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Training on Silage Production Using Kinggrass Forage and Rice Straw to Improve the Availability of Feed for Ruminant Livestock in Wangka Village

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Abstract: Feed availability is one of the key factors determining the success of ruminant livestock operations, especially during the dry season when forage becomes increasingly scarce. This community service activity aims to improve farmers' knowledge and skills in processing kinggrass and rice straw into silage as a high-quality alternative feed with a longer shelf life. The activity was conducted in Wangka Village on May 8, 2026, using the Participatory Action Research (PAR) approach through the following stages: problem identification, extension, demonstration, hands-on silage production, mentoring, and activity evaluation. The evaluation was conducted through observation of participants' ability to practice each stage of silage production, interviews, and assessment of the physical quality of the resulting silage. The results of the community service activity showed that participants were able to understand and practice the silage-making process, starting from chopping forage, mixing fermentation ingredients, compacting the mixture in an airtight container, to the fermentation process itself. The resulting silage had good physical quality, characterized by a greenish-brown color, a fresh, sour aroma, a soft texture, and the absence of mold, indicating that the fermentation process occurred optimally. In addition to improving participants' skills in feed processing, this activity also enhances the community's understanding of the importance of silage technology as a solution for securing feed reserves during the dry season, promotes more optimal use of agricultural waste, and supports the development of more efficient and sustainable livestock businesses.

Keywords: Silage technology; kinggrass forage; rice straw; alternative feed; farmer empowerment.

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INTRODUCTION

Feed availability is a key factor determining the productivity and sustainability of ruminant livestock operations. Sufficient forage availability, both in terms of quantity and quality, directly affects livestock growth, reproduction, health, and productivity. However, forage supply remains one of the main challenges faced by farmers, especially during the dry season when forage production declines significantly. These conditions often lead to feed shortages for farmers, resulting in decreased livestock productivity and increased maintenance costs (Suripto et al., 2023). Therefore, efforts are needed to establish year-round feed reserves by utilizing local resources available within the community.

One local resource with great potential as a feed ingredient is kinggrass (Pennisetum purpureophoides) forage and rice straw. Kinggrass is known as a high-quality forage with high productivity, rapid growth, and good nutritional content, making it widely used as the primary feed for ruminant livestock (Dadang Suherman, 2021). Meanwhile, rice straw is an agricultural byproduct available in abundance during every harvest season, yet its use as livestock feed remains relatively low. In many areas, including Wangka Village, rice straw is often burned or left to rot in the fields, causing environmental pollution and failing to provide added value to the community (Fridarti et al., 2024). In fact, if processed using the right technology, a combination of kinggrass and rice straw can serve as an economical, year-round alternative feed source.

Based on preliminary observations and interviews with village officials and livestock farmers, Wangka Village is one of the villages with potential for developing a ruminant livestock industry, as it is supported by an abundant supply of kinggrass forage and rice straw waste after the harvest season. However, most farmers still rely on feeding fresh forage and lack the skills to preserve feed. This situation prevents the surplus forage during the rainy season from being optimally utilized as a feed reserve for the dry season. Consequently, when natural forage becomes scarce, farmers struggle to meet their livestock's feed needs, potentially leading to a decline in livestock productivity. This issue highlights the community's need for feed preservation technologies that are easy to implement, utilize local resources, and can provide feed reserves for longer periods.

Various community service programs have demonstrated that technology-based training and direct mentoring effectively improve community knowledge and skills in adopting appropriate technologies (Matonda et al., 2026; Kadju & Timang, 2026). Specifically in the livestock sector, Wachidan et al. (2024) and Andriani et al. (2026) reported that silage training increased farmers' capacity to preserve forage for dry-season feeding. However, most of these activities have focused primarily on the training process and have not yet extensively integrated the use of a combination of kinggrass forage and rice straw as silage feedstocks tailored to local community potential. Furthermore, evaluations of participants' skill development and the impact of these activities on the utilization of agricultural waste remain limited. Therefore, this community service initiative introduces a novel approach: the application of silage technology based on a combination of kinggrass forage and rice straw, integrated with extension services, demonstrations, hands-on practice, and evaluation of participants' skills all aimed at enhancing livestock farmers' capacity for sustainable feed production.

