

BERBAKTI: Jurnal Pengabdian Kepada Masyarakat

Vol. 4 No. 2, Sep 2026, pp. 330-337

e-ISSN 2987-033X, <https://doi.org/10.30822/berbakti.v4i2.5783>

Open Access: <https://journal.unwira.ac.id/index.php/BERBAKTI>

Strengthening Ruminant Farmers' Capacity through Husbandry Management Extension and Feed Technology Training in Tegalsari Village, Gadingrejo District

Anggi Derma Tungga Dewi¹ , Lusia Komala Widiastuti^{2*} , Kusuma Adhianto³ ,

Widya Febriyani⁴ , Anisa Ramadhani⁵

^{1,2,3,4,5} Universitas Lampung, Indonesia

e-mail: lusiakomala@fp.unila.ac.id^{2*}

ARTICLE INFO

Article history:

Received: Jul 31, 2026

Revised: Sep 11, 2026

Accepted: Sep 16, 2026

Keywords: farmer capacity, husbandry management, training, feed processing, silage



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ABSTRACT

Ruminant farmers in Tegalsari Village, Gadingrejo District, Pringsewu Regency, continue to face limitations in knowledge and practical skills related to livestock management and feed-processing technologies, particularly in coping with forage shortages during the dry season. This community engagement program aimed to strengthen farmers' capacity through extension on livestock management and training in fermented feed technology. The program was conducted from June to July 2026 and involved 30 ruminant farmers. The activities comprised situation analysis, a pre-test, extension sessions, silage-making training, discussion and question-and-answer sessions, a post-test, and evaluation of the resulting silage. The extension materials covered animal selection and breeding, husbandry management, housing management, and feed-processing technology. Participants' knowledge was assessed using a 40-item questionnaire with a four-point Likert scale, and pre- and post-program scores were compared using a paired-samples t-test. The mean knowledge score increased from 37.5% at pre-test to 81.5% at post-test. Improvements were observed in animal selection and breeding (35% to 72%), husbandry management (42% to 88%), housing management (52% to 76%), and feed-processing technology (21% to 90%), with statistically significant pre-post differences across all domains ($p < 0.05$). These findings indicate substantial gains in farmers' knowledge following the program and support the relevance of combining livestock management extension with practical feed-processing training to promote improved husbandry practices and more sustainable feed provision.

INTRODUCTION

Smallholder livestock production plays a strategic role in supporting food security and improving the economic well-being of rural communities, particularly in agricultural areas such as Gadingrejo District, Pringsewu Regency, Lampung Province. Gadingrejo District has a substantial ruminant population comprising 2,881 cattle, 7,826 sheep, and 3,432 goats ([Badan Pusat Statistik Kabupaten Pringsewu, 2022](#)). These figures indicate considerable potential for livestock farming to be further developed as an important source of household income.

However, this potential has not yet been accompanied by optimal livestock management practices. A preliminary survey conducted in May 2026 among 30 ruminant farmers in Tegalsari Village using structured interviews, housing observations, and focus group discussions (FGDs) revealed that none of the respondents (100%) had previously received extension or training on livestock management. In addition, 90% of the farmers were unfamiliar with fermented feed-processing technology, 80% experienced difficulties securing forage during the dry season, and 70% did not routinely implement livestock-housing sanitation practices. Similar constraints were reported by [Widiastuti and Wati \(2024\)](#), who found that farmers in Margo Lestari Village, South Lampung, also experienced difficulties in securing forage, particularly during the dry season. Limited understanding of feed quality and feed-use efficiency can contribute to high production costs because feed accounts for the largest proportion of livestock production expenditure and may exceed 70% of total production costs ([Irawan et al., 2026](#); [Kusmayadi et al., 2025](#)). Furthermore, insufficient knowledge of alternative feed-processing methods based on agricultural by-products restricts farmers' ability to maintain a sustainable feed supply, particularly during the dry season ([Widiastuti & Wati, 2024](#)).

Various farmer empowerment initiatives involving extension and practical training have contributed to improvements in farmers' knowledge and skills. Livestock management extension has been associated with improved farmer understanding ([Asnawi et al., 2026](#)). Similarly, training in feed-processing technologies, including fermentation, silage production, and the utilization of agricultural by-products, can improve feed-use efficiency while helping reduce production costs ([Sirat et al., 2026](#)). Combining management extension with practical feed-technology training may therefore provide a more comprehensive response to the challenges experienced by farmers in the field ([Tumewu & Lainawa, 2025](#)).

