarcane tops, corn straws, and coffee husks. At the same time, industrial by-products that are widely available in Talawi Sub-district include rice bran. The limitation in the form of high crude fiber content requires the right technological touch. Some treatments that can be introduced include fermentation and ensiled. Fermented is the activity due to yeast, fungi, and filamentous bacteria in the supervision of aerobic or anaerobic processes intended for products (e.g., grains and drops) used to manufacture alcohols, acids, vitamins,

vitamin B groups, and antibiotics. A fermentation process that is widely applied to forage is silage. Ensilage preservation is a process in which finely chopped plants, compacted in an airtight room (silo), undergo acidic fermentation that prevents decay.

The characteristics of forage that can be utilized for silage are low protein content, efficiently fermentable sugars, and low buffer capacity. While ensilage processing must pay attention to several things, namely: 1) Dry matter content of forage between 25-45% (to reduce water loss during storage and make storage easier); 2) Lactic acid bacteria population (0-100,000 lactic acid bacteria/gram forage silage material); 3) Not contaminated by other materials and soil (butyric acid).

MATERIAL AND METHOD

The activities carried out in this community service program included extension activities and training on using local goat feed for farmers in Talawi Hilie Village. A total of 20 participants participated in this activity with two trainers. The activities aimed to enrich the knowledge of goat farmers in goat rearing in general and, in particular, various types of feed and how to feed goats.

The education material presentation system followed by discussion was applied to this activity. Community participants were provided with written information as a guide to follow the counseling and to provide an opportunity to respond to the counseling material so that there is reciprocity in the discussion conducted. The community was stimulated to convey information about the types of plants they know and are familiar with in their daily lives that have the potential to be used as goat feed.

Training activities on utilizing local feed for goats were conducted after the extension activities. Training materials in the form of forage feed ingredients available consisting of king grass, rice straw, Gamal, jackfruit leaves, cassava leaves, ground corn, rice bran, and molasses are made as a mixture of rations that can be obtained easily, and their use in rations is not in large quantities. The principle of making complete feed in silage is similar to the fermentation process in general. The ingredients used consist of 3 ingredients: grass, legumes, and agricultural waste.

Equipment prepared in the training included barrels, basins, scales, and tarpaulins. All forage materials were chopped 3-5 cm long and harvested the day before making complete silage; then, all materials were mixed well and compacted tightly in storage barrels, then harvested after 14 days.

RESULTS AND DISCUSSION

The training activity on making complete silage rations was followed seriously by farmers so that they could understand what was conveyed. The community was very enthusiastic in the demonstration practice of how to make complete silage starting with the process of chopping forage, preparing complete feed ingredients, mixing feed, putting feed into the silo, then compacting, then incubating for two weeks. The process of making complete ration silage is presented in Figure 1.

The making of complete silage rations utilizes local feed resources such as rice straw, field grass, rice bran, and molasses and minerals as additives. The mentoring process in this partner farmer group continued until the implementation of silage in goats and cattle. Raising livestock by utilizing the potential of local feed is an empowerment effort to improve welfare by utilizing all the resources owned and around them. The complete silage made by farmers with a fermentation period of 14 days produced quality fresh sour, with a brownish-green smell without any fungal contaminants that grow.

The complete silage technology needs to identify the potential types of feed plants that can be used as goat feed. Identification of the type of forage is increasingly vital given the increasing importance of forage for livestock needs. Identification of forage, mainly grass,

can be done based on vegetative signs or characteristics. The habit of farmers in Indonesia looking for feed sources around rice fields and moorlands on average, the types of legumes used are Gamal and Kaliandra. Daning & FoEkh (2018) found that the production of Kaliandra and Gamal plants is not significantly different, with a total leaf production of 0.62 kg / 56 days and 0.50 kg / 56 days in a row, and the resulting nutritional quality and digestibility are almost the same.

a. The process of cutting forage

b. Preparation of other feed ingredients

c. Forage and concentrate mixing

d. storage of feed into silos and incubation for 2 weeks

Figure 1. The process of making complete ration silage

These plants have been known to the community in the yard, garden, field, and forest but have yet to be adequately utilized as goat feed. These plants have good nutritional content to be utilized as feed. In explaining to the community partners, they came to know, understand, and comprehend that goat feed can be obtained from the agricultural businesses they do daily. Through their knowledge and understanding, the community is expected to become independent and improve their ability to raise goats and utilize all their resources to improve their welfare.

Training activities aim to provide information and training on feed provision technology that is beneficial to the community. Providing forage for goats and other ruminants is always a significant problem in the dry season, as grass and leguminous forages are challenging to obtain (Kushartono & Iriani, 2004). Legumes, as animal feed, have a very good composition of food substances; besides that, the leaves are very favored by goats. Goats have the habit

of eating browsing because of their nimble tongue, so they can also consume very short grasses and leaves of trees or bushes that are usually not consumed by other ruminants. The eating habits of goats, which are curious about the taste of new foods, allow them to enjoy a wide variety of feeds, especially those with high fiber content. In addition, goats can also utilize the nutrients contained in feed much better than most other ruminants.

In the context of goat farming, the selection of appropriate silage types and additives plays a crucial role in enhancing feed conversion efficiency, milk production, and growth performance (Maged et al., 2014; Simanihuruk & Sirait, 2017; Elsayed & Sadik, 2015). Studies have also emphasized the importance of proper hygiene practices to prevent contamination by harmful microorganisms like Clostridium tyrobutyricum, affecting feed quality and animal health (Mosconi et al., 2023).

The results of counseling and training in this community service activity were expected to motivate farmers to adopt this feed preservation technology. Furthermore, they will apply it in their goat farming business. The technology of making complete silage with various local forage sources in the farming area can fulfill goats' nutritional needs and ensure feed availability throughout the year.

Figure 2. Learning process by farmers

Implementing complete silage rations from locally available resources can significantly benefit goat farming in Talawi Hilie Village by improving feed efficiency, enhancing animal performance, and ensuring sustainable production practices. By leveraging the nutritional advantages of silage and tailoring feed formulations to meet the specific needs of goats, farmers can optimize their operations and promote the growth and well-being of their livestock.

Furthermore, the inclusion of silage in goat rations has been linked to improved rumen fermentation, nutrient digestibility, and energy utilization in various goat breeds (Soomro et al., 2023; Hartati et al., 2023; Suhartanto et al., 2022). By optimizing the fermentation process and incorporating local resources like sorghum and Clitoria ternatea in silage-based complete feeds, the nutritional requirements of goats can be effectively met (Hartati et al., 2023). Additionally, silage from different sources, such as artichoke by-products and Virginia fanpetals, has positively impacted milk quality without compromising animal performance (Monllor et al., 2020; Muelas et al., 2017).

CONCLUSION

The farmer group members received enrichment and skills in providing goat feed. Farmers can adopt the technology of providing goats with complete silage rations by utilizing local feed resources found around their farms, making it more practical and easy to do and ensuring feed availability throughout the year. This activity needs continuous assistance in calculating the silage production capacity to meet the needs of goats in one year. So that farmers can more easily manage their feeding. In addition, further research is needed on using complete silage rations to improve the

performance of ruminants in fostered groups.

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