Given these conditions, this community service activity aims to improve farmers' knowledge and skills in producing silage made from kinggrass forage and rice straw as an alternative feed for ruminant livestock. In addition to improving participants' technical skills, this initiative is expected to promote more optimal use of agricultural waste, provide a feed reserve during the dry season, and support the development of a more efficient, economical, and sustainable livestock system in Wangka Village.

METHOD

The community service activity was conducted on May 8, 2026, in Wangka Village, involving ruminant farmers as activity partners. The location was selected based on preliminary observations indicating that Wangka Village has abundant kinggrass forage and rice straw waste, yet their utilization as livestock feed reserves remains suboptimal. This activity employed a Participatory Action Research (PAR) approach, which positioned the community as active partners in every stage of the activity from problem identification and solution development to training implementation, silage production practice, and evaluation of the activity's results. This approach was chosen to ensure that the introduced technology aligns with community needs and can be applied sustainably.

The initial phase of the project began with identifying problems through field observations and interviews with livestock farmers to gather information on feed availability, the use of kinggrass forage and rice straw, and the challenges faced in securing feed during the dry season. Based on the results of this identification, an extension session was conducted on the concept of silage technology, the benefits of feed preservation, the characteristics of raw materials, and opportunities for utilizing agricultural waste as an alternative feed source. The activity then continued with a demonstration and hands-on practice of silage production, which included chopping kinggrass forage and rice straw, mixing fermentation agents such as EM4 and molasses, compacting the mixture into airtight containers, and the 14-day fermentation process.

After the fermentation process was complete, monitoring and guidance were provided to evaluate the quality of the resulting silage. The assessment was based on the silage's physical characteristics, including color, aroma, texture, the presence of mold, and the livestock's level of preference for the silage provided. During the monitoring process, the outreach team also held discussions with participants regarding challenges encountered during fermentation, the benefits of silage technology, and opportunities for applying this technology in daily livestock operations. This guidance aims to ensure that participants are able to understand and independently carry out all stages of silage production.

Evaluasi kegiatan dilakukan untuk mengukur ketercapaian tujuan program pada aspek pengetahuan, keterampilan, dan respons peserta. Aspek pengetahuan dievaluasi melalui diskusi dan tanya jawab mengenai prinsip dasar teknologi silase serta manfaatnya dalam penyediaan pakan ternak. Aspek keterampilan dinilai melalui observasi terhadap kemampuan peserta dalam melaksanakan setiap tahapan pembuatan silase sesuai prosedur yang telah didemonstrasikan. Selain itu, kualitas fisik silase yang dihasilkan digunakan sebagai indikator keberhasilan proses fermentasi, sedangkan respons peserta diperoleh melalui wawancara mengenai manfaat kegiatan dan potensi penerapan teknologi silase pada usaha peternakan mereka. Hasil evaluasi tersebut menjadi dasar untuk menilai efektivitas kegiatan dalam meningkatkan kapasitas peternak dan mendukung penyediaan pakan ternak yang berkelanjutan.

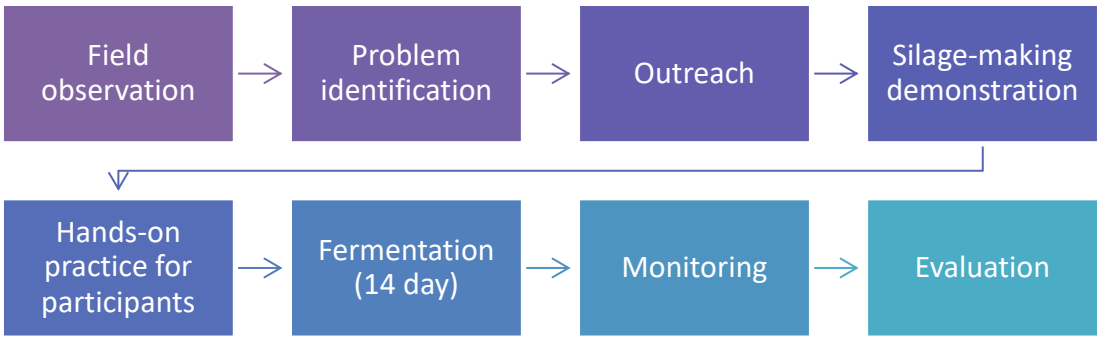

Figure 1. Stages in the implementation of training activities on silage technology using kinggrass forage and rice straw.