Fermented feed technology represents a strategic option for addressing seasonal forage shortages while improving feed preservation and potentially maintaining nutritional quality ([Muchlis et al., 2023](#); [Mahmud et al., 2021](#)). Under anaerobic conditions, lactic acid bacteria contribute to an environment that suppresses spoilage microorganisms, thereby allowing feed materials to be stored for longer periods ([Prabowo et al., 2016](#)). Based on the problems identified during the preliminary assessment, this community engagement program aimed to strengthen the capacity of ruminant farmers in Tegalsari Village, Gadingrejo District, through livestock management extension and practical training in fermented feed-processing technology. The program was designed to address gaps in farmers' technical knowledge and support more efficient and sustainable smallholder livestock-management practices.

METHOD

The community engagement program was conducted from June to July 2026 in Tegalsari Village, Gadingrejo District, Pringsewu Regency. Thirty farmers participated in the program. All participants raised ruminants, including goats, cattle, and sheep, although their length of farming experience and herd sizes varied.

The program combined extension activities with hands-on training and was implemented through seven stages: (1) situation analysis to identify and map farmers' problems; (2) a pre-test to assess participants' baseline knowledge; (3) extension sessions on livestock management and feed-processing technology; (4) practical training in fermented feed preparation; (5) discussion and question-and-answer sessions addressing both the extension materials and practical training; (6) a post-test to assess changes in participants' knowledge; and (7) observation of the fermented feed produced during the program.

The livestock management extension session was conducted on June 15, 2026, from 08:00 to 11:00 Western Indonesian Time and lasted approximately three hours. The activity took place in the yard of a farmer's house in Tegalsari Village, Gadingrejo District. The session was delivered by three lecturers from the Department of Animal Husbandry, Faculty of Agriculture, Universitas Lampung, assisted by two students who served as facilitators. The instructional methods included presentations, discussion, and direct question-and-answer interaction with participating farmers. Presentation media were used to facilitate participants' understanding. The materials covered

major components of livestock management, including animal selection and breeding management, livestock-housing sanitation and management, stocking density and housing ventilation, and feed-processing technology. The session began with approximately 90 minutes of material presentation, followed by approximately 45 minutes of interactive discussion to explore problems routinely encountered by farmers. A further 45-minute question-and-answer session was conducted to reinforce participants' understanding of the materials presented. The extension activity was evaluated through observations of participant engagement and comparison of farmers' knowledge before and after the program.

The feed-processing training focused on producing silage through fermentation. The initial stage involved preparing forage materials consisting of elephant grass, which represented 60% of the total forage material, and corn stover, which represented the remaining 40%. Both materials were locally available around farmers' production areas in Tegalsari Village. The forage materials were chopped using sickles into approximately 4–5 cm pieces to facilitate processing. The chopped forage was then wilted under sunlight for approximately one day to reduce its moisture content and prepare it for anaerobic fermentation.

The additives used in the silage-making process included rice bran as an additional energy source, premix as a source of vitamins and minerals, and Effective Microorganisms-4 (EM4) solution as a microbial inoculant for fermentation (Zhang et al., 2024). The formulation used to prepare 10 kg of silage is presented in Table 1.

Table 1. Composition of ingredients used for silage production (10 kg)

No	Ingredient	Amount	Function
1	Elephant grass	6 kg	Primary forage and fiber source
2	Corn stover	4 kg	Alternative fiber source and palatability enhancer
3	Rice bran	500 g	Additional energy source for fermentation microorganisms
4	Premix	100 g	Source of vitamins and minerals
5	EM4	10 mL	Fermentative microbial inoculant (lactic acid bacteria)
6	Molasses	10 mL	Readily available energy source for microorganisms
7	Water	10 L	Solvent and moisture regulator

Before application, EM4 was diluted with water, with molasses added as a microbial energy source, to ensure a more uniform distribution throughout the feed material. The solution was prepared by mixing EM4, molasses, and water at a ratio of 1:1:1,000, corresponding to 5 mL of EM4, 5 mL of molasses, and 5 L of water in a 5-L container.

During mixing, the wilted forage was combined thoroughly with rice bran and premix and then sprayed or sprinkled evenly with the EM4 solution. The mixture was subsequently placed in an airtight container, such as a silo, plastic drum, or silage bag, and compacted to remove trapped air. The container was tightly sealed to establish anaerobic conditions and stored for approximately 14–21 days. Good-quality silage was characterized by a fresh acidic aroma (Tahuk et al., 2020), a brownish-green color (Azzahra et al., 2025), a non-slimy texture (Umami et al., 2023), and the absence of visible fungal growth (Zhang et al., 2021).

Program evaluation focused primarily on changes in farmers' knowledge. Knowledge was assessed using a 40-item questionnaire comprising 10 items for each of four extension topics: (1) animal selection and breeding, (2) husbandry management, (3) livestock-housing management, and (4) feed-processing technology. Each item was measured using a four-point Likert scale: 1: very poor understanding, 2: limited understanding, 3: understands, and 4: understands very well. A four-point scale was selected to reduce participants' tendency to choose a neutral response.

The instrument was reported to have been assessed for validity using Pearson's product-moment correlation, with calculated correlation coefficients exceeding the relevant critical values, and for reliability using Cronbach's alpha, with $\alpha > 0.60$. Each participant's total score was converted into a percentage of the maximum possible score, calculated as the actual score divided by the maximum possible score $\times 100\%$. Knowledge levels were then classified into three categories: low ($<50\%$), moderate ($50\text{--}70\%$), and high ($>70\%$).

Knowledge was measured before the program through a pre-test and after program completion through a post-test. The results were also visualized graphically to facilitate interpretation of the observed changes. The Shapiro Wilk test was conducted to assess the normality of the data. Normally distributed paired data were analyzed using a paired-samples t-test, whereas non-normally distributed data were to be analyzed using the Wilcoxon signed-rank test. Differences were considered statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION

Community engagement in animal husbandry provides a mechanism through which universities can facilitate the transfer of relevant knowledge and technologies to farming communities (Hariyono et al., 2024). The present program focused primarily on changes in participants' knowledge and practical exposure following livestock-management extension and feed-processing training. In addition, the discussion considers the relevance of the methods used and the extent to which the program addressed farmers identified needs.

The program was implemented by lecturers from the Department of Animal Husbandry, Faculty of Agriculture, Universitas Lampung. The program site was approximately 26 km from the Department of Animal Husbandry campus and required approximately one hour of travel. The preliminary survey indicated that participating farmers had not previously received formal extension or training of this kind, and their access to technical information was limited. Several practical problems were also identified. Farmers reported difficulties selecting superior male and female breeding stock, uncertainty regarding appropriate feed for improving livestock productivity, limited understanding of the relationship between housing conditions and disease occurrence, and difficulty obtaining sufficient forage, particularly during the dry season. On the basis of these identified needs, the program provided livestock-management extension followed by practical training in fermented feed preparation.



Figure 1. Livestock management extension activities



Figure 2. Training in fermented feed processing

The effectiveness of the program was evaluated using pre-and post-test questionnaires to measure changes in participants' understanding. The questionnaire consisted of 40 items, with 10 items representing each knowledge domain. Each item used a four-point Likert scale ranging from very poor understanding to very good understanding. The instrument was reported to have been assessed for validity using Pearson's product-moment correlation and for reliability using Cronbach's alpha. The total score achieved by each participant was converted into a percentage of the maximum possible score and categorized as low (<50%), moderate (50–70%), or high (>70%) following the classification used in the manuscript (Arikunto, 2006).

The extension activity combined presentation-based instruction with interactive discussion (Figure 1) and was followed by practical training in fermented feed production (Figure 2). Changes in participants' knowledge before and after the program are presented in Table 2 and Figure 3.

Table 2. Pre- and post-test evaluation results by extension topic

Question topic	Pre-test (%)	Category	Post-test (%)	Category	Statistical test result (Paired-samples t-test)
Animal selection and breeding	35	Low	72	High	$t = -7.421$ (Significant)
Husbandry management	42	Low	88	High	$t = -9.152$ (Significant)
Livestock-housing management	52	Moderate	76	High	$t = -5.833$ (Significant)
Feed-processing technology	21	Low	90	High	$t = -12.340$ (Significant)

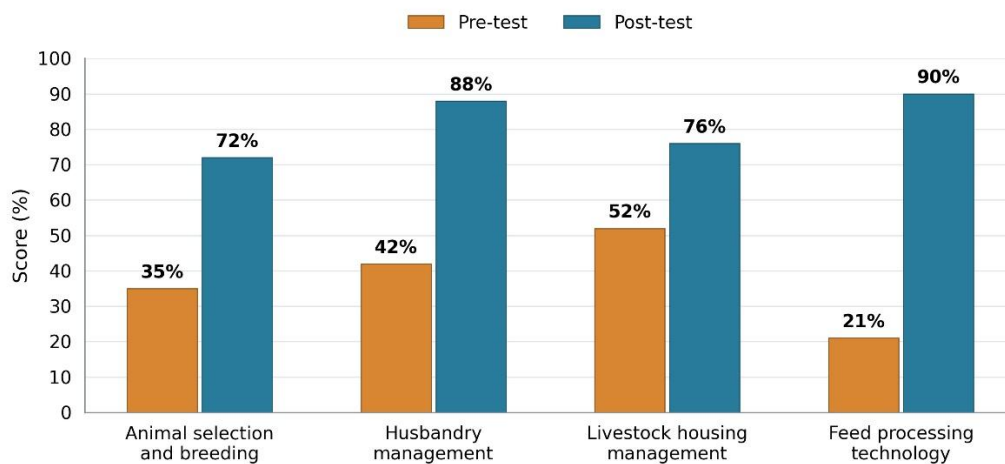


Figure 3. Pre- and post-test evaluation results of farmers in Tegalsari Village, Gadingrejo District, Pringsewu Regency