RESULTS AND DISCUSSION

Implementation of Training on Silage Technology Using Kinggrass Forage and Rice Straw

This community service activity was carried out in Wangka Village, involving ruminant farmers who have traditionally relied on fresh forage as their primary source of livestock feed. Based on initial observations, most farmers have not yet adopted feed preservation technology, so the surplus forage during the rainy season has not been utilized as a feed reserve for the dry season. This situation often leads to forage shortages during the dry season, which in turn reduces livestock productivity.

The activity began with an educational session on the importance of securing feed reserves through silage technology and the use of kinggrass and rice straw as alternative feed sources. In addition to the presentation of materials, the session also included an interactive discussion on the feed supply challenges that farmers have been facing. This approach provided participants with the opportunity to share their experiences while also gaining solutions tailored to on-the-ground conditions.

The activities were implemented using a Participatory Action Research (PAR) approach, which positions farmers as active partners in the learning process. The participants' involvement from the problem-identification stage through extension, practical training, and evaluation demonstrates that the community empowerment process took place in a participatory manner. According to Cornish et al. (2023) and Baum et al. (2006), active community involvement in every stage of the program increases a sense of ownership of the introduced innovations, thereby increasing the likelihood of the program's sustainability.

Improving Farmers' Knowledge and Skills Through Silage Production

The next phase consisted of core activities, including demonstrations and hands-on practice in producing silage made from kinggrass forage and rice straw. The outreach team demonstrated all stages, starting from chopping the forage, mixing in the rice straw, adding the EM4 solution and molasses, compacting the mixture in an airtight container, to sealing the silo for a 14-day fermentation process. After the demonstration, participants practiced all the steps independently with guidance from the outreach team.

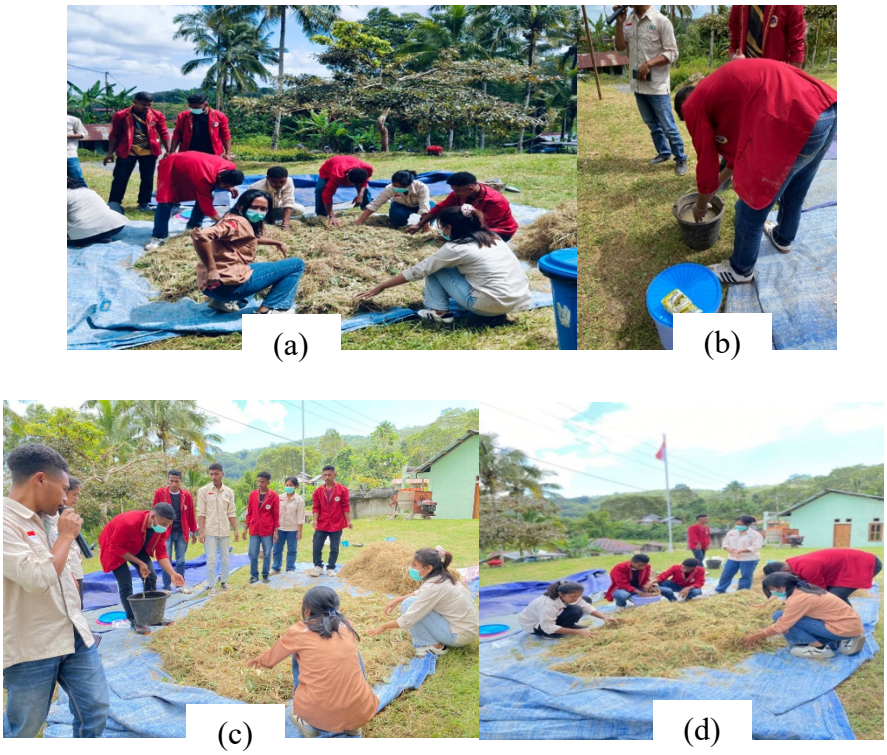

Figure 2. Practical steps for making silage from kinggrass forage and rice straw, including (a) chopping the materials, (b) mixing the EM4 solution and molasses, (c) adding the fermentation solution to the materials, and (d) compacting the materials into the fermentation container.

Demonstration methods combined with hands-on practice provide a more effective learning experience than theoretical instruction. During the activity, participants actively asked questions about the dosage of fermentation ingredients, compaction techniques, and how to maintain anaerobic conditions during fermentation. This active engagement demonstrates that participants not only received information but also developed skills through direct experience. According to Knowles et al. (2015), adult learning is more effective when participants have the opportunity to apply what they have learned in ways relevant to their work. This view is supported by Kolb (2015), who states that concrete experience is a key component of the experiential learning process, making it easier to apply the knowledge gained in daily life.