The extension component was intended to improve farmers' knowledge of livestock management and feed-processing technology. The materials were delivered by the lecturer team with assistance from university students. The activities were conducted from morning until midday in the yard of one of the participating farmers' homes. Participants actively engaged in the discussion sessions and reported that they had not previously received similar extension services in their village. Consequently, the program provided access to information that was largely new to the participating farmers. During the feed-processing sessions, participants reported that they had not previously prepared fermented feed or silage. Their existing feeding practices primarily depended on forage collected from areas surrounding their homes, gardens, and agricultural fields. Participants also indicated that much of their existing knowledge of livestock production had been acquired informally and passed down through generations within their families.

The pre- and post-test data showed higher post-program knowledge scores across all measured domains (Figure 3). Scores for animal selection and breeding increased from 35% to 72%, husbandry management from 42% to 88%, livestock-housing management from 52% to 76%, and feed-processing technology from 21% to 90%. The greatest improvement occurred in feed-processing technology, with an increase of 69 percentage points.

Overall mean knowledge scores increased from 37.5% before the program to 81.5% after the program. The paired-samples t-test results indicated statistically significant pre-post differences across the measured domains ($p < 0.05$) (Table 2). These results indicate that participants demonstrated substantially higher levels of reported knowledge after completing the extension and training activities. Nevertheless, because the evaluation used a single-group pre-post design, the observed differences should primarily be interpreted as changes occurring after participation in the program rather than as definitive evidence that the intervention alone caused the improvement. $t = -14,825$

At baseline, scores classified as low across most knowledge domains suggested that farmers' initial understanding of several technical aspects of livestock management was limited. This was particularly apparent for feed-processing technology, for which the mean baseline score was only 21%, indicating a considerable knowledge gap. After the intervention, all domains showed marked increases in post-test scores. The combination of presentations, interactive discussions, and practical training appears to have provided participants with accessible opportunities to engage with technical livestock-management information within a relatively short period.

The largest gain occurred in feed-processing technology, for which the mean score increased from 21% at pre-test to 90% at post-test, representing a 69-percentage-point increase ($t = -12.340$). This result is consistent with previous reports suggesting that highly practical and directly applicable training, such as fermentation of locally available feed materials, ration preparation using local resources, and forage preservation techniques, can facilitate farmers' understanding and adoption of technical information (Surtina et al., 2021; Utomo et al., 2022). Such practical content may be particularly relevant because farmers can directly relate the training to recurring challenges in daily livestock production, especially seasonal shortages of fresh forage.

Substantial increases were also recorded for husbandry management, from 42% to 88%; animal selection and breeding, from 35% to 72%; and livestock-housing management, from 52% to 76%. The management-related content included housing sanitation, ventilation, vaccination scheduling, and accurate production-record systems (Amam & Harsita, 2019). Taken together, the findings suggest that the extension and practical training activities helped address important gaps in participants' technical knowledge of ruminant production. $t = -9,152p = 0,000t = -7,421p = 0,000t = -5,833p = 0,000$.

Overall, the findings are broadly consistent with previous community-based livestock extension programs emphasizing active learning, field demonstrations, and interactive discussion (Dan et al., 2025; Farhan et al., 2024). The combination of interactive presentations, hands-on demonstrations, and group discussion may have contributed to participants' engagement because it provided opportunities to connect new information with existing farming experience. However, longer-term monitoring would be necessary to determine whether the observed gains in knowledge translate into sustained changes in farming practices, livestock productivity, production efficiency, or animal welfare. Accordingly, similar programs could be implemented periodically with structured monitoring and evaluation to assess the sustainability of outcomes over time.

CONCLUSION

The livestock management extension and fermented feed-processing training conducted in Tegalsari Village were followed by substantial improvements in farmers' knowledge across all assessed domains. The overall mean knowledge score increased from 37.5% at pre-test to 81.5% at post-test, while all four knowledge domains shifted toward the high category after the program. The most pronounced improvement occurred in feed-processing technology, for which the score increased from 21% to 90%. The findings demonstrate the relevance of combining conceptual extension with hands-on training when addressing practical knowledge gaps among smallholder

ruminant farmers. However, the results primarily document short-term changes in knowledge. Continued assistance and follow-up evaluation are therefore needed to determine whether improved understanding leads to sustained adoption of recommended husbandry and feed-processing practices and, ultimately, to improvements in livestock productivity, production efficiency, and farm sustainability.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the Faculty of Agriculture, Universitas Lampung, for financial support provided through the DIPA funding scheme of the Faculty of Agriculture, Universitas Lampung, under Contract No. 1204/UN26.14/PM.01.00/2026. The authors declare that they have no conflicts of interest related to the publication of this manuscript.

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