In addition to improving technical skills, this activity also enhanced participants' understanding of the importance of silage technology as a strategy for securing feed reserves during the dry season. Participants began to understand that foraging preservation not only extends the shelf life of feed but also reduces forage loss during periods of abundant production and makes more optimal use of agricultural waste. These findings are consistent with the results of community service projects by Wachidan et al. (2024) and Andriani et al. (2026), which show that training in silage technology can improve farmers' capacity to manage local resources as high-quality livestock feed.

Program Success Evaluation

The success of the activity was evaluated by observing the physical quality of the resulting silage as an indicator of the fermentation process's success. The parameters observed included color, aroma, texture, the presence of mold, and the livestock's level of preference for the silage provided.

Table 1. Results of the Physical Quality Evaluation of Silage

Observation paramaeters	Observation Results	Category
Color	Brownish-green	Good
Aroma	Fresh and tart	Good
Texture	Soft and not slimy	Good
Mold	None found	Good
Livestock Acceptance Level	Liked by livestock	Good

The evaluation results show that the silage produced has a brownish-green color, a fresh, sour aroma, a soft texture, no mold, and is preferred by ruminant livestock. These characteristics indicate that the fermentation process proceeded optimally. The fresh, sour aroma indicates the formation of lactic acid as a result of lactic acid bacteria fermentation, which serves to inhibit the growth of spoilage microorganisms, while the absence of mold indicates that anaerobic conditions were successfully maintained during fermentation.

Implications of the Program for Sustainable Feed Supply

The application of silage technology based on kinggrass forage and rice straw provides benefits that are not limited to improving farmers' skills but also support the development of a more sustainable livestock system. The use of rice straw as a silage feedstock represents an optimal utilization of agricultural waste that reduces the practice of burning straw after harvest while improving the efficiency of local resource use. This approach aligns with the concept of circular agriculture the reuse of agricultural residues as inputs in production systems to create a more efficient resource utilization cycle (FAO, 2024).

From an economic perspective, silage technology has the potential to reduce feed costs because farmers can utilize the abundant forage available during the rainy season as a feed reserve for the dry season. In addition to ensuring a continuous feed supply, this technology also supports increased livestock productivity by providing a more stable feed supply throughout the year. Therefore, the sustainability of the program requires ongoing assistance, the strengthening of farmer groups, and collaboration between universities, local governments, and livestock extension workers so that silage technology can be more widely adopted and have a lasting impact on the community.

According to McDonald et al. (1991), high-quality silage is characterized by a pleasant acidic aroma, a firm but soft texture, the absence of mold growth, and minimal nutrient losses during fermentation. Similarly, Kung et al. (2018) emphasized that successful silage fermentation depends on maintaining anaerobic conditions that promote lactic acid production while inhibiting spoilage microorganisms. Therefore, the physical characteristics observed in this program indicate that the silage-making process was successfully implemented and can serve as an appropriate feed preservation technology for smallholder farmers.

CONCLUSION

Community service activities through training on silage technology using kinggrass forage and rice straw in Wangka Village successfully improved livestock farmers' knowledge and skills in utilizing local resources as alternative feed for ruminants. Through a Participatory Action Research (PAR) approach that integrated extension, demonstrations, hands-on practice, mentoring, and evaluation, participants gained practical experience in producing silage and understood the benefits of feed preservation technology as a solution for securing feed reserves during the dry season. The results of the activity showed that the silage produced had good physical quality, characterized by a greenish-brown color, a fresh sour aroma, a soft texture, the absence of mold, and acceptability by the livestock, indicating that the fermentation process proceeded optimally.

In addition to improving farmers' technical skills, this initiative also promotes the use of kinggrass forage and rice straw which had not previously been utilized to their full potential as livestock feed with higher nutritional value. The application of silage technology provides a more efficient alternative for feed supply, helps reduce agricultural waste, and supports the sustainability of ruminant livestock farming at the community level. Therefore, continued guidance, capacity building for farmer groups, and collaboration among universities, local governments, livestock extension workers, and community groups are needed to ensure that the application of silage technology can be sustained and have a broader impact on improving livestock productivity and farmer welfare.

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